Connect EZ Mini

User Guide

Firmware version 22.2

Revision history—90002409

Revision	Date	Description
C	March 2022	Release of Digi Connect EZ firmware version 22.2: ■ VPN enhancements: • Renamed **VPN** > **IPsec** > **Tunnels** > **Policies** > **Local network setting** to **Local traffic selector** and added **Remote traffic selector**. • Added a **Dynamic** option to the **Local traffic selector** to configuration of a local network by protocol and/or port instead of a network address range. • Added Protocol and Port match criteria for **Local traffic selector** and **Remote traffic selector**. • Added **VPN** > **IPsec** > **Advanced** > **Debug level** to specify the logging verbosity of IPsec messages in the device system logs. ■ Enhancements to communications with Digi Remote Manager: • Enhanced security for communications with Digi Remote Manager by using client-side certificates. • The default URL for the device's Remote Manager connection is now edp12.devicecloud.com. This URL is required to utilize the client-side certificate support. ■ New **Socket ID string** option to send the configured text to the remote server(s) when a TCP socket connection is opened to the serial port. ■ New **cat** Admin CLI command for displaying file contents. **Additional change** ■ Update serial port mode documentation.
B	December 2021	Release of Digi Connect EZ firmware version 21.11: ■ Configuration option to allow for automatic update of new firmware (disabled by default). ■ User authentication enhancements: • Added TACACS+ command authorization and accounting for Admin CLI commands. • Added a new username alias to provide an alternate username that allows for special characters in the username. ■ VPN enhancements: • Added support for PPP-over-L2TP tunnels. • Changed default IPsec IKE DH group to 14 for enhanced compatibility with industry standard settings.

Revision	Date	Description
		■ Location services enhancements: • New option for Location service to specify the talker ID used in NMEA mesage strings. • Include the mode indicator field in NMEA messages constructed when a GPS fix isn't obtained. ■ SureLink enhancments: • Added new settings under cellular Surelink options to have the device reset the cellular modem if a specified number of Surelink tests fail • Added **show surelink** Admin CLI command. ■ Serial port enhancements: • New option to add and configure an external USB-to-serial adapter. • Disable serial history in remote access mode by default. ■ Support for sending analog and digial I/O health metrics to Digi Remote Manager.
A	November 2021	Initial release.

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✓ Product name and model

- Product serial number (s)
- Firmware version
- Operating system/browser (if applicable)
- Logs (from time of reported issue)
- Trace (if possible)
- Description of issue
- Steps to reproduce

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Digi Connect EZ Mini User Guide

This guide provides reference and usage information for the Connect EZ.

Digi Connect EZ is Digi’s next generation Device Server product line, providing connectivity for existing critical assets in business, commercial, and industrial automation applications. This product line builds on and extends the capabilities of our previous PortServer and Digi One products along with enhanced manageability, security, intelligence, and performance, while offering seamless connectivity for existing applications.

Digi Connect EZ Mini

The Digi Connect EZ Mini has 1 serial port and is specifically designed to make it simple to implement and support machine-to-machine automation applications to allow enterprises to monitor and manage their critical equipment at scale.

The Connect EZ Mini offers a small form factor that can be easily deployed on a DIN rail, mounted on a wall or panel, or as a "bump in the cable". The Connect EZ Mini leverages Digi’s DAL firmware and TrustFence security framework to extend Digi’s critical infrastructure management offerings with enhanced deployment flexibility.

The Connect EZ Mini supports connectivity through RealPort, TCP Sockets, SSH, TLS, and UDP connectivity.

Get started with Connect EZ

This section explains what comes with each Connect EZ model, how to install the necessary software, and how to connect the hardware.

Step 1: Verify product components

Step 2: Connect the power supply

Step 3: Connect to site network using an Ethernet LAN

Step 4: Discover the IP address using the Digi Navigator

Step 5: Configure RealPort from the Digi Navigator

Step 6: Connect to the web UI and update the Connect EZ firmware

Step 7: Connect to Digi Remote Manager

Optional

- Change the password on the Connect EZ
- Mount the Connect EZ
- Connect equipment to the Connect EZ serial port

Administrators only

- Additional configuration to the device can be done in Remote Manager or in the device's local web user interface.

Step 1: Verify product components

Verify that you have the following included equipment.

NEXT STEP: If you are performing the initial device set-up, proceed to the next step after verifying the components: Step 2: Connect the power supply.

Included equipment

Equipment	Description
Connect EZ Mini	For detailed information about the panels, see: ■ Top panel and LEDs ■ Bottom panel

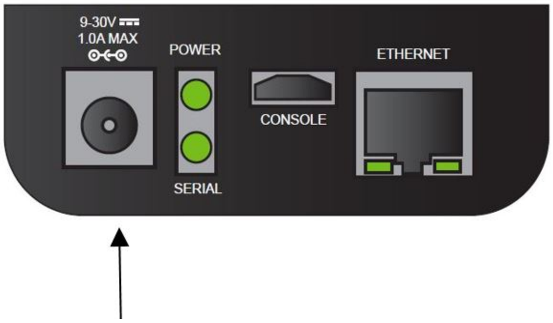
Equipment	Description
	■ Back panel
Power supply	Each kit includes a power supply. The power supply is a Direct Plugin Class 2 output transformer rated 18 W, 12 VDC, and with a 1.5 A output. For information about connecting the power supply, see Step 2: Connect the power supply.
Ethernet cable	Connect to a site network using an Ethernet cable. See Step 3: Connect to site network using an Ethernet LAN.
DIN rail clip kit	The DIN rail clip connects to the back of the device and is used to mount the device onto a DIN rail. See Attach to DIN rail with clip. The kit includes a DIN rail clip and two screws that meet these requirements: ■ M4 in diameter ■ 5 mm in length ■ Countersunk ■ Phillips #2 ■ Black Steel
Loose label	A loose label sticker that includes information about the device is included in the box. You should retain this label sticker with your hardware records. For more information about the label, see Loose label sample. **Note** This label includes the unique default password for the device. This unique password will be needed if the device is factory reset and you want to access the web UI on the device.
Global plug kit	If you purchased the GLB version of the device, a kit that includes global outlet plugs is included.

Step 2: Connect the power supply

The power supply is included with the device.

The power supply is a Direct Plugin Class 2 output transformer rated 18 W, 12 VDC, with 1.5 A output.

1. Orient the device so the top of the device is facing you.



2. Connect the twist-lock end of the power supply cord to the device.
3. Plug the other end of the power supply cord to a main power supply.

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 3: Connect to site network using an Ethernet LAN.

Step 3: Connect to site network using an Ethernet LAN

This section explains how to connect to a site network using an Ethernet cable.

1. Connect one end of an Ethernet cable to your site network.
2. Connect the other end of the Ethernet cable to the **Ethernet** port on the Connect EZ. By default a DHCP request will be sent to the local Ethernet network.

Note If you do not have a DHCP server on your network, you canconnect locally over 192.168.210.1. See Using the web interface.

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 4: Discover the IP address using the Digi Navigator.

Step 4: Discover the IP address using the Digi Navigator

You can use the Digi Navigator to quickly discover the IP address for the Connect EZ.

Make sure you have the device powered and connected the device to your network or computer with an Ethernet cable. See Connect to and access the Digi Navigator.

Note If you don't have access to the **Digi Navigator**, you can use a manual method to discover the IP address. See Discover the device's IP address: Additional methods.

1. Download and install the **Digi Navigator**.
2. Launch the **Digi Navigator**.
3. The tool discovers the Connect EZ devices that are powered on and connected to your network. When the process is complete, a list of the devices appears.
   - **Connected to a network**: By default, the HTTPS service is enabled and used to find an IP address for the Connect EZ. Other services can be enabled if needed from the **Filters** section. See Discover the IP address when connected to a network.
   - **Connected directly to a device or on a network with no DHCP server**: In either of these situations, a default IP address is assigned to the device. You can specify the filters used to assign an IP address. See Discover the IP address when not on a network.
4. Expand a device to display the IP address.

NEXT STEP: If you are performing the initial device set-up, you should proceed to the next step after getting the device's IP address: Step 5: Configure RealPort from the Digi Navigator.

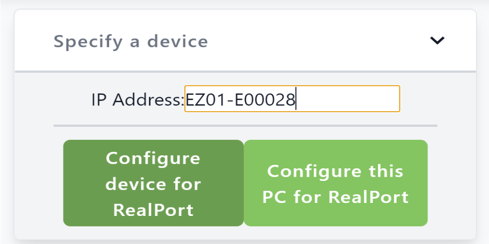
Step 5: Configure RealPort from the Digi Navigator

You can configure the Connect EZ to communicate with your computer using RealPort from the Digi Navigator. You must enable RealPort on the device and then configure your computer for RealPort.

In this step, all serial ports on the device are set to RealPort mode and the RealPort service is enabled. The COM ports on your laptop are also configured.

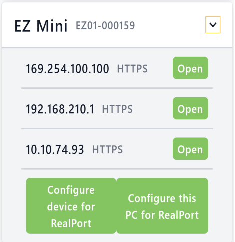
Note You can also configure the device to accept a Realport connection from the web UI on the device. See Configure RealPort mode.

1. Make sure theConnect EZ is powered on and connected to your network or computer.
2. Download and install the **Digi Navigator**.
3. Launch the **Digi Navigator**.
4. Select the device you want to configure using one of the following methods:
   - **Specify a device**: Expand the **Specify a device** section and enter the IP address or host name for the device.


Specify a device

IP Address: EZ01-E00028

   - **Select a device**: From the list of devices shown in the **Digi Navigator**, expand the device that you want to configure.

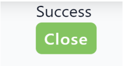

EZ Mini EZ01-000159

169.254.100.100 HTTPS Open

192.168.210.1 HTTPS Open

10.10.74.93 HTTPS Open

5. Configure RealPort on the device.
   a. Click the **Configure device for RealPort** button. A login screen displays.
   b. Enter the device's default user name and password in the appropriate fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
   c. Click **Submit**. A progress message displays.
   d. When RealPort configuration is complete, the **Success** message displays.


Success

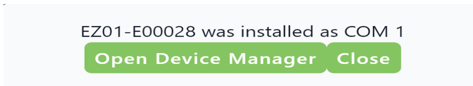
   e. Click **Close** to close the message.
6. Configure RealPort on your computer.

a. Click **Configure this PC for RealPort**.

b. From the **Select starting COM** list box, select the first COM port that should be configured for RealPort. The number of COM ports configured matches the number of serial ports on the Connect EZ device.

c. Click **Submit**. A series of progress messages displays.

d. When the configuration is complete, a message displays.



EZ01-E00028 was installed as COM 1

e. Determine your final step:

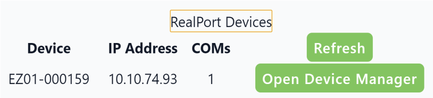
- **Close**: Click **Close** to close the message. Configuration is complete.
- **Open Device Manager**: Click **Open Device Maanger** if you want to do further configuration to the COM ports. The Windows **Properties** dialog displays.

7. If desired, you can verify the RealPort configuration. See Configure the serial port for RealPort mode and Configure the RealPort service.

8. After RealPort configuration is complete, you can open the Windows **Properties** dialog for the COM ports on your computer that are configured for RealPort from within the **Digi Navigator**.

a. Launch the **Digi Navigator** if it is not currently open. A list of Connect EZ devices that have RealPort enabled and configured displays in the RealPort Devices section at the bottom of the application screen.

b. Click **Open Device Manager** to open the Windows **Properties** dialog for the COM ports on your computer that are configured for RealPort. For more information, see Manage the RealPort device list.



RealPort Devices

Device	IP Address	COMs
EZ01-000159	10.10.74.93	1

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 6: Connect to the web UI and update the Connect EZ firmware.

Step 6: Connect to the web UI and update the Connect EZ firmware

You should update the firmware on the Connect EZ device to ensure that you have the latest features.

Step 1: Connect to the local Web UI on the Connect EZ

Step 2: Update the firmware on the Connect EZ

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 7: Connect to Digi Remote Manager.

Connect to the local Web UI on the Connect EZ

Once you are connected to the local Web UI, you can configure your device.

Note You can also use the **Digi Navigator** to access the web UI and configure the device. See Access the web UI from the Digi Navigator.

1. Make sure that an Ethernet cable is connected to the Connect EZ's **Ethernet** port and to a laptop or PC.
2. Open a browser and enter the IP address for the device.
3. Log into the device using the default user name and password. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
4. After logging in, the local web admin dashboard is displayed.

The dashboard shows the current state of the device.

Dashboard area	Description
Network activity	Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices.
Digi Remote Manager	Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID. See Using Digi Remote Manager.
Device	Displays the Connect EZ device's status, statistics, and identifying information.
Network Interfaces	Displays the status of the network interfaces configured on the device.

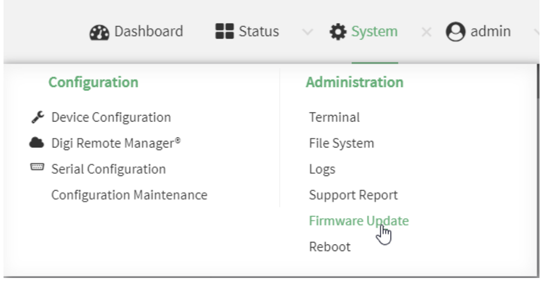
For more information, see Using the web interface.

NEXT STEP: Proceed to the next step: Update the firmware on the Connect EZ.

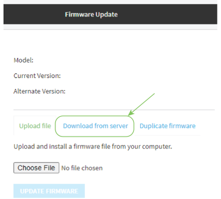
Update the firmware on the Connect EZ

You should update the firmware on the device to ensure that you have the latest features.

1. Log into the Connect EZ Web UI as a user with Admin access.
2. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.



3. Click **Download from server**.



Firmware Update

Model:

Current Version:

Alternate Version:

Upload and install a firmware file from your computer.

No file chosen

4. For **Version:**, select the appropriate version of the device firmware.
5. Click **Update Firmware**.

For more detailed information about this process, see Update system firmware.

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 7: Connect to Digi Remote Manager.

Step 7: Connect to Digi Remote Manager

Make user to connect your device to Digi Remote Manager to ensure that you receive automatic notification of firmware updates and security notices. From Remoter Manager, you can also easily update firmware, ensure consistent configuration across a large group of devices, and manage and monitor cellular connectivity.

To start Digi Remote Manager

1. If you have not already done so, click here to sign up for a Digi Remote Manager account.
2. Check your email for Digi Remote Manager login instructions.
3. Go to remotemanager.digi.com.
4. Log into your Digi Remote Manager account.

For more information about configuring Remote Manager and managing devices, see Central management.

NEXT STEP: If you are performing the initial device set-up, you have now completed all of the required steps. You can return to Get started with Connect EZ for information on optional steps.

Connect equipment to the Connect EZ serial port

After your device is connected and powered up, you can connect equipment to the device using the serial ports.

The serial port on the Connect EZ provides console access to connected critical equipment through a connected Ethernet LAN. Connect your network device to the Connect EZ serial port. For pinout information, see Serial connector pinout: Connect EZ Mini.

You must use a cable with a DB9 connector to connect to the Connect EZ with a DB9 connector. Consult the user guide for the device you are connecting to the Connect EZ to determine the connector type, cable type, and pinout positions for your specific device.

The serial port is enabled by default. The network devices connected to the serial port may be accessed using RealPort, Digi Remote Manager, the local web user interface, TCP, telnet, or SSH connections. TCP, telnet and SSH connections to serial ports are disabled by default and must be enabled by a device-specific configuration.

Serial Status page

The **Serial Status** page contains status information about all of the serial ports available on the device. To get to this page, choose **Status** > **Connections** > **Serial**.

See Serial Status page for more information.

Serial connector pinout: Connect EZ Mini

The Connect EZ Mini has a DB9 serial connector. The table below contains the pinout information.

DB-9 pin	EIA-232	EIA-422	EIA-485 Half-duplex
1	DCD	CTS-	Not used
2	RxD	RxD+	Data+
3	TxD	TxD+	Not used (Reserved)
4	DTR	RTS-	Not used
5	GND	GND	GND
6	DSR	RxD-	Data-
7	RTS	RTS+	Not used

DB-9 pin	EIA-232	EIA-422	EIA-485 Half-duplex
8	CTS	CTS+	Not used
9	RI	TxD-	Not used (Reserved)
Shell	GND		

Serial Status page

The **Serial Status** page contains status information about all of the serial ports available on the device.

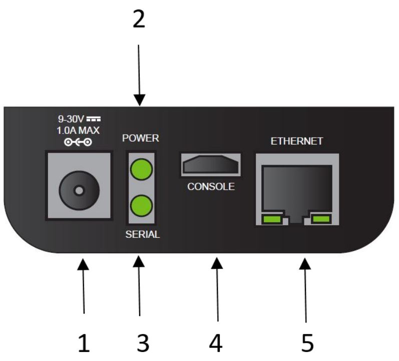
To get to this page, choose **Status** > **Connections** > **Serial**.

Item	Description
🔧 configuration icon	Click the 🔧 (configuration) icon in the upper right corner of the page to access the **Serial Configuration** page. See Serial port for more information.
Status	Displays the connection status. ■ CONNECTED: A terminal, SSH, TCP, or telnet session is active. ■ NO SIGNAL: CTS or DCD is not active on the port.
Port	A list of the ports on the device. The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page. 1. Click the link to connect to the port in the terminal page. 2. In the terminal screen, enter **~b?** to display additional commands. See Access the terminal screen from the web UI for more information about the commands. While you are connected to the terminal, the port status displays in the **Status** column as CONNECTED, and the name of the user logged into the device displays in the **User** column.
Label	A description for the port. You can change this from the **Serial Configuration** page. Click the 🔧 (configuration) icon in the upper right corner of the page to access that page. The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page. See the description for Port (above) for more information.
Log	Click the **Log** button to open the **Serial Port Log** page for that port. See Log serial port messages for more information about the page.
User	When the port is connected to a terminal, SSH, TCP, or Telnet connection the name of the user logged into the device displays. See the description for Port (above) for more information.

Item	Description
TX/RX Bytes	Displays the total number of bytes that have been transmitted and received.
Signals	Indicates the types of communication that the device is ready to send. DCD: Carrier Detected CTS: Clear to Send DTR: Data Terminal Ready RTS: Ready to Dend

Hardware

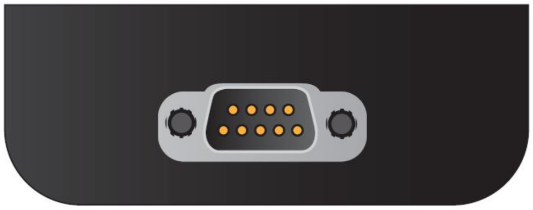
Top panel and LEDs



Item	Name	Description
1	Power	Connect the power supply. See Step 2: Connect the power supply.
2	Power LED	The LED lights up when the power is supplied to the device and the device powered on. ■ **Solid green**: The power source is connected and power is being supplied to the device. ■ **Flashing green**: The Find Me feature has been activated.
3	Serial port LED	Use the serial port to connect to devices and equipment to the Connect EZ. See Connect equipment to the Connect EZ serial port. The serial port LED shows the status of the connection. ■ **Off**: The port is not in use. ■ **Solid Green**: A device is connected to the port. ■ **Blinking Green**: The port is in use and there is activity on the port.

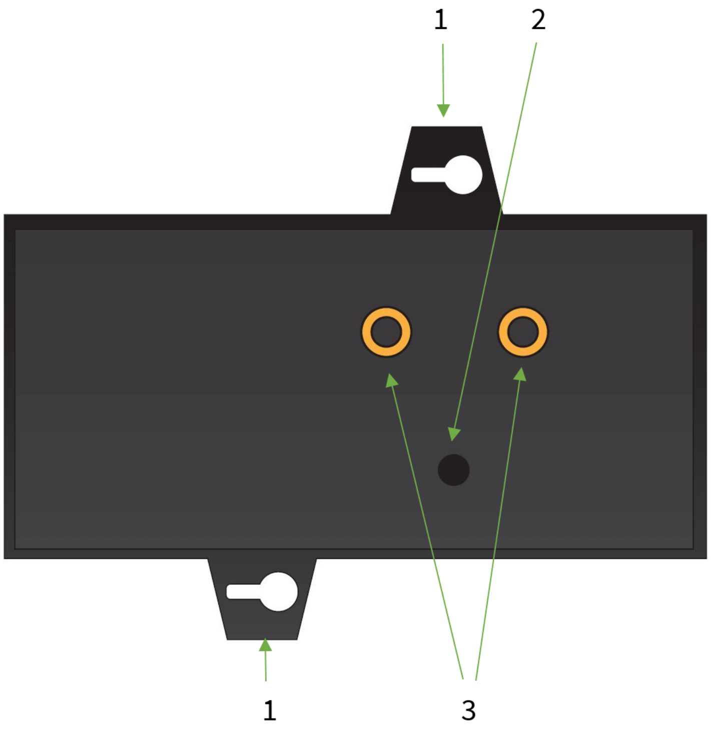
Item	Name	Description
4	Console port	Connect a computer to the Connect EZ. This enables you to log into the Connect EZ if a network is not available.
5	Ethernet port	Indicates connection to Ethernet WAN network. The LED lights up when an Ethernet cable is attached. ▪ Left (yellow): There is activity on the port. ▪ Right (green): The port is in use.

Bottom panel



Name	Description
Serial port	Connect equipment to a serial port to provide console access to the equipment through a connected Ethernet WAN. See Connect equipment to the Connect EZ serial port.

Back panel



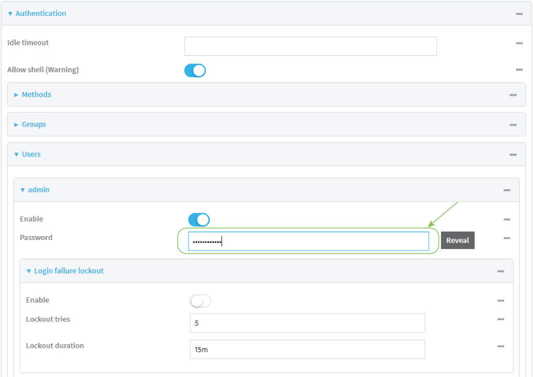
Item	Name	Description
1	Mounting tabs	The mounting tabs on the device are used to mount the device onto a mounting surface. Use round-head M4 size screws. The type and length are dependent on the mounting surface type. Screws are not provided. If you choose not to mount the device, you can permanently remove the mounting tabs with a pliers.
2	Reset button	Use to reset the device to factory defaults.
3	DIN rail clip	You can attach a DIN rail clip to the back of the device and then mount the device to a DIN rail.

Change the password on the Connect EZ

The unique, factory-assigned password for the default **admin** user account is printed on the bottom label of the device and on the loose label included in the package. For ease of use, you may want to change the password from the default.

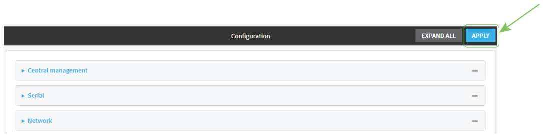
If you erase the device configuration or reset the device to factory defaults, the password for the **admin** user will revert to the original, factory-assigned default password.

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System** > **Device Configuration**. The **Configuration** window appears.
3. Click **Authentication** > **Users** > **Admin**.
4. For **Password**, enter the new password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.



Idle timeout
Allow shell (Warning)
Enable
Password ············
Enable
Lockout tries 5
Lockout duration 15m

5. Click **Apply** to save the configuration and apply the change.



For more detailed information about this process, see Change the default password for the admin user.

Mount the Connect EZ device

There are two mounting options available:

- Attach to a mounting surface using the two mounting tabs
- Attach to DIN rail with DIN rail clip

Attach to a mounting surface using the two mounting tabs

Attach the device to a surface using the two tabs on the device. The type and length are dependent on the mounting surface type.

Note Screws are not provided.

Mounting onto soft or thin materials

Examples: Wallboard, sheetrock, wood, thin sheet metal, or plastic.

Use a screw that meets these requirements:

- M4 pan-head Philips screw
- Coarse-thread sheet metal screw
- 12 mm in length. The length should clear the mounting tab thickness and leave at least 1 cm of screw shank to bite into the mounting material.

Mounting onto thicker metals

Examples: Aluminum or steel.

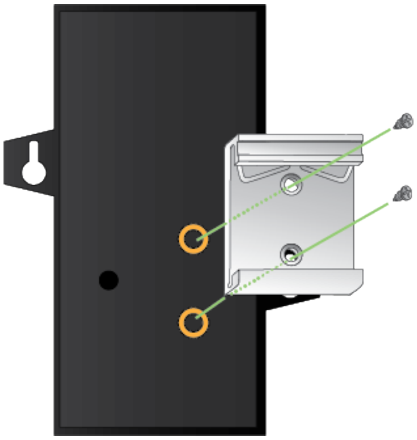
Use a screw that meets these requirements:

- M4 pan-head Philips screw
- Machine-thread screw
- 12 mm in length. The length should clear the mounting tab thickness and leave at least 1 cm of screw shank to bite into the mounting material.

Attach to DIN rail with clip

The DIN rail clip and two screws are included with the device. You will need an appropriate Phillips-head screwdriver. For details about the hardware, see DIN rail clip information.

1. Remove required items from DIN rail mounting kit:
    - DIN rail clip
    - Two flat head screws.
2. Place the DIN rail clip on the rear panel of the device. Make sure the screw holes are aligned.



3. In each hole, use a Phillips-head screw driver to screw in a screw.
4. Tighten the screws as needed to securely fasten the DIN rail clip to the device.
5. Set the device onto a DIN rail and gently press until the clip snaps into the rail.

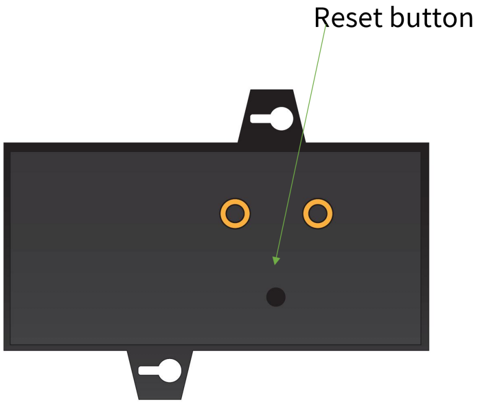
Use the ERASE button to reset your device to the factory defaults

You can reset the Connect EZ to the factory default settings. Resetting the device to factory defaults performs the following actions:

- Clears all configuration settings.
- All firmware updates are deleted.
- Deletes all user files.
- Regenerates SSH keys.
- Clears event and system log files.
- Creates a new event in the event log, indicating a factory reset.

Note While the settings are reset, the device's firmware version remains the same.

1. Make sure that the Connect EZ has been powered on for at least 30 seconds.
2. Locate the **Erase** button on the back of the device.



3. Using a pinhole tool, press and briefly hold the **Erase** button.
4. The device resets to factory defaults and then reboots automatically.

Discover the device's IP address: Additional methods

The IP address is used to login to the Web UI for the device. If you do not have access to the Digi Navigator, you can use either of these methods to discover the IP address.

- Discover the IP address using a Micro USB cable
- Manually configure the PC and assign an IP address to the device

Discover the IP address using a Micro USB cable

You can use a Micro USB cable and a terminal emulation application to determine the device's IP address.

Prerequisites

- A power supply must be connected to the device and the device powered on.
- Access to a terminal emulation application.
- A Micro USB cable.

To use the terminal emulation application to discover the device's IP address:

1. Connect one end of a Micro USB cable to your device and the other end to your PC.
2. Use the terminal emulation application to discover the device's IP address.
   a. Access the terminal emulation application.
   b. Log in to the Connect EZ.
      - **User name**: admin
      - **Password**: The unique password printed on the device label.
   c. Type **a** to enter the Admin CLI.
   d. Type **show network** to show all devices currently connected to the network.
   e. Scroll down until you discover the Connect EZ.
   f. Write down the IP address shown for the device.

Manually configure the PC and assign an IP address to the device

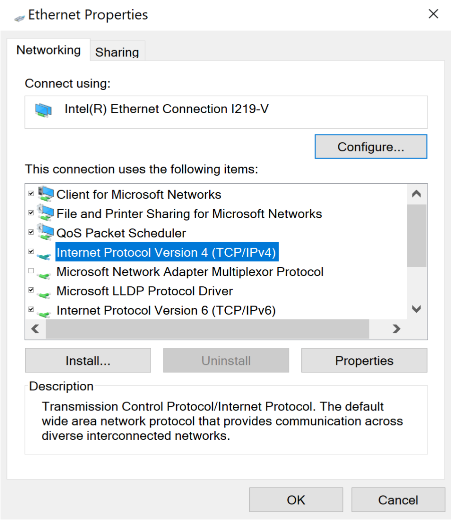
You can manually assign an IP address to the device.

Prerequisites

- An Ethernet cable must be connected to the device and your network.
- A power supply must be connected to the device and the device powered on.
- Determine the IP address that you want to assign to the device.

To configure your laptop and assign an IP address:

1. On your PC, navigate to the Ethernet network settings dialog.
2. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.



Connect using:

Intel(R) Ethernet Connection I219-V

This connection uses the following items:

- ☑ Client for Microsoft Networks
- ☑ File and Printer Sharing for Microsoft Networks
- ☑ QoS Packet Scheduler
- ☑ Internet Protocol Version 4 (TCP/IPv4)
- □ Microsoft Network Adapter Multiplexor Protocol
- ☑ Microsoft LLDP Protocol Driver
- ☑ Internet Protocol Version 6 (TCP/IPv6)

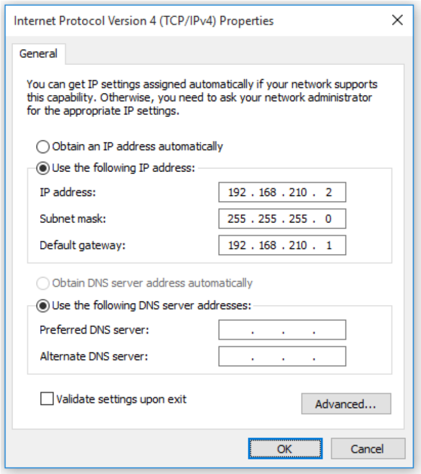
Description

Transmission Control Protocol/Internet Protocol. The default wide area network protocol that provides communication across diverse interconnected networks.

3. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.
4. Select **Use the following IP address**.

Note **IMPORTANT**: Make note of the current IP address entries for **IP address**, **Subnet mask**, and **Default gateway**. You will need this information to complete the final step of the process.

5. Configure with the following details:
   - **IP address** for PC: 192.168.210.2
   - **Subnet**: 255.255.255.0
   - **Gateway**: 192.168.210.1



You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 210 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 210 . 1

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

□ Validate settings upon exit

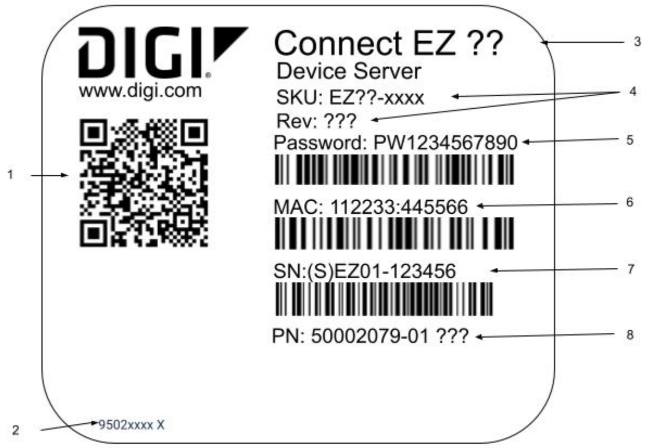
6. Click **OK**.
7. Open a browser window.
8. Enter the default gateway IP address: 192.168.201.1
9. Log into the device using the default user name and password. The default user name is **admin** and the default password is the unique password printed on the label packaged with your

device. For more detailed instructions, see Connect to the local Web UI on the Connect EZ.

10. Update the IP address for the device.
11. On your PC, revert the IP address information to the original entries.
    a. Return to the **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog.
    b. Enter the original IP address entries for **IP address**, **Subnet mask**, and **Default gateway**.
    c. Click **OK**.

Loose label sample

A loose label sticker that includes information about the device is included in the box. You should retain this label sticker with your hardware records.



	Item	Description
1	QR code	Scan the QR code to display a semicolon separated list of: ProductName;DeviceID;Password;SerialNumber;SKUPartNumber SKUPartRevision **Note** Note the space between SKUPartNumber and SKUPartRevision Example: Connect EZ 02;00000000-00000000-112233FF-FF445566;PW1234567890;EZ02-123456;EZ02-C000 B
2	Label part number	Label part number and revision level.
3	Product name	Product name, such as Connect EZ Mini, Connect EZ 2, or Connect EZ 4i.
4	Device part number (SKU) and revision	Device part number (SKU number) and revision. For example, EZ02-C000 A

	Item	Description
5	Password	The unique default password for the device. This unique default password will be needed if the device is factory reset and you want to access the web UI on the device.
6	MAC address	The MAC address for the device.
7	Serial number	The unique serial number assigned to the device. The SN is needed when submitting a Digi support ticket.
8	Device kit part number and revision level	The part number and revision level of the device kit.

Configuration and management

This chapter contains the following topics:

Review Connect EZ default settings

You can review the default settings for your Connect EZ device by using the local WebUI or Digi Remote Manager:

Local WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System** > **Device Configuration**.

Digi Remote Manager

1. If you have not already done so, connect to your Digi Remote Manager account.
2. Click **Device Management** to display a list of your devices.
3. Locate and select your device as described in Use Digi Remote Manager to view and manage your device.
4. Click **Configure**.

The following tables list important factory default settings for the Connect EZ.

Default interface configuration

Interface type	Preconfigured interfaces	Devices	Default configuration
Wide Area Networks (WAN)	▪ **Ethernet**	▪ **ETH**	▪ Firewall zone: Edge ▪ WAN priority: Metric=5 ▪ IP Address: DHCP address ▪ Digi SureLink^{TM} disabled for IPv4
Loopback	▪ **Loopback**	▪ **Loopback**	▪ Firewall zone: Loopback ▪ IP address: 127.0.0.1/8

Other default configuration settings

Feature	Configuration
Central management	▪ Digi Remote Manager enabled as the central management service.

Feature	Configuration
Security policies	■ Packet filtering allows all outbound traffic. ■ SSH and web administration: • Enabled for local administration • Firewall zone: Set up
Monitoring	■ Device heath metrics uploaded to Digi Remote Manager at 60 minute interval. ■ SNMP: Disabled

Change the default password for the admin user

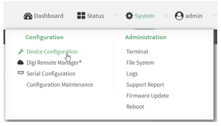
The unique, factory-assigned password for the default **admin** user account is printed on the bottom label of the device and on the loose label included in the package.

If you erase the device configuration or reset the device to factory defaults, the password for the **admin** user will revert to the original, factory-assigned default password.

To change the default password for the admin user:

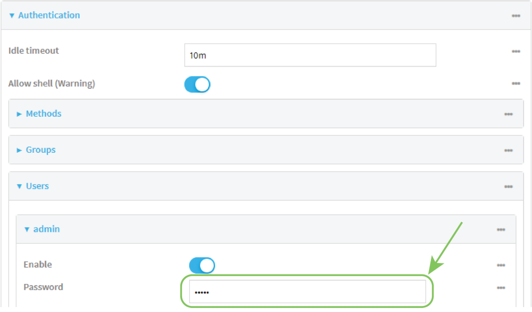
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication** > **Users** > **admin**.
4. Enter a new password for the admin user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.



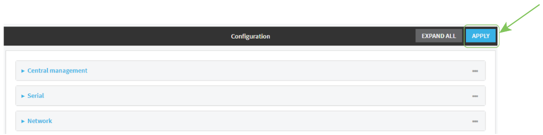
Idle timeout 10m

Allow shell (Warning)

Enable

Password ••••••

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set a new password for the admin user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config)> auth user admin password new-password
(config)>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configuration methods

There are two primary methods for configuring your Connect EZ device:

- Web interface.

  The web interface can be accessed in two ways:

  - Central management using the Digi Remote Manager, a cloud-based device management and data enablement platform that allows you to connect any device to any application, anywhere. With the Remote Manager, you can configure your Connect EZ device and use the configuration as a basis for a profile which can be applied to other similar devices. See Using Digi Remote Manager for more information about using the Remote Manager to manage and configure your Connect EZ device.
  - The local web interface. See Using the web interface for more information about using the local web interface to manage and configure your Connect EZ device.

> **Note** Changes made to the device's configuration by using the local web interface will not be automatically reflected in Digi Remote Manager. You must manually refresh Remote Manager for the changes to be displayed.

Web-based instructions in this guide are applicable to both the Remote Manager and the local web interface.

- Command line.

  A robust command line allows you to perform all configuration and management tasks from within a command shell. Both the Remote Manager and the local web interface also have the option to open a terminal emulator for executing commands on your Connect EZ device. See Using the command line for more information about using the command line to manage and configure your Connect EZ device.

In this guide, task topics show how to perform tasks:

WebUI

Shows how to perform a task by using the local web interface.

Command line

Shows how to perform a task by using the command line interface.

Using Digi Remote Manager

By default, your Connect EZ device is configured to use Digi Remote Manager as its central management server. No configuration changes are required to begin using the Remote Manager.

For information about configuring central management for your Connect EZ device, see Central management.

Access Digi Remote Manager

To access Digi Remote Manager:

1. If you have not already done so, go to https://myaccount.digi.com/ to sign up for a Digi Remote Manager account.

   Check your email for Digi Remote Manager login instructions.
2. Go to remotemanager.digi.com.
1. Enter your username and password.

   The Digi Remote Manager Dashboard appears.

Using the web interface

To connect to the Connect EZ local WebUI:

1. Use an Ethernet cable to connect the Connect EZ's **ETH** port to a laptop or PC.
2. Open a browser and go to **192.168.2.1**.
3. Log into the device using a configured user name and password.

   The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.

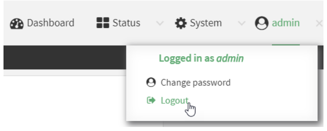
After logging in, the local web admin dashboard is displayed.

The dashboard shows the current state of the device.

Dashboard area	Description
Network activity	Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices.
Digi Remote Manager	Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID. See Using Digi Remote Manager.
Device	Displays the Connect EZ device's status, statistics, and identifying information.
Network Interfaces	Displays the status of the network interfaces configured on the device.

Log out of the web interface

- On the main menu, click your user name. Click **Log out**.



Use the local REST API to configure the Connect EZ device

Your Connect EZ device includes a REST API that can be used to return information about the device's configuration and to make modifications to the configuration. You can view the REST API specification from your web browser by opening the URL:

https://*ip-address*/cgi-bin/config.cgi

For example:

https://192.168.210.1/cgi-bin/config.cgi

Use the GET method to return device configuration information

To return device configuration, issue the **GET** method. For example, using **curl**:

```
$ curl -k -u admin https://ip-address/cgi-bin/config.cgi/value/path -X GET
```

where:

- *ip-address* is the IP address of the Connect EZ device.
- *path* is the path location in the configuration for the information being returned.

  To determine allowed values for *path* from the Admin CLI:

  1. Log into the Connect EZ command line as a user with full Admin access rights.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. At the command line, type **config** to enter configuration mode:

     ```
     > config
     (config)>
     ```
  3. At the config prompt, type **?** (question mark):

     ```
     (config)> ?
     auth                      Authentication
     cloud                     Central management
     firewall                  Firewall
     monitoring                Monitoring
     network                   Network
     serial                    Serial
     service                   Services
     system                    System
     ```

```
vpn                       VPN

(config)>
```

The allowed values for *path* are listed in the first (left) column.

4. To determine further allowed path location values by using the **?** (question mark) with the path name:

```
(config> service ?

Services

 Additional Configuration
 -------------------------------------------------------------------
------------
 dns                       DNS
 iperf                     IPerf
 location                  Location
 mdns                      Service Discovery (mDNS)
 modbus_gateway            Modbus Gateway
 multicast                 Multicast
 ntp                       NTP
 ping                      Ping responder
 snmp                      SNMP
 ssh                       SSH
 telnet                    Telnet
 web_admin                 Web administration

(config)> service
```

For example, to use **curl** to return the ssh configuration:

```
$ curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/value/service/ssh -
X GET
Enter host password for user 'admin':
{
ok": true,
       "result": {
               "type": "object",
               "path": "service.ssh"
,              "collapsed": {
"acl.zone.0": "internal"
,
"acl.zone.1": "edge"
,
"acl.zone.2": "ipsec"
,
"acl.zone.3": "setup"
,
"enable": "true"
,
"key": ""
,
"mdns.enable": "true"
,
"mdns.name": ""
,
"mdns.type": "_ssh._tcp."
,
"port": "22"
,
"protocol.0": "tcp"
               }
       }
}
$
```

You can also use the **GET** method to return the configuration parameters associated with an item:

```
curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/keys/service/ssh -X
GET
Enter host password for user 'admin':
{ "ok": true, "result": [ "acl", "enable", "key", "mdns", "port", "protocol" ]
}
$
```

Use the POST method to modify device configuration parameters and list arrays

Use the POST method to modify device configuration parameters

To modify configuration parameters, use the **POST** method with the **path** and **value** parameters.

```
$ curl -k -u admin "https://ip-address/cgi-
bin/config.cgi/value?path=path&value=new_value" -X POST
```

where:

- *path* is the path to the configuration parameter, in dot notation (for example, **ssh.service.enable**).
- *new_value* is the new value for the parameter.

For example, to disable the ssh service using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.enable&value=false" -X POST
Enter host password for user 'admin':
{ "ok": true }
$
```

Use the POST method to add items to a list array

To add items to a list array, use the **POST** method with the **path** and **append** parameters. For example, to add the external firewall zone to the ssh service:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.acl.zone&append=true&value=external" -X
POST
Enter host password for user 'admin':
{ "ok": true, "result": "service.ssh.acl.zone.4" }
$
```

Use the POST method to add objects to a list array

Objects in an array that require one or more underlying values can be set using the **collapsed** URI parameter. We recommend including the -g option as well, to instruct curl to turn off globbing. The below example would add a new static route for the WAN interface for the 1.2.4.0/24 destination network:

```
$ curl -g -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=network.route.static&append=true&collapsed
[dst]=1.2.4.0/24&collapsed[interface]=/network/interface/wan" -X POST
Enter host password for user 'admin':
{ "ok": true, "result": "network.route.static.1" }
$
```

Use the DELETE method to remove items from a list array

To remove items from a list array, use the **DELETE** method. For example, using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=path
```

where *path* is the path to the list item, including the list number, in dot notation (for example, **service.ssh.acl.zone.4**).

For example, to remove the external firewall zone to the ssh service:

1. Use the **GET** method to determine the SSH service's list number for the external zone:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value/service/ssh/acl/zone -X GET
{
       "ok": true,
       "result": {
               "type": "array",
               "path": "service.ssh.acl.zone"
,              "collapsed": {
"0": "internal"
,
"1": "edge"
,
"2": "ipsec"
,
"3": "setup"
,
"4": "external"
               }
       }
}
$
```

2. Use the **DELETE** method to remove the external zone (list item 4).

```
$ curl -k -u admin https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.acl.zone.4 -X DELETE
Enter host password for user 'admin':
```

```
{ "ok": true }
$
```

Access the terminal screen from the web UI

A user can log into a terminal screen and use CLI commands to access features.

Note You can also access the terminal screen from a port listed in the Serial Status page.

1. Log in to the web UI.
2. Click **System** > **Terminal**. The **Terminal** screen displays.
3. When prompted, enter your user name and password.
4. Enter the number of the port that you want to access.
5. Information about the port you are connected to displays, as well as commands.

   ```
   Connecting to port5:
   Settings: 9600, 8, 1, none, none
   Type '~b.' to disconnect from port
   Type '~b?' to list commands
   ```

6. Enter **~b?** to display additional commands.

Command	Description
~b.	Disconnect from the port.
~bB	Send a BREAK sequence.
~bc	Clear the history buffer.
~br	Send a DTR reset sequence.
~b?	Display a list of commands.

7. Enter **~b.** to disconnect from the port.

Using the command line

The Digi Connect EZ device provides a command-line interface that you can use to configure the device, display status and statistics, update firmware, and manage device files.

See Command line interface for detailed instructions on using the command line interface and see Command line reference for information on available commands.

Access the command line interface

You can access the Connect EZ command line interface using an SSH connection, a telnet connection, or a serial connection. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access. For further information about configuring access to these services, see:

- Serial: Serial port
- WebUI: Configure the web administration service
- SSH: Configure SSH access
- Telnet: Configure telnet access

Log in to the command line interface

Command line

1. Connect to the Connect EZ device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See Access the command line interface for more information.
    - For serial connections, the default configuration is:
        - **115200** baud rate
        - **8** data bits
        - **no** parity
        - **1** stop bit
        - **no** flow control
    - For SSH and telnet connections, the default IP address of the device is**192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

```
login: admin
Password: **********
```

The default username is **admin**. The default unique password for your device is printed on the device label.

3. Depending on the device configuration, you may be presented with another menu, for example:

   ```
   Access selection menu:

          a: Admin CLI
          q: Quit

   Select access or quit [admin] :
   ```

   Type **a** or **admin** to access the Connect EZ command line.

You will now be connected to the Admin CLI:

```
Connecting now...
 Press Tab to autocomplete commands
 Press '?' for a list of commands and details
 Type 'help' for details on navigating the CLI
 Type 'exit' to disconnect from the Admin CLI

>
```

See Command line interface for detailed instructions on using the command line interface.

Exit the command line interface

Command line

1. At the command prompt, type **exit**.

   ```
   > exit
   ```

2. Depending on the device configuration, you may be presented with another menu, for example:

   ```
   Access selection menu:

          a: Admin CLI
          q: Quit

   Select access or quit [admin] :
   ```

   Type **q** or **quit** to exit.

Interfaces

Connect EZ devices has a WAN physical communications interface.

Wide Area Networks (WANs)

The Connect EZ device is preconfigured with one Wide Area Network (WAN), named **ETH1**.

You can modify configuration settings for the existing WAN, and you can create new WANs.

This section contains the following topics:

Wide Area Networks (WANs)

A Wide Area Network (WAN) provides connectivity to the internet or a remote network. A WAN configuration consists of the following:

- A physical device, such as an Ethernet device.
- Several networking parameters for the WAN, such as firewall configuration and IPv4 and IPv6 support.
- Several parameters controlling failover.

Configure WAN priority and default route metrics

The Connect EZ device is preconfigured with one Wide Area Network (WAN), named **ETH1**. You can also create additional WANs and WWANs.

When a WAN is initialized, the Connect EZ device automatically adds a default IP route for the WAN. The priority of the WAN is based on the metric of the default route, as configured in the WAN's IPv4 and IPv6 metric settings.

Assigning priority to WANs

By default, the Connect EZ device's WAN (**ETH1**) is configured with the lowest metric (**1**), and is therefor the highest priority WAN. By default, the Wireless WAN (**Modem**) is configured with a metric of **3**, which means it has a lower priority than **ETH1**. You can assign priority to WANs based on the behavior you want to implement for primary and backup WAN interfaces. For example, if you want a cellular connection to be your primary WAN, with an Ethernet interface as backup, configure the metric of the WWAN to be lower than the metric of the WAN.

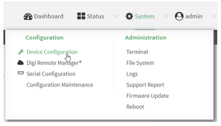
Example: Configure cellular connection as the primary WAN, and the Ethernet connection as backup

Required configuration items

- Configured WAN and WWAN interfaces. This example uses the preconfigured **ETH1** and **Modem** interfaces.
- The metric for each WAN.

WebUI

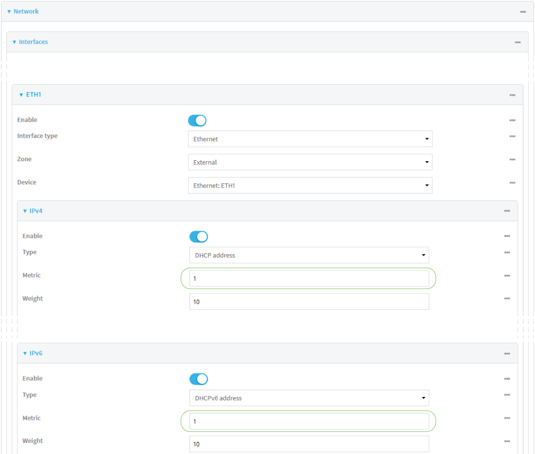
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Set the metrics for **Modem**:
   1. Click **Network** > **Interfaces** > **Modem** > **IPv4**.
   2. For **Metric**, type **1**.

   c. Click **IPv6**.
   d. For **Metric**, type **1**.

4. Set the metrics for **ETH1**:
   a. Click **Network** > **Interfaces** > **ETH1** > **IPv4**.
   b. For **Metric**, type **2**.
   c. Click **IPv6**.
   d. For **Metric**, type **2**.

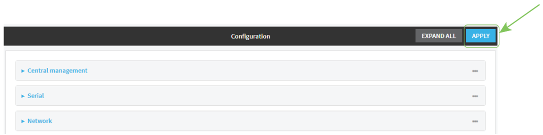


Enable
Interface type: Ethernet
Zone: External
Device: Ethernet: ETH1

IPv4
Enable
Type: DHCP address
Metric: 1
Weight: 10

IPv6
Enable
Type: DHCPv6 address
Metric: 1
Weight: 10

5. Click **Apply** to save the configuration and apply the change.



The Connect EZ device is now configured to use the cellular modem WWAN, **Modem**, as its highest priority WAN, and its Ethernet WAN, **ETH1**, as its secondary WAN.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the metrics for **Modem**:
   a. Set the IPv4 metric for **Modem** to **1**. For example:

```
(config)> network interface modem ipv4 metric 1
(config)>
```

   b. Set the IPv6 metric for **Modem** to **1**:

```
(config)> network interface modem ipv6 metric 1
(config)>
```

4. Set the metrics for **ETH1**:
   a. Set the IPv4 metric for **ETH1** to **2**:

   ```
   (config)> network interface eth1 ipv4 metric 2
   (config)>
   ```

   b. Set the IPv6 metric for **ETH1** to **1**:

   ```
   (config)> network interface eth1 ipv6 metric 2
   (config)>
   ```

5. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

The Connect EZ device is now configured to use the cellular modem WWAN, **Modem**, as its highest priority WAN, and its Ethernet WAN, **ETH1**, as its secondary WAN.

Configure SureLink active recovery to detect WAN failures

Problems can occur beyond the immediate WAN connection that prevent some IP traffic from reaching its destination. Normally this kind of problem does not cause the Connect EZ device to detect that the WAN has failed, because the connection continues to work while the core problem exists somewhere else in the network.

Using Digi SureLink, you can configure the Connect EZ device to regularly probe connections through the WAN to determine if the WAN has failed.

Required configuration items

- Enable SureLink. SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.
- The type of probe test to be performed, one of:
  - Test another interface's status: Used to create a failover or coupled relationship between two interfaces. Requires the name of the alternate interface, the IP version to be tested, and the expected status of the alternate interface (either up or down).
  - Ping: Requires the hostname or IP address of the host to be pinged.
  - DNS query: You can perform a DNS query to a named DNS server, or to the DNS servers configured for the WAN.
  - HTTP test: Requires the URL of the host to be tested.
  - Test DNS servers configured for this interface: Tests communication with this interface's DNS servers that are either provided by DHCP, or statically configured.

- Interface status: Determines if the interface has an IP address assigned to it, that the physical link is up, and that a route is present to send traffic out of the network interface.

The preconfigured WAN is configured by default to use SureLink to both test the interface status and perform a test DNS query.

Additional configuration items

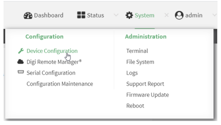
- The behavior of the Connect EZ device upon test failure:
  - The default behavior, which is to fail over to the next priority WAN.
  - Restart the WAN interface.
  - Reboot the device.
- The interval between connectivity tests.
- The number of probe attempts before the WAN is considered to have failed.
- The amount of time that the device should wait for a response to a probe attempt before considering it to have failed.
- If the type of probe test is:
  - Ping: Configure the number of bytes in the ping packet.
  - Interface status: Configure the amount of time that the interface is down before it is considered to have failed, and the amount of time it takes to make an initial connection before it is considered down.
- Additional test targets.
- If more than one test target is configured, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.

To configure the Connect EZ device to regularly probe connections through the WAN:

WebUI

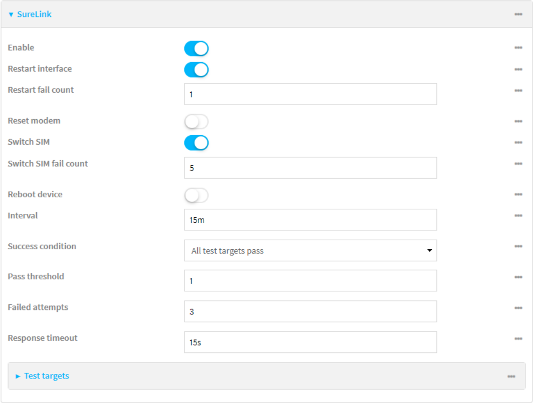
SureLink can be configured for both IPv4 and IPv6.

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



3. The **Configuration** window is displayed.
4. Click **Network** > **Interfaces**.
5. Create a new WAN or select an existing one:
   - To create a new WAN, see Configure a Wide Area Network (WAN).
   - To edit an existing WAN, click to expand the appropriate WAN.

6. After creating or selecting the WAN, click **IPv4** (or **IPv6**) > **SureLink**.

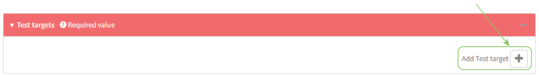


▾ SureLink

Enable	●
Restart interface	●
Restart fail count	1
Reset modem	○
Switch SIM	●
Switch SIM fail count	5
Reboot device	○
Interval	15m
Success condition	All test targets pass ▾
Pass threshold	1
Failed attempts	3
Response timeout	15s

▸ Test targets

7. **Enable** SureLink.
8. SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.
9. Click to expand **Test targets**.
10. For **Add Test Target**, click ✚.



▾ Test targets ❗Required value

Add Test target ✚

11. Select the **Test type**:
    - **Ping test**: Tests connectivity by sending an ICMP echo request to the hostname or IP address specified in **Ping host**. You can also optionally change the number of bytes in the **Ping payload size**.
    - **DNS test**: Tests connectivity by sending a DNS query to the specified **DNS server**.
    - **HTTP test**: Tests connectivity by sending an HTTP or HTTPS GET request to the URL specified in **Web servers**. The URL should take the format of **http[s]://*hostname*/[*path*]**.
    - **Test DNS servers configured for this interface**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
    - **Test the interface status**: The interface is considered to be down based on:
        - **Down time**: The amount of time that the interface can be down before this test is considered to have failed.

          Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

          For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.

          The default is 60 seconds.
        - **Initial connection time**: The amount of time to wait for an initial connection to the interface before this test is considered to have failed.

          Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

          For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.

The default is 60 seconds.

12. Optional active recovery configuration parameters:
    a. For **Restart interface**, enable to configure the device to restart the interface when its connection is considered to have failed. This is useful for interfaces that may regain connectivity after restarting.
    b. For **Reboot device**, enable to instruct the device to reboot when the WAN connection is considered to have failed.

    > **Note** If both the **Restart interface** and **Reboot device** parameters are enabled, the **Reboot device** parameter takes precedence.

    c. Change the **Interval** between connectivity tests.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

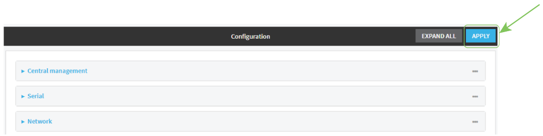
       For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.

       The default is 15 minutes.
    d. If more than one test target is configured, for **Success condition**, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.
    e. For **Attempts**, type the number of probe attempts before the WAN is considered to have failed.
    f. For **Response timeout**, type the amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

       For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.

       The default is 15 seconds.
13. (Optional) Repeat this procedure for IPv6.
14. Click **Apply** to save the configuration and apply the change.



Command line

Active recovery can be configured for both IPv4 and IPv6. These instructions are for IPv4; to configure IPv6 active recovery, replace **ipv4** in the command line with **ipv6**.

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN, or edit an existing one:
   - To create a new WAN, see Configure a Wide Area Network (WAN).
   - To edit an existing WAN, change to the WAN's node in the configuration schema. For example, for a WAN named **my_wan**, change to the **my_wan** node in the configuration schema:

   ```
   (config)> network interface my_wan
   (config network interface my_wan)>
   ```

4. Enable SureLink.

   SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.

```
(config network interface my_wan> ipv4 surelink enable true
(config network interface my_wan)>
```

5. Add a test target:

```
(config network interface my_wan)> add ipv4 surelink target end
(config network interface my_wan ipv4 surelink target 0)>
```

6. Set the test type:

```
(config network interface my_wan ipv4 surelink target 0)> test value
(config network interface my_wan ipv4 surelink target 0)>
```

   where *value* is one of:
   - **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
     - Specify the hostname or IP address:

     ```
     (config network interface my_wan ipv4 surelink target 0)> ping_
     host host
     (config network interface my_wan ipv4 surelink target 0)>
     ```

     - (Optional) Set the size, in bytes, of the ping packet:

     ```
     (config network interface my_wan ipv4 surelink target 0)> ping_
     size [num]
     (config network interface my_wan ipv4 surelink target 0)>
     ```

   - **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
     - Specify the DNS server. Allowed value is the IP address of the DNS server.

```
(config network interface my_wan ipv4 surelink target 0)> dns_
server ip_address
(config network interface my_wan ipv4 surelink target 0)>
```

- **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
    - Specify the url:

    ```
    (config network interface my_wan ipv4 surelink target 0)> http_
    url value
    (config network interface my_wan ipv4 surelink target 0)>
    ```

    where *value* uses the format **http[s]://*hostname*/[*path*]**
- **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
    - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

    ```
    (config network interface my_wan ipv4 surelink target 0)>
    interface_down_time value
    (config network interface my_wan ipv4 surelink target 0)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan ipv4 surelink target 0)>
    interface_down_time 600s
    (config network interface my_wan ipv4 surelink target 0)>
    ```

    The default is 60 seconds.
    - (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

    ```
    (config network interface my_wan ipv4 surelink target 0)>
    interface_timeout value
    (config network interface my_wan ipv4 surelink target 0)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan ipv4 surelink target 0)>
    interface_timeout 600s
    (config network interface my_wan ipv4 surelink target 0)>
    ```

    The default is 60 seconds.

(Optional) Repeat to add additional test targets.

7. Optional active recovery configuration parameters:
   a. Move back two levels in the configuration by typing **.. ..**:

```
(config network interface my_wan ipv4 surelink target 0)> .. ..
(config network interface my_wan ipv4 surelink>
```

   b. To configure the device to restart the interface when its connection is considered to have failed:

```
(config network interface my_wan ipv4 surelink)> restart enable
(config network interface my_wan ipv4 surelink>
```

   This is useful for interfaces that may regain connectivity after restarting.

   c. To configure the device to reboot when the interface is considered to have failed:

```
(config network interface my_wan ipv4 surelink)> reboot enable
(config network interface my_wan ipv4 surelink>
```

   Note If both the **restart** and **reboot** parameters are enabled, the **reboot** parameter takes precedence.

   d. Set the **Interval** between connectivity tests:

```
(config network interface my_wan ipv4 surelink)> interval value
(config network interface my_wan ipv4 surelink>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan ipv4 surelink)> interval 600s
(config network interface my_wan ipv4 surelink)>
```

   The default is 15 minutes.

   e. If more than one test target is configured, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets:

```
(config network interface my_wan ipv4 surelink)> success_condition
value
(config network interface my_wan ipv4 surelink>
```

   Where *value* is either **one** or **all**.

   f. Set the number of probe attempts before the WAN is considered to have failed:

```
(config network interface my_wan ipv4 surelink)> attempts num
(config network interface my_wan ipv4 surelink>
```

   The default is **3**.

   g. Set the amount of time that the device should wait for a response to a probe attempt before considering it to have failed:

```
(config network interface my_wan ipv4 surelink)> timeout value
(config network interface my_wan ipv4 surelink>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan ipv4 surelink)> timeout 600s
(config network interface my_wan ipv4 surelink)>
```

The default is 15 seconds.

8. (Optional) Repeat this procedure for IPv6.
9. Save the configuration and apply the change:

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to reboot when a failure is detected

Using SureLink, you can configure the Connect EZ device to reboot when it has determined that an interface has failed.

Required configuration items

- Enable SureLink.SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.
- Enable device reboot upon interface failure.
- The type of probe test to be performed, either:
  - Ping: Requires the hostname or IP address of the host to be pinged.
  - DNS query: You can perform a DNS query to a named DNS server, or to the DNS servers configured for the WAN.
  - HTTP or HTTPS test: Requires the URL of the host to be tested.
  - Interface status: Determines if the interface has an IP address assigned to it, that the physical link is up, and that a route is present to send traffic out of the network interface.

Additional configuration items

- See for Configure SureLink active recovery to detect WAN failures optional SureLink configuration parameters.

To configure the Connect EZ device to reboot when an interface has failed:

☰ WebUI

SureLink can be configured for both IPv4 and IPv6.

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.
3. The **Configuration** window is displayed.
4. Click **Network** > **Interfaces**.
5. Create a new WAN or select an existing one:
   - To create a new WAN, see Configure a Wide Area Network (WAN).
   - To edit an existing WAN, click to expand the appropriate WAN.
6. After creating or selecting the WAN, click **IPv4** (or **IPv6**) > **SureLink**.
7. **Enable** SureLink.
8. SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.
9. Enable **Reboot device**.

   Note If both the **Restart interface** and **Reboot device** parameters are enabled, the **Reboot device** parameter takes precedence.

10. Click to expand **Test targets**.
11. For **Add Test Target**, click ✚.
12. Select the **Test type**:
    - **Ping test**: Tests connectivity by sending an ICMP echo request to the hostname or IP address specified in **Ping host**. You can also optionally change the number of bytes in the **Ping payload size**.
    - **DNS test**: Tests connectivity by sending a DNS query to the specified **DNS server**.
    - **HTTP test**: Tests connectivity by sending an HTTP or HTTPS GET request to the URL specified in **Web servers**. The URL should take the format of **http[s]://*hostname*/[*path*]**.
    - **Test DNS servers configured for this interface**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
    - **Test the interface status**: The interface is considered to be down based on:
      - **Down time**: The amount of time that the interface can be down before this test is considered to have failed.

        Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

        For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

        The default is 60 seconds.
      - **Initial connection time**: The amount of time to wait for an initial connection to the interface before this test is considered to have failed.

        Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

The default is 60 seconds.

13. Optional active recovery configuration parameters:
    a. For **Restart interface**, enable to configure the device to restart the interface when its connection is considered to have failed. This is useful for interfaces that may regain connectivity after restarting.
    b. For **Reboot device**, enable to instruct the device to reboot when the WAN connection is considered to have failed.
    c. **Note** If both the **Restart interface** and **Reboot device** parameters are enabled, the **Reboot device** parameter takes precedence.
    d. Change the **Interval** between connectivity tests.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

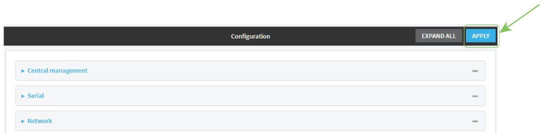
       For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

       The default is 15 minutes.
    e. If more than one test target is configured, for **Success condition**, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.
    f. For **Attempts**, type the number of probe attempts before the WAN is considered to have failed.
    g. For **Response timeout**, type the amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

       For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

       The default is 15 seconds.
14. (Optional) Repeat this procedure for IPv6.
15. Click **Apply** to save the configuration and apply the change.



Command line

Active recovery can be configured for both IPv4 and IPv6. These instructions are for IPv4; to configure IPv6 active recovery, replace **ipv4** in the command line with **ipv6**.

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN, or edit an existing one:
   - To create a new WAN, see Configure a Wide Area Network (WAN).
   - To edit an existing WAN, change to the WAN's node in the configuration schema. For example, for a WAN named **my_wan**, change to the **my_wan** node in the configuration schema:

   ```
   (config)> network interface my_wan
   (config network interface my_wan)>
   ```

4. Enable SureLink. SureLink can be enabled for both IPv4 and IPv6 configurations. By default, SureLink is enabled for IPv4 for the preconfigured WAN. It is disabled for IPv6.

```
(config network interface my_wan> ipv4 surelink enable true
(config network interface my_wan)>
```

5. Set the device to reboot when the interface is considered to have failed:

```
(config network interface my_wan ipv4 surelink)> reboot true
(config network interface my_wan ipv4 surelink>
```

Note If both the **restart** and **reboot** parameters are enabled, the **reboot** parameter takes precedence.

6. Add a test target:

```
(config network interface my_wan)> add ipv4 surelink target end
(config network interface my_wan ipv4 surelink target 0)>
```

7. Set the test type:

```
(config network interface my_wan ipv4 surelink target 0)> test value
(config network interface my_wan ipv4 surelink target 0)>
```

where *value* is one of:

- **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
  - Specify the hostname or IP address:

  ```
  (config network interface my_wan ipv4 surelink target 0)> ping_
  host host
  (config network interface my_wan ipv4 surelink target 0)>
  ```

  - (Optional) Set the size, in bytes, of the ping packet:

```
(config network interface my_wan ipv4 surelink target 0)> ping_
size [num]
(config network interface my_wan ipv4 surelink target 0)>
```

- **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
    - Specify the DNS server. Allowed value is the IP address of the DNS server.

```
(config network interface my_wan ipv4 surelink target 0)> dns_
server ip_address
(config network interface my_wan ipv4 surelink target 0)>
```

- **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
    - Specify the url:

```
(config network interface my_wan ipv4 surelink target 0)> http_
url value
(config network interface my_wan ipv4 surelink target 0)>
```

where *value* uses the format **http[s]://*hostname*/[*path*]**

- **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
    - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

```
(config network interface my_wan ipv4 surelink target 0)>
interface_down_time value
(config network interface my_wan ipv4 surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **parameter name** to ten minutes, enter either **10m** or **600s**:

```
(config)> path-param 600s
(config)>
```

The default is 60 seconds.

- (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

```
(config network interface my_wan ipv4 surelink target 0)>
interface_timeout value
(config network interface my_wan ipv4 surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **parameter name** to ten minutes, enter either **10m** or **600s**:

```
(config)> path-param 600s
(config)>
```

The default is 60 seconds.

(Optional) Repeat to add additional test targets.

8. Optional active recovery configuration parameters:

   a. Move back two levels in the configuration by typing **.. ..**:

   ```
   (config network interface my_wan ipv4 surelink target 0)> .. ..
   (config network interface my_wan ipv4 surelink>
   ```

   b. To configure the device to restart the interface when its connection is considered to have failed:

   ```
   (config network interface my_wan ipv4 surelink)> restart enable
   (config network interface my_wan ipv4 surelink>
   ```

   This is useful for interfaces that may regain connectivity after restarting.

   c. To configure the device to reboot when the interface is considered to have failed:

   ```
   (config network interface my_wan ipv4 surelink)> reboot enable
   (config network interface my_wan ipv4 surelink>
   ```

   Note If both the **restart** and **reboot** parameters are enabled, the **reboot** parameter takes precedence.

   d. Set the **Interval** between connectivity tests:

   ```
   (config network interface my_wan ipv4 surelink)> interval value
   (config network interface my_wan ipv4 surelink>
   ```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

   ```
   (config network interface my_wan ipv4 surelink)> interval 600s
   (config network interface my_wan ipv4 surelink)>
   ```

   The default is 15 minutes.

   e. If more than one test target is configured, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets:

   ```
   (config network interface my_wan ipv4 surelink)> success_condition
   value
   (config network interface my_wan ipv4 surelink>
   ```

   Where *value* is either **one** or **all**.

f. Set the number of probe attempts before the WAN is considered to have failed:

```
(config network interface my_wan ipv4 surelink)> attempts num
(config network interface my_wan ipv4 surelink>
```

The default is **3**.

g. Set the amount of time that the device should wait for a response to a probe attempt before considering it to have failed:

```
(config network interface my_wan ipv4 surelink)> timeout value
(config network interface my_wan ipv4 surelink>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **parameter name** to ten minutes, enter either **10m** or **600s**:

```
(config)> path-param 600s
(config)>
```

The default is 15 seconds.

9. (Optional) Repeat this procedure for IPv6.
10. Save the configuration and apply the change:

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

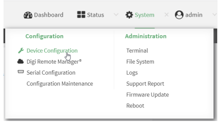
Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable SureLink

If your device uses a private APN with no Internet access, or your device has a restricted wired WAN connection that doesn't allow DNS resolution, follow this procedure to disable the default SureLink connectivity tests. You can also disable DNS lookup or other internet activity, while retaining the SureLink interface test.

WebUI

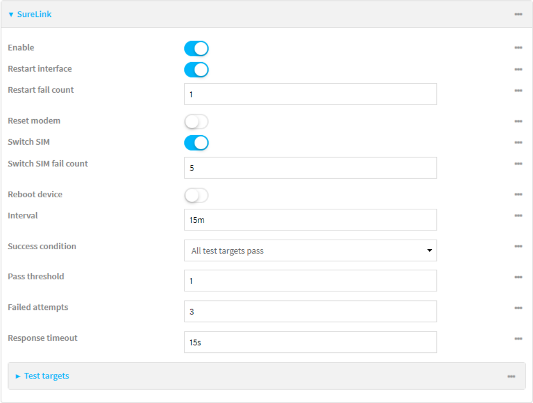
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. Select the appropriate WAN on which SureLink should be disabled..

5. After selecting the WAN, click **IPv4** > **SureLink**.

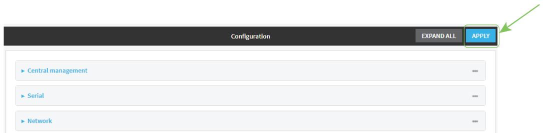


▾ SureLink

Enable	☑
Restart interface	☑
Restart fail count	1
Reset modem	☐
Switch SIM	☑
Switch SIM fail count	5
Reboot device	☐
Interval	15m
Success condition	All test targets pass
Pass threshold	1
Failed attempts	3
Response timeout	15s

▸ Test targets

6. Toggle off **Enable** to disable SureLink.
7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Change to the WAN's node in the configuration schema. For example, to disable SureLink for the WAN interface:

```
(config)> network interface modem
(config network interface modem)>
```

4. Disable SureLink:

```
(config network interface modem> ipv4 surelink enable false
(config network interface modem)>
```

5. Save the configuration and apply the change:

```
(config network interface my_wwan ipv4 surelink)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

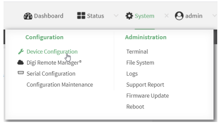
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable DNS lookup

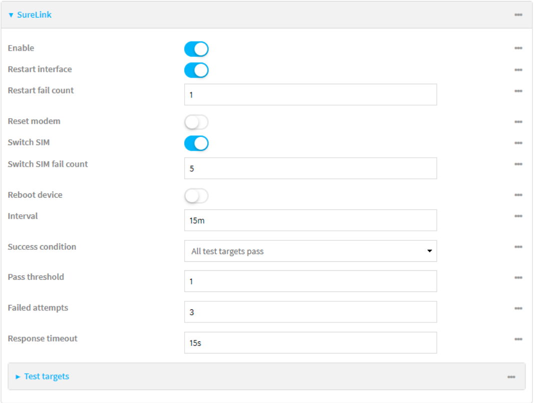
Alternatively, you can disable DNS lookup or other internet activity for device that use a private APN with no Internet access, or that have restricted wired WAN connections that do not allow DNS resolution, while retaining the SureLink interface test. The SureLink interface test determines if the interface has an IP address assigned to it, that the physical link is up, and that a route is present to send traffic out of the network interface.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Select the appropriate WAN on which SureLink should be disabled..
5. After selecting the WAN, click **IPv4** > **SureLink**.

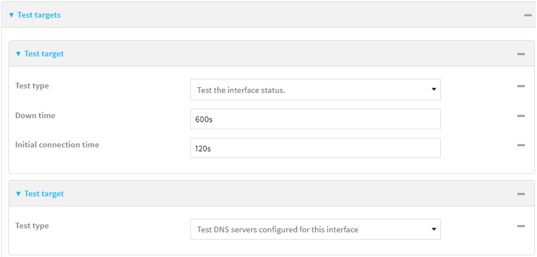


▾ SureLink

Enable	●
Restart interface	●
Restart fail count	1
Reset modem	○
Switch SIM	●
Switch SIM fail count	5
Reboot device	○
Interval	15m
Success condition	All test targets pass
Pass threshold	1
Failed attempts	3
Response timeout	15s

▸ Test targets

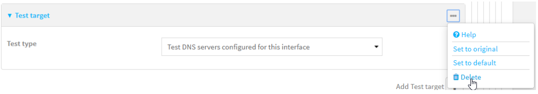
6. Click to expand **Test targets**.
7. Click to expand the second test target. This test target has its **Test type** set to **Test DNS servers configured for this interface**.



Test type: Test the interface status.
Down time: 600s
Initial connection time: 120s

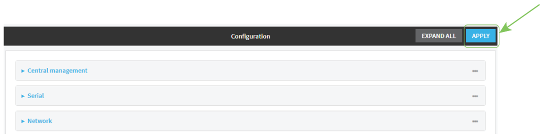
Test type: Test DNS servers configured for this interface

8. Click the menu icon **(...)** next to the target and select **Delete**.



Test type: Test DNS servers configured for this interface

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Change to WAN's node in the configuration schema. For example, to disable SureLink for an interface named my_wan:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Determine the index number of the target:

```
(config network interface my_wan)> show ipv4 surelink target
0
        interface_down_time 600s
        interface_timeout 120s
        test interface_up
1
        test dns_configured
(config network interface my_wan)>
```

5. Delete the target:

```
(config network interface my_wan> del ipv4 surelink target 1
(config network interface my_wan)>
```

6. Save the configuration and apply the change:

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Wide Area Network (WAN)

Configuring a Wide Area Network (WAN) involves configuring the following items:

Required configuration items

- The interface type: **Ethernet**.
- The firewall zone:**External**.
- The network device that is used by the WAN.
- Configure the WAN as a DHCP client.

Additional configuration items

Additional IPv4 configuration:

- The metric for IPv4 routes associated with the WAN.
- The relative weight for IPv4 routes associated with the WAN.
- The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- The IPv4 Maximum Transmission Unit (MTU) of the WAN.

- When to use DNS servers for this interface.
- Whether to include the Connect EZ device's hostname in DHCP requests.

- SureLink active recovery configuration. See Configure SureLink active recovery to detect WAN failures for further information.

IPv6 configuration:

- The metric for IPv4 routes associated with the WAN.
- The relative weight for IPv4 routes associated with the WAN.
- The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.

- The IPv4 Maximum Transmission Unit (MTU) of the WAN.
    - When to use DNS servers for this interface.
    - Whether to include the Connect EZ device's hostname in DHCP requests.
    - Active recovery configuration. See Configure SureLink active recovery to detect WAN failures for further information.
- MAC address blacklist and whitelist.

To create a new WAN or edit an existing WAN:

☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.
3. The **Configuration** window is displayed.
4. Click **Network** > **Interfaces**.
5. Create the WAN or select an existing WAN:
    - To create a new WAN, for **Add interface**, type a name for the WAN and click ✚.
    - To edit an existing WAN, click to expand the WAN.

   The Interface configuration window is displayed.

   New WANs are enabled by default. To disable, click **Enable**.
6. For **Interface type**, leave at the default setting of **Ethernet**.
7. For **Zone**, select **External**.
8. For **Device**, select an Ethernet device.
9. Configure IPv4 settings:
    a. Click to expand **IPv4**.

       IPv4 support is enabled by default.

    b. For **Type**, select **DHCP address**.

    c. Optional IPv4 configuration items:

        i. Set the **Metric**.

        ii. See Configure WAN priority and default route metrics for further information about metrics.

        iii. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

        iv. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

        v. Set the **MTU**.

        vi. For **Use DNS**, select one of the following:

        - **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
        - **When primary default route**: Only use the DNS servers provided for this

interface when the interface is the primary route.

- **Never**: Never use DNS servers for this interface.

vii. Enable **DHCP Hostname** to instruct the Connect EZ device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ device's system name.

d. See Configure SureLink active recovery to detect WAN failures for information about configuring **Active recovery**.

10. (Optional) Configure IPv6 settings:

a. Click to expand **IPv6**.

b. **Enable** IPv6 support.

c. For **Type**, select **DHCPv6 address**.

d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.

e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.

f. Set the **Metric**.

g. See Configure WAN priority and default route metrics for further information about metrics.

h. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

i. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

j. Set the **MTU**.

k. For **Use DNS**:

- **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **Never**: Never use DNS servers for this interface.

l. Enable **DHCP Hostname** to instruct the Connect EZ device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

- See RFC4702 for further information about DHCP server support for the Client FQDN option.

- See Configure system information for information about setting the Connect EZ device's system name.

11. (Optional) Click to expand **MAC address blacklist**.

    Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address blacklist**.

    a. Click to expand **MAC address blacklist**.

    b. For **Add MAC address**, click ✚.

    c. Type the **MAC address**.

12. (Optional) Click to expand **MAC address whitelist**.

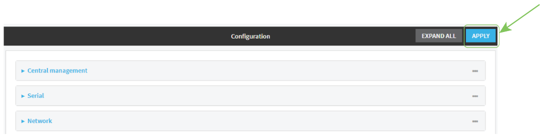
    If there whitelist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Click to expand **MAC address whitelist**.

    b. For **Add MAC address**, click ✚.

    c. Type the **MAC address**.

13. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN or edit an existing one:

   - To create a new WAN named **my_wan**:

```
(config)> add network interface my_wan
(config network interface my_wan)>
```

   - To edit an existing WAN named **my_wan**, change to the **my_wan** node in the configuration schema:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Set the appropriate firewall zone:

```
(config network interface my_wan)> zone zone
(config network interface my_wan)>
```

   See Firewall configuration for further information.

5. Select an Ethernet device.
   a. Enter **device ?** to view available devices and the proper syntax.

   ```
   (config network interface my_wan)> device ?

   Current value:

   (config network interface my_wan)> device
   ```

   b. Set the device for the LAN:

   ```
   (config network interface my_wan)> device device
   (config network interface my_wan)>
   ```

6. Configure IPv4 settings:
   - IPv4 support is enabled by default. To disable:

     ```
     (config network interface my_wan)> ipv4 enable false
     (config network interface my_wan)>
     ```

   - Configure the WAN to be a DHCP client:

     ```
     (config network interface my_wan)> ipv4 type dhcp
     (config network interface my_wan)>
     ```

   a. Optional IPv4 configuration items:
      i. Set the IP metric:

      ```
      (config network interface my_wan)> ipv4 metric num
      (config network interface my_wan)>
      ```

      See Configure WAN priority and default route metrics for further information about metrics.

      ii. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

      ```
      (config network interface my_wan)> ipv4 weight num
      (config network interface my_wan)>
      ```

      iii. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

      ```
      (config network interface my_wan)> ipv4 mgmt num
      (config network interface my_wan)>
      ```

      iv. Set the MTU:

      ```
      (config network interface my_wan)> ipv4 mtu num
      (config network interface my_wan)>
      ```

v. Configure how to use DNS:

```
(config network interface my_wan)> ipv4 use_dns value
(config network interface my_wan)>
```

where *value* is one of:

- **always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **primary**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **never**: Never use DNS servers for this interface.

b. See Configure WAN priority and default route metrics for further information about metrics.

7. (Optional) Configure IPv6 settings:

a. Enable IPv6 support:

```
(config network interface my_wan)> ipv6 enable true
(config network interface my_wan)>
```

b. Set the IPv6 type to DHCP:

```
(config network interface my_wan)> ipv6 type dhcpv6
(config network interface my_wan)>
```

c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (**?**):

```
(config network interface my_wan)> ipv6 ?

IPv6

 Parameters                Current Value
 ----------------------------------------------------------------------
----------
 dhcp_hostname             false              DHCP Hostname
 enable                    true               Enable
 metric                    0                  Metric
 mgmt                      0                  Management priority
 mtu                       1500               MTU
 type                      dhcpv6             Type
 use_dns                   always             Use DNS
 weight                    10                 Weight

 Additional Configuration
 ----------------------------------------------------------------------
----------
 connection_monitor        Active recovery

(config network interface my_wan)>
```

d. Modify any of the remaining default settings as appropriate. For example, to change the metric:

```
(config network interface my_wan)> ipv6 metric 1
(config network interface my_wan)>
```

If the minimum length is not available, then a longer prefix will be used.

See Configure WAN priority and default route metrics for further information about metrics.

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show WAN status and statistics

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. From the menu, click **Status**.
3. Under **Networking**, click **Interfaces**.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Enter the show network command at the Admin CLI prompt:

```
> show network

  Interface          Proto  Status   Address
  ----------------   -----  -------  -------------------------------
  defaultip          IPv4   up       192.168.210.1/24
  defaultlinklocal   IPv4   up       169.254.100.100/16
  eth1               IPv4   up       10.10.10.10/24
  eth1               IPv6   up       fe00:2404::240:f4ff:fe80:120/64
  loopback           IPv4   up       127.0.0.1/8


>
```

3. Additional information can be displayed by using the show network verbose command:

```
> show network verbose

 Interface         Proto  Status   Type    Zone      Device    Metric
Weight
 ----------------  -----  -------  ------  --------  --------  ------  --
----
 defaulttip        IPv4   up       static  setup     eth2      10      10
 defaultlinklocal  IPv4   up       static  setup     eth2      0       10
 eth1              IPv4   up       dhcp    external  eth1      1       10
 eth1              IPv6   up       dhcp    external  eth1      1       10
 loopback          IPv4   up       static  loopback  loopback  0       10


>
```

4. Enter **show network interface *name*** at the Admin CLI prompt to display additional information about a specific WAN. For example, to display information about ETH1, enter **show network interface *eth1***:

```
> show network interface eth1

 wan1 Interface Status
 ---------------------
 Device              : eth1
 Zone                : external

 IPv4 Status         : up
 IPv4 Type           : dhcp
 IPv4 Address(es)    : 10.10.10.10/24
 IPv4 Gateway        : 10.10.10.1
 IPv4 MTU            : 1500
 IPv4 Metric         : 1
 IPv4 Weight         : 10
 IPv4 DNS Server(s)  : 10.10.10.2, 10.10.10.3

 IPv6 Status         : up
 IPv6 Type           : dhcpv6
 IPv6 Address(es)    : fe00:2404::240:f4ff:fe80:120/64
 IPv6 Gateway        : ff80::234:f3ff:ff0e:4320
 IPv6 MTU            : 1500
 IPv6 Metric         : 1
 IPv6 Weight         : 10
 IPv6 DNS Server(s)  : fd00:244::1, fe80::234:f3f4:fe0e:4320

>
```

5. Type **exit** to exit the Admin CLI.

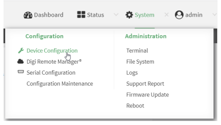
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a WAN

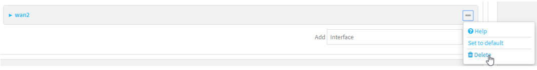
Follow this procedure to delete any WANs that have been added to the system. You cannot delete the preconfigured WAN, **ETH1**.

WebUI

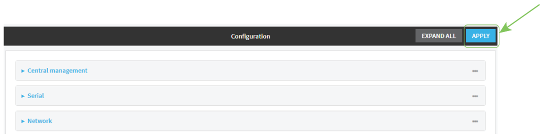
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click the menu icon (**...**) next to the name of the WAN to be deleted and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete the WAN. For example, to delete a WAN named my_wan:

```
(config)> del network interface my_wan
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status and statistics

You can show Surelink status for all interfaces, or for an individual interface. You can also show Surelink status for ipsec tunnels and OpenVPN clients.

Surelink status is only available from the Admin CLI.

Command line

Show Surelink status for all interfaces

To show the Surelink status all interfaces, use the show surelink interface all command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink interface all

 Interface  Test                           Proto  Last Response  Status
 ---------  -----------------------------  -----  -------------  -------
 eth1       Interface is up                IPv4   32 seconds     Passing
 eth1       Interface's DNS servers (DNS)  IPv4   28 seconds     Passing
 eth2       Interface is up                IPv4   21 seconds     Passing
 eth2       Interface's DNS servers (DNS)  IPv4   20 seconds     Passing
 modem      Interface is up                IPv4   115 seconds    Passing
 modem      Interface's DNS servers (DNS)  IPv4   114 seconds    Passing

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status for a specific interface

To show the Surelink status a specific interface, use the show surelink interface name *name* command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show surelink interface name *name* command to show the Surelink status of a specific interface, for example:

```
> show surelink interface name eth1

 Interface  Test                           Proto  Last Response  Status
 ---------  -----------------------------  -----  -------------  -------
 eth1       Interface is up                IPv4   32 seconds    Passing
 eth1       Interface's DNS servers (DNS)  IPv4   28 seconds
Passingsing

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status for all IPsec tunnels

To show the Surelink status all IPsec tunnels, use the show surelink ipsec all command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink ipsec all

 IPsec   Test                  Last Response  Status
 ------  --------------------  -------------  ------------------
 test    194.43.79.74 (Ping)   29 seconds     Passed
 test    194.43.79.75 (Ping)   5 seconds      Passed
 test1   194.43.79.74 (Ping)   21 seconds     Failed
 test2   194.43.79.75 (Ping)   21 seconds     Waiting for result

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status for a specific IPsec tunnel

To show the Surelink status a specific IPsec tunnel, use the show surelink ipsec tunnel *name* command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show surelink ipsec tunnel *name* command to show the Surelink status of a specific tunnel, for example:

```
> show surelink ipsec tunnel test

 IPsec   Test                  Last Response  Status
 ------  --------------------  -------------  ------------------
 test    194.43.79.74 (Ping)   29 seconds     Passed
 test    194.43.79.75 (Ping)   5 seconds      Passed

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status for all OpenVPN clients

To show the Surelink status all OpenVPN clients, use the show surelink openvpn client all command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type :

```
> show surelink openvpn all

 OpenVPN Client   Test                  Last Response  Status
 --------------  --------------------  -------------  ------------------
 test_client1    194.43.79.74 (Ping)   29 seconds     Passed
 test_client1    194.43.79.75 (Ping)   5 seconds      Passed
 test_client2    194.43.79.74 (Ping)   21 seconds     Failed
 test_client2    194.43.79.75 (Ping)   21 seconds     Waiting for result

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Surelink status for a specific OpenVPN client

To show the Surelink status a specific OpenVPN client, use the show surelink openvpn client *name* command:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show surelink openvpn client *name* command to show the Surelink status of a specific OpenVPN client, for example:

```
> show surelink openvpn client test_client1

 OpenVPN Client   Test                  Last Response  Status
 --------------  --------------------  -------------  ------------------
 test_client1    194.43.79.74 (Ping)   29 seconds     Passed
 test_client1    194.43.79.75 (Ping)   5 seconds      Passed
```

```
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Serial port

Connect EZ devices have a single serial port that provides access to different features, depending on the serial port mode selection.

Default serial port configuration

You can review the default serial port configuration for your device.

Serial mode options

You can choose a serial mode option for each serial port, depending on the feature that you want to use.

- Login: Allows the port to be used to log into the CLI.
- Remote Access: Provides socket level access to ports.
- Application: Provides access to the serial device from Python applications.
- RealPort: Used in conjunction with the Digi RealPort driver. RealPort can also be configured using the Digi Navigator. For more information about configuring RealPort, see Digi Navigator application.
- UDP serial: Provides access to the serial port using UDP.
- Modbus: Allows the device to function as a Modbus protocol gateway.

View serial port information

- Show serial status and statistics
- Log serial port messages

Default serial port configuration

The Connect EZ default serial port configuration is:

- Enabled: **enabled**
- Serial mode: **Remote access**
- Label: **None**
- Baud rate: **9600**
- Data bits: **8**

- Parity: **None**
- Stop bits: **1**
- Flow control: **None**
- Escape sequence: **None**
- History size: 0
- Exclusive access: **disabled**
- Idle timeout: **0 m**

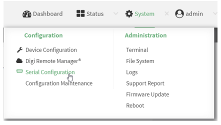
Configure Login mode

Login mode allows the user to log into the device through the serial port.

To change the configuration to match the serial configuration of the device to which you want to connect:

WebUI

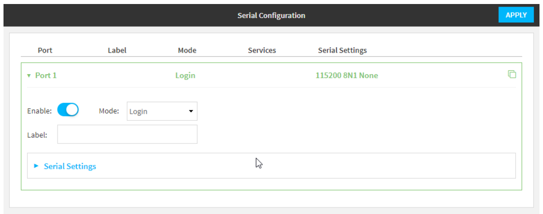
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.



The **Serial Configuration** page is displayed.

> **Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.



Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

Enable: ●

Mode: Login

Label:

The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **Login**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:

- **RS-232**
    - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
    - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
    - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
- **RS-422**
    - Enable **Termination** if you want to enable electrical termination on this serial port.
- **RS-485**
    - Enable **Termination** if you want to enable electrical termination on this serial port.
    - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

The default is **RS-232**.

8. Expand **Serial Settings**.

   The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

   a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.

   b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

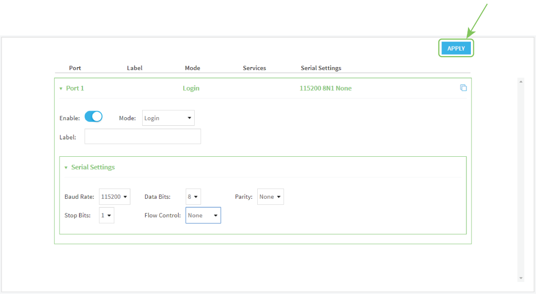
   c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

   d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

   e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

9. Click **Apply** to save the configuration and apply the change.

   The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port 1 Login 115200 8N1 None

Enable: ● Mode: Login
Label:

Baud Rate: 115200 Data Bits: 8 Parity: None
Stop Bits: 1 Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. The serial port is enabled by default. To disable:

   ```
   (config)> serial port1 enable false
   (config)>
   ```

4. Set the mode:

   ```
   (config)> serial port1 mode login
   (config)>
   ```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

   ```
   (config)> serial port1 altpin true
   (config)>
   ```

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6. - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

       ```
       (config)> serial port1 rts_toggle true
       (config)>
       ```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

       ```
       (config)> serial port1 "rts_pre_delay value
       (config)>
       ```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

       ```
       (config)> serial port1 rts_post_delay value
       (config)>
       ```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.

- **rs-485**
    - Enable **termination** if you want to enable electrical termination on this serial port:

      ```
      (config)> serial port1 termination true
      (config)>
      ```

    - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

      ```
      (config)> serial port1 full_duplex true
      (config)>
      ```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

   ```
   (config)>path-paramlabel label
   (config)>
   ```

8. Set the baud rate used by the device to which you want to connect:

   ```
   (config)>path-parambaudrate rate
   (config)>
   ```

9. Set the number of data bits used by the device to which you want to connect:

   ```
   (config)>path-paramdatabits bits
   (config)>
   ```

10. Set the type of parity used by the device to which you want to connect:

    ```
    (config)>path-paramparity parity
    (config)>
    ```

    Allowed values are:

    - **even**
    - **odd**
    - **none**

    The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

    ```
    (config)>path-paramstopbits bits
    (config)>
    ```

12. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

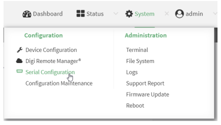
Configure Remote Access mode

Remote Access mode allows for remote access to another device that is connected to the serial port.

To change the configuration to match the serial configuration of the device to which you want to connect:

WebUI

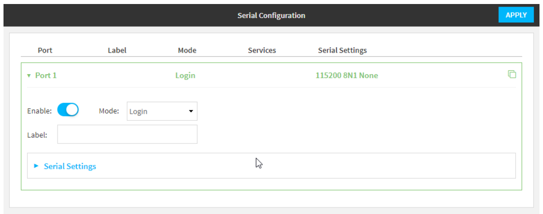
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

   The **Serial Configuration** page is displayed.

   > **Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.

   Serial Configuration

Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

   Enable: ● Mode: Login

   Label:

   ▸ Serial Settings

   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Remote Access**. This is the default.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.

        - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
    - **RS-422**
        - Enable **Termination** if you want to enable electrical termination on this serial port.
    - **RS-485**
        - Enable **Termination** if you want to enable electrical termination on this serial port.
        - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

    The default is **RS-232**.

8. Expand **Serial Settings**.

    The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

    a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.

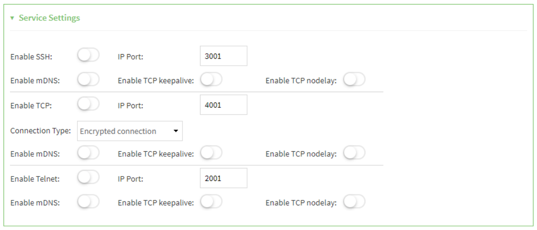
    b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

    c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

    d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

    e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
9. Click **Enable** to enable the data framing feature.
10. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.
11. For **Idle Time**, enter the length of time the device should wait before sending the packet.
12. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.
13. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.
14. Expand **Service Settings**.

    All service settings are disabled by default. Click available options to toggle them to enabled, and set the IP ports as appropriate.



Enable SSH: ○ IP Port: 3001
Enable mDNS: ○ Enable TCP keepalive: ○ Enable TCP nodelay: ○

Enable TCP: ○ IP Port: 4001
Connection Type: Encrypted connection
Enable mDNS: ○ Enable TCP keepalive: ○ Enable TCP nodelay: ○

Enable Telnet: ○ IP Port: 2001
Enable mDNS: ○ Enable TCP keepalive: ○ Enable TCP nodelay: ○

15. Expand **Autoconnect Settings**.

a. Click **Enable** to enable the autoconnect feature.

b. For **Connection Trigger**, select the option that describes the type of event that should trigger the connection.

c. For **Outbound Connection Type**, select the option that describes the method used to initiate the connection.

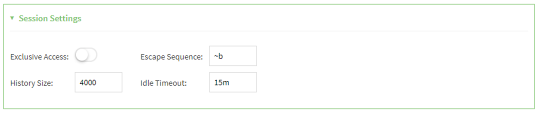
d. For **Destination**, enter the host name or IP address of the remote server. When using SSH, this should be prefixed with the user name and followed by @.

e. For **IP Port**, enter the TCP port of the remote server (1-65535).

f. Click **Enable TCP keepalive** to enable TCP keepalive on the connection.

g. Click **Enable TCP nodelay** to enable TCP nodelay on the connection.

16. Expand **Session Settings**.



▾ Session Settings

Exclusive Access: ○

Escape Sequence: ~b

History Size: 4000

Idle Timeout: 15m

a. Enable **Exclusive access** to limit access to the serial port to a single active session.

b. For **Escape sequence**, type the characters used to start an escape sequence. If no characters are defined, the escape sequence is disabled. The default is **~b**.

c. For **History size**, type or select the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port. The default is **4000** bytes.

d. For **Idle timeout**, type the amount of time to wait before disconnecting due to user inactivity.

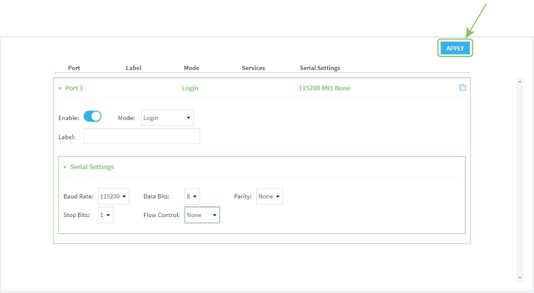
17. Expand **Monitor Settings**.

a. Enable **CTS** to monitor CTS (Clear to Send) changes on this port.

b. Enable **DCD** to monitor DCD (Data Carrier Detect) changes on this port.

18. Click **Apply** to save the configuration and apply the change.

The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

Enable: ●

Mode: Login

Label:

▾ Serial Settings

Baud Rate: 115200

Data Bits: 8

Parity: None

Stop Bits: 1

Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. The serial port is enabled by default. To disable:

   ```
   (config)> serial port1 enable false
   (config)>
   ```

4. Set the mode:

   ```
   (config)> serial port1 mode remoteaccess
   (config)>
   ```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

   ```
   (config)> serial port1 altpin true
   (config)>
   ```

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6. - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

       ```
       (config)> serial port1 rts_toggle true
       (config)>
       ```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

       ```
       (config)> serial port1 "rts_pre_delay value
       (config)>
       ```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

       ```
       (config)> serial port1 rts_post_delay value
       (config)>
       ```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **rs-485**
     - Enable **termination** if you want to enable electrical termination on this serial port:

       ```
       (config)> serial port1 termination true
       (config)>
       ```

- Enable **full_duplex** if you want to enable full duplex communication on this serial port:

  ```
  (config)> serial port1 full_duplex true
  (config)>
  ```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

   ```
   (config)>path-paramlabel label
   (config)>
   ```

8. Set the baud rate used by the device to which you want to connect:

   ```
   (config)>path-parambaudrate rate
   (config)>
   ```

9. Set the number of data bits used by the device to which you want to connect:

   ```
   (config)>path-paramdatabits bits
   (config)>
   ```

10. Set the type of parity used by the device to which you want to connect:

    ```
    (config)>path-paramparity parity
    (config)>
    ```

    Allowed values are:

    - **even**
    - **odd**
    - **none**

    The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

    ```
    (config)>path-paramstopbits bits
    (config)>
    ```

12. Configure the session settings.

    a. Set the characters used to start an escape sequence:

    ```
    (config)>path-paramescape string
    (config)
    ```

    If no characters are defined, the escape sequence is disabled. The default is **~b**.

    b. Limit access to the serial port to a single active session:

    ```
    (config)>path-paramexclusive true
    (config)
    ```

    c. Set the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port.

```
(config)>path-paramhistory bytes
(config)
```

The default is **4000** bytes.

d. Set the amount of time to wait before disconnecting due to user inactivity:

```
(config)>path-paramidle_timeout value
(config)
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)>path-paramidle_timeout 600s
(config)
```

The default is **15m**.

13. Configure monitor settings.

a. (Optional) Enable monitoring of CTS (Clear to Send) changes on this port:

```
(config)>path-parammonitor cts true
(config)
```

b. (Optional) Enable monitoring of DCD (Data Carrier Detect) changes on this port:

```
(config)>path-parammonitor dcd true
(config)
```

14. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

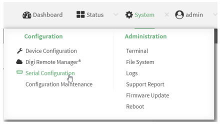
Configure Application mode

Application mode provides access to the serial device from Python applications.

To change the configuration to match the serial configuration of the device to which you want to connect:

☰ **WebUI**

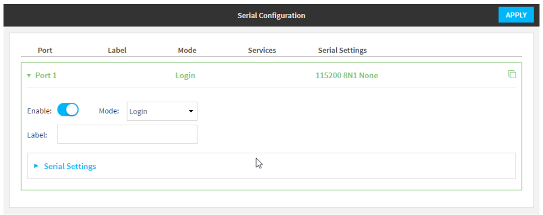
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

   The **Serial Configuration** page is displayed.

   Note You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.

Port	Label	Mode	Services	Serial Settings
Port 1		Login		115200 8N1 None

   Enable: ●
   Mode: Login
   Label:

   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Application**. The default is **Login**.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

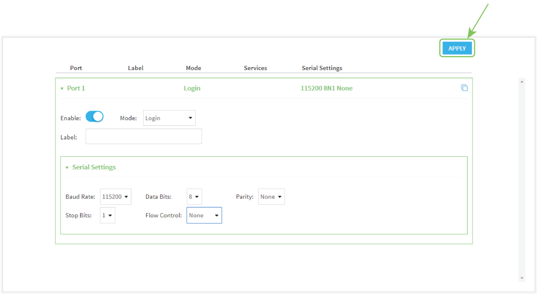
   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.

8. Click **Apply** to save the configuration and apply the change.

   The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port 1 Login 115200 8N1 None

Enable: ● Mode: Login
Label:

Serial Settings

Baud Rate: 115200 Data Bits: 8 Parity: None
Stop Bits: 1 Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode application
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

```
(config)> serial port1 altpin true
(config)>
```

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6. - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

        - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

          ```
          (config)> serial port1 "rts_pre_delay value
          (config)>
          ```

        - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

          ```
          (config)> serial port1 rts_post_delay value
          (config)>
          ```

    - **rs-422**
        - Enable **Termination** if you want to enable electrical termination on this serial port.
    - **rs-485**
        - Enable **termination** if you want to enable electrical termination on this serial port:

          ```
          (config)> serial port1 termination true
          (config)>
          ```

        - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

          ```
          (config)> serial port1 full_duplex true
          (config)>
          ```

    The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

   ```
   (config)>path-paramlabel label
   (config)>
   ```

8. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure RealPort mode

You can configure the Connect EZ to communicate with your computer using RealPort.

Note If you are using the Windows OS, you can also enable and configure RealPort mode for the Connect EZ device and your computer from the **Digi Navigator**. See Digi Navigator application.

Step 1: Install Realport

You can install RealPort on a computer with either a Windows OS or a Linux OS.

- **Windows**: For the Windows installation process, see Install RealPort on a Windows computer.
- **Linux**: For the Linux installation process, refer to the Get started: Install RealPort for LINUX in the **RealPort Installation User's Guide**.

Step 2: Configure the serial ports for RealPort mode

You should perform this process on each of the serial ports on the device. See Configure the serial port for RealPort mode.

Step 3: Configure the RealPort service

To complete RealPort configuration on the Connect EZ, you must enable and configure the RealPort service. See Configure the RealPort service.

Install RealPort on a Windows computer

You must download and run the RealPort utility.

Step 1: Download and run Digi Device Discovery Utility

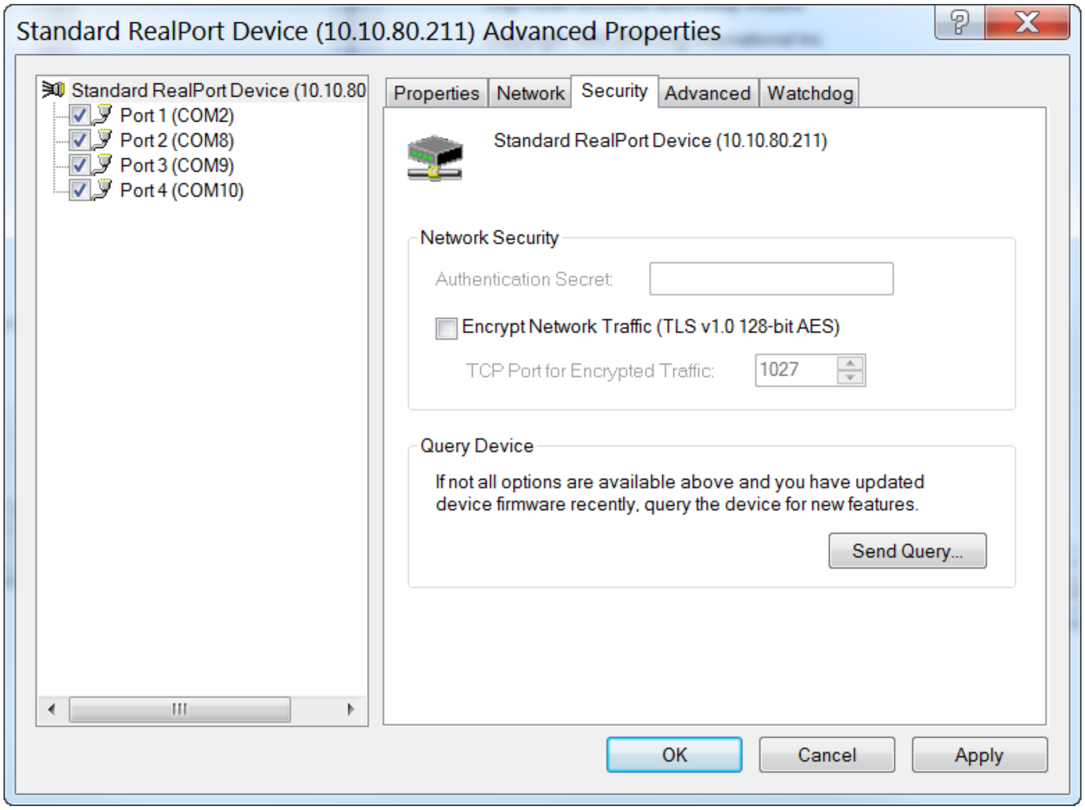
1. Navigate to www.digi.com/support/realport.
2. From the **Operating System Specific Drivers** list box, select the appropriate Microsoft Windows option. A list of driver options appears.
3. Click the desired **RealPort for Windows** version. The file is downloaded, and a Windows Explorer window launches, showing the RealPort files.
4. When the download is complete, open the .zip file and click the **setup.exe** file. The **Digi RealPort Setup Wizard** appears.
5. Select **Add a New Device**.
6. Follow the steps in the wizard to install RealPort.
7. Click **Finish** to close the wizard.

Step 2: Configure Encrypted RealPort

Encrypted RealPort is a security feature that maintains data integrity. It prevents unauthorized changes in data, including intentional destruction or alteration, tampering, duplication, or accidental loss. Encrypted RealPort also prevents disclosure to unauthorized individuals or processes. If your data is sensitive, Encrypted RealPort is strongly recommended.

To implement Encrypted RealPort:

1. Follow the standard Windows process to access the **Device Manager** from your computer's operating system.
2. Select **Multi-port Serial Adapters**.
3. Right-click on your device. Click the **Properties** menu option. The **Properties** dialog appears.
4. Click the **Advanced** tab.
5. Click **Properties**. The **Advanced Properties** dialog appears
6. Click the **Security** tab.



Standard RealPort Device (10.10.80.211) Advanced Properties

Standard RealPort Device (10.10.80.211)

Network Security

Authentication Secret:

□ Encrypt Network Traffic (TLS v1.0 128-bit AES)

TCP Port for Encrypted Traffic: 1027

Query Device

If not all options are available above and you have updated device firmware recently, query the device for new features.

7. Select the **Encrypt Network Traffic** check box to enable encrypted network traffic. When you select this option, the **TCP Port for Encrypted Traffic** field becomes available.
8. The **TCP Port for Encrypted Traffic** field has a default value of **1027**. The entry must match the device's TCP port setting. You can verify the setting on the device using the web interface on the device.
   a. Open browser window.
   b. Enter the IP address in the URL address bar to access the web interface.
   c. Choose **Network > Network Services Settings**.
   d. Select the **Enable Encrypted RealPort** option and verify that the port number is **1027**.
   e. Click **Apply**.
9. Click **OK**.
10. Click **Apply**.

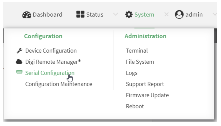
Configure the serial port for RealPort mode

RealPort mode allows you to use Realport.

To change the configuration to match the serial configuration of the device to which you want to connect:

☰ **WebUI**

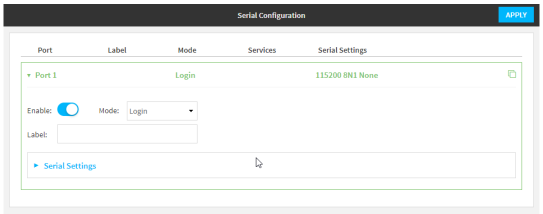
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

   The **Serial Configuration** page is displayed.

   Note You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.

Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

   Enable: ●
   Mode: Login
   Label:

   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **RealPort**.
5. Leave **Sharing Mode** at the default, **None**.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

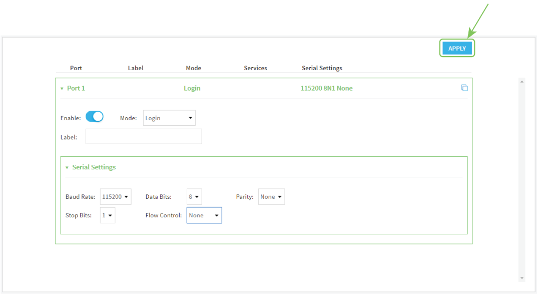
   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.
8. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.

9. Click **Apply** to save the configuration and apply the change.

   The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port 1 Login 115200 8N1 None

Enable: on Mode: Login
Label:

Serial Settings

Baud Rate: 115200 Data Bits: 8 Parity: None
Stop Bits: 1 Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the signal mode:

```
(config)> serial port1 signal mode value
(config)>
```

   where **value** is one of:

   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

- **rs-422**
    - Enable **Termination** if you want to enable electrical termination on this serial port.
- **rs-485**
    - Enable **termination** if you want to enable electrical termination on this serial port:

    ```
    (config)> serial port1 termination true
    (config)>
    ```

    - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

    ```
    (config)> serial port1 full_duplex true
    (config)>
    ```

The default is **rs-232**.

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

    ```
    (config)> serial port1 altpin true
    (config)>
    ```

    This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

    If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6. Set a label that will be used when referring to this port.

    ```
    (config)> serial port1 label label
    (config)>
    ```

7. (Optional) Set a label that will be used when referring to this port.

    ```
    (config)> serial port1 label label
    (config)>
    ```

8. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

9. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the RealPort service

After you have configured RealPort mode on the Connect EZ, you must enable and configure the RealPort service. When this step is complete, all of the serial ports on the Connect EZ are configured to use the RealPort service.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System** > **Configuration** > **Device Configuration**.
3. Expand **Services**.
4. Expand **RealPort**.
5. Click **Enable** to enable the RealPort service.
6. For **RealPort Server Port,** enter **1027**.
7. Enable **Encryption** to enable encryption of data. This is enabled by default.
8. (Optional) For **Shared Secret**, enter the key to ensure secure communication. Leave this field blank to disable authentication.
9. Enable **Exclusive Mode** to ensure that any connection from an IP address is closed when opening a new connection from the same IP address. This disabled by default.
10. Enable **RealPort Keepalive** to send RealPort keepalive packets. This is enabled by default.
11. Enable **TCP Port Keepalive** to send TCP keepalive packets. This is disabled by default.
12. Click **Apply** to save the configuration and apply the change.

    The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.

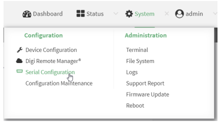
Configure UDP serial mode

The UDP serial mode option in the serial port configuration provides access to the serial port using UDP.

To change the configuration to match the serial configuration of the device to which you want to connect:

WebUI

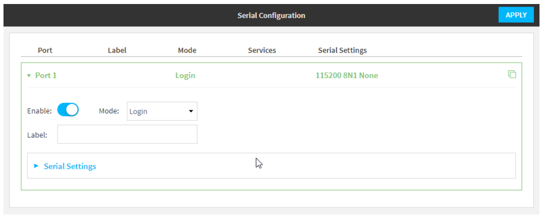
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

   The **Serial Configuration** page is displayed.

   Note You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click to expand the port that you want to configure for UDP serial mode.



Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

Enable: ●
Mode: Login
Label:
▸ Serial Settings

The serial port is enabled by default. To disable, toggle off **Enable**.

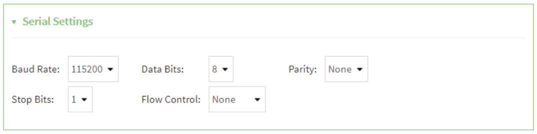
4. For **Mode**, select **UDP serial**.

   The default is **Login**.

5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.

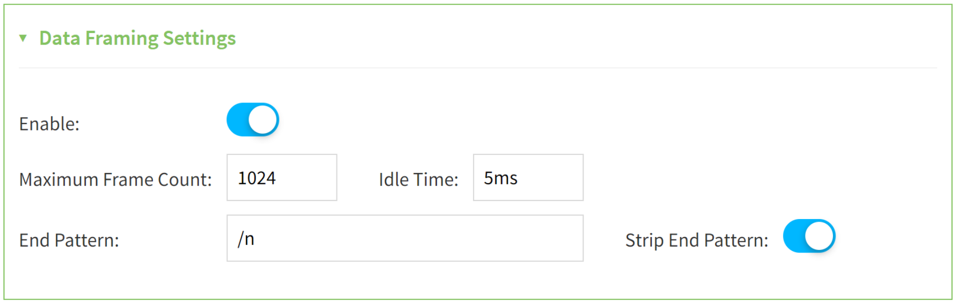
7. Expand **Serial Settings**.



Baud Rate: 115200
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

   a. For **Baud rate**, select the baud rate used by the device to which you want to connect.
   b. For **Data bits**, select the number of data bits used by the device to which you want to connect.
   c. For **Parity**, select the type of parity used by the device to which you want to connect.
   d. For **Stop bits**, select the number of stop bits used by the device to which you want to connect.
   e. For **Flow control**, select the type of flow control used by the device to which you want to connect.

8. Expand **Data Framing Settings**.



Data Framing Settings

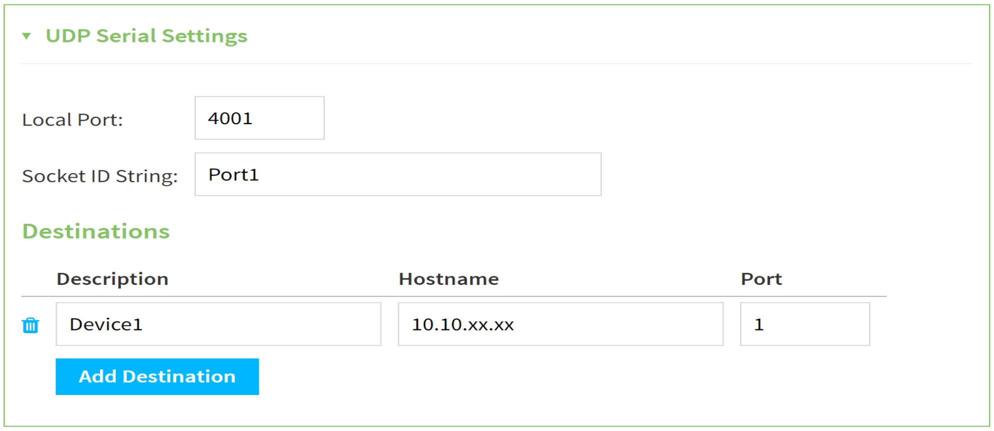
Enable: ●

Maximum Frame Count: 1024 Idle Time: 5ms

End Pattern: /n Strip End Pattern: ●

   a. Click **Enable** to enable the data framing feature.
   b. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.
   c. For **Idle Time**, enter the length of time the device should wait before sending the packet.
   d. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.
   e. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.

9. Expand **UDP Serial Settings**.



UDP Serial Settings

Local Port: 4001

Socket ID String: Port1

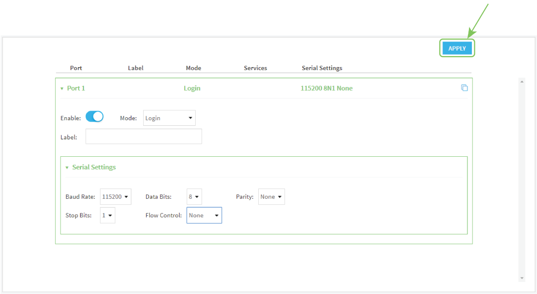
Destinations

Description	Hostname	Port
Device1	10.10.xx.xx	1

   a. For **Local port**, enter the UDP port. The default is 4001 or serial port 1, 4002 for serial port 2, etc.
   b. (Optional) For **Socket String ID**, enter a string that should be added at the beginning of each packet.
   c. For **Destinations**, you can configure the remote sites to which you want to send data. If you do not specify any destinations, the Connect EZ sends new data from the last IP address and port from which data was received. To add a destination:
      i. Click **Add Destination**. A destination row is added.
      ii. (Optional) For **Description**, enter a description of the destination.
      iii. For **Hostname**, enter the host name or IP address of the remote site to which data should be sent.
      iv. For **Port**, enter the port number of the remote site to which data should be sent.

10. Click **Apply** to save the configuration and apply the change.

    The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port Label Mode Services Serial Settings

▾ Port 1 Login 115200 8N1 None

Enable: ● Mode: Login

Label:

▾ Serial Settings

Baud Rate: 115200 Data Bits: 8 Parity: None

Stop Bits: 1 Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode udp
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

```
(config)> serial port1 altpin true
(config)>
```

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6.
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

- For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

  ```
  (config)> serial port1 "rts_pre_delay value
  (config)>
  ```

- For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

  ```
  (config)> serial port1 rts_post_delay value
  (config)>
  ```

- **rs-422**
  - Enable **Termination** if you want to enable electrical termination on this serial port.
- **rs-485**
  - Enable **termination** if you want to enable electrical termination on this serial port:

    ```
    (config)> serial port1 termination true
    (config)>
    ```

  - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

    ```
    (config)> serial port1 full_duplex true
    (config)>
    ```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

   ```
   (config)>serial port1 label label
   (config)>
   ```

8. Set the baud rate used by the device to which you want to connect:

   ```
   (config)>serial port1 label baudrate rate
   (config)>
   ```

9. Set the number of data bits used by the device to which you want to connect:

   ```
   (config)>serial port1 label databits bits
   (config)>
   ```

10. Set the type of parity used by the device to which you want to connect:

    ```
    (config)>serial port1 label parity parity
    (config)>
    ```

    Allowed values are:

    - **even**
    - **odd**
    - **none**

The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

    ```
    (config)>serial port1 label stopbits bits
    (config)>
    ```

12. Set the type of flow control used by the device to which you want to connect:

    ```
    (config)>serial port1 label flow type
    (config)
    ```

    Allowed values are:

    - **none**
    - **rts/cts**
    - **xon/xoff**

    The default is **none**.

13. Enable data framing:

    ```
    (config)>serial port1 framing enable true
    (config)
    ```

14. Set the maximum size of the packet:

    ```
    (config)>serial port1 framing max_count int
    (config)
    ```

    The default is **1024**.

15. Set the length of time the device should wait before sending the packet:

    ```
    (config)>serial port1 framing idle_time value
    (config)
    ```

    where *value* is in milliseconds (ms) or seconds (s). The maximum value is **60s**.

16. Set the end pattern. The packet is sent when this pattern is received from the serial port:

    ```
    (config)>serial port1 framing end_pattern backslash-escaped-string
    (config)
    ```

17. Set the strip end pattern if you want to remove the end pattern from the packet before it is sent:

    ```
    (config)>serial port1 framing strip_pattern true
    (config)
    ```

18. Set the UDP port:

    ```
    (config)> serial port1 udp port port
    (config)>
    ```

    The default is **4001**.

19. (Optional) Enter a string that should be added at the beginning of each packet:

    ```
    (config)> serial port1 udp socketid backslash-escaped-string
    (config)>
    ```

20. Configure the remote sites to which you want to send data. If you do not specify any destinations, the Connect EZ send new data to the last hostname and port from which data was received. To add a destination:

    i. Add a destination:

       ```
       (config)> add serial port1 upd destination end
       (config serial port1 udp destination 0)>
       ```

    ii. (Optional) Enter a description of the destination:

       ```
       (config serial port1 udp destination 0)> description string
       (config serial port1 udp destination 0)>
       ```

    iii. Set the host name or IP address of the remote site to which data should be sent:

       ```
       (config serial port1 udp destination 0)>hostname hostanme-or-IP-address
       (config serial port1 udp destination 0)>
       ```

    iv. Set the port number of the remote site to which data should be sent:

       ```
       (config serial port1 udp destination 0)> port port
       (config serial port1 udp destination 0)>
       ```

21. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

22. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

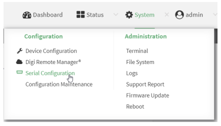
Configure Modbus mode

Modbus mode allows you to use the serial port for Modbus. See Modbus gateway.

To change the configuration to match the serial configuration of the device to which you want to connect:

☰ **WebUI**

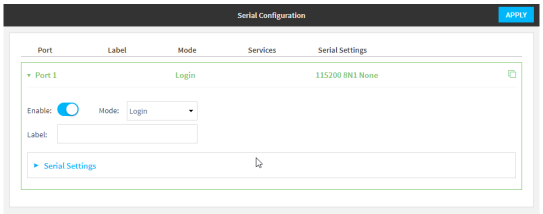
1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

   The **Serial Configuration** page is displayed.

   Note You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.

Port	Label	Mode	Services	Serial Settings
▾ Port 1		Login		115200 8N1 None

   Enable: ●
   Mode: Login
   Label:

   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Modbus**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.
8. Expand **Serial Settings**.

The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.

b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

1. Set the baud rate used by the device to which you want to connect:

```
(config)>path-parambaudrate rate
(config)>
```

2. Set the number of data bits used by the device to which you want to connect:

```
(config)>path-paramdatabits bits
(config)>
```

3. Set the type of parity used by the device to which you want to connect:

```
(config)>path-paramparity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

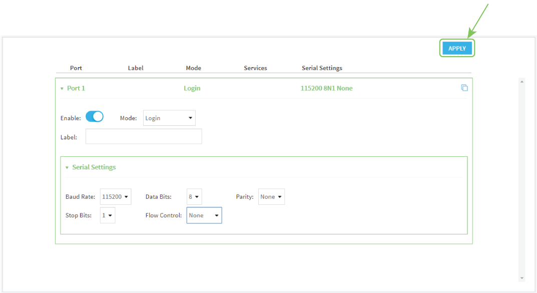
The default is **none**.

4. Set the stop bits used by the device to which you want to connect:

```
(config)>path-paramstopbits bits
(config)>
```

9. Click **Apply** to save the configuration and apply the change.

The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.



Port	Label	Mode	Services	Serial Settings
Port 1		Login		115200 8N1 None

Enable: ● Mode: Login

Label:

Serial Settings

Baud Rate: 115200 Data Bits: 8 Parity: None

Stop Bits: 1 Flow Control: None

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode modbus
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default.

```
(config)> serial port1 altpin true
(config)>
```

   This feature should be enabled when you are using a modem and an 8-pin cable and you need CD (Carrier Detect). When enabled, the DTR on pin 1 drives DCD.

   If altpin is disabled, the hardware signal on RJ45 pin 1 becomes DSR instead of DCD. This alternative can be used if DCD is not required, and DSR is needed instead.

6. ■ **rs-232**

   - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

   - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

- For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

- **rs-422**
    - Enable **Termination** if you want to enable electrical termination on this serial port.
- **rs-485**
    - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

- Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

8. Expand **Serial Settings**.

   The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

   a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.

   b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

   c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

   d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

   e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

1. Set the baud rate used by the device to which you want to connect:

```
(config)>path-parambaudrate rate
(config)>
```

2. Set the number of data bits used by the device to which you want to connect:

```
(config)>path-paramdatabits bits
(config)>
```

3. Set the type of parity used by the device to which you want to connect:

```
(config)>path-paramparity parity
(config)>
```

   Allowed values are:

   - **even**
   - **odd**
   - **none**

   The default is **none**.

4. Set the stop bits used by the device to which you want to connect:

```
(config)>path-paramstopbits bits
(config)>
```

9. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show serial status and statistics

To show the status and statistics for the serial port:

☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **Status**
3. Under **Connections**, click **Serial**.

⌨ Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show serial command:

```
> show serial
```

```
Label      Port   Enable  Mode   Baudrate
--------   -----  ------  -----  --------
Serial 1   port1  true    login  9600
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Log serial port messages

To display and configure the serial port log:

Note You can access this page by clicking the **Log** button in the Serial Status page.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **Status**
3. Under **Connections**, click **Serial**.
4. Click **Log**.

   The **Serial port log** window displays.
5. Click **Start** to start serial port logging.
6. Click **Stop** to stop serial port logging if it has been started.
7. Click **Refresh** to refresh the log display.
8. Click **Download** to download the serial port log.
9. (Optional) For **Log size**, configure the maximum allowed log size for the serial port log. The default is **65536**.

Digi Navigator application

You can use the **Digi Navigator** application with the Connect EZ device to discover device IP addresses, install and configure RealPort, and verify connection to the network.

Before you begin

Your device must be connected to your network or a laptop before you can access the Digi Navigator after it has been installed.

Use the Digi Navigator application features

These features can be performed from the **Digi Navigator**.

- Configure RealPort
- Discover the device's IP address

Install and configure the Digi Navigator application

- Install the Digi Navigator
- Connect to and access the Digi Navigator
- Digi Navigator features
- Discover the IP address when connected to a network
- Discover the IP address when not on a network
- Manage the RealPort device list
- Access the web UI from the Digi Navigator
- Filter devices for display in the Digi Navigator
- Access Digi Remote Manager from the Digi Navigator

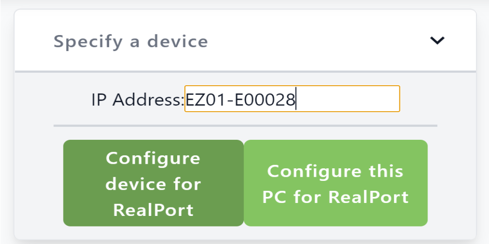
Step 5: Configure RealPort from the Digi Navigator

You can configure the Connect EZ to communicate with your computer using RealPort from the Digi Navigator. You must enable RealPort on the device and then configure your computer for RealPort.

In this step, all serial ports on the device are set to RealPort mode and the RealPort service is enabled. The COM ports on your laptop are also configured.

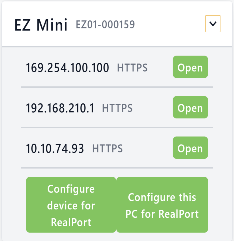
Note You can also configure the device to accept a Realport connection from the web UI on the device. See Configure RealPort mode.

1. Make sure theConnect EZ is powered on and connected to your network or computer.
2. Download and install the **Digi Navigator**.
3. Launch the **Digi Navigator**.
4. Select the device you want to configure using one of the following methods:
   - **Specify a device**: Expand the **Specify a device** section and enter the IP address or host name for the device.



IP Address: EZ01-E00028

   - **Select a device**: From the list of devices shown in the **Digi Navigator**, expand the device that you want to configure.



EZ Mini EZ01-000159

169.254.100.100 HTTPS

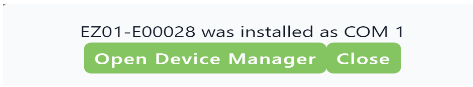
192.168.210.1 HTTPS

10.10.74.93 HTTPS

5. Configure RealPort on the device.
   a. Click the **Configure device for RealPort** button. A login screen displays.
   b. Enter the device's default user name and password in the appropriate fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
   c. Click **Submit**. A progress message displays.
   d. When RealPort configuration is complete, the **Success** message displays.

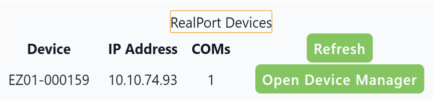
Success

   e. Click **Close** to close the message.
6. Configure RealPort on your computer.
   a. Click **Configure this PC for RealPort**.
   b. From the **Select starting COM** list box, select the first COM port that should be configured for RealPort. The number of COM ports configured matches the number of serial ports on the Connect EZ device.
   c. Click **Submit**. A series of progress messages displays.
   d. When the configuration is complete, a message displays.



EZ01-E00028 was installed as COM 1

   e. Determine your final step:
      - **Close**: Click **Close** to close the message. Configuration is complete.
      - **Open Device Manager**: Click **Open Device Maanger** if you want to do further configuration to the COM ports. The Windows **Properties** dialog displays.
7. If desired, you can verify the RealPort configuration. See Configure the serial port for RealPort mode and Configure the RealPort service.
8. After RealPort configuration is complete, you can open the Windows **Properties** dialog for the COM ports on your computer that are configured for RealPort from within the **Digi Navigator**.
   a. Launch the **Digi Navigator** if it is not currently open. A list of Connect EZ devices that have RealPort enabled and configured displays in the RealPort Devices section at the bottom of the application screen.
   b. Click **Open Device Manager** to open the Windows **Properties** dialog for the COM ports on your computer that are configured for RealPort. For more information, see Manage the RealPort device list.



RealPort Devices

Device	IP Address	COMs	Refresh
EZ01-000159	10.10.74.93	1	Open Device Manager

NEXT STEP: If you are performing the initial device set-up, proceed to the next step: Step 6: Connect to the web UI and update the Connect EZ firmware.

Step 4: Discover the IP address using the Digi Navigator

You can use the Digi Navigator to quickly discover the IP address for the Connect EZ.

Make sure you have the device powered and connected the device to your network or computer with an Ethernet cable. See Connect to and access the Digi Navigator.

Note If you don't have access to the **Digi Navigator**, you can use a manual method to discover the IP address. See Discover the device's IP address: Additional methods.

1. Download and install the **Digi Navigator**.
2. Launch the **Digi Navigator**.
3. The tool discovers the Connect EZ devices that are powered on and connected to your network. When the process is complete, a list of the devices appears.
   - **Connected to a network**: By default, the HTTPS service is enabled and used to find an IP address for the Connect EZ. Other services can be enabled if needed from the **Filters** section. See Discover the IP address when connected to a network.
   - **Connected directly to a device or on a network with no DHCP server**: In either of these situations, a default IP address is assigned to the device. You can specify the filters used to assign an IP address. See Discover the IP address when not on a network.
4. Expand a device to display the IP address.

NEXT STEP: If you are performing the initial device set-up, you should proceed to the next step after getting the device's IP address: Step 5: Configure RealPort from the Digi Navigator.

Install the Digi Navigator

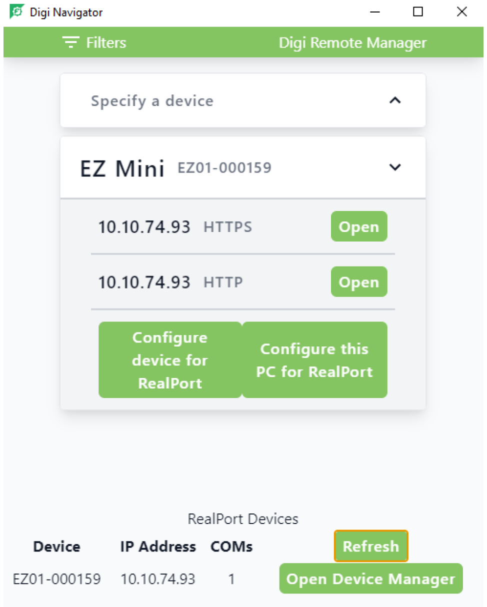
This section explains how to download and install the **Digi Navigator** application.

Note Microsoft Visual C++ must be installed to ensure that Realport can be installed. Microsoft Visual C++ is installed by default during the Digi Navigator install process, if it is not already installed on your computer.

1. Navigate to the Digi Connect EZ drivers support page.
2. Click **Digi Navigator** to start the download.
3. Click the downloaded file to install the tool.
4. If Microsoft Visual C++ is not currently installed on your computer, the installation process for this application begins.
   a. Click **OK** to begin installation.
   b. The Microsoft Visual C++ installation screen closes automatically when installation is complete.
5. Click **Finish** to complete installation of the Digi Navigator.

Digi Navigator features

All features of the Digi Navigator are available from the main application screen.



Device	IP Address	COMs
EZ01-000159	10.10.74.93	1

Section	Description
Green toolbar	From the toolbar at the top of the screen, you can apply filters and access Digi Remote Manager. **Filters**: Click **Filters** to expand the filters section and apply Device Filters, Service Filters, and Default IP Filters. Click **Filters** again to minimize the filters section. **Digi Remote Manager**: Click **Digi Remote Manager** to launch Remote Manager.
Specify a device	Expand the **Specify a device** section to enter the IP address of a Connect EZ device and then configure the device to use RealPort.
Connect EZ device	Expand a device to be able to access the web UI for the device and configure the device to use RealPort. ■ **Access web UI**: Click **Open** to access the web UI for the device. ■ **Configure RealPort**: Click **Configure device for Realport** and **Configure this PC for RealPort** to configure the device to use RealPort.
RealPort Devices	Click **RealPort Devices** at the bottom of the screen to display a list of devices that are configured to use RealPort.

Connect to and access the Digi Navigator

Your device must be connected to your network or a laptop before you can access the Digi Navigator.

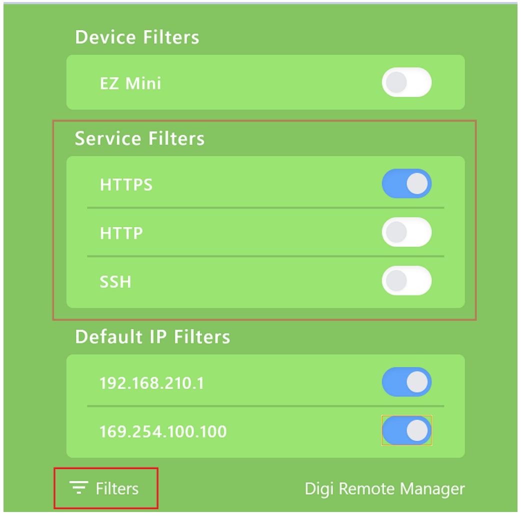
1. Connect a power supply to the device and power it on.
2. Use an Ethernet cable to connect the device to your network or computer.

- If you are connected to a computer, you will need to determine the default IP address.
- If you are connected to your network, the Connect EZ is automatically assigned an IP address.

Discover the IP address when connected to a network

To discover the IP address for a Connect EZ device connected to your network, the Digi Navigator uses the HTTPS service by default. Other services can be used, if needed.

1. Make sure your device is connected to the network and the Digi Navigator is installed.
2. Launch the **Digi Navigator**.
3. Click **Filters** from the green toolbar to expand the toolbar and display the filter options.



Device Filters

EZ Mini ○

Service Filters

HTTPS ●

HTTP ○

SSH ○

Default IP Filters

192.168.210.1 ●

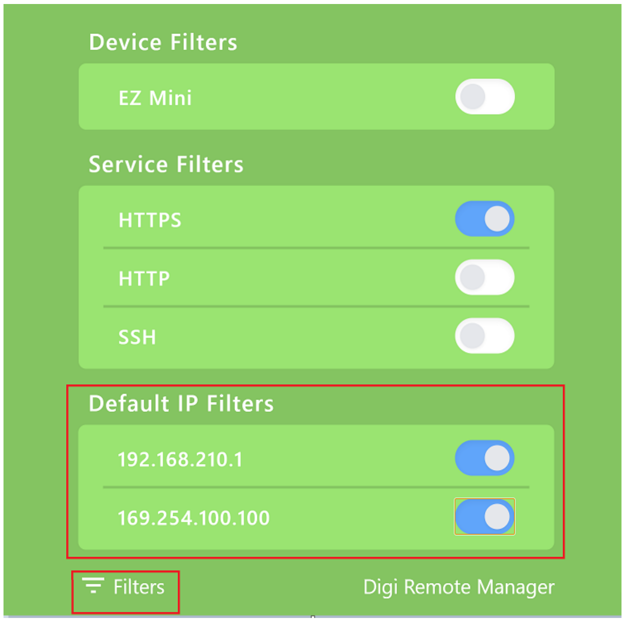
169.254.100.100 ●

4. In the **Services Filters** section, click the enable button to enable the services that you want to use to find an IP address.
5. Click **Filters** at the bottom of the expanded toolbar to minimize the toolbar and hide the filters.

Discover the IP address when not on a network

If the Connect EZ device is directly connected to a computer or connected to a network with no DHCP server, a default IP address is found for the device. You can specify the filters used to find a default IP address.

1. Make sure your device is connected to the network and the Digi Navigator is installed.
2. Launch the **Digi Navigator**.
3. Click **Filters** from the green toolbar to expand the toolbar and display the filter options.



Device Filters

EZ Mini ○

Service Filters

HTTPS ●

HTTP ○

SSH ○

Default IP Filters

192.168.210.1 ●

169.254.100.100 ●

4. In the **Default IP Filters** section, click the enable button to enable the services that you want to use to find an IP address.
5. Click **Filters** at the bottom of the expanded toolbar to minimize the toolbar and hide the filters.

Manage the RealPort device list

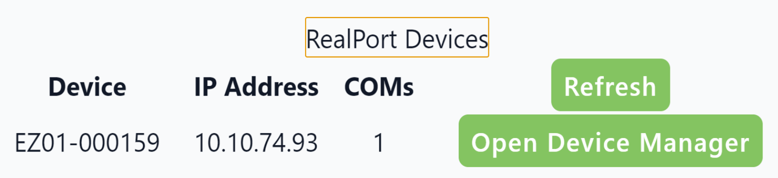
After you have enabled and configured RealPort on at least one Connect EZ device, a list of configured devices displays at the bottom of the **Digi Navigator** application screen. Using the available buttons, you can refresh the list and easily access the COM port configuration on your computer.

Refresh

Click **Refresh** to update the list of Connect EZ devices that have RealPort enabled and configured.

Open Device Manager

Click **Open Device Manager** to open the Windows **Properties** dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device.



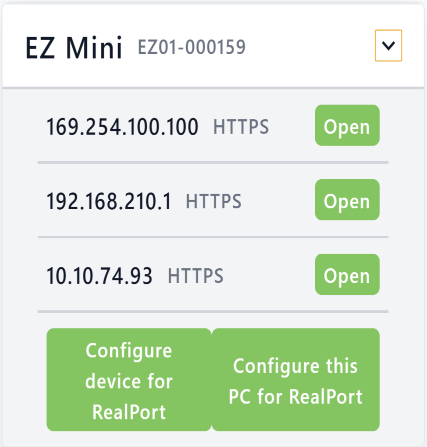
RealPort Devices

Device	IP Address	COMs
EZ01-000159	10.10.74.93	1

Access the web UI from the Digi Navigator

You can access the web user interface for the device from the Digi Navigator.

1. Make sure you have the device powered and connected the device to your network or computer with an Ethernet cable. See Connect to and access the Digi Navigator.
2. Launch the **Digi Navigator**.
3. From the list of devices shown in the **Digi Navigator**, expand the device that you want to configure.



EZ Mini EZ01-000159

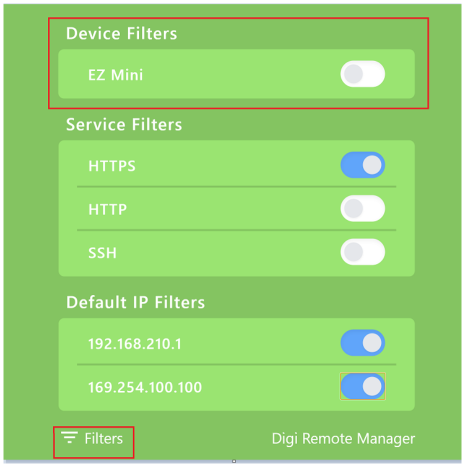
169.254.100.100	HTTPS	Open
192.168.210.1	HTTPS	Open
10.10.74.93	HTTPS	Open

4. Click **Open** next to the IP address you want to use. The login screen for the web UI launches.
   a. Enter the user name and password for the Connect EZ in the **Username** and **Password** fields.
   b. Click **Login**.

Filter devices for display in the Digi Navigator

You can use the Digi Navigator filters to determine the types of Connect EZ devices you want to display. Only the devices that are powered on and connected to your network can be included in the Digi Navigator display.

1. Make sure you have the device powered and connected the device to your network or computer with an Ethernet cable. See Connect to and access the Digi Navigator.
2. Launch the **Digi Navigator**.
3. Click **Filters** from the green toolbar to expand the toolbar and display the filter options.



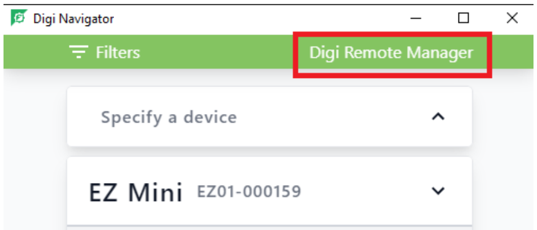
4. In the **Device Filters** section, a list of the Connect EZ types display. All types are disabled by default, and when all are disabled, all types are displayed.
5. To filter the types that are displayed, click the enable slider for the types you want to display. Only the enabled types will display, and all other types remain disabled and do not display.
6. Click **Filters** at the bottom of the expanded toolbar to minimize the toolbar and hide the filters.

Access Digi Remote Manager from the Digi Navigator

You can access Digi Remote Manager from the Digi Navigator. Within the Remote Manager, you can configure and monitor your Connect EZ.

For information about using Digi Remote Manager, refer to the *Digi Remote Manager User Guide*.

1. Make sure you have the device powered and connected the device to your network or computer with an Ethernet cable. See Connect to and access the Digi Navigator.
2. Launch the **Digi Navigator**.
3. Click the **Digi Remote Manager** link in the toolbar.



4. The **Digi Remote Manager** login screen launches.
   a. Enter your Remote Manager user name and password.
   b. Click **Login**.

Virtual Private Networks (VPN)

Virtual Private Networks (VPNs) are used to securely connect two private networks together so that devices can connect from one network to the other using secure channels.

This chapter contains the following topics:

IPsec

IPsec is a suite of protocols for creating a secure communication link—an IPsec tunnel—between a host and a remote IP network or between two IP networks across a public network such as the Internet.

IPsec data protection

IPsec protects the data being sent across a public network by providing the following:

Data origin authentication
Authentication of data to validate the origin of data when it is received.

Data integrity
Authentication of data to ensure it has not been modified during transmission.

Data confidentiality
Encryption of data sent across the IPsec tunnel to ensure that an unauthorized device cannot read the data.

Anti-Replay
Authentication of data to ensure an unauthorized device has not injected it into the IPsec tunnel.

IPsec mode

The Connect EZ supports the **Tunnel** mode. With the **Tunnel** mode, the entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet. **Transport** mode is not currently supported.

IPsec modes

IPsec can run in two different modes: **Tunnel** and **Transport**.

Tunnel
The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.

Transport
Only the payload of the IP packet is encrypted and/or authenticated. The IP header is left untouched. This mode has limitations when using an authentication header, because the IP addresses in the IP header cannot be translated (for example, with Network Address Translation (NAT), as it would invalidate the authentication hash value.

Internet Key Exchange (IKE) settings

IKE is a key management protocol that allows IPsec to negotiate the security associations (SAs) that are used to create the secure IPsec tunnel. Both IKEv1 and IKEv2 are supported.

SA negotiations are performed in two phases, known as **phase 1** and **phase 2**.

Phase 1

In phase 1, IKE creates a secure authenticated communication channel between the device and the peer (the remote device which is at the other end of the IPsec tunnel) using the configured pre-shared key and the Diffie-Hellman key exchange. This creates the IKE SAs that are used to encrypt further IKE communications.

For IKEv1, there are two modes for the phase 1 negotiation: **Main mode** and **Aggressive mode**. IKEv2 does not use these modes.

Main mode
Main mode is the default mode. It is slower than aggressive mode, but more secure, in that all sensitive information sent between the device and its peer is encrypted.

Aggressive mode
Aggressive mode is faster than main mode, but is not as secure as main mode, because the device and its peer exchange their IDs and hash information in clear text instead of being encrypted. Aggressive mode is usually used when one or both of the devices have a dynamic external IP address.

Phase 2

In phase 2, IKE negotiates the SAs for IPsec. This creates two unidirectional SAs, one for each direction. Once the phase 2 negotiation is complete, the IPsec tunnel should be fully functional.

IPsec and IKE renegotiation

To reduce the chances of an IPsec tunnel being compromised, the IPsec SAs and IKE SA are renegotiated at a regular interval. This results in different encryption keys being used in the IPsec tunnel.

Authentication

Client authenticaton

XAUTH (extended authentication) pre-shared key authentication mode provides additional security by using client authentication credentials in addition to the standard pre-shared key. The Connect EZ device can be configured to authenticate with the remote peer as an XAUTH client.

RSA Signatures

With RSA signatures authentication, the Connect EZ device uses a private RSA key to authenticate with a remote peer that is using a corresponding public key.

Certificate-based Authentication

X.509 certificate-based authentication makes use of private keys on both the server and client which are secured and never shared. Both the server and client have a certificate which is generated with their respective private key and signed by a Certificate Authority (CA).

The Connect EZ implementation of IPsec can be configured to use X.509 certificate-based authentication using the private keys and certificates, along with a root CA certificate from the signing authority and, if available, a Certificate Revocation List (CRL).

Configure an IPsec tunnel

Configuring an IPsec tunnel with a remote device involves configuring the following items:

Required configuration items

- **IPsec tunnel configuration items:**
  - The mode: either tunnel or transport.
  - Enable the IPsec tunnel.

    The IPsec tunnel is enabled by default.

  - The firewall zone of the IPsec tunnel.
  - The routing metric for routes associated with this IPsec tunnel.
  - The authentication type and pre-shared key or other applicable keys and certificates.

    If SCEP certificates will be selected as the Authentication type, create the SCEP client prior to configuring the IPsec tunnel. See Configure a Simple Certificate Enrollment Protocol client for instructions.
  - The local endpoint type and ID values, and the remote endpoint host and ID values.
- **IKE configuration items**
  - The IKE version, either IKEv1 or IKEv2.
  - Whether to initiate a key exchange or wait for an incoming request.
  - The IKE mode, either main aggressive.
  - The IKE authentication protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
  - The IKE encryption protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
  - The IKE Diffie-Hellman group to use for the IPsec tunnel negotiation during phase 1 and phase 2.
- Enable dead peer detection and configure the delay and timeout.
- Destination networks that require source NAT.
- Active recovery configuration. See Configure SureLink active recovery for IPsec for information about IPsec active recovery.

Additional configuration items

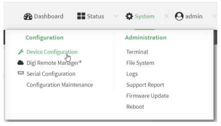
The following additional configuration settings are not typically configured to get an IPsec tunnel working, but can be configured as needed:

- Determine whether the device should use UDP encapsulation even when it does not detect that NAT is being used.
- If using IPsec failover, identify the primary tunnel during configuration of the backup tunnel.
- The Network Address Translation (NAT) keep alive time.
- The protocol, either Encapsulating Security Payload (ESP) or Authentication Header (AH).
- The management priority for the IPsec tunnel interface. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- Enable XAUTH client authentication, and the username and password to be used to authenticate with the remote peer.
- Enable Mode-configuration (MODECFG) to receive configuration information, such as the private IP address, from the remote peer.
- Disable the padding of IKE packets. This should normally not be done except for compatibility purposes.
- Destination networks that require source NAT.
- Depending on your network and firewall configuration, you may need to add a packet filtering rule to allow incoming IPsec traffic.

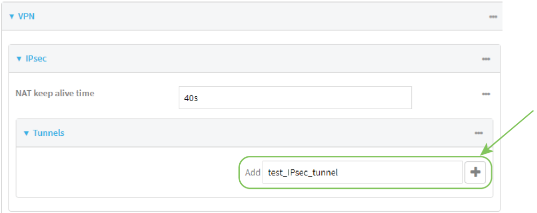
- **Tunnel and key renegotiating**
  - The lifetime of the IPsec tunnel before it is renegotiated.
  - The amount of time before the IKE phase 1 lifetime expires.
  - The amount of time before the IKE phase 2 lifetime expires
  - The lifetime margin, a randomizing amount of time before the IPsec tunnel is renegotiated.

☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



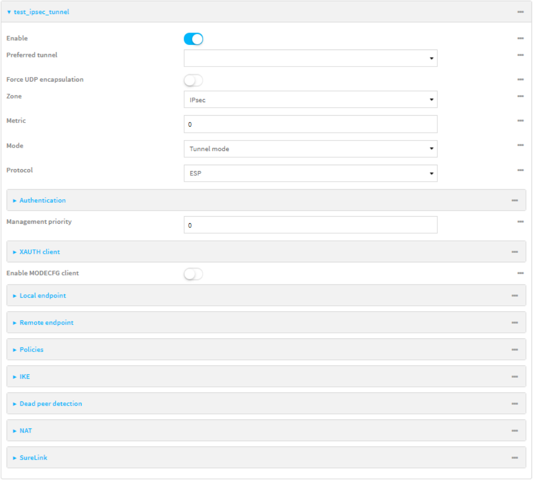
   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec**.
4. Click to expand **Tunnels**.
5. For **Add IPsec tunnel**, type a name for the tunnel and click ✚.



NAT keep alive time: 40s

Add: test_IPsec_tunnel

   The new IPsec tunnel configuration is displayed.



Enable: ●
Preferred tunnel:
Force UDP encapsulation: ○
Zone: IPsec
Metric: 0
Mode: Tunnel mode
Protocol: ESP
Management priority: 0
Enable MODECFG client: ○

6. The IPsec tunnel is enabled by default. To disable, click **Enable**.
7. (Optional) **Preferred tunnel** provides an optional mechanism for IPsec failover behavior. See Configure IPsec failover for more information.

8. (Optional) Enable **Force UDP encapsulation** to force the tunnel to use UDP encapsulation even when it does not detect that NAT is being used.
9. For **Zone**, select the firewall zone for the IPsec tunnel. Generally this should be left at the default of **IPsec**.

Note Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

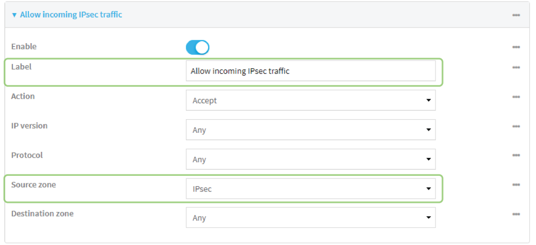
a. Click to expand **Firewall** > **Packet filtering**.

b. For **Add packet filter**, click ✚.

c. For **Label**, type **Allow incoming IPsec traffic**.

d. For **Source zone**, select **IPsec**.

Leave all other fields at their default settings.



▾ Allow incoming IPsec traffic

Enable: ●

Label: Allow incoming IPsec traffic

Action: Accept

IP version: Any

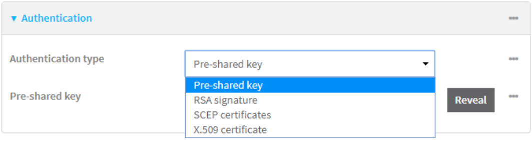
Protocol: Any

Source zone: IPsec

Destination zone: Any

10. For **Metric**, enter or select the priority of routes associated with this IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used.

    The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See Configure IPsec failover for more information.
11. For **Mode**, select **Tunnel mode**. **Transport mode** is not currently supported.
12. Select the Mode, either:
    - **Tunnel mode**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
    - **Transport mode**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.
13. Select the **Protocol**, either:
    - **ESP** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
    - **AH** (Authentication Header): Provides authentication and integrity only.
14. Click to expand **Authentication**.



▾ Authentication

Authentication type: Pre-shared key

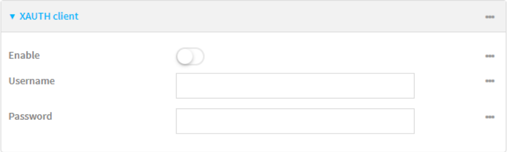
Pre-shared key

a. For **Authentication type**, select one of the following:
   - **Pre-shared key**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
     i. Type the **Pre-shared key**.

- **Asymmetric pre-shared keys**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
    i. For **Local key**, type the local pre-shared key. This must be the same as the remote key on the remote host.
    ii. For **Remote key**, type the remote pre-shared key. This must be the same as the local key on the remote host.
- **RSA signature**: Uses a private RSA key to authenticate with the remote peer.
    i. For **Private key**, paste the device's private RSA key in PEM format.
    ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.
    iii. For **Peer public key**, paste the peer's public RSA key in PEM format.
- **SCEP certificates**: Uses Simple Certificate Enrollment Protocol (SCEP) to download a private key, certificates, and an optional Certificate Revocation List (CRL) to the Connect EZ device from a SCEP server.

  You must create the SCEP client prior to configuring the IPsec tunnel. See Configure a Simple Certificate Enrollment Protocol client for instructions.
    i. For **SCEP Client**, select the SCEP client.
- **X.509 certificate**: Uses private key and X.509 certificates to authenticate with the remote peer.
    i. For **Private key**, paste the device's private RSA key in PEM format.
    ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.
    iii. For **Certificate**, paste the local X.509 certificate in PEM format.
    iv. For Peer verification, select either:
        - **Peer certificate**: For **Peer certificate**, paste the peer's X.509 certificate in PEM format.
        - **Certificate Authority**: For **Certificate Authority chain**, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.

15. (Optional) For **Management Priority**, set the management priority for this IPsec tunnel. A tunnel that is up and has the highest priority will be used for central management and direct device access.
16. (Optional) To configure the device to connect to its remote peer as an XAUTH client:
    a. Click to expand **XAUTH client**.



    b. Click **Enable**.
    c. Type the **Username** and **Password** that the device will use to authenticate as an XAUTH client with the peer.

17. (Optional) Click **Enable MODECFG client** to receive configuration information, such as the private IP address, from the remote peer.
18. Click to expand **Local endpoint**.
    a. For **Type**, select either:
        - **Default route**: Uses the same network interface as the default route.
        - **Interface**: Select the **Interface** to be used as the local endpoint.

    b. Click to expand **ID**.
        i. Select the ID type:
            - **Auto**: The ID will be automatically determined from the value of the tunnels endpoints.
            - **Raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

              For **Raw ID value**, type the ID that will be passed.
            - **Any**: Any ID will be accepted.
            - **IPv4**: The ID will be interpreted as an IP address and sent as an ID_IPV4_ADDR IKE identity.

              For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.
            - **IPv6**: The ID will be interpreted as an IP address and sent as an ID_IPV6_ADDR IKE identity.

              For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.
            - **RFC822/Email**: The ID will be interpreted as an RFC822 (email address).

              For **RFC822 ID value**, type the ID in internet email address format.
            - **FQDN**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

              For **FQDN ID value**, type the ID as an FQDN.
            - **KeyID**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

              For **KEYID ID value**, type the key ID.
            - **MAC address**: The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
            - **Serial number**: The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.
19. Click to expand **Remote endpoint**.
    a. For **IP version**, select either **IPv4** or **IPv6**.

    b. For **Hostname list selection**, select one of the following:
        - **Round robin**: Attempts to connect to hostnames sequentially based on the list order.
        - **Random**: Randomly selects an IPsec peer to connect to from the hostname list.
        - **Priority ordered**: Selects the first hostname in the list that is resolvable.

    c. Click to expand **Hostname**.

        i. Click ✚ next to **Add Hostname**.
        ii. For Hostname, type a hostname or IPv4 address. If your device is not configured to initiate the IPsec connection (see **IKE** > **Initiate connection**), you can also use the keyword **any**, which means that the hostname is dynamic or unknown.
        iii. Click ✚ again to add additional hostnames.
    d. Click to expand **ID**.
        i. Select the ID type:
            - **Auto**: The ID will be automatically determined from the value of the tunnels endpoints.
            - **Raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

              For **Raw ID value**, type the ID that will be passed.
            - **Any**: Any ID will be accepted.
            - **IPv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

              For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.
            - **IPv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

              For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.
            - **RFC822/Email**: The ID will be interpreted as an RFC822 (email address).

              For **RFC822 ID value**, type the ID in internet email address format.
            - **FQDN**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

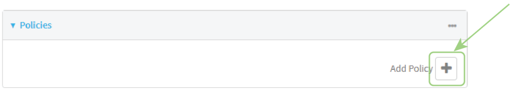
              For **FQDN ID value**, type the ID as an FQDN.
            - **KeyID**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

              For **KEYID ID value**, type the key ID.
            - **MAC address**: The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
            - **Serial number**: The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.

20. Click to expand **Policies**.

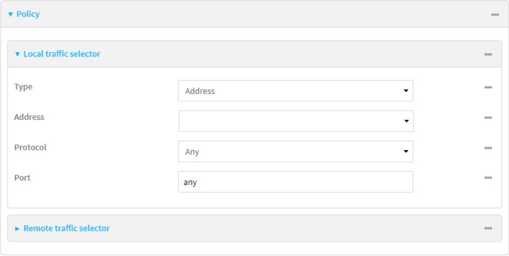
    Policies define the network traffic that will be encapsulated by this tunnel.

    a. Click ✚ to create a new policy.



The new policy configuration is displayed.

b. Click to expand **Local traffic selector**.



Type: Address
Address:
Protocol: Any
Port: any

c. For **Type**, select one of the following:
   - **Address**: The address of a local network interface.

     For **Address**, select the appropriate interface.
   - **Network**: The subnet of a local network interface.

     For **Address**, select the appropriate interface.
   - **Custom network**: A user-defined network.

     For **Custom network**, enter the IPv4 address and optional netmask.
   - **Request a network**: Requests a network from the remote peer.
   - **Dynamic**: Uses the address of the local endpoint.

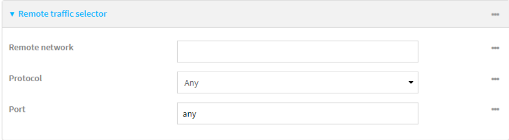
d. For **Protocol**, select one of the following:
   - **Any**: Matches any protocol.
   - **TCP**: Matches TCP protocol only.
   - **UDP**: Matches UDP protocol only.
   - **ICMP**: Matches ICMP requests only.
   - **Other protocol**: Matches an unlisted protocol.

     If **Other protocol** is selected, type the number of the protocol.

e. For **Port**, type the port matching criteria.

   Allowed values are a port number, a range of port numbers, or **any**.

f. (Optional) Click to expand **Remote traffic selector**.



Remote network:
Protocol: Any
Port: any

g. For **Remote network**, enter the IP address and optional netmask of the remote network.

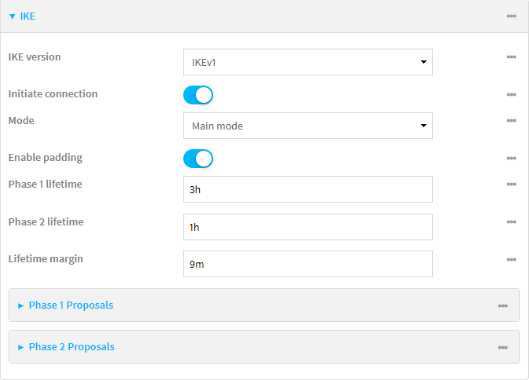
h. For **Protocol**, select one of the following:
   - **Any**: Matches any protocol.
   - **TCP**: Matches TCP protocol only.
   - **UDP**: Matches UDP protocol only.
   - **ICMP**: Matches ICMP requests only.
   - **Other protocol**: Matches an unlisted protocol.

     If **Other protocol** is selected, type the number of the protocol.

   i. For **Port**, type the port matching criteria.

      Allowed values are a port number, a range of port numbers, or **any**.

21. Click to expand **IKE**.



▾ IKE

IKE version: IKEv1

Initiate connection: ●

Mode: Main mode

Enable padding: ●

Phase 1 lifetime: 3h

Phase 2 lifetime: 1h

Lifetime margin: 9m

   a. For **IKE version**, select either IKEv1 or IKEv2. This setting must match the peer's IKE version.
   b. **Initiate connection** instructs the device to initiate the key exchange, rather than waiting for an incoming request. This must be disabled if **Remote endpoint** > **Hostname** is set to **any**.
   c. For **Mode**, select either **Main mode** or **Aggressive mode**.
   d. For **IKE fragmentation**, select one of the following:
      - **If supported by the peer**: Send oversized IKE messages in fragments, if the peer supports receiving them.
      - **Always**: Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **If supported by the peer**.
      - **Never**: Do not send oversized IKE messages in fragments.
      - **Accept**: Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

      The default is **Always**.
   e. For **Enable padding**, click to disable the padding of IKE packets. This should normally not be disabled except for compatibility purposes.
   f. For Phase 1 lifetime, enter the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

      For example, to set **Phase 1 lifetime** to ten minutes, enter **10m** or **600s**.
   g. For Phase 2 lifetime, enter the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

      For example, to set **Phase 2 lifetime** to ten minutes, enter **10m** or **600s**.

h. For Lifetime margin, enter a randomizing amount of time before the IPsec tunnel is renegotiated.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Lifetime margin** to ten minutes, enter **10m** or **600s**.

i. Click to expand **Phase 1 Proposals**.

  i. Click ✚ to create a new phase 1 proposal.

  ii. For **Cipher**, select the type of encryption.

  iii. For **Hash**, select the type of hash to use to verify communication integrity.

  iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.

  v. You can add additional Phase 1 proposals by clicking ✚ next to **Add Phase 1 Proposal**.

j. Click to expand **Phase 2 Proposals**.

  i. Click ✚ to create a new phase 2 proposal.

  ii. For **Cipher**, select the type of encryption.

  iii. For **Hash**, select the type of hash to use to verify communication integrity.

  iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.

  v. You can add additional Phase 2 proposals by clicking ✚ next to **Add Phase 2 Proposal**.

22. (Optional) Click to expand **Dead peer detection**. Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically restarted when failure occurs.

  a. To enable or disable dead peer detection, click **Enable**.

  b. For **Delay**, type the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle.

  c. For **Timeout**, type the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed.

23. (Optional) Click to expand **NAT** to create a list of destination networks that require source NAT.

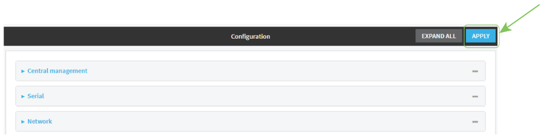
  a. Click ✚ next to **Add NAT destination**.

  b. For **Destination network**, type the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.

24. See Configure SureLink active recovery for IPsec for information about IPsec **Active recovery**.

25. (Optional) Click **Advanced** to set various IPsec-related time out, keep alive, and related values.

26. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel. For example, to add an IPsec tunnel named **ipsec_example**:

```
(config)> add vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

   The IPsec tunnel is enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example)> enable false
(config vpn ipsec tunnel ipsec_example)>
```

4. (Optional) Set the tunnel to use UDP encapsulation even when it does not detect that NAT is being used:

```
(config vpn ipsec tunnel ipsec_example)> force_udp_encap true
(config vpn ipsec tunnel ipsec_example)>
```

5. Set the firewall zone for the IPsec tunnel. Generally this should be left at the default of **ipsec**.

```
(config vpn ipsec tunnel ipsec_example)> zone zone
(config vpn ipsec tunnel ipsec_example)>
```

   To view a list of available zones:

```
(config vpn ipsec tunnel ipsec_example)> zone ?

Zone: The firewall zone assigned to this IPsec tunnel. This can be used
by packet filtering rules
and access control lists to restrict network traffic on this tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Default value: ipsec
Current value: ipsec

(config vpn ipsec tunnel ipsec_example)>
```

Note Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

a. Type **...** to move to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example)> ...
(config)>
```

b. Add a packet filter:

```
(config)> add firewall filter end
(config firewall filter 2)>
```

c. Set the label to **Allow incoming IPsec traffic**:

```
(config config firewall filter 2)> label "Allow incoming IPsec
traffic"
(config firewall filter 2)>
```

d. Set the source zone to **ipsec**:

```
(config config firewall filter 2)> src_zone ipsec
(config firewall filter 2)>
```

6. Set the metric for the IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used. The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See Configure IPsec failover for more information.

```
(config vpn ipsec tunnel ipsec_example)> metric value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any integer between **0** and **65535**.

7. Set the mode:

```
(config vpn ipsec tunnel ipsec_example)> mode mode
(config vpn ipsec tunnel ipsec_example)>
```

where *mode* is either:

- **tunnel**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
- **transport**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.

The default is **tunnel**.

8. Set the protocol:

```
(config vpn ipsec tunnel ipsec_example)> type protocol
(config vpn ipsec tunnel ipsec_example)>
```

where *protocol* is either:

- **esp** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
- **ah** (Authentication Header): Provides authentication and integrity only.

The default is **esp**.

9. (Optional) Set the management priority for this IPsec tunnel:

```
(config vpn ipsec tunnel ipsec_example)> mgmt value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any interger between **0** and **1000**.

10. Set the authentication type:

```
(config vpn ipsec tunnel ipsec_example)> auth type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **secret**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
  a. Set the pre-shared key:

```
(config vpn ipsec tunnel ipsec_example)> auth secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **asymmetric-secrets**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
  a. Set the local pre-shared key. This must be the same as the remote key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth local_secret key
(config vpn ipsec tunnel ipsec_example)>
```

  b. Set the remote pre-shared key. This must be the same as the local key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth remote_secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **rsasig**: Uses a private RSA key to authenticate with the remote peer.
  a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth private_key key
(config vpn ipsec tunnel ipsec_example)>
```

  b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

```
(config vpn ipsec tunnel ipsec_example)> auth private_key_
passphrase passphrase
(config vpn ipsec tunnel ipsec_example)>
```

  c. For the **peer_public_key** parameter, paste the peer's public RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_public_key
key
(config vpn ipsec tunnel ipsec_example)>
```

- **x509**: Uses private key and X.509 certificates to authenticate with the remote peer.

  a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

  ```
  (config vpn ipsec tunnel ipsec_example)> auth private_key key
  (config vpn ipsec tunnel ipsec_example)>
  ```

  b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

  ```
  (config vpn ipsec tunnel ipsec_example)> auth private_key_
  passphrase passphrase
  (config vpn ipsec tunnel ipsec_example)>
  ```

  c. For the **cert** parameter, paste the local X.509 certificate in PEM format:

  ```
  (config vpn ipsec tunnel ipsec_example)> auth cert certificate
  (config vpn ipsec tunnel ipsec_example)>
  ```

  d. Set the method for verifying the peer's X.509 certificate:

  ```
  (config vpn ipsec tunnel ipsec_example)> auth peer_verify value
  (config vpn ipsec tunnel ipsec_example)>
  ```

  where *value* is either:

  - **cert**: Uses the peer's X.509 certificate in PEM format for verification.
    - For the **peer_cert** parameter, paste the peer's X.509 certificate in PEM format:

      ```
      (config vpn ipsec tunnel ipsec_example)> auth peer_cert
      certificate
      (config vpn ipsec tunnel ipsec_example)>
      ```

  - **ca**: Uses the Certificate Authority chain for verification.
    - For the **ca_cert** parameter, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.

      ```
      (config vpn ipsec tunnel ipsec_example)> auth ca_cert cert_
      chain
      (config vpn ipsec tunnel ipsec_example)>
      ```

11. (Optional) Configure the device to connect to its remote peer as an XAUTH client:

    a. Enable XAUTH client functionality:

    ```
    (config vpn ipsec tunnel ipsec_example)> xauth_client enable true
    (config vpn ipsec tunnel ipsec_example)>
    ```

b. Set the XAUTH client username:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client username name
(config vpn ipsec tunnel ipsec_example)>
```

c. Set the XAUTH client password:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client password pwd
(config vpn ipsec tunnel ipsec_example)>
```

12. (Optional) Enable MODECFG client functionality:

    MODECFG client functionality configures the device to receive configuration information, such as the private IP address, from the remote peer.

    a. Enable MODECFG client functionality:

```
(config vpn ipsec tunnel ipsec_example)> modecfg_client enable true
(config vpn ipsec tunnel ipsec_example)>
```

13. Configure the local endpoint:

    a. Set the method for determining the local network interface:

```
(config vpn ipsec tunnel ipsec_example)> local type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is either:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**: Select the **Interface** to be used as the local endpoint.

b. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> local id type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **auto**: The ID will be automatically determined from the value of the tunnels endpoints.
- **raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

  Set the unmodified ID that will be passed:

```
(config vpn ipsec tunnel ipsec_example)> local id type raw_id id
(config vpn ipsec tunnel ipsec_example)>
```

- **any**: Any ID will be accepted.
- **ipv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

  Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

```
(config vpn ipsec tunnel ipsec_example)> local id type ipv4_id
id
(config vpn ipsec tunnel ipsec_example)>
```

- **ipv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

  Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

```
(config vpn ipsec tunnel ipsec_example)> local id type ipv6_id
id
(config vpn ipsec tunnel ipsec_example)>
```

- **rfc822**: The ID will be interpreted as an RFC822 (email address).

  Set the ID in internet email address format:

```
(config vpn ipsec tunnel ipsec_example)> local id type rfc822_id
id
(config vpn ipsec tunnel ipsec_example)>
```

- **fqdn**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
- **keyid**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  Set the key ID:

```
(config vpn ipsec tunnel ipsec_example)> local id type keyid_id
id
(config vpn ipsec tunnel ipsec_example)>
```

- **mac_address**: The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.
- **serial_number**: The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

14. Configure the remote endpoint:

    a. Add a remote hostname:

```
(config vpn ipsec tunnel ipsec_example)> add remote hostname end value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is the hostname or IPv4 address of the IPsec peer. If your device is not configured to initiate the IPsec connection (see ike initiate), you can also use the keyword **any**, which means that the hostname is dynamic or unknown.

Repeat for additional hostnames.

    b. Set the hostname selection type:

```
(config vpn ipsec tunnel ipsec_example)> remote hostname_selection
value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **round_robin**: Attempts to connect to hostnames sequentially based on the list order.
- **random**: Randomly selects an IPsec peer to connect to from the hostname list.
- **priority**: Selects the first hostname in the list that is resolvable.

c. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> remote id type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **auto**: The ID will be automatically determined from the value of the tunnels endpoints.
- **raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

  Set the unmodified ID that will be passed:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type raw_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **any**: Any ID will be accepted.
- **ipv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

  Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type ipv4_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **ipv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

  Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type ipv6_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **rfc822**: The ID will be interpreted as an RFC822 (email address).

  Set the ID in internet email address format:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type rfc822_
  id id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **fqdn**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

- **keyid**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  Set the key ID:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type keyid_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **mac_address**: The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.
- **serial_number**: The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

15. Configure IKE settings:

    a. Set the IKE version:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike version value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is either **ikev1** or **ikev2**. This setting must match the peer's IKE version.

    b. Determine whether the device should initiate the key exchange, rather than waiting for an incoming request. By default, the device will initiate the key exchange. This must be disabled if remote hostname is set to **any**. To disable:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike initiate false
    (config vpn ipsec tunnel ipsec_example)>
    ```

    c. Set the IKE phase 1 mode:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike mode value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is either **aggressive** or **main**.

    d. Set the IKE fragmentation:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike fragmentation value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is one of:

    - **if_supported**: Send oversized IKE messages in fragments, if the peer supports receiving them.
    - **always**: Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **if supported**.
    - **never**: Do not send oversized IKE messages in fragments.
    - **accept**: Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

    The default is **always**.

    e. Padding of IKE packets is enabled by default and should normally not be disabled except for compatibility purposes. To disable:

```
(config vpn ipsec tunnel ipsec_example)> ike pad false
(config vpn ipsec tunnel ipsec_example)>
```

f. Set the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **phase1_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is three hours.

g. Set the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **phase2_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is one hour.

h. Set a randomizing amount of time before the IPsec tunnel is renegotiated:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **lifetime_margin** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is nine minutes.

i. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 1:

i. Add a phase 1 proposal:

```
(config vpn ipsec tunnel ipsec_example)> add ike phase1_proposal
end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

ii. Set the type of encryption to use during phase 1:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
cipher value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

where *value* is one of **3des**, **aes128**, **aes192**, **aes256**, or **null**. The default is **3des**.

iii. Set the type of hash to use during phase 1 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
hash value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

where *value* is one of **md5**, **sha1**, **sha256**, **sha384**, or **sha512**. The default is **sha1**.

iv. Set the type of Diffie-Hellman group to use for key exchange during phase 1:

i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
dh_group ?
curve25519
curve448
ecp192
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
dh_group value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

The default is **modp2048**.

v. (Optional) Add additional phase 1 proposals:

i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
..
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)>
```

ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)>
add end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

iii. Repeat to add more phase 1 proposals.

j. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 2:

  i. Move back two levels in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> ..
..
(config vpn ipsec tunnel ipsec_example ike)>
```

  ii. Add a phase 2 proposal:

```
(config vpn ipsec tunnel ipsec_example ike)> add ike phase2_
proposal end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

  iii. Set the type of encryption to use during phase 2:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
cipher value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

  where *value* is one of **3des**, **aes128**, **aes192**, **aes256**, or **null**. The default is **3des**.

  iv. Set the type of hash to use during phase 2 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
hash value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

  where *value* is one of **md5**, **sha1**, **sha256**, **sha384**, or **sha512**. The default is **sha1**.

  v. Set the type of Diffie-Hellman group to use for key exchange during phase 2:

    i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
dh_group ?
curve25519
curve448
ecp192
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

    ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
dh_group value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

  The default is **modp2048**.

  vi. (Optional) Add additional phase 2 proposals:

i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
..
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)>
```

ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)>
add end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

iii. Repeat to add more phase 2 proposals.

16. (Optional) Configure dead peer detection:

    Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically restarted when failure occurs.

    a. Change to the root of the configuration schema:

    ```
    (config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> ...
    (config)>
    ```

    b. To disable dead peer detection:

    ```
    (config)> vpn ipsec tunnel ipsec_example dpd enable false
    (config)>
    ```

    c. Set the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle. The default is **60**.

    ```
    (config)> vpn ipsec tunnel ipsec_example dpd delay value
    (config)>
    ```

    d. Set the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed. The default is **90**.

    ```
    (config)> vpn ipsec tunnel ipsec_example dpd timeout value
    (config)>
    ```

17. (Optional) Create a list of destination networks that require source NAT:

    a. Add a destination network:

    ```
    (config)> add vpn ipsec tunnel ipsec_example nat end
    (config vpn ipsec tunnel ipsec_example nat 0)>
    ```

    b. Set the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.

```
(config vpn ipsec tunnel ipsec_example nat 0)> dst value
(config vpn ipsec tunnel ipsec_example nat 0)>
```

18. Configure policies that define the network traffic that will be encapsulated by this tunnel:
    a. Change to the root of the configuration schema:

    ```
    (config vpn ipsec tunnel ipsec_example nat 0)> ...
    (config)>
    ```

    b. Add a policy:

    ```
    (config)> add vpn ipsec tunnel ipsec_example policy end
    (config vpn ipsec tunnel ipsec_example policy 0)>
    ```

    c. Set the type of local traffic selector:

    ```
    (config vpn ipsec tunnel ipsec_example policy 0)> local type value
    (config vpn ipsec tunnel ipsec_example policy 0)>
    ```

    where *value* is one of:

    - **address**: The address of a local network interface.

      Set the address:

      i. Use the **?** to determine available interfaces:

      ii. Set the interface. For example:

      ```
      (config vpn ipsec tunnel ipsec_example policy 0)> local
      address eth1
      (config vpn ipsec tunnel ipsec_example policy 0)>
      ```

    - **network**: The subnet of a local network interface.

      Set the network:

      i. Use the **?** to determine available interfaces:

      ii. Set the interface. For example:

      ```
      (config vpn ipsec tunnel ipsec_example policy 0)> local
      network eth1
      (config vpn ipsec tunnel ipsec_example policy 0)>
      ```

    - **custom**: A user-defined network.

      Set the custom network:

      ```
      (config vpn ipsec tunnel ipsec_example policy 0)> local custom
      value
      (config vpn ipsec tunnel ipsec_example policy 0)>
      ```

      where *value* is the IPv4 address and optional netmask. The keyword **any** can also be used.

    - **request**: Requests a network from the remote peer.
    - **dynamic**: Uses the address of the local endpoint.

d. Set the port matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

e. Set the protocol matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local protocol value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any**: Matches any protocol.
- **tcp**: Matches TCP protocol only.
- **udp**: Matches UDP protocol only.
- **icmp**: Matches ICMP requests only.
- **other**: Matches an unlisted protocol.

  If **other** is used, set the number of the protocol:

  ```
  (config vpn ipsec tunnel ipsec_example policy 0)> local
  protocol_other int
  (config vpn ipsec tunnel ipsec_example policy 0)>
  ```

  Allowed values are an integer between **1** and **255**.

f. Set the IP address and optional netmask of the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote network value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

g. Set the port matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

h. Set the protocol matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote protocol
value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any**: Matches any protocol.
- **tcp**: Matches TCP protocol only.
- **udp**: Matches UDP protocol only.
- **icmp**: Matches ICMP requests only.

- **other**: Matches an unlisted protocol.

  If **other** is used, set the number of the protocol:

  ```
  (config vpn ipsec tunnel ipsec_example policy 0)> remote
  protocol_other int
  (config vpn ipsec tunnel ipsec_example policy 0)>
  ```

  Allowed values are an integer between **1** and **255**.

19. (Optional) You can also configure various IPsec related time out, keep alive, and related values:

    a. Change to the root of the configuration schema:

    ```
    (config vpn ipsec tunnel ipsec_example policy 0)> ...
    (config)>
    ```

    b. Use the **?** to determine available options:

    ```
    (config)> vpn ipsec advanced ?

    Advanced: Advanced configuration that applies to all IPsec tunnels.

     Parameters                 Current Value
     ----------------------------------------------------------------------
    ---------
     debug                      none          Debug level
     ike_fragment_size          1280          Maximum IKE fragment size
     ike_retransmit_tries       5             IKE retransmit tries
     keep_alive                 40s           NAT keep alive time

     Additional Configuration
     ----------------------------------------------------------------------
    ----------
     connection_retry_timeout  Connection retry timeout
     connection_try_interval   Connection try interval
     ike_timeout               IKE timeout

    (config)>
    ```

    Generally, the default settings for these should be sufficient.

    c. You can also enable debugging for IPsec:

    ```
    (config)> vpn ipsec advanced debug value
    (config)>
    ```

    where *value* is one of:

    - **none**
    - **basic_auditing**
    - **detailed_control**
    - **generic_control**
    - **raw_data**
    - **sensitive_data**

20. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

21. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure IPsec failover

There are two methods to configure the Connect EZ device to fail over from a primary IPsec tunnel to a backup tunnel:

- **SureLink** active recovery—You can use SureLink along with the IPsec tunnel's metric to configure two or more tunnels so that when the primary tunnel is determined to be inactive by SureLink, a secondary tunnel can begin serving traffic that the primary tunnel was serving.
- **Preferred tunnel**—When multiple IPsec tunnels are configured, one tunnel can be configured as a backup to another tunnel by defining a preferred tunnel for the backup device.

Required configuration items

- Two or more configured IPsec tunnels: The primary tunnel, and one or more backup tunnels.
- Either:
    - SureLink configured on the primary tunnel with **Restart Interface** enabled, and the metric for all tunnels set appropriately to determine which IPsec tunnel has priority. With this failover configuration, both tunnels are active simultaneously, and there is minimal downtime due to failover.
    - Identify the preferred tunnel during configuration of the backup tunnel. In this scenario, the backup tunnel is not active until the preferred tunnel fails.

IPsec failover using SureLink

With this configuration, when two IPsec tunnels are configured with the same local and remote endpoints but different metrics, traffic addressed to the remote endpoint will be routed through the IPsec tunnel with the lower metric.

If **SureLink** > **Restart Interface** is enabled for the tunnel with the lower metric, and SureLink determines that the tunnel is not functioning properly (for example, pings to a host at the other end of the tunnel are failing), then:

1. SureLink will shut down the tunnel and renegotiate its IPsec connection.
2. While the tunnel with the lower metric is down, traffic addressed to the remote endpoint will be routed through the tunnel with the higher metric.

For example:

- Tunnel_1:
    - **Metric**: 10
    - **Local endpoint** > **Interface**: ETH2
    - **Remote endpoint** > **Hostname**: 192.168.10.1
    - **SureLink** configuration:
        - **Restart Interface** enabled
        - **Test target**:
            - **Test type**: Ping test
            - **Ping host**: 192.168.10.2
- Tunnel_2:

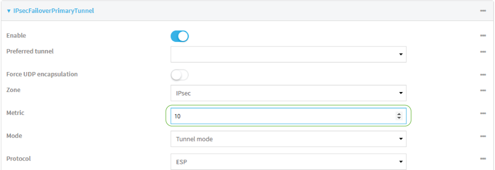
- **Metric**: 20
- **Local endpoint** > **Interface**: ETH2
- **Remote endpoint** > **Hostname**: 192.168.10.1

In this configuration:

1. Tunnel_1 will normally be used for traffic destined for the 192.168.10.1 endpoint.
2. If pings to 192.168.10.2 fail, SureLink will shut down the tunnel and renegotiate its IPsec connection.
3. While Tunnel_2 is down, Tunnel_2 will be used for traffic destined for the 192.168.10.1 endpoint.

WebUI

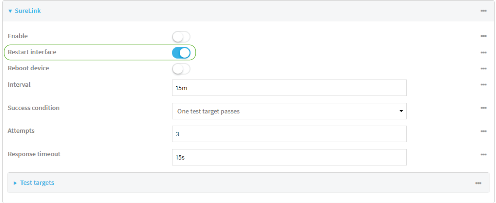
1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**).



▾ IPsecFailoverPrimaryTunnel

Enable	●
Preferred tunnel	
Force UDP encapsulation	○
Zone	IPsec
Metric	10
Mode	Tunnel mode
Protocol	ESP

   - Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See Configure SureLink active recovery for IPsec for instructions.

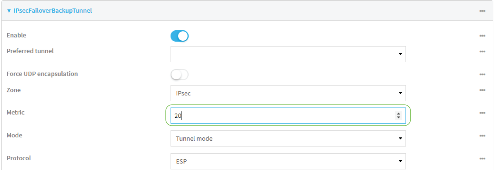


▾ SureLink

Enable	○
Restart interface	●
Reboot device	○
Interval	15m
Success condition	One test target passes
Attempts	3
Response timeout	15s

▸ Test targets

2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**).



▾ IPsecFailoverBackupTunnel

Enable	●
Preferred tunnel	
Force UDP encapsulation	○
Zone	IPsec
Metric	20
Mode	Tunnel mode
Protocol	ESP

Command line

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
    - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**):

      ```
      (config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> metric 10
      (config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
      ```

    - Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See Configure SureLink active recovery for IPsec for instructions.

      ```
      (config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> surelink
      restart true
      (config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
      ```

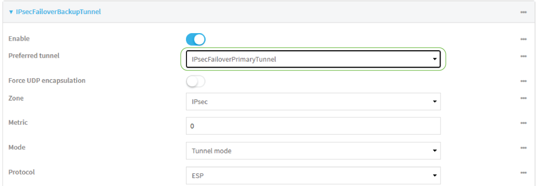
2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See Configure an IPsec tunnel for instructions.
    - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**):

      ```
      (config vpn ipsec tunnel IPsecFailoverBackupTunnel)> metric 20
      (config vpn ipsec tunnel IPsecFailoverBackupTunnel)>
      ```

IPsec failover using Preferred tunnel

WebUI

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
2. Create a backup IPsec tunnel. See Configure an IPsec tunnel for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel in the **Preferred tunnel** parameter:



▾ IPsecFailoverBackupTunnel

Enable	●
Preferred tunnel	IPsecFailoverPrimaryTunnel
Force UDP encapsulation	○
Zone	IPsec
Metric	0
Mode	Tunnel mode
Protocol	ESP

Command line

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
2. Create a backup IPsec tunnel. See Configure an IPsec tunnel for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel:
    1. Use the **?** to view a list of available tunnels:

       ```
       (config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover ?

       Preferred tunnel: This tunnel will not start until the preferred
       tunnel has failed. It will continue
       to operate until the preferred tunnel returns to full operation
       ```

```
status.
Format:
 primary_ipsec_tunnel
 backup_ipsec_tunnel
Optional: yes
Current value:

(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover
```

b. Set the primary IPsec tunnel:

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover primary_
ipsec_tunnel
(config vpn ipsec tunnel backup_ipsec_tunnel)>
```

Configure SureLink active recovery for IPsec

You can configure the Connect EZ device to regularly probe IPsec tunnels to determine if the connection has failed and take remedial action.

You can also configure the IPsec tunnel to fail over to a backup tunnel. See Configure IPsec failover for further information.

Required configuration items

- A valid IPsec configuration. See Configure an IPsec tunnel for configuration instructions.
- Enable IPsec active recovery.
- The behavior of the Connect EZ device upon IPsec failure: either
  - Restart the IPsec interface
  - Reboot the device.

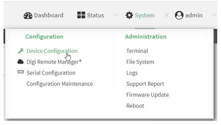
Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe attempts before the IPsec connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

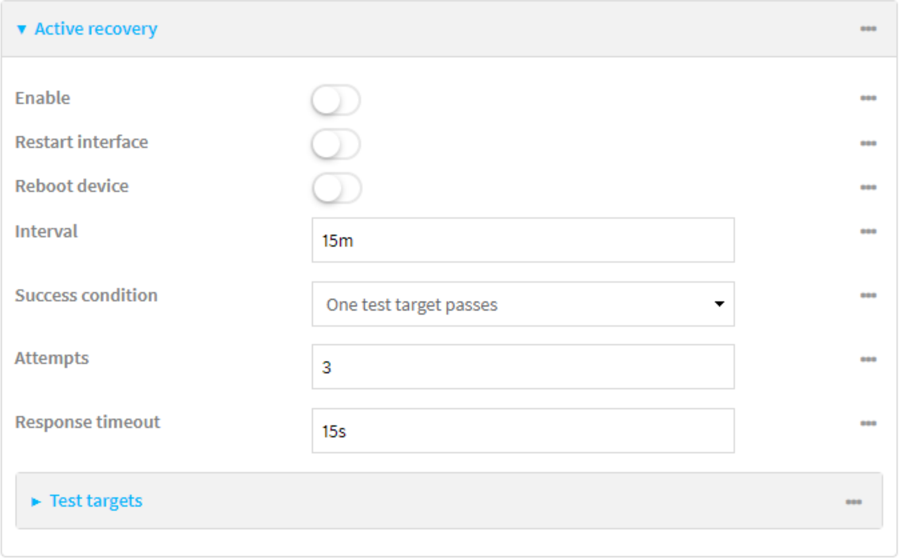
To configure the Connect EZ device to regularly probe the IPsec connection:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec**.
4. Create a new IPsec tunnel or select an existing one:
   - To create a new IPsec tunnel, see Configure an IPsec tunnel.
   - To edit an existing IPsec tunnel, click to expand the appropriate tunnel.
5. After creating or selecting the IPsec tunnel, click **Active recovery**.



▼ Active recovery

Enable ○
Restart interface ○
Reboot device ○
Interval: 15m
Success condition: One test target passes
Attempts: 3
Response timeout: 15s

► Test targets

6. **Enable** active recovery.
7. For **Restart interface**, enable to configure the device to restart the interface when its connection is considered to have failed. This is useful for interfaces that may regain connectivity after restarting.
8. For **Reboot device**, enable to instruct the device to reboot when the WAN connection is considered to have failed.
9. Change the **Interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.
10. For **Success condition**, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.
11. For **Attempts**, type the number of probe attempts before the WAN is considered to have failed.

12. For **Response timeout**, type the amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

    For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

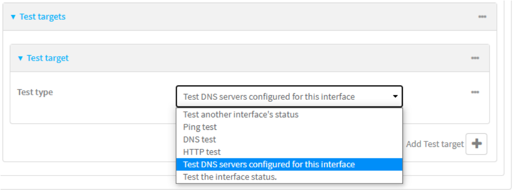
    The default is 15 seconds.

13. Add a test target:

    a. Click to expand **Test targets**.

    b. For **Add Test target**, click ➕.

    c. Select the **Test type**:



▾ Test targets
▾ Test target
Test another interface's status
Ping test
DNS test
HTTP test
Test DNS servers configured for this interface
Test the interface status.
Add Test target

Test type: Test DNS servers configured for this interface

- **Test another interface's status**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces. If **Test another interface's status** is selected:
  - For **Test Interface**, select the alternate interface to be tested.
  - For **IP version**, select the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.
  - For **Expected status**, select whether the expected status of the alternate interface is **Up** or **Down**. For example, if **Expected status** is set to **Down**, but the alternate interface is determined to be up, then this test will fail.
- **Ping test**: Tests connectivity by sending an ICMP echo request to the hostname or IP address specified in **Ping host**. You can also optionally change the number of bytes in the **Ping payload size**.
- **DNS test**: Tests connectivity by sending a DNS query to the specified **DNS server**.
- **HTTP test**: Tests connectivity by sending an HTTP or HTTPS GET request to the URL specified in **Web servers**. The URL should take the format of **http[s]://*hostname*/[*path*]**.
- **Test DNS servers configured for this interface**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **Test the interface status**: The interface is considered to be down based on:
  - **Down time**: The amount of time that the interface can be down before this test is considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

    For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

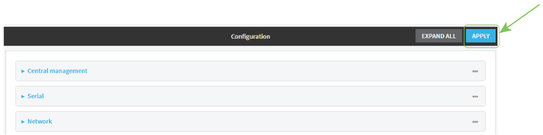
    The default is 60 seconds.
  - **Initial connection time**: The amount of time to wait for an initial connection to the interface before this test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number*{w|d|h|m|s}**.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

The default is 60 seconds.

14. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new IPsec tunnel, or edit an existing one:
   - To create a new IPsec tunnel, see Configure an IPsec tunnel.
   - To edit an existing IPsec tunnel, change to the IPsec tunnel's node in the configuration schema. For example, for an IPsec tunnel named **ipsec_example**, change to the **ipsec_example** node in the configuration schema:

```
(config)> vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

4. Enable active recovery:

```
(config vpn ipsec tunnel ipsec_example)> surelink enable true
(config vpn ipsec tunnel ipsec_example)>
```

5. To configure the device to restart the interface when its connection is considered to have failed:

```
(config vpn ipsec tunnel ipsec_example)> surelink restart true
(config vpn ipsec tunnel ipsec_example)>
```

   This is useful for interfaces that may regain connectivity after restarting.

6. To configure the device to reboot when the interface is considered to have failed:

```
(config vpn ipsec tunnel ipsec_example)> surelink reboot enable
(config vpn ipsec tunnel ipsec_example)>
```

7. Set the **Interval** between connectivity tests:

   ```
   (config vpn ipsec tunnel ipsec_example)> surelink interval value
   (config vpn ipsec tunnel ipsec_example)>
   ```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

   ```
   (config vpn ipsec tunnel ipsec_example)> surelink interval 600s
   (config vpn ipsec tunnel ipsec_example)>
   ```

   The default is 15 minutes.

8. Determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets:

   ```
   (config vpn ipsec tunnel ipsec_example)> surelink success_condition value
   (config vpn ipsec tunnel ipsec_example)>
   ```

   Where *value* is either **one** or **all**.

9. Set the number of probe attempts before the WAN is considered to have failed:

   ```
   (config vpn ipsec tunnel ipsec_example)> surelink  attempts num
   (config vpn ipsec tunnel ipsec_example)>
   ```

   The default is **3**.

10. Set the amount of time that the device should wait for a response to a probe attempt before considering it to have failed:

    ```
    (config vpn ipsec tunnel ipsec_example)> surelink timeout value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config vpn ipsec tunnel ipsec_example)> surelink timeout 600s
    (config vpn ipsec tunnel ipsec_example)>
    ```

    The default is 15 seconds.

11. Configure test targets:

    a. Add a test target:

    ```
    (config vpn ipsec tunnel ipsec_example)> add surelink target end
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

    b. Set the test type:

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)> test value
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

where *value* is one of:

- **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
  - Specify the hostname or IP address:

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ping_host host
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

  - (Optional) Set the size, in bytes, of the ping packet:

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ping_size [num]
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

- **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
  - Specify the DNS server. Allowed value is the IP address of the DNS server.

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    dns_server ip_address
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

- **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
  - Specify the url:

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    http_url value
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

    where *value* uses the format **http[s]://*hostname*/[*path*]**
- **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
  - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    interface_down_time value
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

    For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example surelink target 0)>
interface_down_time 600s
(config vpn ipsec tunnel ipsec_example surelink target 0)>
```

The default is 60 seconds.

- (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

  ```
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  interface_timeout value
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  ```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

  For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

  ```
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  interface_timeout 600s
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  ```

  The default is 60 seconds.

- **other**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces:

  ```
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  other value
  (config vpn ipsec tunnel ipsec_example surelink target 0)>
  ```

  If **other** is set:

  - Set the alternate interface to be tested:

    i. Use the **?** to determine available interfaces:

    ii. Set the interface. For example:

    ```
    (config vpn ipsec tunnel ipsec_example surelink
    target 0)> other_interface /network/interface/eth1
    (config vpn ipsec tunnel ipsec_example surelink
    target 0)>
    ```

  - Set the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.

    ```
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    other_ip_version value
    (config vpn ipsec tunnel ipsec_example surelink target 0)>
    ```

    where *value* is one of: **any**, **both**, **ipv4**, or **ipv6**.

  - Set the expected status of the alternate interface:

```
(config vpn ipsec tunnel ipsec_example surelink target 0)>
other_status value
(config vpn ipsec tunnel ipsec_example surelink target 0)>
```

where *value* is either **up** or **down**. For example, if **other_status** is set to **down**, but the alternate interface is determined to be up, then this test will fail.

12. Save the configuration and apply the change:

```
(config vpn ipsec tunnel ipsec_example connection_monitor target 0)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show IPsec status and statistics

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status** > **IPsec**.

   The **IPsec** page appears.
3. To view configuration details about an IPsec tunnel, click the 🔧 (configuration) icon in the upper right of the tunnel's status pane.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured IPsec tunnels, type the following at the prompt:

```
> show ipsec all

 Name    Enable  Status   Hostname
 ------  ------  -------  ---------------
 ipsec1  true    up       192.168.2.1
 vpn1    false   pending  192.168.3.1

>
```

3. To display details about a specific tunnel:

```
> show ipsec tunnel ipsec1

 Tunnel                    : ipsec1
 Enable                       : true
 Status                       : pending
 Hostname                     : 192.168.2.1
 Zone                         : ipsec
 Mode                         : tunnel
 Type                         : esp

>
```

4. Type **exit** to exit the Admin CLI.

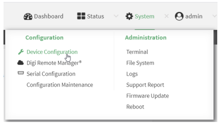
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Debug an IPsec configuration

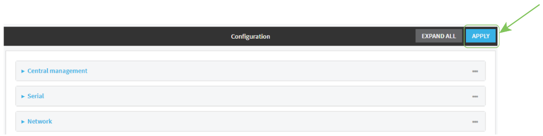
If you experience issues with an IPsec tunnel not being successfully negotiated with the remote end of the tunnel, you can enable IPsec debug messages to be written to the system log. See View system and event logs for more information about viewing the system log.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec**.
4. Click to expand **Advanced**.
5. For **Debug level**, select one of the following:
   - **Disable debug messages**.
   - **Basic auditing debug**: Logs basic auditing information, (for example, SA up/SA down).
   - **Generic control flow** : Select this for basic debugging information.
   - **Detailed control flow** : More detailed debugging control flow.
   - **Raw data**: Includes raw data dumps in hexadecimal format.
   - **Sensitive material**: Also includes sensitive material in dumps (for example, encryption keys).
6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the IPsec debug value:

```
config> vpn ipsec advanced debug value
config>
```

   where *value* is one of:

   - **none**. (Default) No debug messages are written.
   - **basic_auditing**: Logs basic auditing information, (for example, SA up/SA down).
   - **generic_control**: Select this for basic debugging information.
   - **detailed_control**: More detailed debugging control flow.
   - **raw_data**: Includes raw data dumps in hexadecimal format.
   - **sensitive_data**: Also includes sensitive material in dumps (for example, encryption keys).

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a Simple Certificate Enrollment Protocol client

Simple Certificate Enrollment Protocol (SCEP) is a mechanism that allows for large-scale X.509 certificate deployment. You can configure Connect EZ device to function as a SCEP client that will connect to a SCEP server that is used to sign Certificate Signing Requests (CSRs), provide Certificate Revocation Lists (CRLs), and distribute valid certificates from a Certificate Authority (CA).

Required configuration

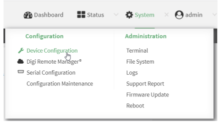
- Enable the SCEP client.
- The fully-qualified domain name of the SCEP server to be used for certificate requests.
- The challenge password provided by the SCEP server that the SCEP client will use when making SCEP requests.
- The distinguished name to be used for the CSR.
- The file name of the Certificate Revocation List (CRL) from the Certificate Authority (CA).

Additional configuration

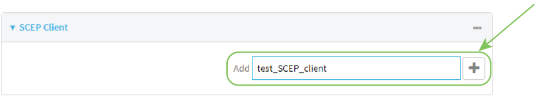
- The number of days that the certificate enrollment can be renewed, prior to the request expiring.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

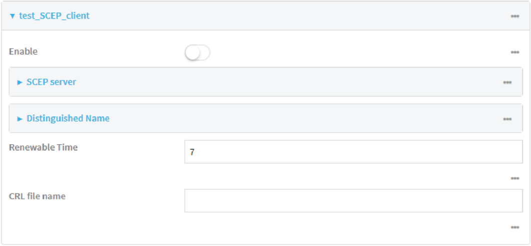
   

   The **Configuration** window is displayed.
3. Click **Network** > **SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click **+**.

   test_SCEP_client

   The new SCEP client configuration is displayed.

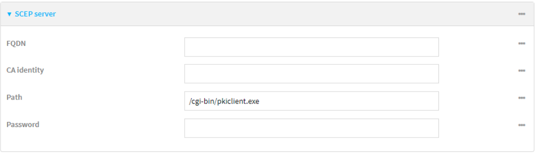
   Enable

   Renewable Time: 7

   CRL file name:

5. Click **Enable** to enable the SCEP client.
6. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is used by the Connect EZ device to determine when to start attempting to auto-renew an existing certificate. The default is **7**.
7. (Optional) For CRL file name, type the filename of the Certificate Revocation List (CRL) from the CA.

   The CRL is stored on the Connect EZ device in the /etc/config/scep_client/*client_name* directory.
8. Click to expand **SCEP server**.

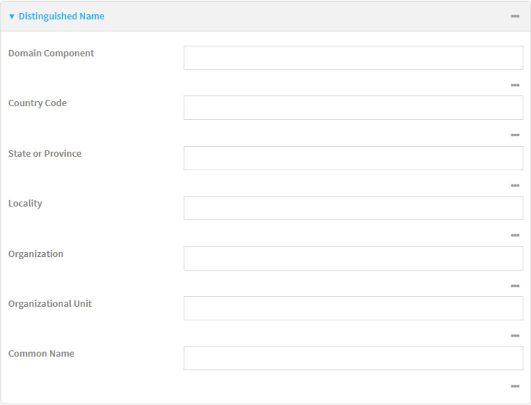
   FQDN:

   CA identity:

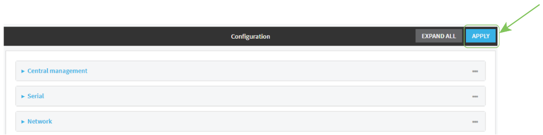
   Path: /cgi-bin/pkiclient.exe

   Password:

9. For **FQDN**, type the fully qualified domain name or IP address of the SCEP server.
10. (Optiona) For **CA identity**, type a string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.
11. For **Path**, Type the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.
12. For **Password**, type the challenge password as configured on the SCEP server.
13. Click to expand **Distinguished Name**.



14. Type the value for each appropriate Distinguished Name attribute.
15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client:

```
(config)> add network scep_client scep_client_name
(config network scep_client scep_client_name
)>
```

4. Enable the SCEP client:

```
(config network scep_client scep_client_name)> enable true
(config network scep_client scep_client_name)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client scep_client_name)> server url
https://scep.example.com
(config network scep_client scep_client_name)>
```

6. (Optiona) Set a CA idenity string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.

```
(config network scep_client scep_client_name)> server ca_ident string
(config network scep_client scep_client_name)>
```

7. Set the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.

```
(config network scep_client scep_client_name)> server path path
(config network scep_client scep_client_name)>
```

8. Set the challenge password as configured on the SCEP server:

```
(config network scep_client scep_client_name)> server password challenge_
password
(config network scep_client scep_client_name)>
```

9. Set Distinguished Name attributes:

   a. Set the Domain Component:

   ```
   (config network scep_client scep_client_name)> distinguished_name dc
   value
   (config network scep_client scep_client_name)>
   ```

   b. Set the two letter Country Code:

   ```
   (config network scep_client scep_client_name)> distinguished_name c
   value
   (config network scep_client scep_client_name)>
   ```

   c. Set the State or Province:

   ```
   (config network scep_client scep_client_name)> distinguished_name st
   value
   (config network scep_clientscep_client_name )>
   ```

   d. Set the Locality:

```
(config network scep_client scep_client_name)> distinguished_name l
value
(config network scep_client scep_client_name)>
```

e. Set the Organization:

```
(config network scep_client scep_client_name)> distinguished_name o
value
(config network scep_client scep_client_name)>
```

f. Set the Organizational Unit:

```
(config network scep_client scep_client_name)> distinguished_name ou
value
(config network scep_client scep_client_name)>
```

g. Set the Common Name:

```
(config network scep_client scep_client_name)> distinguished_name cn
value
(config network scep_client scep_client_name)>
```

10. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is used by the Connect EZ device to determine when to start attempting to auto-renew an existing certificate. The default is **7**.

```
(config network scep_client scep_client_name)> renewable_time integer
(config network scep_client scep_client_name)>
```

11. (Optional) Set the filename of the Certificate Revocation List (CRL) from the CA.

    The CRL is stored on the Connect EZ device in the /etc/config/scep_client/*client_name* directory.

```
(config network scep_client scep_client_name)> crl_name name
(config network scep_client scep_client_name)>
```

12. Save the configuration and apply the change:

```
(config network scep_client scep_client_name)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example: SCEP client configuration with Fortinet SCEP server

In this example configuration, we will configure the Connect EZ device as a SCEP client that will connect to a Fortinet SCEP server.

Fortinet configuration

On the Fortinet server:

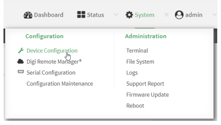
1. Enable ports for SCEP services:
   a. From the menu, select **Network** > **Interfaces**.
   b. Select the appopriate port and click **Edit**.
   c. For **Access Rights** > **Services**, enable the following services:
      - **HTTPS** > **SCEP**
      - **HTTPS** > **CRL Downloads**
      - **HTTP** > **SCEP**
      - **HTTP** > **CRL Downloads**
   d. The remaining fields can be left at their defaults or changed as appropriate.
   e. Click **OK**.
2. Create a Certificate Authority (CA):
   a. From the menu, click **Certificate Authorities** > **Local CAs**.
   b. Click **Create New**.
   c. Type a **Certificate ID** for the CA, for example, **fortinet_example_ca**.
   d. Complete the **Subject Information** fields.
   e. The remaining fields can be left at their defaults or changed as appropriate.
   f. Click **OK**.
3. Edit SCEP settings:
   a. From the menu, click **SCEP** > **General**.
   b. Click **Enable SCEP** if it is not enabled.
   c. For **Default enrollment password**, enter a password. The password entered here must correspond to the challenge password configured for the SCEP client on the Connect EZ device.
   d. The remaining fields can be left at their defaults or changed as appropriate.
   e. Click **OK**.
4. Create an **Enrollment Request**:
   a. From the menu, click **SCEP** > **Enrollment Requests**.
   b. Click **Create New**.
   c. For **Automatic request type**, select **Wildcard**.
   d. For **Certificate authority**, select the CA created in step 1, above.
   e. Complete the **Subject Information** fields. The Distinguished Name (DN) attributes entered here must correspond to the Distinguished Name attributes configured for the SCEP client on the Connect EZ device.
   f. For **Renewal** > **Allow renewal *x* days before the certified is expired**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. The **Renewable Time** setting on the Connect EZ device must match the setting of this parameter.
   g. The remaining fields can be left at their defaults or changed as appropriate.
   h. Click **OK**.

Connect EZ configuration

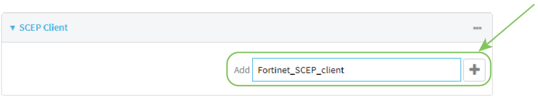
On the Connect EZ device:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

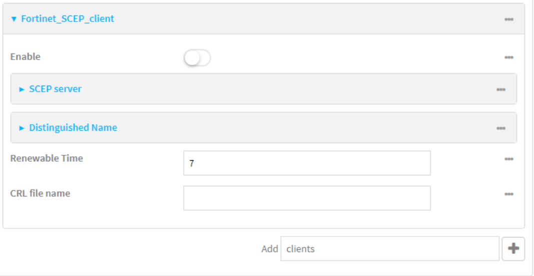
   

   The **Configuration** window is displayed.
3. Click **Network** > **SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click **+**.

   Add: Fortinet_SCEP_client

   The new SCEP client configuration is displayed.

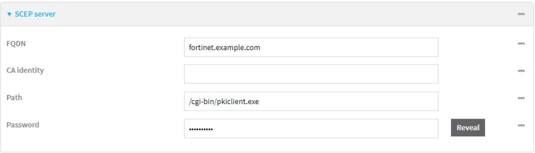
   

   Renewable Time: 7

   CRL file name:

   Add: clients

5. Click **Enable** to enable the SCEP client.
6. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal *x* days before the certified is expired** option on the Fortinet server.
7. (Optional) For CRL file name, type the filename of the Certificate Revocation List (CRL) from the CA. The filename of the CRL corresponds to the Certificate ID of the CA created on the Fortinet server, for example, **fortinet_example_ca.crl**.
8. Click to expand **SCEP server**.

   FQDN: fortinet.example.com

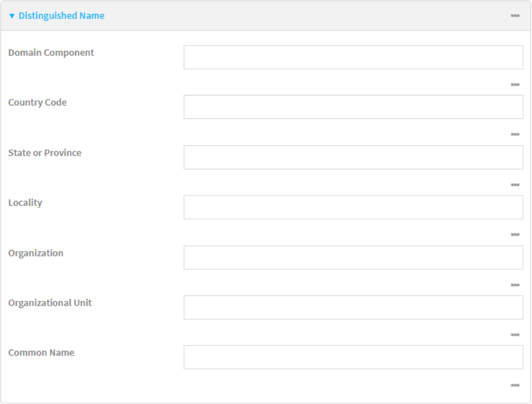
   CA identity:

   Path: /cgi-bin/pkiclient.exe

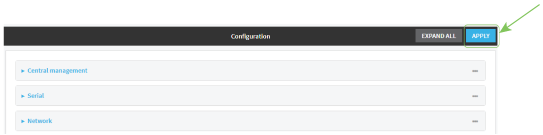
   Password: ••••••••••

9. For **FQDN**, type the fully qualified domain name or IP address of the Fortinet server.
10. For **Password**, type the challenge password. This corresponds to the **Default enrollment password** on the Fortinet server.

11. Click to expand **Distinguished Name**.



12. Type the value for each appropriate Distinguished Name attribute. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.
13. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client, for example, **Fortinet_SCEP_client**:

```
(config)> add network scep_client Fortinet_SCEP_client
(config network scep_client Fortinet_SCEP_client
)>
```

4. Enable the SCEP client:

```
(config network scep_client Fortinet_SCEP_client)> enable true
(config network scep_client Fortinet_SCEP_client)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client Fortinet_SCEP_client)> server url
https://fortinet.example.com
(config network scep_client Fortinet_SCEP_client)>
```

6. Set the challenge password as configured on the SCEP server. This corresponds to the **Default enrollment password** on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> server password
challenge_password
(config network scep_client Fortinet_SCEP_client)>
```

7. Set Distinguished Name attributes. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.

   a. Set the Domain Component:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
dc value
(config network scep_client Fortinet_SCEP_client)>
```

   b. Set the two letter Country Code:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
c value
(config network scep_client Fortinet_SCEP_client)>
```

   c. Set the State or Province:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
st value
(config network scep_client  Fortinet_SCEP_client)>
```

d. Set the Locality:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
l value
(config network scep_client Fortinet_SCEP_client)>
```

e. Set the Organization:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
o value
(config network scep_client Fortinet_SCEP_client)>
```

f. Set the Organizational Unit:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
ou value
(config network scep_client Fortinet_SCEP_client)>
```

g. Set the Common Name:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
cn value
(config network scep_client Fortinet_SCEP_client)>
```

8. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal *x* days before the certified is expired** option on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> renewable_time integer
(config network scep_client Fortinet_SCEP_client)>
```

9. (Optional) Set the filename of the Certificate Revocation List (CRL) from the CA.

   The CRL is stored on the Connect EZ device in the /etc/config/scep_client/*client_name* directory.

```
(config network scep_client Fortinet_SCEP_client)> crl_name name
(config network scep_client Fortinet_SCEP_client)>
```

10. Save the configuration and apply the change:

```
(config network scep_client Fortinet_SCEP_client)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

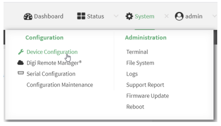
    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable hardware cryptographic acceleration

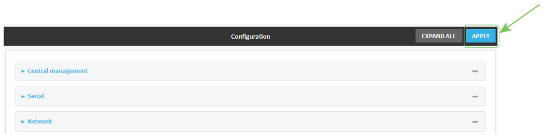
If you are experiencing problems when using IPSEC, such as the kernel crashing or unexpected package loss, disabling hardware cryptographic acceleration may correct the problem.

☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Select **System**.
4. Click to disable **HW crypto acceleration**.
5. Click **Apply** to save the configuration and apply the change.

The device must be rebooted for the change to take effect. See Reboot your Connect EZ device.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Disable hardware cryptographic acceleration:

   ```
   (config)> system hycrypto false
   >
   ```
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

The device must be rebooted for the change to take effect. See Reboot your Connect EZ device.

OpenVPN

OpenVPN is an open-source Virtual Private Network (VPN) technology that creates secure point-to-point or site-to-site connections in routed or bridged configurations. OpenVPN uses a custom security protocol that is Secure Socket Layer (SSL) / Transport Layer Security (TLS) for key exchange. It uses standard encryption and authentication algorithms for data privacy and authentication over TCP or UDP.

The OpenVPN server can push the network configuration, such as the topology and IP routes, to OpenVPN clients. This makes OpenVPN simpler to configure as it reduces the chances of a configuration mismatch between the client and server. OpenVPN also supports cipher negotiation between the client and server. This means you can configure the OpenVPN server and clients with a range of different cipher options and the server will negotiate with the client on the cipher to use for the connection.

For more information on OpenVPN, see www.openvpn.net.

OpenVPN modes:

There are two modes for running OpenVPN:

- Routing mode, also known as TUN.
- Bridging mode, also known as TAP.

Routing (TUN) mode

In routing mode, each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.

The manner in which the IP subnets are defined depends on the OpenVPN topology in use. The Connect EZ device supports two types of OpenVPN topology:

OpenVPN Topology	Subnet definition method
net30	Each OpenVPN client is assigned a **/30** subnet within the IP subnet specified in the OpenVPN server configuration. With net30 topology, pushed routes are used, with the exception of the default route. Automatic route pushing (exec) is not allowed, because this would not inform the firewall and would be blocked.
subnet	Each OpenVPN client connected to the OpenVPN server is assigned an IP address within the IP subnet specified in the OpenVPN server configuration. For the Connect EZ device, pushed routes are not allowed; you will need to manually configure routes on the device.

For more information on OpenVPN topologies, see OpenVPN topology.

Bridging (TAP) mode

In bridging mode, a LAN interface on the OpenVPN server is assigned to OpenVPN. The LAN interfaces of the OpenVPN clients are on the same IP subnet as the OpenVPN server's LAN interface. This means that devices connected to the OpenVPN client's LAN interface are on the same IP subnet as devices. The Connect EZ device supports two mechanisms for configuring an OpenVPN server in TAP mode:

- OpenVPN managed—The Connect EZ device creates the interface and then uses its standard configuration to set up the connection (for example, its standard DHCP server configuration).
- Device only—IP addressing is controlled by the system, not by OpenVPN.

Additional OpenVPN information

For more information on OpenVPN, see these resources:

Bridging vs. routing

OpenVPN/Routing

Configure an OpenVPN server

Required configuration items

- Enable the OpenVPN server.

  The OpenVPN server is enabled by default.
- The mode used by the OpenVPN server, one of:
  - **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
  - **TAP - OpenVPN managed**—Also know as bridging mode. A more advanced implementation of OpenVPN. The Connect EZ device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).
  - **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is is, the OpenVPN server must be included as a device in either an interface or a bridge.
- The firewall zone to be used by the OpenVPN server.
- The IP network and subnet mask of the OpenVPN server.
- The server's Certificate authority (CA) certificate, and public, private and Diffie-Hellman (DH) keys.
- An OpenVPN authentication group and an OpenVPN user.
- Determine the method of certificate management:
  - Certificates managed by the server.
  - Certificates created externally and added to the server.
- If certificates are created and added to the server, determine the level of authentication:
  - Certificate authentication only.
  - Username and password authentication only.
  - Certificate and username and password authentication.

  If username and password authentication is used, you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.
- Certificates and keys:
  - The **CA certificate** (usually in a ca.crt file).
  - The **Public key** (for example, server.crt)

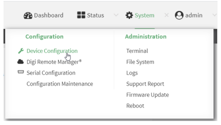
  - The **Private key** (for example, server.key).
  - The **Diffie Hellman key** (usually in dh2048.pem).
- Active recovery configuration. See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

Additional configuration items

- The route metric for the OpenVPN server.
- The range of IP addresses that the OpenVPN server will provide to clients.
- The TCP/UDP port to use. By default, the Connect EZ device uses port **1194**.
- Access control list configuration to restrict access to the OpenVPN server through the firewall.
- Additional OpenVPN parameters.

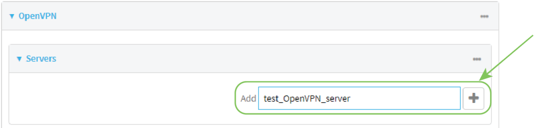
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN** > **OpenVPN** > **Servers**.
4. For **Add**, type a name for the OpenVPN server and click ✚.

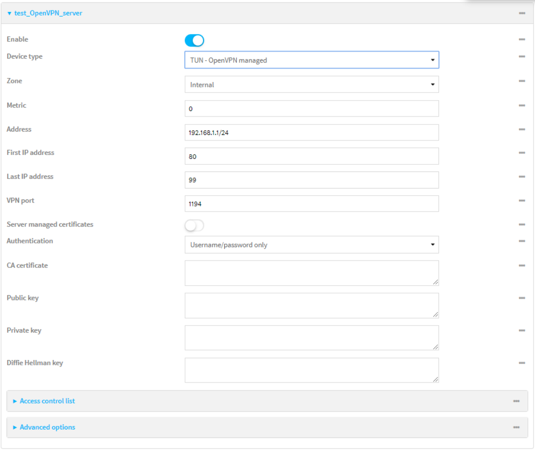


▾ OpenVPN

▾ Servers

Add test_OpenVPN_server ✚

The new OpenVPN server configuration is displayed.



▾ test_OpenVPN_server

Enable	●
Device type	TUN - OpenVPN managed
Zone	Internal
Metric	0
Address	192.168.1.1/24
First IP address	80
Last IP address	99
VPN port	1194
Server managed certificates	○
Authentication	Username/password only
CA certificate	
Public key	
Private key	
Diffie Hellman key	

▸ Access control list

▸ Advanced options

The OpenVPN server is enabled by default. To disable, click **Enable**.

5. For **Device type**, select the mode used by the OpenVPN server, either:
    - **TUN (OpenVPN managed)**
    - **TAP - OpenVPN managed**
    - **TAP - Device only**

    See OpenVPN for information about OpenVPN server modes.
6. If **TUN (OpenVPN managed)** or **TAP - OpenVPN managed** is selected for **Device type**:
    a. For **Zone**, select the firewall zone for the OpenVPN server. For TUN device types, this should be set to **Internal** to treat clients as LAN devices.
    b. (Optional) Select the **Metric** for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used. The default setting is **0**.
    c. For **Address**, type the IP address and subnet mask of the OpenVPN server.
    d. (Optional) For **First IP address** and **Last IP address**, set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients. The default is from **80** to **99**.
7. (Optional) Set the **VPN port** that the OpenVPN server will use. The default is **1194**.
8. For **Server managed certificates**, determine the method of certificate management. If enabled, the server will manage certificates. If not enabled, certificates must be created externally and added to the server.
9. If **Server managed certificates** is not enabled:
    a. Select the **Authentication** type:
        - **Certificate only**: Uses only certificates for client authentication. Each client requires a public and private key.
        - **Username/password only**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.
        - **Certificate and username/password**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key, and you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.

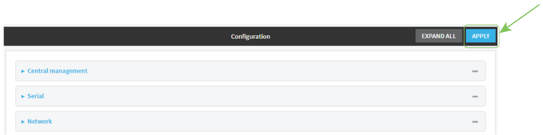
    b. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, server.crt), the **Private key** (for example, server.key), and the **Diffie Hellman key** (usually in dh2048.pem) into their respective fields. The contents will be hidden when the configuration is saved.
10. (Optional) Click to expand **Access control list** to restrict access to the OpenVPN server:
    - To limit access to specified IPv4 addresses and networks:
        a. Click **IPv4 Addresses**.
        b. For **Add Address**, click ✚.
        c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
            - A single IP address or host name.
            - A network designation in CIDR notation, for example, 192.168.1.0/24.
            - **any**: No limit to IPv4 addresses that can access the service-type.

        d. Click ✚ again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:
    a. Click **IPv6 Addresses**.
    b. For **Add Address**, click ✚.
    c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the service-type.
    d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the Connect EZ device:
    a. Click **Interfaces**.
    b. For **Add Interface**, click ✚.
    c. For **Interface**, select the appropriate interface from the dropdown.
    d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

11. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.
    a. Click **Enable** to enable the use of additional OpenVPN parameters.
    b. Click **Override** if the additional OpenVPN parameters should override default options.
    c. For **OpenVPN parameters**, type the additional OpenVPN parameters.
12. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn server name
(config vpn openvpn server name)>
```

   where *name* is the name of the OpenVPN server.

   The OpenVPN server is enabled by default. To disable the server, type:

```
(config vpn openvpn server name)> enable false
(config vpn openvpn server name)>
```

4. Set the mode used by the OpenVPN server:

```
(config vpn openvpn server name)> device_type value
(config vpn openvpn server name)>
```

   where *value* is one of:

   - **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
   - **TAP - OpenVPN managed**—Also know as bridging mode. A more advanced implementation of OpenVPN. The Connect EZ device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).
   - **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is is, the OpenVPN server must be included as a device in either an interface or a bridge.

   See OpenVPN for information about OpenVPN modes. The default is **tun**.

5. If **tap** or **tun** are set for **device_type**:

   a. Set the IP address and subnet mask of the OpenVPN server.

```
(config vpn openvpn server name)> address ip_address/netmask
(config vpn openvpn server name)>
```

   b. Set the firewall zone for the OpenVPN server. For TUN device types, this should be set to **internal** to treat clients as LAN devices.

```
(config vpn openvpn server name)> zone value
(config vpn openvpn server name)>
```

   To view a list of available zones:

```
(config vpn openvpn server name)> firewall zone ?
```

```
Zone: The zone for the local TUN interface. To treat clients as LAN
devices this would usually be
set to internal.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn openvpn server name)>
```

c. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn server name)> metric value
(config vpn openvpn server name)>
```

where *value* is an interger between **0** and **65535**. The default is **0**.

d. (Optional) Set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients:

i. Set the first address in the range limit:

```
(config vpn openvpn server name)> server_first_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the first client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_first_ip** is set to **80**, the first client IP address will be 192.168.1.80.

The default is from **80**.

ii. Set the last address in the range limit:

```
(config vpn openvpn server name)> server_last_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the last client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_last_ip** is set to **99**, the last client IP address will be 192.168.1.80.

The default is from **80**.

6. (Optional) Set the port that the OpenVPN server will use:

```
(config vpn openvpn server name)> port port
(config vpn openvpn server name)>
```

The default is **1194**.

7. Determine the method of certificate management:

   a. To allow the server to manage certificates:

   ```
   (config vpn openvpn server name)> autogenerate true
   (config vpn openvpn server name)>
   ```

   b. To create certificates externally and add them to the server

   ```
   (config vpn openvpn server name)> autogenerate false
   (config vpn openvpn server name)>
   ```

   The default setting is **false**.

   c. If **autogenerate** is set to false:

      i. Set the authentication type:

      ```
      (config vpn openvpn server name)> authentication value
      (config vpn openvpn server name)>
      ```

      where *value* is one of:

      - **cert**: Uses only certificates for client authentication. Each client requires a public and private key.
      - **passwd**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.
      - **cert_passwd**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key, and you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.

      ii. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

      ```
      (config vpn openvpn server name)> cacert value
      (config vpn openvpn server name)>
      ```

      iii. Paste the contents of the public key (for example, server.crt) into the value of the **server_cert** parameter:

      ```
      (config vpn openvpn server name)> server_cert value
      (config vpn openvpn server name)>
      ```

      iv. Paste the contents of the private key (for example, server.key) into the value of the **server_key** parameter:

      ```
      (config vpn openvpn server name)> server_key value
      (config vpn openvpn server name)>
      ```

      v. Paste the contents of the Diffie Hellman key (usually in dh2048.pem) into the value of the **diffie** parameter:

```
(config vpn openvpn server name)> diffie value
(config vpn openvpn server name)>
```

8. (Optional) Set the access control list to restrict access to the OpenVPN server:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config vpn openvpn server name)> add acl address end value
     (config vpn openvpn server name)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config vpn openvpn server name)> add acl address6 end value
     (config vpn openvpn server name)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:

     ```
     (config vpn openvpn server name)> add acl interface end value
     (config vpn openvpn server name)>
     ```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.
   - To limit access based on firewall zones:

     ```
     (config vpn openvpn server name)> add acl zone end value
     ```

     Where *value* is a firewall zone defined on your device, or the **any** keyword.

     Display a list of available firewall zones:

     Type **... firewall zone ?** at the config prompt:

     ```
     (config vpn openvpn server name)> ... firewall zone ?

     Zones: A list of groups of network interfaces that can be
     referred to by packet
     ```

```
filtering rules and access control lists.

 Additional Configuration
 ---------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config vpn openvpn server name)>
```

Repeat this step to list additional firewall zones.

9. (Optional) Set additional OpenVPN parameters.
   a. Enable the use of additional OpenVPN parameters:

```
(config vpn openvpn server name)> advanced_options enable true
(config vpn openvpn server name)>
```

   b. Configure whether the additional OpenVPN parameters should override default options:

```
(config vpn openvpn server name)> advanced_options override true
(config vpn openvpn server name)>
```

   c. Set the additional OpenVPN parameters:

```
(config vpn openvpn server name)> extra parameters
(config vpn openvpn server name)>
```

10. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

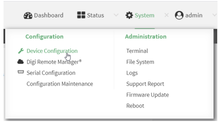
Configure an OpenVPN Authentication Group and User

If username and password authentication is used for the OpenVPN server, you must create an OpenVPN authentication group and user.

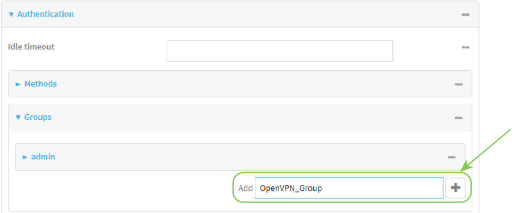
See Configure an OpenVPN server for information about configuring an OpenVPN server to use username and password authentication. See Connect EZ user authentication for more information about creating authentication groups and users.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

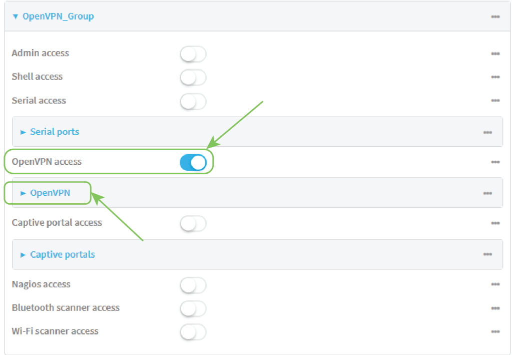
   

   The **Configuration** window is displayed.
3. Add an OpenVPN authentication group:
   a. Click **Authentication** > **Groups**.
   b. For **Add Group**, type a name for the group (for example, **OpenVPN_Group**) and click ✚.

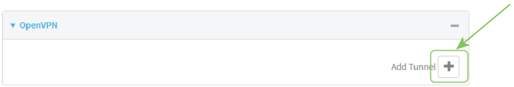
   

   Add OpenVPN_Group ✚

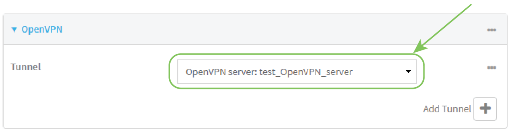
   The new authentication group configuration is displayed.

   c. Click **OpenVPN access** to enable OpenVPN access rights for users of this group.
   d. Click to expand the **OpenVPN** node.
   e. Click ✚ to add a tunnel.

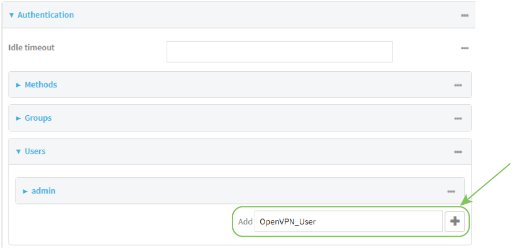
   f. For **Tunnel**, select an OpenVPN tunnel to which users of this group will have access.

   Tunnel: OpenVPN server: test_OpenVPN_server

   g. Repeat to add additional OpenVPN tunnels.

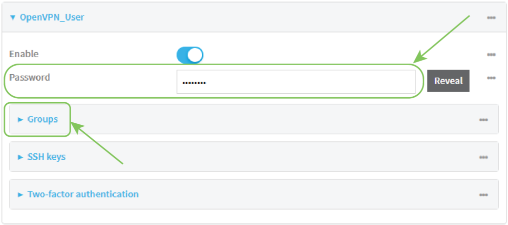
4. Add an OpenVPN authentication user:
   a. Click **Authentication** > **Users**.
   b. For **Add**, type a name for the user (for example, **OpenVPN_User**) and click ✚.



Add OpenVPN_User

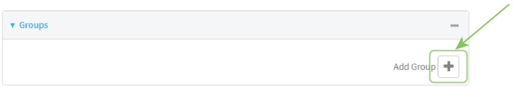
   c. Type a password for the user.

      This password is used for local authentication of the user. You can also configure the user to use RADIUS or TACACS+ authentication by configuring authentication methods. See User authentication methods for information.
   d. Click to expand the **Groups** node.

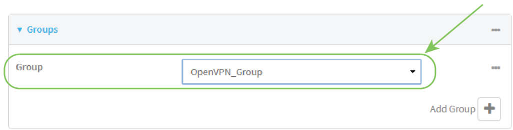


Password ....

   e. Click ✚ to add a group to the user.

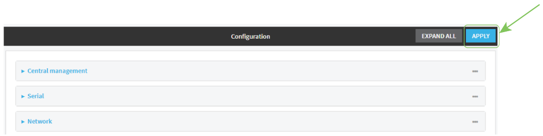


   f. Select a **Group** with **OpenVPN access** enabled.



Group OpenVPN_Group

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **OpenVPN_Group**:

   ```
   (config)> add auth group OpenVPN_Group
   (config auth group OpenVPN_Group)>
   ```

4. Enable OpenVPN access rights for users of this group:

   ```
   (config auth group OpenVPN_Group)> acl openvpn enable true
   ```

5. Add an OpenVPN tunnel to which users of this group will have access:

   a. Determine available tunnels:

   ```
   (config auth group OpenVPN_Group)> .. .. .. vpn openvpn server ?

   Servers: A list of openvpn servers

    Additional Configuration
    ---------------------------------------------------------------------
   ----------
    OpenVPN_server1           OpenVPN server

   (config auth group OpenVPN_Group)>
   ```

   b. Add a tunnel:

   ```
   (config auth group OpenVPN_Group)> add auth group test acl openvpn
   tunnels end /vpn/openvpn/server/OpenVPN_server1
   (config auth group OpenVPN_Group)>
   ```

6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an OpenVPN client by using an .ovpn file

Required configuration items

- Enable the OpenVPN client.

  The OpenVPN client is enabled by default.
- The firewall zone to be used by the OpenVPN client.

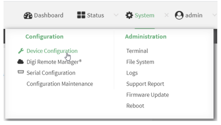
Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.

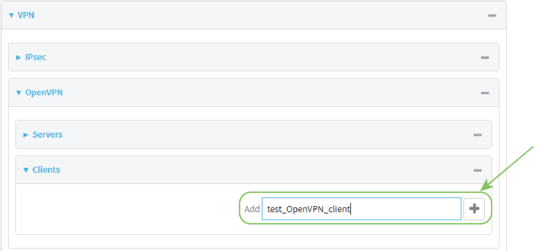
See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

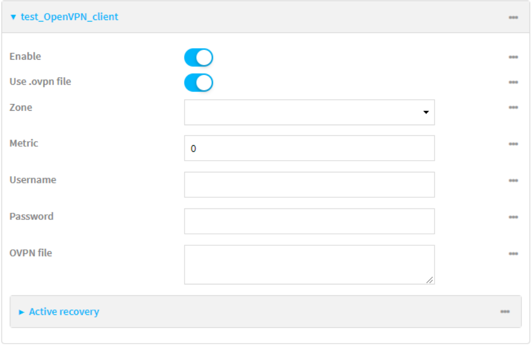
   

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Clients**.
4. For **Add**, type a name for the OpenVPN client and click **+**.

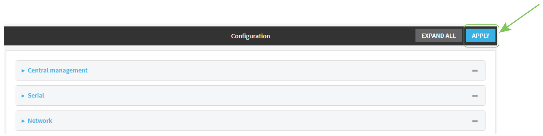
   Add: test_OpenVPN_client

   The new OpenVPN client configuration is displayed.

   Metric: 0

5. The OpenVPN client is enabled by default. To disable, click **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable. If **Use .ovpn file** is disabled, see Configure an OpenVPN client without using an .ovpn file for configuration information.
7. For **Zone**, select the firewall zone for the OpenVPN client.
8. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
9. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
10. For **OVPN file**, paste the content of the client.ovpn file.
11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn client name
(config vpn openvpn client name)>
```

   where *name* is the name of the OpenVPN server.

   The OpenVPN client is enabled by default. To disable the client, type:

```
(config vpn openvpn client name)> enable false
(config vpn openvpn client name)>
```

4. Set the firewall zone for the OpenVPN client:

```
(config vpn openvpn client name)> zone value
(config vpn openvpn client name)>
```

   To view a list of available zones:

```
(config vpn openvpn client name)> zone ?

Zone: The zone for the openvpn client interface.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn openvpn client name)>
```

5. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn client name)> metric value
(config vpn openvpn client name)>
```

   where *value* is an interger between **0** and **65535**. The default is **0**.

6. (Optional) Set the login credentials as configured on the OpenVPN server:

```
(config vpn openvpn client name)> username value
(config vpn openvpn client name)> password value
(config vpn openvpn client name)>
```

7. Paste the content of the client.ovpn file into the value of the **config_file** parameter:

```
(config vpn openvpn client name)> config_file value
(config vpn openvpn client name)>
```

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure an OpenVPN client without using an .ovpn file

Required configuration items

- Enable the OpenVPN client.

  The OpenVPN client is enabled by default.
- The mode used by the OpenVPN server, either routing (TUN), or bridging (TAP).
- The firewall zone to be used by the OpenVPN client.
- The IP address of the OpenVPN server.

- Certificates and keys:
    - The **CA certificate** (usually in a ca.crt file).
    - The **Public key** (for example, client.crt)
    - The **Private key** (for example, client.key).

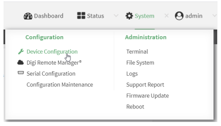
Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.
- Additional OpenVPN parameters.

See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

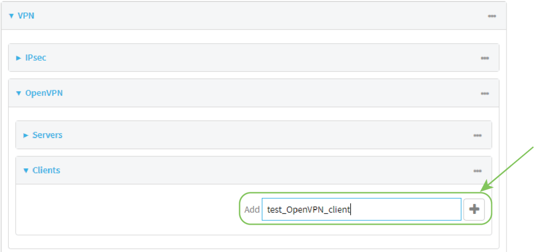
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



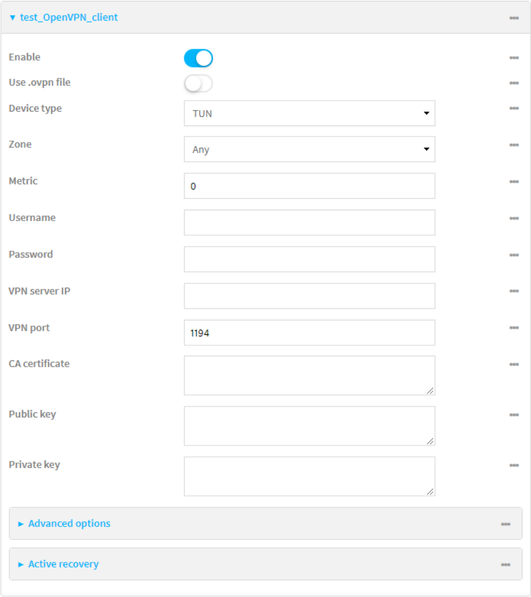
The **Configuration** window is displayed.

3. Click **VPN** > **OpenVPN** > **Clients**.
4. For **Add**, type a name for the OpenVPN client and click **+**.



Add test_OpenVPN_client

The new OpenVPN client configuration is displayed.



▾ test_OpenVPN_client

Enable: ●

Use .ovpn file: ○

Device type: TUN

Zone: Any

Metric: 0

Username:

Password:

VPN server IP:

VPN port: 1194

CA certificate:

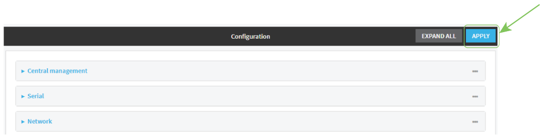
Public key:

Private key:

▸ Advanced options

▸ Active recovery

5. The OpenVPN client is enabled by default. To disable, click **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable.
7. For **Device type**, select the mode used by the OpenVPN server, either **TUN** or **TAP**.
8. For **Zone**, select the firewall zone for the OpenVPN client.
9. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
10. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
11. For **VPN server IP**, type the IP address of the OpenVPN server.
12. (Optional) Set the **VPN port** used by the OpenVPN server. The default is **1194**.
13. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, client.crt), and the **Private key** (for example, client.key) into their respective fields. The contents will be hidden when the configuration is saved.
14. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.
    a. Click **Enable** to enable the use of additional OpenVPN parameters.
    b. Click **Override** if the additional OpenVPN parameters should override default options.
    c. For **OpenVPN parameters**, type the additional OpenVPN parameters. For example, to override the configuration by using a configuration file, enter **--config filename**, for example, **--config /etc/config/openvpn_config**.
15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, type:

   ```
   (config)> add vpn openvpn client name
   (config vpn openvpn client name)>
   ```

   where *name* is the name of the OpenVPN server.

   The OpenVPN client is enabled by default. To disable the client, type:

   ```
   (config vpn openvpn client name)> enable false
   (config vpn openvpn client name)>
   ```

4. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually:

   ```
   (config vpn openvpn client name)> use_file false
   (config vpn openvpn client name)>
   ```

5. Set the mode used by the OpenVPN server:

   ```
   (config vpn openvpn client name)> device_type value
   (config vpn openvpn client name)>
   ```

   where *value* is either **tun** or **tap**. The default is **tun**.

6. Set the firewall zone for the OpenVPN client:

   ```
   (config vpn openvpn client name)> zone value
   (config vpn openvpn client name)>
   ```

   To view a list of available zones:

   ```
   (config vpn openvpn client name)> zone ?

   Zone: The zone for the openvpn client interface.
   Format:
     any
     dynamic_routes
     edge
     external
     internal
     ipsec
     loopback
     setup
   ```

```
Current value:

(config vpn openvpn client name)>
```

7. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

   ```
   (config vpn openvpn client name)> metric value
   (config vpn openvpn client name)>
   ```

   where *value* is an interger between **0** and **65535**. The default is **0**.

8. (Optional) Set the login credentials as configured on the OpenVPN server:

   ```
   (config vpn openvpn client name)> username value
   (config vpn openvpn client name)> password value
   (config vpn openvpn client name)>
   ```

9. Set the IP address of the OpenVPN server:

   ```
   (config vpn openvpn client name)> server ip_address
   (config vpn openvpn client name)>
   ```

10. (Optional) Set the port used by the OpenVPN server:

    ```
    (config vpn openvpn client name)> port port
    (config vpn openvpn client name)>
    ```

    The default is **1194**.

11. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

    ```
    (config vpn openvpn client name)> cacert value
    (config vpn openvpn client name)>
    ```

12. Paste the contents of the public key (for example, client.crt) into the value of the **public_cert** parameter:

    ```
    (config vpn openvpn client name)> public_cert value
    (config vpn openvpn client name)>
    ```

13. Paste the contents of the private key (for example, client.key) into the value of the **private_key** parameter:

    ```
    (config vpn openvpn client name)> private_key value
    (config vpn openvpn client name)>
    ```

14. (Optional) Set additional OpenVPN parameters.

    a. Enable the use of additional OpenVPN parameters:

       ```
       (config vpn openvpn client name)> advanced_options enable true
       (config vpn openvpn client name)>
       ```

b. Configure whether the additional OpenVPN parameters should override default options:

```
(config vpn openvpn client name)> advanced_options override true
(config vpn openvpn client name)>
```

c. Set the additional OpenVPN parameters:

```
(config vpn openvpn client name)> advanced_options extra parameters
(config vpn openvpn client name)>
```

15. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

16. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure SureLink active recovery for OpenVPN

You can configure the Connect EZ device to regularly probe OpenVPN client connections to determine if the connection has failed and take remedial action.

Required configuration items

- A valid OpenVPN client configuration. See Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file for configuration instructions.
- Enable OpenVPN active recovery.
- The behavior of the Connect EZ device upon OpenVPN failure: either
    - Restart the OpenVPN interface
    - Reboot the device.

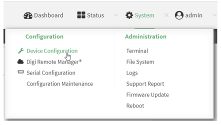
Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe attempts before the OpenVPN connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

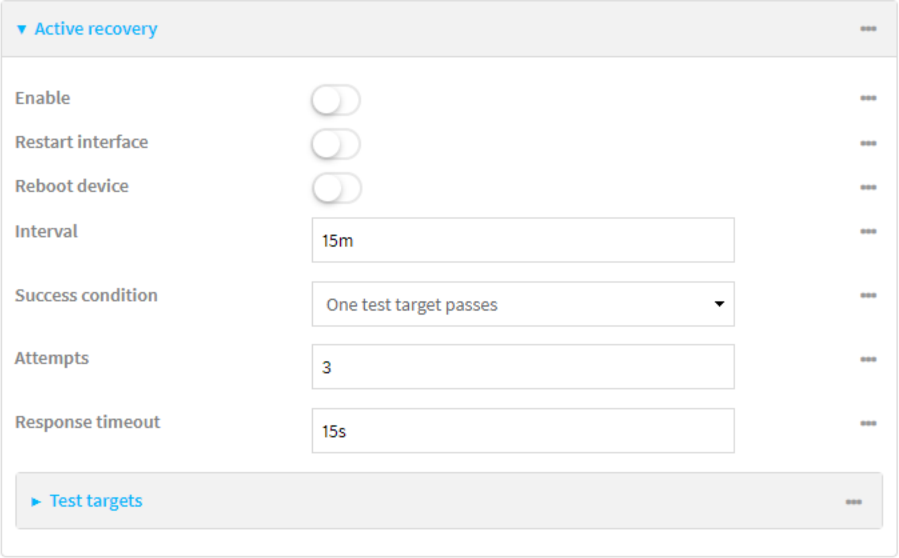
To configure the Connect EZ device to regularly probe the OpenVPN connection:

≡ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Clients**.
4. Create a new OpenVPN client or select an existing one:
   - To create a new OpenVPN client, see Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file.
   - To edit an existing OpenVPN client, click to expand the appropriate client.
5. After creating or selecting the OpenVPN client, click **Active recovery**.

   ▾ Active recovery

Enable	○
Restart interface	○
Reboot device	○
Interval	15m
Success condition	One test target passes ▾
Attempts	3
Response timeout	15s

   ▸ Test targets

6. **Enable** active recovery.
7. For **Restart interface**, enable to configure the device to restart the interface when its connection is considered to have failed. This is useful for interfaces that may regain connectivity after restarting.
8. For **Reboot device**, enable to instruct the device to reboot when the WAN connection is considered to have failed.
9. Change the **Interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number*{w|d|h|m|s}**.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

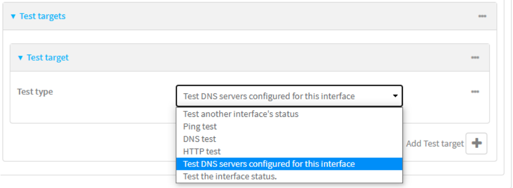
   The default is 15 minutes.
10. For **Success condition**, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.

11. For **Attempts**, type the number of probe attempts before the WAN is considered to have failed.
12. For **Response timeout**, type the amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number*{w|d|h|m|s}**.

    For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

    The default is 15 seconds.
13. Add a test target:
    a. Click to expand **Test targets**.
    b. For **Add Test target**, click **✚**.
    c. Select the **Test type**:


▾ Test targets
▾ Test target
Test type
Test DNS servers configured for this interface
Test another interface's status
Ping test
DNS test
HTTP test
Test DNS servers configured for this interface
Test the interface status.
Add Test target
✚

- **Test another interface's status**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces. If **Test another interface's status** is selected:
    - For **Test Interface**, select the alternate interface to be tested.
    - For **IP version**, select the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.
    - For **Expected status**, select whether the expected status of the alternate interface is **Up** or **Down**. For example, if **Expected status** is set to **Down**, but the alternate interface is determined to be up, then this test will fail.
- **Ping test**: Tests connectivity by sending an ICMP echo request to the hostname or IP address specified in **Ping host**. You can also optionally change the number of bytes in the **Ping payload size**.
- **DNS test**: Tests connectivity by sending a DNS query to the specified **DNS server**.
- **HTTP test**: Tests connectivity by sending an HTTP or HTTPS GET request to the URL specified in **Web servers**. The URL should take the format of **http[s]://*hostname*/[*path*]**.
- **Test DNS servers configured for this interface**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **Test the interface status**: The interface is considered to be down based on:
    - **Down time**: The amount of time that the interface can be down before this test is considered to have failed.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number*{w|d|h|m|s}**.

      For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

      The default is 60 seconds.

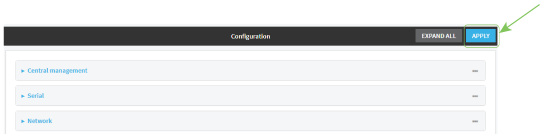
- **Initial connection time**: The amount of time to wait for an initial connection to the interface before this test is considered to have failed.

  Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

  For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

  The default is 60 seconds.

14. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new OpenVPN client, or edit an existing one:
   - To create a new OpenVPN client, see Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file.
   - To edit an existing OpenVPN client, change to the OpenVPN client's node in the configuration schema. For example, for an OpenVPN client named **openvpn_client1**, change to the **openvpn_client1** node in the configuration schema:

```
(config)> vpn openvpn client openvpn_client1
(config vpn openvpn client openvpn_client1)>
```

4. Enable active recovery:

```
(config vpn openvpn client openvpn_client1)> surelink enable true
(config vpn openvpn client openvpn_client1)>
```

5. To configure the device to restart the interface when its connection is considered to have failed:

```
(config vpn openvpn client openvpn_client1)> surelink restart true
(config vpn openvpn client openvpn_client1)>
```

   This is useful for interfaces that may regain connectivity after restarting.
6. To configure the device to reboot when the interface is considered to have failed:

```
(config vpn openvpn client openvpn_client1)> surelink reboot enable
(config vpn openvpn client openvpn_client1)>
```

7. Set the **Interval** between connectivity tests:

   ```
   (config vpn openvpn client openvpn_client1)> surelink interval value
   (config vpn openvpn client openvpn_client1)>
   ```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

   ```
   (config vpn openvpn client openvpn_client1)> surelink interval 600s
   (config vpn openvpn client openvpn_client1)>
   ```

   The default is 15 minutes.
8. Determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets:

   ```
   (config vpn openvpn client openvpn_client1)> surelink success_condition
   value
   (config vpn openvpn client openvpn_client1)>
   ```

   Where *value* is either **one** or **all**.
9. Set the number of probe attempts before the WAN is considered to have failed:

   ```
   (config vpn openvpn client openvpn_client1)> surelink  attempts num
   (config vpn openvpn client openvpn_client1)>
   ```

   The default is **3**.
10. Set the amount of time that the device should wait for a response to a probe attempt before considering it to have failed:

    ```
    (config vpn openvpn client openvpn_client1)> surelink timeout value
    (config vpn openvpn client openvpn_client1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config vpn openvpn client openvpn_client1)> surelink timeout 600s
    (config vpn openvpn client openvpn_client1)>
    ```

    The default is 15 seconds.
11. Configure test targets:
    a. Add a test target:

       ```
       (config vpn openvpn client openvpn_client1)> add surelink target end
       (config vpn openvpn client openvpn_client1 surelink target 0)>
       ```

    b. Set the test type:

```
(config vpn openvpn client openvpn_client1 surelink target 0)> test
value
(config vpn openvpn client openvpn_client1 surelink target 0)>
```

where *value* is one of:

- **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
    - Specify the hostname or IP address:

      ```
      (config vpn openvpn client openvpn_client1 surelink target
      0)> ping_host host
      (config vpn openvpn client openvpn_client1 surelink target
      0)>
      ```

    - (Optional) Set the size, in bytes, of the ping packet:

      ```
      (config vpn openvpn client openvpn_client1 surelink target
      0)> ping_size [num]
      (config vpn openvpn client openvpn_client1 surelink target
      0)>
      ```

- **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
    - Specify the DNS server. Allowed value is the IP address of the DNS server.

      ```
      (config vpn openvpn client openvpn_client1 surelink target
      0)> dns_server ip_address
      (config vpn openvpn client openvpn_client1 surelink target
      0)>
      ```

- **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
    - Specify the url:

      ```
      (config vpn openvpn client openvpn_client1 surelink target
      0)> http_url value
      (config vpn openvpn client openvpn_client1 surelink target
      0)>
      ```

      where *value* uses the format **http[s]://*hostname*/[*path*]**
- **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
    - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

```
(config vpn openvpn client openvpn_client1 surelink target
0)> interface_down_time value
(config vpn openvpn client openvpn_client1 surelink target
0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config vpn openvpn client openvpn_client1 surelink target
0)> interface_down_time 600s
(config vpn openvpn client openvpn_client1 surelink target
0)>
```

The default is 60 seconds.

- (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

  ```
  (config vpn openvpn client openvpn_client1 surelink target
  0)> interface_timeout value
  (config vpn openvpn client openvpn_client1 surelink target
  0)>
  ```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

  For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

  ```
  (config vpn openvpn client openvpn_client1 surelink target
  0)> interface_timeout 600s
  (config vpn openvpn client openvpn_client1 surelink target
  0)>
  ```

  The default is 60 seconds.

- **other**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces:

  ```
  (config vpn openvpn client openvpn_client1 surelink target
  0)> other value
  (config vpn openvpn client openvpn_client1 surelink target
  0)>
  ```

  If **other** is set:

  - Set the alternate interface to be tested:

    i. Use the **?** to determine available interfaces:

    ii. Set the interface. For example:

    ```
    (config vpn openvpn client openvpn_client1 surelink
    target 0)> other_interface /network/interface/eth1
    ```

```
(config vpn openvpn client openvpn_client1 surelink
target 0)>
```

- Set the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.

  ```
  (config vpn openvpn client openvpn_client1 surelink target
  0)> other_ip_version value
  (config vpn openvpn client openvpn_client1 surelink target
  0)>
  ```

  where *value* is one of: **any**, **both**, **ipv4**, or **ipv6**.

- Set the expected status of the alternate interface:

  ```
  (config vpn openvpn client openvpn_client1 surelink target
  0)> other_status value
  (config vpn openvpn client openvpn_client1 surelink target
  0)>
  ```

  where *value* is either **up** or **down**. For example, if **other_status** is set to **down**, but the alternate interface is determined to be up, then this test will fail.

12. Save the configuration and apply the change:

    ```
    (config vpn openvpn client openvpn_client1 connection_monitor target 0)>
    save
    Configuration saved.
    >
    ```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Show Surelink status and statistics for information about showing Surelink status for OpenVPN clients.

Show OpenVPN server status and statistics

You can view status and statistics for OpenVPN servers from either the web interface or the command line:

☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status** > **OpenVPN** > **Servers**.

   The **OpenVPN Servers** page appears.
3. To view configuration details about an OpenVPN server, click the 🔧 (configuration) icon in the upper right of the OpenVPN server's status pane.

⌨ Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured OpenVPN servers, type the following at the prompt:

```
> show openvpn server all

 Server           Enable  Type  Zone      IP Address       Port
 ---------------  ------  ----  --------  ---------------  ----
 OpenVPN_server1  true    tun   internal  192.168.30.1/24  1194
 OpenVPN_server2  false   tun   internal  192.168.40.1/24  1194

>
```

3. To display details about a specific server:

```
> show openvpn server name OpenVPN_server1

 Server                    : OpenVPN_server1
 Enable                    : true
 Type                      : tun
 Zone                      : internal
 IP Address                : 192.168.30.1/24
 Port                      : 1194
 Use File                  : true
 Metric                    : 0
 Protocol                  : udp
 First IP                  : 80
 Last IP                   : 99

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show OpenVPN client status and statistics

You can view status and statistics for OpenVPN clients from either web interface or the command line:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status** > **OpenVPN** > **Clients**.

   The **OpenVPN Clients** page appears.
3. To view configuration details about an OpenVPN client, click the 🔧 (configuration) icon in the upper right of the OpenVPN client's status pane.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured OpenVPN clients, type the following at the prompt:

```
> show openvpn client all

 Client           Enable  Status     Username  Use File  Zone
 ---------------  ------  -------    --------  --------  --------
 OpenVPN_Client1  true    connected            true      internal
 OpenVPN_Client2  true    pending              true      internal

>
```

3. To display details about a specific client:

```
> show openvpn client name OpenVPN_client1

 Client                   : OpenVPN_client1
 Enable                   : true
 Status                   : up
 Username                 : user1
 IP address               : 123.122.121.120
 Remote                   : 120.121.122.123
 MTU                      : 1492
 Zone                     : internal
 IP Address               : 192.168.30.1/24
 Port                     : 1194
 Use File                 : true
 Metric                   : 0
 Protocol                 : udp
 Port                     : 1194
 Type                     : tun

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Generic Routing Encapsulation (GRE)

Generic Routing Encapsulation (GRE) is an IP packet encapsulation protocol that allow for networks and routes to be advertized from one network device to another. You can use GRE to encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an IP network.

Configuring a GRE tunnel

Configuring a GRE tunnel involves the following items:

Required configuration items

- A GRE loopback endpoint interface.
- GRE tunnel configuration:
  - Enable the GRE tunnel.

    The GRE tunnels are enabled by default.
  - The local endpoint interface.
  - The IP address of the remote device/peer.

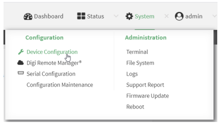
Additional configuration items

- A GRE key.
- Enable the device to respond to keepalive packets.

Task One: Create a GRE loopback endpoint interface

WebUI

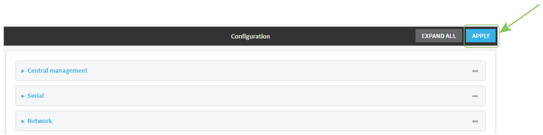
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. For **Add Interface**, type a name for the GRE loopback endpoint interface and click ✚.
5. **Enable** the interface.

   New interfaces are enabled by default. To disable, or to enable if it has been disabled, click **Enable**.
6. For **Interface type**, select **Ethernet**.
7. For **Zone**, select **Internal**.
8. For **Device**, select **Ethernet: Loopback**.

9. Click to expand **IPv4**.
10. For **Address**, enter the IP address and subnet mask of the local GRE endpoint, for example **10.10.1.1/24**.
11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint interface. For example, to add an interface named **gre_endpoint**:

```
(config)> add network interface gre_interface
(config network interface gre_interface)>
```

4. Set the interface zone to **internal**:

```
(config network interface gre_interface)> zone internal
(config network interface gre_interface)>
```

5. Set the interface device to **loopback**:

```
(config network interface gre_interface)> device /network/device/loopback
(config network interface gre_interface)>
```

6. Set the IP address and subnet mask of the local GRE endpoint. For example, to set the local GRE endpoint's IP address and subnet mask to **10.10.1.1/24:**

```
(config network interface gre_interface)> ipv4 address 10.10.1.1/24
(config network interface gre_interface)>
```

7. Save the configuration and apply the change:

```
(config network interface gre_interface)> save
Configuration saved.
>
```

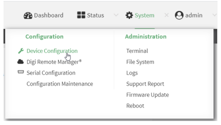
8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Task Two: Configure the GRE tunnel

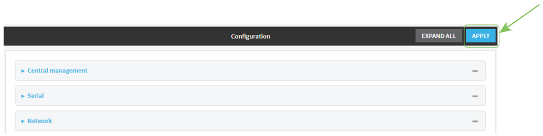
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **IP Tunnels**.
4. For **Add IP tunnel**, type a name for the GRE tunnel and click **+**.
5. **Enable** the tunnel.

   New tunnels are enabled by default. To disable, or to enable if it has been disabled, click **Enable**.
6. For **Local endpoint**, select the GRE endpoint interface created in Task One.
7. For **Remote endpoint**, type the IP address of the GRE endpoint on the remote peer.
8. (Optional) For **Key**, enter a key that will be inserted in GRE packets created by this tunnel. It must match the key set by the remote endpoint. Allowed value is an interger between 0 and 4294967295, or an IP address.
9. (Optional) **Enable keepalive reply** to enable the device to reply to Cisco GRE keepalive packets.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint tunnel. For example, to add a tunnel named **gre_example**:

```
(config)> add vpn iptunnel gre_example
(config vpn iptunnel gre_example)>
```

GRE tunnels are enabled by default. To disable:

```
(config vpn iptunnel gre_example)> enable false
(config vpn iptunnel gre_example)>
```

4. Set the local endpoint to the GRE endpoint interface created in Task One, for example:

```
(config vpn iptunnel gre_example)> local /network/interface/gre_endpoint
(config vpn iptunnel gre_example)>
```

5. Set the IP address of the GRE endpoint on the remote peer:

```
(config vpn iptunnel gre_example)> remote ip_address
(config vpn iptunnel gre_example)>
```

6. (Optional) Set a key that will be inserted in GRE packets created by this tunnel.

   The key must match the key set by the remote endpoint.

```
(config vpn iptunnel gre_example)> key value
(config vpn iptunnel gre_example)>
```

   where value is an interger between 0 and 4294967295, or an IP address.

7. (Optional) Enable the device to reply to Cisco GRE keepalive packets:

```
(config vpn iptunnel gre_example)> keepalive true
(config vpn iptunnel gre_example)>
```

8. Save the configuration and apply the change:

```
(config vpn iptunnel gre_example)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show GRE tunnels

To view information about currently configured GRE tunnels:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **Status** > **IP tunnels**.

   The **IP Tunnels**page appears.
3. To view configuration details about a GRE tunnel, click the 🔧 (configuration) icon in the upper right of the tunnel's status pane.

Example: GRE tunnel over an IPSec tunnel

The Connect EZ device can be configured as an advertised set of routes through an IPSec tunnel. This allows you to leverage the dynamic route advertisement of GRE tunnels through a secured IPSec tunnel.

The example configuration provides instructions for configuring the Connect EZ device with a GRE tunnel through IPsec.

Connect EZ-1 configuration tasks

1. Create an IPsec tunnel named **ipsec_gre1** with:
   - A pre-shared key.
   - **Remote endpoint** set to the public IP address of the Connect EZ-2 device.
   - A policy with:
     - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
     - **Remote network** set to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.
2. Create an IPsec endpoint interface named **ipsec_endpoint1**:
   a. **Zone** set to **Internal**.
   b. **Device** set to **Ethernet: Loopback**.
   c. IPv4 Address set to the IP address of the local GRE tunnel, **172.30.0.1/32**.
3. Create a GRE tunnel named **gre_tunnel1**:
   a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint1**.
   b. Remote endpoint set to the IP address of the GRE tunnel on Connect EZ-2, **172.30.0.2**.
4. Create an interface named **gre_interface1** and add it to the GRE tunnel:
   a. **Zone** set to **Internal**.
   b. **Device** set to **IP tunnel: gre_tunnel1**.
   c. IPv4 Address set to a virtual IP address on the GRE tunnel, **172.31.0.1/30**.

Connect EZ-2 configuration tasks

1. Create an IPsec tunnel named **ipsec_gre2** with:
   - The same pre-shared key as the **ipsec_gre1** tunnel on Connect EZ-1.
   - **Remote endpoint** set to the public IP address of Connect EZ-1.
   - A policy with:
     - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
     - **Remote network** set to the IP address of the remote GRE tunnel, **172.30.0.1/32**.
2. Create an IPsec endpoint interface named **ipsec_endpoint2**:
   a. **Zone** set to **Internal**.
   b. **Device** set to **Ethernet: Loopback**.
   c. IPv4 Address set to the IP address of the local GRE tunnel, **172.30.0.2/32**.

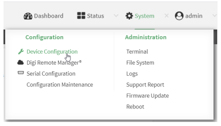
3. Create a GRE tunnel named **gre_tunnel2**:
   a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint2**.
   b. Remote endpoint set to the IP address of the GRE tunnel on Connect EZ-1, **172.30.0.1**.
4. Create an interface named **gre_interface2** and add it to the GRE tunnel:
   a. **Zone** set to **Internal**.
   b. **Device** set to **IP tunnel: gre_tunnel2**.
   c. IPv4 Address set to a virtual IP address on the GRE tunnel, **172.31.1.1/30**.

Configuration procedures

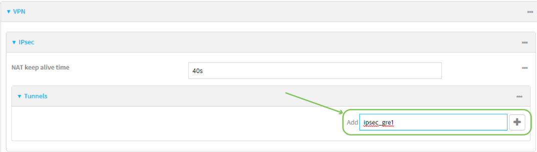
Configure the Connect EZ-1 device
Task one: Create an IPsec tunnel

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



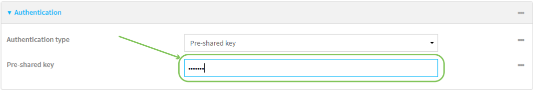
   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec** > **Tunnels**.
4. For **Add IPsec Tunnel**, type **ipsec_gre1** and click **+**.



NAT keep alive time 40s

Add ipsec_gre1

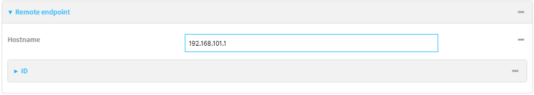
5. Click to expand **Authentication**.
6. For **Pre-shared key**, type **testkey**.



Authentication type Pre-shared key

Pre-shared key •••••••

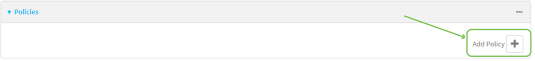
7. Click to expand **Remote endpoint**.
8. For **Hostname**, type public IP address of the Connect EZ-2 device.



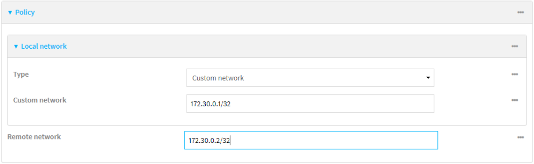
Hostname 192.168.101.1

9. Click to expand **Policies**.

10. For **Add Policy**, click ✚ to add a new policy.



11. Click to expand **Local network**.
12. For **Type**, select **Custom network**.
13. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
14. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.

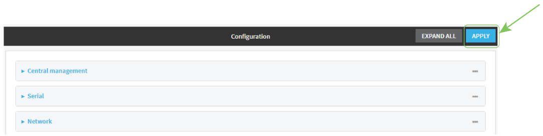


Type: Custom network

Custom network: 172.30.0.1/32

Remote network: 172.30.0.2/32

15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre1**:

```
(config)> add vpn ipsec tunnel ipsec_gre1
(config vpn ipsec tunnel ipsec_gre1)>
```

4. Set the pre-shared key to **testkey**:

```
(config vpn ipsec tunnel ipsec_gre1)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre1)>
```

5. Set the remote endpoint to public IP address of the Connect EZ-2 device:

```
(config vpn ipsec tunnel ipsec_gre1)> remote hostname 192.168.101.1
(config vpn ipsec tunnel ipsec_gre1)>
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre1)> add policy end
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local custom 172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> remote network
172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

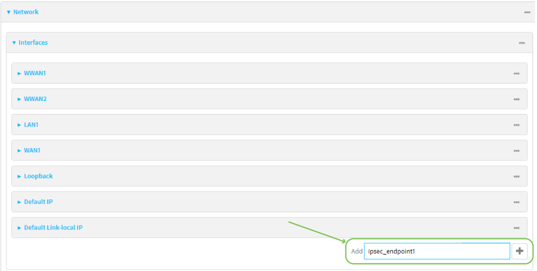
10. Save the configuration and apply the change:

```
(config ipsec tunnel ipsec_gre1 policy 0)> save
Configuration saved.
>
```

Task two: Create an IPsec endpoint interface

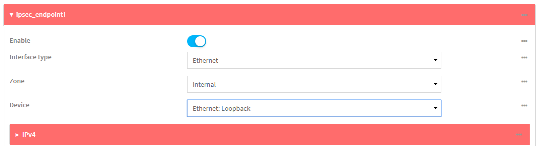
WebUI

1. Click **Network** > **Interface**.
2. For **Add Interface**, type **ipsec_endpoint1** and click ✚.



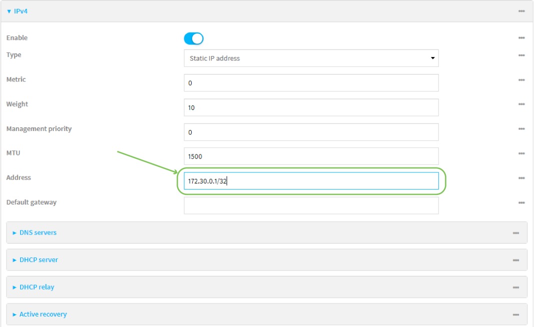
Add ipsec_endpoint1

3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.



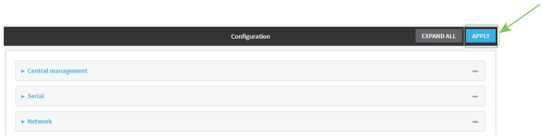
Enable ●
Interface type: Ethernet
Zone: Internal
Device: Ethernet: Loopback

5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.1/32**.



Enable ●
Type: Static IP address
Metric: 0
Weight: 10
Management priority: 0
MTU: 1500
Address: 172.30.0.1/32
Default gateway:

7. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint1**:

```
(config)> add network interface ipsec_endpoint1
(config network interface ipsec_endpoint1)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint1)> zone internal
(config network interface ipsec_endpoint1)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint1)> device
/network/device/loopback
(config network interface ipsec_endpoint1)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.1/32**:

```
(config network interface ipsec_endpoint1)> ipv4 address 172.30.0.1/32
(config network interface ipsec_endpoint1)>
```

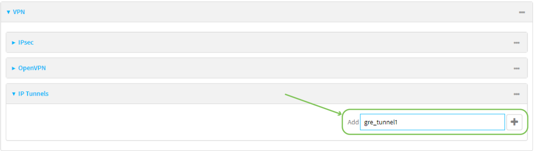
6. Save the configuration and apply the change:

```
(config vpn ipsec tunnel ipsec_endpoint1 policy 0)> save
Configuration saved.
>
```

Task three: Create a GRE tunnel

WebUI

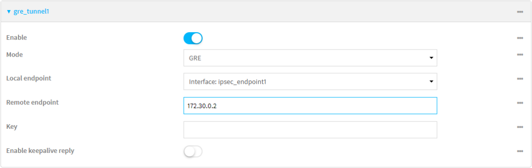
1. Click **VPN** > **IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel1** and click **✚**.



gre_tunnel1

3. For **Local endpoint**, select the IPsec endpoint interface created in Task two (**Interface: ipsec_endpoint1**).

4. For **Remote endpoint**, type the IP address of the GRE tunnel on Connect EZ-2, **172.30.0.2**.



▾ gre_tunnel1

Enable: ●

Mode: GRE

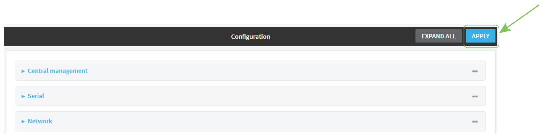
Local endpoint: Interface: ipsec_endpoint1

Remote endpoint: 172.30.0.2

Key:

Enable keepalive reply: ○

5. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add a GRE tunnel named **gre_tunnel1**:

```
(config)> add vpn iptunnel gre_tunnel1
(config vpn iptunnel gre_tunnel1)>
```

3. Set the local endpoint to the IPsec endpoint interface created in Task two (**/network/interface/ipsec_endpoint1**):

```
(config vpn iptunnel gre_tunnel1)> local /network/interface/ipsec_
endpoint1
(config vpn iptunnel gre_tunnel1)>
```

4. Set the remote endpoint to the IP address of the GRE tunnel on Connect EZ-2, **172.30.0.2**:

```
(config vpn iptunnel gre_tunnel1)> remote 172.30.0.2
(config vpn iptunnel gre_tunnel1)>
```

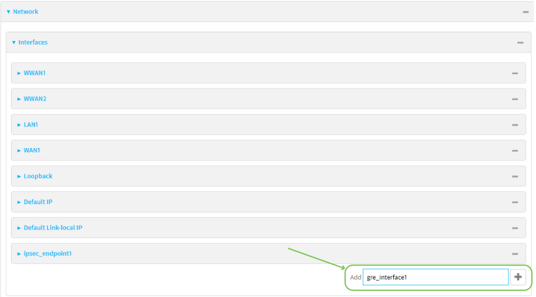
5. Save the configuration and apply the change:

```
(config vpn iptunnel gre_tunnel1)> save
Configuration saved.
>
```

Task four: Create an interface for the GRE tunnel device

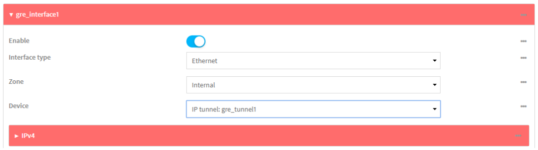
WebUI

1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **gre_interface1** and click **✚**.



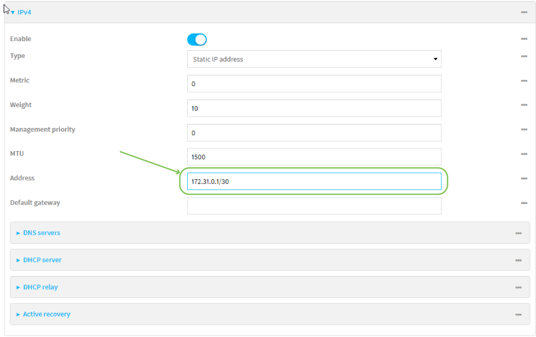
Add: gre_interface1

3. For **Zone**, select **Internal**.
4. For **Device**, select the GRE tunnel created in Task three (**IP tunnel: gre_tunnel1**).



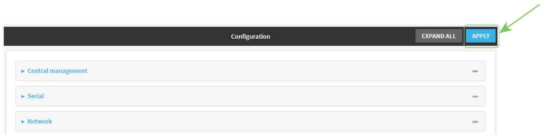
Enable: ●
Interface type: Ethernet
Zone: Internal
Device: IP tunnel: gre_tunnel1

5. Click to expand **IPv4**.
6. For **Address**, type **172.31.0.1/30** for a virtual IP address on the GRE tunnel.



Enable: ●
Type: Static IP address
Metric: 0
Weight: 10
Management priority: 0
MTU: 1500
Address: 172.31.0.1/30
Default gateway:

7. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **gre_interface1**:

```
(config)> add network interface gre_interface1
(config network interface gre_interface1)>
```

3. Set the zone to **internal**:

```
(config network interface gre_interface1)> zone internal
(config network interface gre_interface1)>
```

4. Set the device to the GRE tunnel created in Task three (**/vpn/iptunnel/gre_tunnel1**):

```
(config network interface gre_interface1)> device /vpn/iptunnel/gre_
tunnel1
(config network interface gre_interface1)>
```

5. Set **172.31.0.1/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface1)> ipv4 address 172.31.0.1/30
(config network interface gre_interface1)>
```

6. Save the configuration and apply the change:

```
(config network interface gre_interface1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

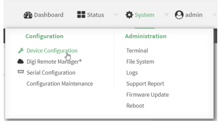
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the Connect EZ-2 device

Task one: Create an IPsec tunnel

WebUI

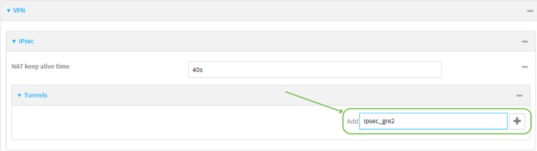
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

3. Click **VPN** > **IPsec** > **Tunnels**.

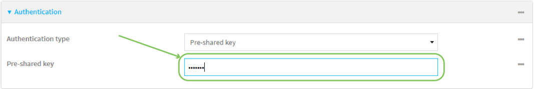
4. For **Add IPsec Tunnel**, type **ipsec_gre2** and click ➕.



NAT keep alive time: 40s

Add: ipsec_gre2 ➕

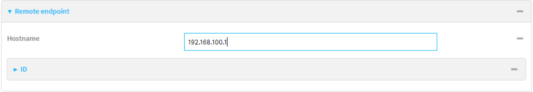
5. Click to expand **Authentication**.
6. For **Pre-shared key**, type the same pre-shared key that was configured for the Connect EZ-1 (**testkey**).



Authentication type: Pre-shared key

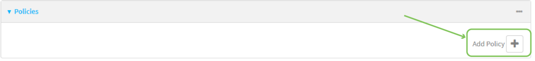
Pre-shared key: •••••••

7. Click to expand **Remote endpoint**.
8. For **Hostname**, type public IP address of the Connect EZ-1 device.

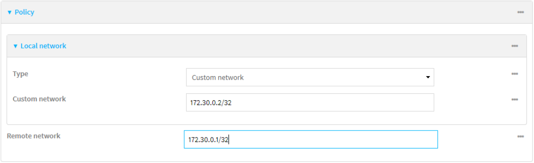


Hostname: 192.168.100.1

9. Click to expand **Policies**.
10. For **Add Policy**, click ➕ to add a new policy.



11. Click to expand **Local network**.
12. For **Type**, select **Custom network**.
13. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
14. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**.

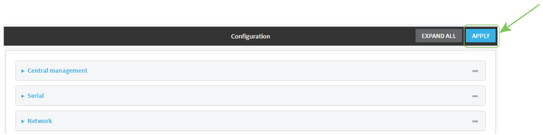


Type: Custom network

Custom network: 172.30.0.2/32

Remote network: 172.30.0.1/32

15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre2**:

```
(config)> add vpn ipsec tunnel ipsec_gre2
(config vpn ipsec tunnel ipsec_gre2)>
```

4. Set the pre-shared key to the same pre-shared key that was configured for the Connect EZ-1 (**testkey**):

```
(config vpn ipsec tunnel ipsec_gre2)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre2)>
```

5. Set the remote endpoint to public IP address of the Connect EZ-1 device:

```
(config vpn ipsec tunnel ipsec_gre2)> remote hostname 192.168.100.1
(config vpn ipsec tunnel ipsec_gre2)>
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre2)> add policy end
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local custom 172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> remote network
172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

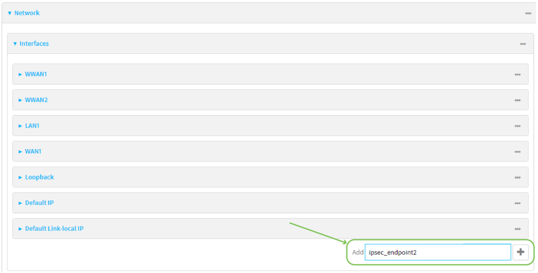
10. Save the configuration and apply the change:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> save
Configuration saved.
>
```

Task two: Create an IPsec endpoint interface

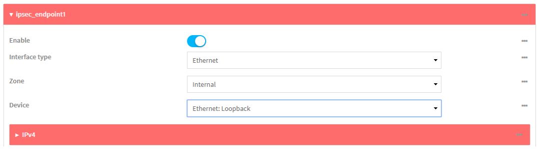
WebUI

1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **ipsec_endpoint2** and click **+**.



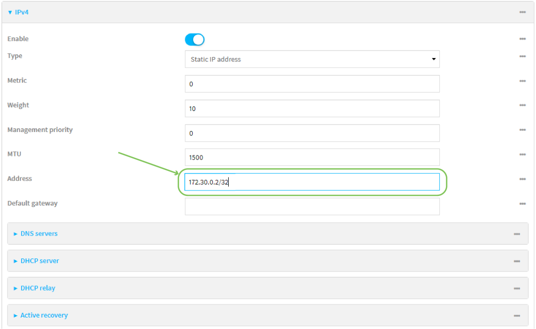
Add ipsec_endpoint2

3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.



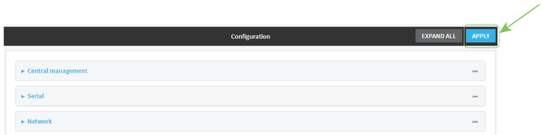
Enable
Interface type: Ethernet
Zone: Internal
Device: Ethernet: Loopback

5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.2/32**.



Enable
Type: Static IP address
Metric: 0
Weight: 10
Management priority: 0
MTU: 1500
Address: 172.30.0.2/32
Default gateway

7. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint2**:

```
(config)> add network interface ipsec_endpoint2
(config network interface ipsec_endpoint2)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint2)> zone internal
(config network interface ipsec_endpoint2)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint2)> device
/network/device/loopback
(config network interface ipsec_endpoint2)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.2/32**:

```
(config network interface ipsec_endpoint2)> ipv4 address 172.30.0.2/32
(config network interface ipsec_endpoint2)>
```

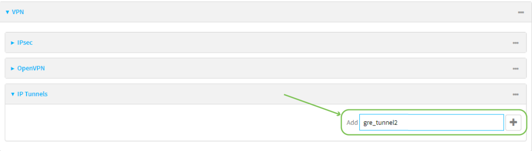
6. Save the configuration and apply the change:

```
(config vpn ipsec tunnel ipsec_endpoint2)> save
Configuration saved.
>
```

Task three: Create a GRE tunnel

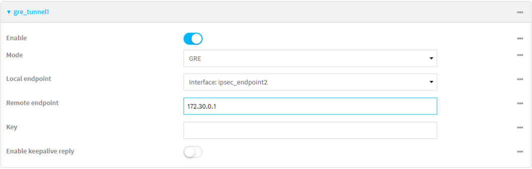
WebUI

1. Click **VPN** > **IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel2** and click **+**.



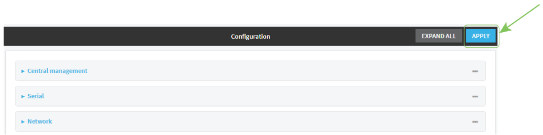
Add gre_tunnel2

3. For **Local endpoint**, select the IPsec endpoint interface created in Task two (**Interface: ipsec_endpoint2**).
4. For **Remote endpoint**, type the IP address of the GRE tunnel on Connect EZ-1, **172.30.0.1**.



Enable ●
Mode GRE
Local endpoint Interface: ipsec_endpoint2
Remote endpoint 172.30.0.1
Key
Enable keepalive reply ○

5. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add a GRE tunnel named **gre_tunnel2**:

```
(config)> add vpn iptunnel gre_tunnel2
(config vpn iptunnel gre_tunnel2)>
```

3. Set the local endpoint to the IPsec endpoint interface created in Task two (**/network/interface/ipsec_endpoint2**):

```
(config vpn iptunnel gre_tunnel2)> local /network/interface/ipsec_
endpoint2
(config vpn iptunnel gre_tunnel2)>
```

4. Set the remote endpoint to the IP address of the GRE tunnel on Connect EZ-1, **172.30.0.1**:

```
(config vpn iptunnel gre_tunnel2)> remote 172.30.0.1
(config vpn iptunnel gre_tunnel2)>
```

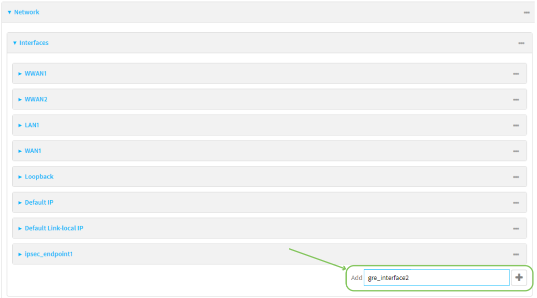
5. Save the configuration and apply the change:

```
(config vpn iptunnel gre_tunnel2)> save
Configuration saved.
>
```

Task four: Create an interface for the GRE tunnel device

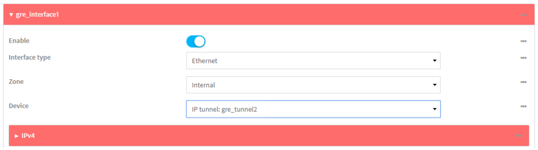
WebUI

1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **gre_interface2** and click ✚.



3. For **Zone**, select **Internal**.

4. For **Device**, select the GRE tunnel created in Task three (**IP tunnel: gre_tunnel2**).



gre_interface1

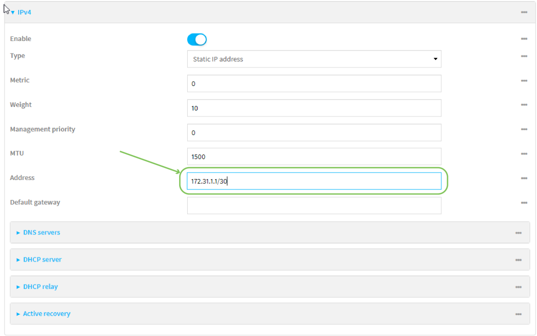
Enable

Interface type: Ethernet

Zone: Internal

Device: IP tunnel: gre_tunnel2

5. Click to expand **IPv4**.
6. For **Address**, type **172.31.1.1/30** for a virtual IP address on the GRE tunnel.



IPv4

Enable

Type: Static IP address

Metric: 0

Weight: 10

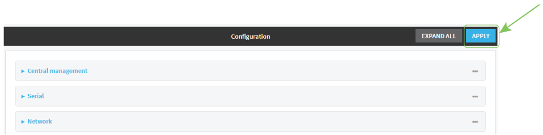
Management priority: 0

MTU: 1500

Address: 172.31.1.1/30

Default gateway:

7. Click **Apply** to save the configuration and apply the change.



Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **gre_interface2**:

```
(config)> add network interface gre_interface2
(config network interface gre_interface2)>
```

3. Set the zone to **internal**:

```
(config network interface gre_interface2)> zone internal
(config network interface gre_interface2)>
```

4. Set the device to the GRE tunnel created in Task three (**/vpn/iptunnel/gre_tunnel2**):

```
(config network interface gre_interface2)> device /vpn/iptunnel/gre_
tunnel2
(config network interface gre_interface2)>
```

5. Set **172.31.0.1/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface2)> ipv4 address 172.31.1.1/30
(config network interface gre_interface2)>
```

6. Save the configuration and apply the change:

```
(config network interface gre_interface2)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

L2TP

Your Connect EZ device supports PPP-over-L2TP (Layer 2 Tunneling Protocol).

Configure a PPP-over-L2TP tunnel

Your Connect EZ device supports PPP-over-L2TP (Layer 2 Tunneling Protocol). The tunnel endpoints are known as L2TP Access Concentrators (LAC) and L2TP Network Servers (LNS). Each endpoint terminates the PPP session.

Required configuration items

- For L2TP access concentrators:
  - The hostname or IP address of the L2TP network server.
  - The firewall zone for the tunnel.
- For L2TP network servers:
  - The IP address of the L2TP access concentrator.
  - The local IP address assigned to the L2TP virtual network interface.
  - The IP address assigned to the remote peer.
  - The firewall zone for the tunnel.

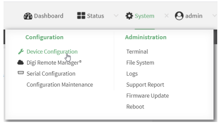
Additional configuration items

- The UDP port that L2TP servers will listen on, if other than the deafult of **1701**.
- Access control for the L2TP tunnel.
- For L2TP access concentrators:
  - L2TP network server port.
  - The username and password of the L2TP server.
  - The metric for the tunnel.
  - Enable custom PPP configuration options for the tunnel.
    - Whether to override the default configuration and only use the custom options.
    - Optional configuration data in the format of a pppd options file.
  - SureLink options for the tunnel.

- For L2TP network servers:
    - The Authentication method.
    - The metric for the tunnel.
    - Enable custom PPP configuration options for the tunnel.
        - Whether to override the default configuration and only use the custom options.
        - Optional configuration data in the format of a pppd options file.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **L2TP**.
4. (Optional) Type the **UDP listening port** that L2TP servers will listen on, if other than the default of **1701**.
5. Set the access control for L2TP tunnels:
    - To limit access to specified IPv4 addresses and networks:
        a. Click **IPv4 Addresses**.
        b. For **Add Address**, click ✚.
        c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
            - A single IP address or host name.
            - A network designation in CIDR notation, for example, 192.168.1.0/24.
            - **any**: No limit to IPv4 addresses that can access the service-type.
        d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to specified IPv6 addresses and networks:
        a. Click **IPv6 Addresses**.
        b. For **Add Address**, click ✚.
        c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
            - A single IP address or host name.
            - A network designation in CIDR notation, for example, 2001:db8::/48.
            - **any**: No limit to IPv6 addresses that can access the service-type.
        d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to hosts connected through a specified interface on the Connect EZ device:

    a. Click **Interfaces**.
    b. For **Add Interface**, click ✚.
    c. For **Interface**, select the appropriate interface from the dropdown.
    d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

6. To add an L2TP access concentrator:
    a. Click to expand **L2TP access concentrators**.
    b. For **Add L2TP access concentrator**, type a name for the LAC and click ✚.
    c. LACs are enabled by default. To disable, click to toggle off **Enable**.
    d. For **L2TP network server**, type the hostname or IP address of the L2TP network server.
    e. (Optional) Type the **L2TP network server port** to use to connect to the server, if other than the default of **1701**.
    f. (Optional) Type the **Username** to use to log into the server.
    g. (Optional) Type the **Password** to use to log into the server.
    h. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.
    i. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.
    j. (Optional): Custom PPP configuration:
        i. **Enable** custom PPP configuration.
        ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.
        iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.
    k. For SureLink, see Configure SureLink active recovery for PPP-over-L2TP.

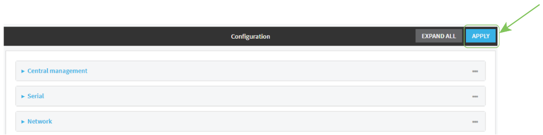
7. To add an L2TP network server:
    a. Click to expand **L2TP network servers**.
    b. For **Add L2TP network server**, type a name for the LNS and click ✚.
    c. LNSs are enabled by default. To disable, click to toggle off **Enable**.
    d. For **L2TP access concentrator**, type the IP addressof the L2TP access concentrator that this server will allow connections from. This can also be:
        - A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
        - The keyword **any**, which means that the server will accept connections from any IP address.
    e. For **Local IP address**, type the IP address of the L2TP virtual network interface.
    f. For **Remote IP address**, type the IP address to assign to the remote peer.

g. (Optional) For **Authentication method**, select one of the following:
   - **None**: No authentication is required.
   - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
   - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
   - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

   If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.

   The default is **None**.
h. (Optional) For **Authentication method**, select the authentication method, one of:
   - **None**: No authentication is required.
   - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
   - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
   - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.
   - If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.
   - The default is **None**.
i. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.
j. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.
k. (Optional): Custom PPP configuration:
   i. **Enable** custom PPP configuration.
   ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.
   iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.

8. Click **Apply** to save the configuration and apply the change.



⌨ Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Set the UDP listening port that L2TP servers will listen on:

   ```
   (config)> vpn l2tp port value
   (config)>
   ```

   where *value* is an integer between **1** and **65535**. The default is **1701**.

4. Set the access control for L2TP tunnels:

   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add vpn l2tp acl address end value
     (config)>
     ```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.

   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add vpn l2tp acl address6 end value
     (config)>
     ```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.

   - To limit access to hosts connected through a specified interface on the Connect EZ device:

     ```
     (config)> add vpn l2tp acl interface end value
     (config)>
     ```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.

   - To limit access based on firewall zones:

     ```
     (config)> add vpn l2tp acl zone end value
     ```

     Where *value* is a firewall zone defined on your device, or the **any** keyword.

     Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 --------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

5. To add an L2TP access concentrator:
   a. Add an LAC:

   ```
   (config)> add vpn l2tp lac name
   (config add vpn l2tp lac name)>
   ```

   where *name* is the name of the LAC. For example, to add an LAC named lac_tunnel:

   ```
   (config)> add vpn l2tp lac lac_tunnel
   (config vpn l2tp lac lac_tunnel)>
   ```

   LACs are enabled by default. To disable:

   ```
   (config vpn l2tp lac lac_tunnel)> enable false
   (config vpn l2tp lac lac_tunnel)>
   ```

   b. Set the hostname or IP address of the L2TP network server:

   ```
   (config vpn l2tp lac lac_tunnel)> lns hostname
   (config vpn l2tp lac lac_tunnel)>
   ```

   c. (Optional) Set the UDP port to use to connect to the L2TP network server:

   ```
   (config vpn l2tp lac lac_tunnel)> port int
   (config vpn l2tp lac lac_tunnel)>
   ```

   where *int* is an integer between **1** and **65535**. The default is **1701**.

d. (Optional) Set the username to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> username username
(config vpn l2tp lac lac_tunnel)>
```

e. (Optional) Set the password to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> password password
(config vpn l2tp lac lac_tunnel)>
```

f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lac lac_tunnel)> metric int
(config vpn l2tp lac lac_tunnel)>
```

where *int* is an integer between **0** and **65535**. The default is **1**.

g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

i. Use the **?** to determine available zones:

```
(config vpn l2tp lac lac_tunnel)> zone ?

Zone: The firewall zone assigned to this tunnel. This can be used
by packet
filtering rules and access control lists to restrict network
traffic on this
tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn l2tp lac lac_tunnel)>
```

ii. Set the zone:

```
(config vpn l2tp lac lac_tunnel)> zone zone
(config vpn l2tp lac lac_tunnel)>
```

h. (Optional): Custom PPP configuration:

i. Enable custom PPP configuration:

```
(config vpn l2tp lac lac_tunnel)> custom enable true
(config vpn l2tp lac lac_tunnel)>
```

ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lac lac_tunnel)> custom override true
(config vpn l2tp lac lac_tunnel)>
```

iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lac lac_tunnel)> custom config_file data
(config vpn l2tp lac lac_tunnel)>
```

i. To configure SureLink active recovery for the L2TP access connector, see Configure SureLink active recovery for PPP-over-L2TP.

6. To add an L2TP network server:

   a. Add an LNS:

   ```
   (config)> add vpn l2tp lns name
   (config add vpn l2tp lac name)>
   ```

   where *name* is the name of the LNS. For example, to add an LNS named lns_server:

   ```
   (config)> add vpn l2tp lns lns_server
   (config vpn l2tp lns lns_server)>
   ```

   LACs are enabled by default. To disable:

   ```
   (config vpn l2tp lns lns_server)> enable false
   (config vpn l2tp lns lns_server)>
   ```

   b. Set the IP address of the L2TP access concentrator that this server will allow connections from:

   ```
   (config vpn l2tp lns lns_server)> lac IP_address
   (config vpn l2tp lns lns_server)>
   ```

   This can also be:

   - A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
   - The keyword **any**, which means that the server will accept connections from any IP address.

   c. Set the IP address of the L2TP virtual network interface:

   ```
   (config vpn l2tp lns lns_server)> local_address IP_address
   (config vpn l2tp lns lns_server)>
   ```

   d. Set the IP address to assign to the remote peer:

   ```
   (config vpn l2tp lns lns_server)> remote_address IP_address
   (config vpn l2tp lns lns_server)>
   ```

   e. (Optional) Set the authentication method:

```
(config vpn l2tp lns lns_server)> auth method
(config)>
```

where *method* is one of the following:

- **none**: No authentication is required.
- **auto**: The device will attempt to connect using CHAP first, and then PAP.
- **chap**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- **pap**: Uses the Password Authentication Profile (PAP) to authenticate.

If **auto**, **chap**, or **pap** is selected, enter the **Username** and **Password** required to authenticate:

```
(config vpn l2tp lns lns_server)> username username
(config vpn l2tp lns lns_server)> password password
(config vpn l2tp lns lns_server)>
```

The default is **none**.

f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lns lns_server)> metric int
(config vpn l2tp lns lns_server)>
```

where *int* is an integer between **0** and **65535**. The default is **1**.

g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

i. Use the **?** to determine available zones:

```
(config vpn l2tp lns lns_server)> zone ?

Zone: The firewall zone assigned to this tunnel. This can be used
by packet
filtering rules and access control lists to restrict network
traffic on this
tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn l2tp lns lns_server)>
```

ii. Set the zone:

```
(config vpn l2tp lns lns_server)> zone zone
(config vpn l2tp lns lns_server)>
```

h. (Optional): Custom PPP configuration:

i. Enable custom PPP configuration:

```
(config vpn l2tp lac lns lns_server)> custom enable true
(config vpn l2tp lns lns_server)>
```

ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lns lns_server)> custom override true
(config vpn l2tp lns lns_server)>
```

iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lns lns_server)> custom config_file data
(config vpn l2tp lns lns_server)>
```

7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure SureLink active recovery for PPP-over-L2TP

You can configure the Connect EZ device to regularly probe PPP-over-L2TP access concatenators to determine if the connection has failed and take remedial action.

Required configuration items

- A valid PPP-over-L2TP configuration. See Configure a PPP-over-L2TP tunnel for configuration instructions.
- Enable PPP-over-L2TP active recovery.
- The behavior of the Connect EZ device upon PPP-over-L2TP failure: either
  - Restart the PPP-over-L2TP interface
  - Reboot the device.

Additional configuration items

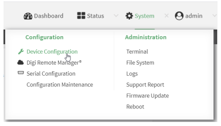
- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.

- The number of probe attempts before the PPP-over-L2TP connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

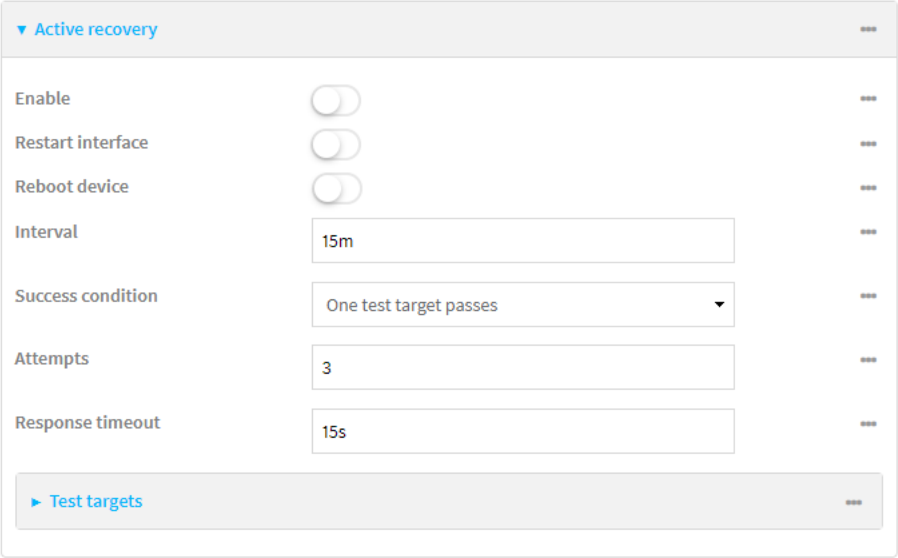
To configure the Connect EZ device to regularly probe the PPP-over-L2TP connection:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **PPP-over-L2TP**.
4. Create a new PPP-over-L2TP access concatenator or select an existing one:
   - To create a new L2TP access concatenator , see Configure a PPP-over-L2TP tunnel.
   - To edit an existing L2TP access concatenator , click to expand the appropriate tunnel.
5. After creating or selecting the PPP-over-L2TP access concatenator, click **Active recovery**.

   ▾ Active recovery

   Enable ○
   Restart interface ○
   Reboot device ○
   Interval 15m
   Success condition One test target passes ▾
   Attempts 3
   Response timeout 15s

   ▸ Test targets

6. **Enable** active recovery.
7. For **Restart interface**, enable to configure the device to restart the interface when its connection is considered to have failed. This is useful for interfaces that may regain connectivity after restarting.
8. For **Reboot device**, enable to instruct the device to reboot when the WAN connection is considered to have failed.

9. Change the **Interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.

10. For **Success condition**, determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets.

11. For **Attempts**, type the number of probe attempts before the WAN is considered to have failed.

12. For **Response timeout**, type the amount of time that the device should wait for a response to a probe attempt before considering it to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

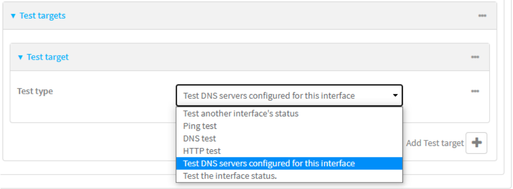
    The default is 15 seconds.

13. Add a test target:

    a. Click to expand **Test targets**.

    b. For **Add Test target**, click ✚.

    c. Select the **Test type**:


▾ Test targets
▾ Test target
Test another interface's status
Ping test
DNS test
HTTP test
Test DNS servers configured for this interface
Test the interface status.
Add Test target
✚

Test type: Test DNS servers configured for this interface

- **Test another interface's status**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces. If **Test another interface's status** is selected:
  - For **Test Interface**, select the alternate interface to be tested.
  - For **IP version**, select the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.
  - For **Expected status**, select whether the expected status of the alternate interface is **Up** or **Down**. For example, if **Expected status** is set to **Down**, but the alternate interface is determined to be up, then this test will fail.
- **Ping test**: Tests connectivity by sending an ICMP echo request to the hostname or IP address specified in **Ping host**. You can also optionally change the number of bytes in the **Ping payload size**.
- **DNS test**: Tests connectivity by sending a DNS query to the specified **DNS server**.
- **HTTP test**: Tests connectivity by sending an HTTP or HTTPS GET request to the URL specified in **Web servers**. The URL should take the format of **http[s]://*hostname*/[*path*]**.
- **Test DNS servers configured for this interface**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.

- **Test the interface status**: The interface is considered to be down based on:
    - **Down time**: The amount of time that the interface can be down before this test is considered to have failed.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

      For example, to set **Down time** to ten minutes, enter **10m** or **600s**.

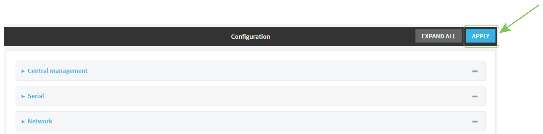
      The default is 60 seconds.
    - **Initial connection time**: The amount of time to wait for an initial connection to the interface before this test is considered to have failed.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

      For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

      The default is 60 seconds.

14. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new PPP-over-L2TP access concatenator , or edit an existing one:
    - To create a new PPP-over-L2TP access concatenator , see Configure a PPP-over-L2TP tunnel.
    - To edit an existing PPP-over-L2TP access concatenator , change to the PPP-over-L2TP access concatenator node in the configuration schema. For example, for an PPP-over-L2TP access concatenator named **lac_tunnel**, change to the **lac_tunnel** node in the configuration schema:

```
(config)> vpn l2tp lac lac_tunnel
(config vpn l2tp lac lac_tunnel)>
```

4. Enable active recovery:

```
(config vpn l2tp lac lac_tunnel)> surelink enable true
(config vpn l2tp lac lac_tunnel)>
```

5. To configure the device to restart the interface when its connection is considered to have failed:

```
(config vpn l2tp lac lac_tunnel)> surelink restart true
(config vpn l2tp lac lac_tunnel)>
```

This is useful for interfaces that may regain connectivity after restarting.

6. To configure the device to reboot when the interface is considered to have failed:

```
(config vpn l2tp lac lac_tunnel)> surelink reboot enable
(config vpn l2tp lac lac_tunnel)>
```

7. Set the **Interval** between connectivity tests:

```
(config vpn l2tp lac lac_tunnel)> surelink interval value
(config vpn l2tp lac lac_tunnel)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config vpn l2tp lac lac_tunnel)> surelink interval 600s
(config vpn l2tp lac lac_tunnel)>
```

The default is 15 minutes.

8. Determine whether the interface should fail over based on the failure of one of the test targets, or all of the test targets:

```
(config vpn l2tp lac lac_tunnel)> surelink success_condition value
(config vpn l2tp lac lac_tunnel)>
```

Where *value* is either **one** or **all**.

9. Set the number of probe attempts before the WAN is considered to have failed:

```
(config vpn l2tp lac lac_tunnel)> surelink  attempts num
(config vpn l2tp lac lac_tunnel)>
```

The default is **3**.

10. Set the amount of time that the device should wait for a response to a probe attempt before considering it to have failed:

```
(config vpn l2tp lac lac_tunnel)> surelink timeout value
(config vpn l2tp lac lac_tunnel)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config vpn l2tp lac lac_tunnel)> surelink timeout 600s
(config vpn l2tp lac lac_tunnel)>
```

The default is 15 seconds.

11. Configure test targets:
    a. Add a test target:

    ```
    (config vpn l2tp lac lac_tunnel)> add surelink target end
    (config vpn l2tp lac lac_tunnel surelink target 0)>
    ```

    b. Set the test type:

    ```
    (config vpn l2tp lac lac_tunnel surelink target 0)> test value
    (config vpn l2tp lac lac_tunnel surelink target 0)>
    ```

    where *value* is one of:

    - **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
        - Specify the hostname or IP address:

        ```
        (config vpn l2tp lac lac_tunnel surelink target 0)> ping_host
        host
        (config vpn l2tp lac lac_tunnel surelink target 0)>
        ```

        - (Optional) Set the size, in bytes, of the ping packet:

        ```
        (config vpn l2tp lac lac_tunnel surelink target 0)> ping_size
        [num]
        (config vpn l2tp lac lac_tunnel surelink target 0)>
        ```

    - **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
        - Specify the DNS server. Allowed value is the IP address of the DNS server.

        ```
        (config vpn l2tp lac lac_tunnel surelink target 0)> dns_
        server ip_address
        (config vpn l2tp lac lac_tunnel surelink target 0)>
        ```

    - **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
    - **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
        - Specify the url:

        ```
        (config vpn l2tp lac lac_tunnel surelink target 0)> http_url
        value
        (config vpn l2tp lac lac_tunnel surelink target 0)>
        ```

        where *value* uses the format **http[s]://*hostname*/[*path*]**
    - **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
        - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

```
(config vpn l2tp lac lac_tunnel surelink target 0)>
interface_down_time value
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config vpn l2tp lac lac_tunnel surelink target 0)>
interface_down_time 600s
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

The default is 60 seconds.

- (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

```
(config vpn l2tp lac lac_tunnel surelink target 0)>
interface_timeout value
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config vpn l2tp lac lac_tunnel surelink target 0)>
interface_timeout 600s
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

The default is 60 seconds.

- **other**: Allows you to test another interface's status, to create a failover or coupled relationship between interfaces:

```
(config vpn l2tp lac lac_tunnel surelink target 0)> other
value
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

If **other** is set:

- Set the alternate interface to be tested:
  1. Use the **?** to determine available interfaces:
  2. Set the interface. For example:

```
(config vpn l2tp lac lac_tunnel surelink target 0)>
other_interface /network/interface/eth1
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

- Set the alternate interface's IP version. This allows you to determine the alternate interface's status for a particular IP version.

```
(config vpn l2tp lac lac_tunnel surelink target 0)> other_
ip_version value
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

where *value* is one of: **any**, **both**, **ipv4**, or **ipv6**.

- Set the expected status of the alternate interface:

```
(config vpn l2tp lac lac_tunnel surelink target 0)> other_
status value
(config vpn l2tp lac lac_tunnel surelink target 0)>
```

where *value* is either **up** or **down**. For example, if **other_status** is set to **down**, but the alternate interface is determined to be up, then this test will fail.

See Show Surelink status and statistics for information about showing Surelink status for IPsec tunnels.

L2TP with IPsec

L2TP is commonly used in conjunction with IPsec in transport mode (to provide security).

Your Connect EZ supoorts L2TP with IPsec by configuring a transport-mode IPsec tunnel between the two endpoints, and then an L2TP tunnel with its LNS and LAC configured the same as the IPsec tunnel's endpoints. See Configure an IPsec tunnel for information about configuring an IPsec tunnel.

Note The Connect EZ does not currently support the configuration of IPsec protocol/port traffic selectors. This means that you cannot restrict traffic on the IPsec tunnel to L2TP traffic (typically UDP port 1701).

While multiple L2TP clients are supported on the Connect EZ by configuring a separate LNS for each client, multiple clients behind a Network Address Translation (NAT) device are not supported, because they will all appear to have the same IP address.

Show L2TP tunnel status

☰ WebUI

Show the status of L2TP access connectors from the WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status**. Under VPN, select **L2TP** > **Access Connectors**.

   The **L2TP Access Connectors** page appears.
3. To view configuration details about an L2TP access connector, click the 🔧 (configuration) icon in the upper right of the tunnel's status pane.

Show the status of L2TP network servers from the WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status**. Under VPN, select **L2TP** > **Network Servers**.

   The **L2TP Network Servers** page appears.
3. To view configuration details about an L2TP network server, click the 🔧 (configuration) icon in the upper right of the tunnel's status pane.

Command line

Show the status of L2TP access connectors from the Admin CLI

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lac

 Name       Enabled  Status   Device
 ---------  -------  ------   -----------
 lac_test1  true     up       test_device0
 lac_test2  true     pending
>
```

3. To display details about a specific tunnel:

```
> show l2tp lac name lac_test2

 lac_test2 L2TP Access Concentrator Status
 ------------------------------------
 Enabled         : true
 Status          : pending

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show the status of L2TP network servers from the Admin CLI

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lns

 Name       Enabled  Status   Device
 ---------  -------  ------   -----------
 lns_test1  true     up       test_device0
 lns_test2  true     pending

>
```

3. To display details about a specific tunnel:

```
> show l2tp lns name lns_test2

 lns_test2 L2TP Access Concentrator Status
 -----------------------------------
 Enabled          : true
 Status           : pending

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

L2TPv3 Ethernet

Your Connect EZ device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

Configure an L2TPv3 tunnel

Your Connect EZ device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

Required configuration items

- A name for the L2TPv3 tunnel.
- Enable the tunnel.
- The remote endpoint IP address.
- The local endpoint IP address.
- The session ID.
- The peer session ID.

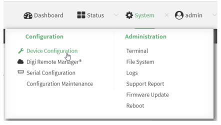
Additional configuration items

- Encapsulation type. If UDP is selected:
  - The ID for the tunnel.
  - The ID of the peer's tunnel.
  - Determine whether to enable UDP checksum.
- The session cookie.

- The peer session cookie.
- The Layer2SpecificHeader type.
- The Sequence numbering control.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

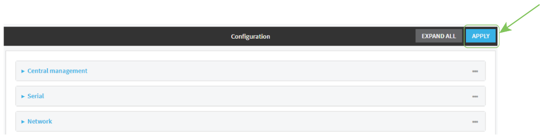
   The **Configuration** window is displayed.
3. Click **VPN** > **L2TPv3 ethernet**.
4. For **Add L2TPv3 ethernet tunnel**, type a name for the tunnel and click ✚.
5. For **Remote endpoint**, type the IPv4 address of the remote endpoint.
6. For **Local endpoint**, select the interface that will be the local endpoint.
7. For **Tunnel ID**, type the tunnel identifier for this tunnel. This must match the value for **Peer tunnel ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
8. For **Peer tunnel ID**, type the **Tunnel ID** of the remote peer.
9. (Optional) For **Encapsulation type**, select either **UDP** or **IP**. If **UDP** is selected:
   a. For **UDP source port**, type the number of the source UDP port to be used for the tunnel.
   b. For **UDP destination port**, type the number of the destination UDP port to be used for the tunnel.
   c. (Optional) Click to enable **UDP checksum** to calculate and check the UDP checksum.
10. Click to expand **Sessions**.
    a. For **Add Sesssion**, type a name for a session carried by the parent tunnel and click ✚.
    b. For **Session ID**, type the session identifier for this session. This must match the value for **Peer session ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
    c. For **Peer session ID**, type the **Session ID** of the remote peer.
    d. (Optional) For **Cookie**, type the cookie value to be assigned to the session. Allowed value is 8 or 16 hex digits.
    e. (Optional) For **Peer cookie**, type the **Cookie** value of the remote peer.
    f. For **Layer2SpecificHeader type**, select the Layer2Specific header type. This must match what is configured on the remote peer.
    g. For **Sequence numbering control**, determine the sequence number control to prevent or detect out of order packets. Allowed values are:
       - **None**: No sequence numbering.
       - **Send**: Add a sequence number to each outgoing packet.
       - **Receive**: Reorder packets if they are received out of order.

- **Both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

The default is **None**.

h. Repeat for additional sessions.

11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a L2TPv3 Ethernet tunnel. For example, to add a tunnel named **L2TPv3_example**:

```
(config)> add vpn l2tpv3 L2TPv3_example
(config vpn l2tpeth L2TPv3_example)>
```

   The tunnel is enabled by default. To disable:

```
(config vpn l2tpeth L2TPv3_example)> enable false
(config vpn l2tpeth L2TPv3_example)>
```

4. Set the IPv4 address of the remote endpoint:

```
(config vpn l2tpeth L2TPv3_example)> remote IP_address
(config vpn l2tpeth L2TPv3_example)>
```

5. Set the interface of the local endpoint:

   i. Use the **?** to determine available interfaces:

   ii. Set the interface. For example:

```
(config vpn l2tpeth L2TPv3_example)> local /network/interface/eth1
(config vpn l2tpeth L2TPv3_example)>
```

6. Set the tunnel identifier for this tunnel. This must match the value for peer tunnel ID on the remote peer.

```
(config vpn l2tpeth L2TPv3_example)> tunnel_id value
(config vpn l2tpeth L2TPv3_example)>
```

   where *value* is any integer between 1 and 4294967295.

7. Set the tunnel ID of the remote peer:

   ```
   (config vpn l2tpeth L2TPv3_example)> peer_tunnel_id value
   (config vpn l2tpeth L2TPv3_example)>
   ```

   where *value* is any integer between 1 and 4294967295.

8. (Optional) Set the encapsulation type:

   ```
   (config vpn l2tpeth L2TPv3_example)> encapsulation  value
   (config vpn l2tpeth L2TPv3_example)>
   ```

   where *value* is either **udp** or **ip**. The default is **upd**.

   If **udp** is set:

   a. Set the source UDP port to be used for the tunnel:

      ```
      (config vpn l2tpeth L2TPv3_example)> udp_source_port port
      (config vpn l2tpeth L2TPv3_example)>
      ```

   b. Set the destination UDP port to be used for the tunnel.

      ```
      (config vpn l2tpeth L2TPv3_example)> udp_destination_port port
      (config vpn l2tpeth L2TPv3_example)>
      ```

   c. (Optional) To calculate and check the UDP checksum:

      ```
      (config vpn l2tpeth L2TPv3_example)> udp_checksum true
      (config vpn l2tpeth L2TPv3_example)>
      ```

9. Add a session carried by the parent tunnel:

   ```
   (config vpn l2tpeth L2TPv3_example)> add session session_example
   (config vpn l2tpeth L2TPv3_example session_example)>
   ```

10. Set the session identifier for this session. This must match the value for peer session ID on the remote peer.

    ```
    (config vpn l2tpeth L2TPv3_example session_example)> session_id value
    (config vpn l2tpeth L2TPv3_example session_example)>
    ```

    where *value* is any integer between 1 and 4294967295.

11. Set the session ID of the remote peer:

    ```
    (config vpn l2tpeth L2TPv3_example session_example)> peer_session_id
    value
    (config vpn l2tpeth L2TPv3_example session_example)>
    ```

    where *value* is any integer between 1 and 4294967295.

12. (Optional) Set the cookie value to be assigned to the session.

    ```
    (config vpn l2tpeth L2TPv3_example session_example)> cookie value
    (config vpn l2tpeth L2TPv3_example session_example)>
    ```

    Allowed *value* is 8 or 16 hex digits.

13. (Optional) Set the cookie value of the remote peer:

```
(config vpn l2tpeth L2TPv3_example session_example)> peer cookie value
(config vpn l2tpeth L2TPv3_example session_example)>
```

    Allowed *value* is 8 or 16 hex digits.

14. Set the Layer2Specific header type. This must match what is configured on the remote peer.

```
(config vpn l2tpeth L2TPv3_example session_example)> l2spec_type value
(config vpn l2tpeth L2TPv3_example session_example)>
```

    where *value* is either **none** or **default**. The default is **default**.

15. Set the sequence number control to prevent or detect out of order packets.

```
(config vpn l2tpeth L2TPv3_example session_example)> seq value
(config vpn l2tpeth L2TPv3_example session_example)>
```

    where *value* is one of:

    - **none**: No sequence numbering.
    - **send**: Add a sequence number to each outgoing packet.
    - **recv**: Reorder packets if they are received out of order.
    - **both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

      The default is **none**.

16. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

17. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show L2TPV3 tunnel status

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status**. Under VPN, select **L2TPv3 Ethernet**.

   The **L2TPv3 Ethernet** page appears.
3. To view configuration details about an L2TPV3 tunnel, click the 🔧 (configuration) icon in the upper right of the tunnel's status pane.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured L2TPv3 Ethernet tunnels, type the following at the prompt:

```
> show l2tpeth

 Tunnel Session     Enabled  Device        Status
 -----------------  -------  ------------  ------
 test/session/test  true     le_test_test  up

>
```

3. To display details about a specific tunnel:

```
> show l2tpeth name /vpn/l2tpeth/test/session/test

 test/session/test Tunnel Session Status
 ---------------------------------------
 Enabled                  : true
 Status                   : up


 Local IP                 : 4.3.2.1
 Remote IP                : 10.10.10.1
 Tunnel ID                : modem
 Peer Tunnel ID           : 10.10.10.1 === 4.3.2.1
 Session ID               : 255
 Peer Session ID          : 1476
 Lifetime (Actual)        : 600

 Device                   : le_test_test
 RX Packets               : 2,102
 RX Bytes                 : 462
 TX Packets               : 2,787
 TX Byptes                : 3,120

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Services

This chapter contains the following topics:

Allow remote access for web administration and SSH

By default, only devices connected to the Connect EZ's LAN have access to the device via web administration and SSH. To enable these services for access from remote devices:

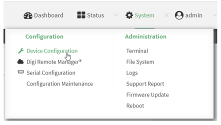
- The Connect EZ device must have a publicly reachable IP address.
- The **External** firewall zone must be added to the web administration or SSH service. See Firewall configuration for information on zones.
- See Set the idle timeout for Connect EZ users for information about setting the inactivity timeout for the web administration and SSH services.

To allow web administration or SSH for the External firewall zone:

Add the External firewall zone to the web administration service

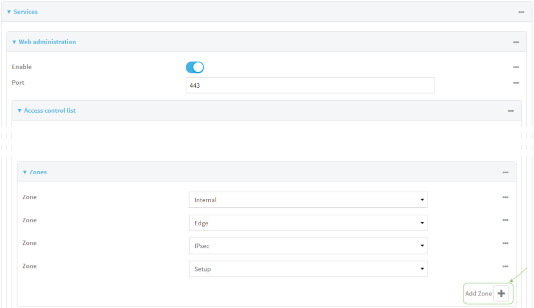
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



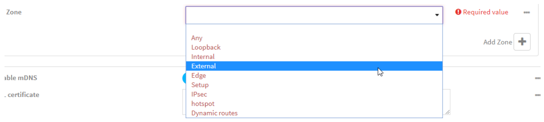
The **Configuration** window is displayed.

3. Click **Services** > **Web administration** > **Access Control List** > **Zones**.
4. For **Add Zone**, click ✚.

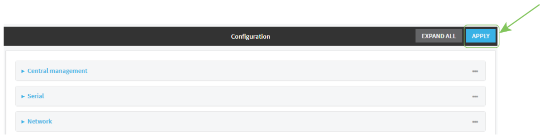


Enable
Port 443
Zone Internal
Zone Edge
Zone IPsec
Zone Setup

5. Select **External**.



6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the external zone to the web administration service:

```
(config)> add service web_admin acl zone end external
(config)>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

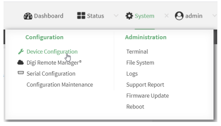
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Add the External firewall zone to the SSH service

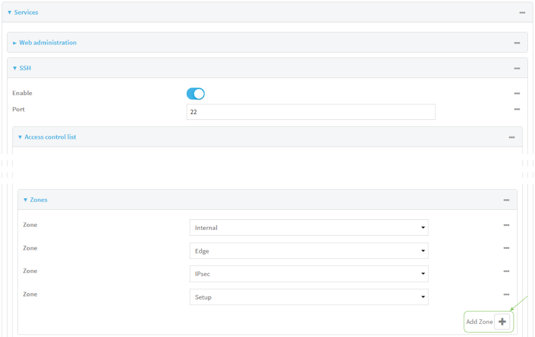
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



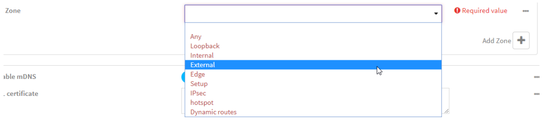
   The **Configuration** window is displayed.
3. Click **Configuration** > **Services** > **SSH** > **Access Control List** > **Zones**.

4. For **Add Zone**, click ✚.

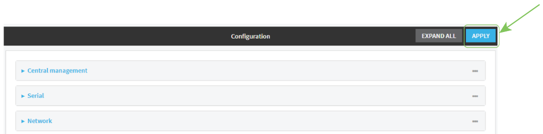


Enable ●
Port 22
Zone Internal
Zone Edge
Zone IPsec
Zone Setup

5. Select **External**.



6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Add the **External** zone to the SSH service:

   ```
   (config)> add service ssh acl zone end external
   (config)>
   ```
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the web administration service

The web administration service allows you to monitor and configure the Connect EZ device by using the WebUI, a browser-based interface.

By default, the web administration service is enabled and uses the standard HTTPS port, 443. The default access control for the service uses the **Internal** firewall zone, which means that only devices connected to the Connect EZ's LAN can access the WebUI. If this configuration is sufficient for your needs, no further configuration is required. See Allow remote access for web administration and SSH for information about configuring the web administration service to allow access from remote devices.

Required configuration items

- The web administration service is enabled by default.
- Configure access control for the service.

Additional configuration items

- Port to use for web administration service communication.
- Multicast DNS (mDNS) support.
- An SSL certificate to use for communications with the service.
- Support for legacy encryption protocols.

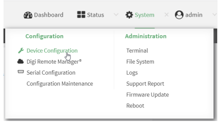
See Set the idle timeout for Connect EZ users for information about setting the inactivity timeout for the web administration services.

Enable or disable the web administration service

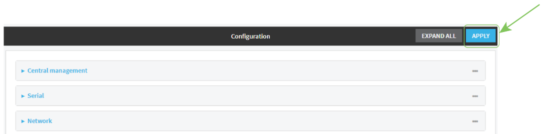
The web administration service is enabled by default. To disable the service, or enable it if it has been disabled:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Web administration**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Enable or disable the web administration service:
   - To enable the service:

     ```
     (config)> service web_admin enable true
     (config)>
     ```

   - To disable the sevice:

     ```
     (config)> service web_admin enable false
     (config)>
     ```

4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

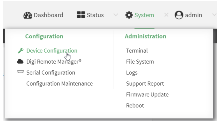
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Web administration**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the web administration service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the web administration service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **SSL certificate**, if you have your own signed SSL certificate, paste the certificate and private key. If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
    - The SSL certificate and private key must be in PEM format.
    - The private key can use one of the following algorithms:
        - RSA
        - DSA
        - ECDSA
        - ECDH

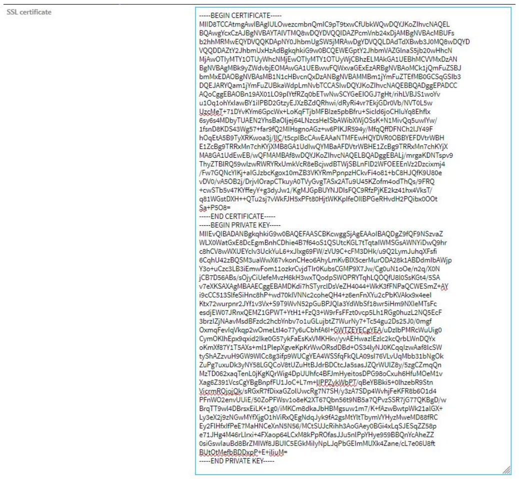
    Note Password-protected certificate keys are not supported.

   Example:

    a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365
-out certificate.pem
```

    b. Paste the contents of **certificate.pem** and **key.pem** into the **SSL certificate** field. The contents of the **certificate.pem** must be first. For example:



SSL certificate

```
-----BEGIN CERTIFICATE-----
MIID8TCCAtmgAwIBAgIULOwezcmbnQmIC9pT9txwCfUbkWQwDQYJKoZIhvcNAQEL
BQAwgYcxCzAJBgNVBAYTAlVTMQ8wDQYDVQQIDAZPcmVnb24xDjAMBgNVBAcMBUFs
b2hhMRMwEQYDVQQKDApNY0JhbmUgSW5jMRAwDgYDVQQLDAdTdXBwb3J0MQ8wDQYD
VQQDDAZtY2JhbmUxHzAdBgkqhkiG9w0BCQEWEGptY2JhbmVAZGlnaS5jb20wHhcN
MjAwOTIyMTY1OTUyWhcNMjEwOTIyMTY1OTUyWjCBhzELMAkGA1UEBhMCVVMxDzAN
BgNVBAgMBk9yZWdvbjEOMAwGA1UEBwwFQWxvaGExEzARBgNVBAoMCk1jQmFuZSBJ
bmMxEDAOBgNVBAsMB1N1cHBvcnQxDzANBgNVBAMMBm1jYmFuZTEfMB0GCSqGSIb3
DQEJARYQam1jYmFuZUBkaWdpLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCC
AQoCggEBAOBn19AX01LO9plYtfRZq0bETwNwSCYGeEIOGJ7gHt/rihLVBJS1woYv
u1Oq1ohYxIawBY1iIPBD2GtzyEJXzBZdQRhwi/dRyRi4vr7EkjGDr0Vb/NVT0L5w
UzcMeT+71DYvKYm6GpcWx+LoKqFTjbMFBIze5pbBfru+SicId6joCHIuYq8Ehflx
6sy6s4MDbyTUAEN2YhsBaOljej64LNzcsHeISbAWibXWjOSsK+N1MivQq5uwIYw/
1fsnD8KDS43Wg57+far9fQ2MIHsgnoAGz+w6PIKJR594y/MfqQffDFNCh2lJY49F
hOqEtA5B9TyXRKwoa3j/IJC/t5cpIBcCAwEAAaNTMFEwHQYDVR0OBBYEFDVtrWBH
E1ZcBg9TRRxMn7chKYjXMB8GA1UdIwQYMBaAFDVtrWBHE1ZcBg9TRRxMn7chKYjX
MA8GA1UdEwEB/wQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEBALj/mrgaKDNTspv9
ThyZTBIRQ59wIzwRWRYRxUmkVcR8eBcjwdBTWjSBLnFID2WFOEEEnVz2Dzcixmj4
/Fw7GQNcYIKj+aIGJzbcKgox10mZB3VKYRmPpnpzHCkvFi4o81+bC8HJQfK9U80e
vDV0/vA5OB2j/DrjvlOrapCTkuyA0TVyGvgTASx2ATu9U45KZofm4odThQs/9FRQ
+cwSTb5v47KYffeyY+g3dyJw1/KgMJGpBUYNJDIsFQC9RfzPjKE2kz41hx4VksT/
q81WGstDXH++QTu2sj7vWkFJH5xPFt80HjtWKKpIfeOIlBPGeRHvdH2PQibx0OOt
Sa+P5O8=
-----END CERTIFICATE-----
-----BEGIN PRIVATE KEY-----
MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSjAgEAAoIBAQDgZ9fQF9NSzvaZ
WLX0WatGxE8DcEgmBnhCDhie4B7f64oS1QSUtcKGL7tTqtaIWMSGsAWNYiDwQ9hr
c8hCV8wWXUEYclv3UckYuL6+xJIxg69FW/zVU9C+cFM3DHk/u9Q2LymJuhqXFsfi
6CqhU42zBQSM3uaWwX67vkonCHeo6AhyLmKvBIX5cerMurODA28k1ABDdmIbAWjp
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jCB7D56ABs/sOjyCiUefeMvzH6kH3wxTQodpSWOPRYTqhLQOQfU8l0SsKGt4/5SA
v7eXKSAXAgMBAAECggEBAMDKdi7hSTyrcIDsVeZH4044+WkK3fFNPaQCWESmZ+AY
i9cCC513SlfeSiHnc8hP+wd70kIVNNc2coheQH4+z6enFnXYu2cPbKVAkx9x4eeI
Ktx72wurpnr2JYf1v3Vx+S9T9WvN52pGuBPJQla3YdWbSf18wr5iHm9NXIeMTsFc
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3brzIZjNAavMsdBFzdc2hcbYnbv7o1uGLujbtZ7WurNy7+Tc54gu2Ds25J0/0mgf
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CymOKlhEpx9qxid2Ike0G57ykFaEsKxVMKHkv/yvAEHwazIEzlc2kcQrbLWnDQYx
oKmXf87Y1T5AXs+ml1PlepXgveKpKrWwORsdDBd+OS34lyNJ0KCqqIzwAaf8lcSW
tyShAZzvuH9GW9WlCc8g3ifp9WUCgYEA4WSSfqFkQLA09sI76VLvUqMbb31bNgOk
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MzTD062xaqTenL0jKgKQrWig4DpUUhfc4BFJmHyeitosDPG98oCxuh6HfuMOeM1v
Xag6Z391VcsCgYBgBnpfFU1JoC+L7m+lIPPZykWbPT/qBeYBBki5+0lhzebR9Stn
VicrmRQiojQk/sRGxR7fDixaGZolUwcRg7N7SH/y3zA7SDp4WvhjFeKFR8b6O1d4
PFnWO2envUUiE/50ZoPFWsv1o8eK2XT67Qbn56t9NB5a7QPvzSSR7jG77QKBgD/w
BrqTT9wl4DBrsxEiLK+1g0/iMKCm8dkaJbHBMgsuw1m7/K+fAzwBwtpWk21aIGX+
Ly3eX2j9zNGwMYfXjgO1hViRxQEgNdqJyk9fA2gsMtYltTbymVYHyzMweMD88fRC
Ey2FlHfxIfPeE7MaHNCeXnN5N56/MCtSUJcRihh3AoGAey0BGi4xLqSJESqZZ58p
e71JHg4M46rLlrxi+4FXaop64LCxM8kPpROfasJJu5nlPpYHye959BBQnYcAheZZ
0siGswlauBd8BrZMIWf8JBUIC5EGkMilyNpLJqPbGEImMUXk4Zane/cL7e06U8ft
BUtOtMefbBDDxpP+E+iliuM=
-----END PRIVATE KEY-----
```
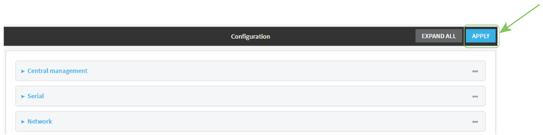

8. For **Allow legacy encryption protocols**, enable this option to allow clients to connect to the HTTPS session by using encryption protocols older than TLS 1.2, in addition to TLS 1.2 and

later protocols. This option is disabled by default, which means that only TLS 1.2 and later encryption protocols are allowed with HTTPS connections.

9. **View** is set to **Auto** by default and normally should not be changed.
10. **Legacy port redirection** is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed. To disable legacy port redirection, click to expand **Legacy port redirection** and deselect **Enable**.
11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service web_admin acl address end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the web administratrion service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service web_admin acl address6 end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the web administratrion service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:

```
(config)> add service web_admin acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service web_admin acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 --------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

4. (Optional) If you have your own signed SSL certificate, if you have your own signed SSL certificate, set the certificate and private key by pasting their contents into the **service web_admin cert** command. Enclose the certificate and private key contents in quotes (**"**).

```
(config)> service web_admin cert "ssl-cert-and-private-key"
(config)>
```

- If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
- The SSL certificate and private key must be in PEM format.

- The private key can use one of the following algorithms:
  - RSA
  - DSA
  - ECDSA
  - ECDH

Note Password-protected certificate keys are not supported.

Example

a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365
-out certificate.pem
```

b. Paste the contents of **certificate.pem** and **key.pem** into the **service web_admin cert** command. Enclose the contents of **certificate.pem** and **key.pem** in quotes. For example:

```
(config)> service web_admin cert "-----BEGIN CERTIFICATE-----
MIID8TCCAtmgAwIBAgIULOwezcmbnQmIC9pT9txwCfUbkWQwDQYJKoZIhvcNAQEL
BQAwgYcxCzAJBgNVBAYTAlVTMQ8wDQYDVQQIDAZPcmVnb24xDjAMBgNVBAcMBUFs
b2hhMRMwEQYDVQQKDApNY0JhbmUgSW5jMRAwDgYDVQQLDAdTdXBwb3J0MQ8wDQYD
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MjAwOTIyMTY1OTUyWhcNMjEwOTIyMTY1OTUyWjCBhzELMAkGA1UEBhMCVVMxDzAN
BgNVBAgMBk9yZWdvbjEOMAwGA1UEBwwFQWxvaGExEzARBgNVBAoMCk1jQmFuZSBJ
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DQEJARYQam1jYmFuZUBkaWdpLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCC
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u1Oq1ohYxIawBY1iIPBD2GtzyEJXzBZdQRhwi/dRyRi4vr7EkjGDr0Vb/NVT0L5w
UzcMeT+71DYvKYm6GpcWx+LoKqFTjbMFBIze5pbBfru+SicId6joCHIuYq8Ehflx
6sy6s4MDbyTUAEN2YhsBaOljej64LNzcsHeISbAWibXWjOSsK+N1MivQq5uwIYw/
1fsnD8KDS43Wg57+far9fQ2MIHsgnoAGz+w6PIKJR594y/MfqQffDFNCh2lJY49F
hOqEtA5B9TyXRKwoa3j/lIC/t5cpIBcCAwEAAaNTMFEwHQYDVR0OBBYEFDVtrWBH
E1ZcBg9TRRxMn7chKYjXMB8GA1UdIwQYMBaAFDVtrWBHE1ZcBg9TRRxMn7chKYjX
MA8GA1UdEwEB/wQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEBALj/mrgaKDNTspv9
ThyZTBlRQ59wIzwRWRYRxUmkVcR8eBcjwdBTWjSBLnFlD2WFOEEEnVz2Dzcixmj4
/Fw7GQNcYIKj+aIGJzbcKgox10mZB3VKYRmPpnpzHCkvFi4o81+bC8HJQfK9U80e
vDV0/vA5OB2j/DrjvlOrapCTkuyA0TVyGvgTASx2ATu9U45KZofm4odThQs/9FRQ
+cwSTb5v47KYffeyY+g3dyJw1/KgMJGpBUYNJDIsFQC9RfzPjKE2kz41hx4VksT/
q81WGstDXH++QTu2sj7vWkFJH5xPFt80HjtWKKpIfeOIlBPGeRHvdH2PQibx0OOt
Sa+P5O8=
-----END CERTIFICATE-----
-----BEGIN PRIVATE KEY-----
MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSjAgEAAoIBAQDgZ9fQF9NSzvaZ
WLX0WatGxE8DcEgmBnhCDhie4B7f64oS1QSUtcKGL7tTqtaIWMSGsAWNYiDwQ9hr
c8hCV8wWXUEYcIv3UckYuL6+xJIxg69FW/zVU9C+cFM3DHk/u9Q2LymJuhqXFsfi
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Y3o+uCzc3LB3iEmwFom11ozkrCvjdTIr0KubsCGMP9X7Jw/Cg0uN1oOe/n2q/X0N
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```

```
Ktx72wurpnr2JYf1v3Vx+S9T9WvN52pGuBPJQla3YdWbSf18wr5iHm9NXIeMTsFc
esdjEW07JRnxQEMZ1GPWT+YtH1+FzQ3+W9rFsFFzt0vcp5Lh1RGg0huzL2NQ5EcF
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CymOKlhEpx9qxid2Ike0G57ykFaEsKxVMKHkv/yvAEHwazIEzlc2kcQrbLWnDQYx
oKmXf87Y1T5AXs+ml1PlepXgveKpKrWwORsdDBd+OS34lyNJ0KCqqIzwAaf8lcSW
tyShAZzvuH9GW9WlCc8g3ifp9WUCgYEA4WSSfqFkQLA09sI76VLvUqMbb31bNgOk
ZuPg7uxuDk3yNY58LGQCoV8tUZuHtBJdrBDCtcJa5sasJZQrWUlZ8y/5zgCZmqQn
MzTD062xaqTenL0jKgKQrWig4DpUUhfc4BFJmHyeitosDPG98oCxuh6HfuMOeM1v
Xag6Z391VcsCgYBgBnpfFU1JoC+L7m+lIPPZykWbPT/qBeYBBki5+0lhzebR9Stn
VicrmROjojQk/sRGxR7fDixaGZolUwcRg7N7SH/y3zA7SDp4WvhjFeKFR8b6O1d4
PFnWO2envUUiE/50ZoPFWsv1o8eK2XT67Qbn56t9NB5a7QPvzSSR7jG77QKBgD/w
BrqTT9wl4DBrsxEiLK+1g0/iMKCm8dkaJbHBMgsuw1m7/K+fAzwBwtpWk21alGX+
Ly3eX2j9zNGwMYfXjgO1hViRxQEgNdqJyk9fA2gsMtYltTbymVYHyzMweMD88fRC
Ey2FlHfxIfPeE7MaHNCeXnN5N56/MCtSUJcRihh3AoGAey0BGi4xLqSJESqZZ58p
e71JHg4M46rLlrxi+4FXaop64LCxM8kPpROfasJJu5nlPpYHye959BBQnYcAheZZ
0siGswIauBd8BrZMIWf8JBUIC5EGkMiIyNpLJqPbGEImMUXk4Zane/cL7e06U8ft
BUtOtMefbBDDxpP+E+iIiuM=
-----END PRIVATE KEY-----"
(config)>
```

5. (Optional) Configure Multicast DNS (mDNS):

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

   - To enable the mDNS protocol:

     ```
     (config)> service web_admin mdns enable true
     (config>
     ```

   - To disable the mDNS protocl:

     ```
     (config)> service web_admin mdns enable false
     (config)>
     ```

6. (Optional) Set the port number for this service.

   The default setting of 443 normally should not be changed.

   ```
   (config)> service web_admin port 444
   (config)>
   ```

7. (Optional) Configure the device to allow legacy encryption protocols.

   Legacy encryption protocols allow clients to connect to the HTTPS session by using encryption protocols older than TLS 1.2, in addition to TLS 1.2 and later protocols. This option is disabled by default, which means that only TLS 1.2 and later encryption protocols are allowed with HTTPS connections.

   To enable legacy encryption protocols:

   ```
   (config)> service web_admin legacy_encryption true
   (config)>
   ```

8. (Optional) Disable legacy port redirection.

Legacy port redirection is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed.

To disable legacy port redirection:

```
(config)> service web_admin legacy enable false
(config)>
```

9. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure SSH access

The Connect EZ's default configuration has SSH access enabled, and allows SSH access to the device from authorized users within the **Internal** firewall zone. If this configuration is sufficient for your needs, no further configuration is required. See Allow remote access for web administration and SSH for information about configuring the SSH service to allow access from remote devices.

Required configuration items

- Enable SSH access.
- Configure access control for the SSH service.

Additional configuration items

- Port to use for communications with the SSH service.
- Multicast DNS (mDNS) support.
- A private key to use for communications with the SSH service.
- Create custom SSH configuration settings.

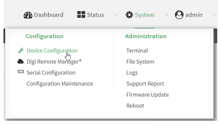
See Set the idle timeout for Connect EZ users for information about setting the inactivity timeout for the SSH service.

Enable or disable the SSH service

The SSH service is enabled by default. To disable the service, or enable it if it has been disabled:

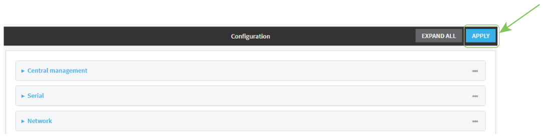
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **SSH**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Enable or disable the SSH service:
   - To enable the service:

     ```
     (config)> service ssh enable true
     (config)>
     ```
   - To disable the sevice:

     ```
     (config)> service ssh enable false
     (config)>
     ```
4. Save the configuration and apply the change:

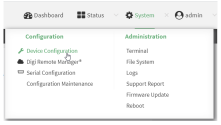
   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **SSH**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.

c. For **Address**, enter the IPv4 address or network that can access the device's SSH service. Allowed values are:
   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 192.168.1.0/24.
   - **any**: No limit to IPv4 addresses that can access the SSH service.

d. Click ✚ again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

  a. Click **IPv6 Addresses**.

  b. For **Add Address**, click ✚.

  c. For **Address**, enter the IPv6 address or network that can access the device's SSH service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the SSH service.

  d. Click ✚ again to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

  a. Click **Interfaces**.

  b. For **Add Interface**, click ✚.

  c. For **Interface**, select the appropriate interface from the dropdown.

  d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:

  a. Click **Zones**.

  b. For **Add Zone**, click ✚.

  c. For **Zone**, select the appropriate firewall zone from the dropdown.

     See Firewall configuration for information about firewall zones.

  d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **Private key**, type the private key in PEM format. If **Private key** is blank, the device will use an automatically-generated key.
8. To create custom SSH configuration settings:

   a. Click to expand **Custom configuration**.

   b. Click **Enable**.

   c. For **Override**:
      - If **Override** is enabled, entries in **Configuration file** will be used in place of the standard SSH configuration.
      - If **Override** is not enabled, entries in **Configuration file** will be added to the standard SSH configuration.

d. For **Configuration file**, type configuration settings in the form of an OpenSSH sshd_config file.

For example, to enable the diffie-helman-group-sha-14 key exchange algorithm:

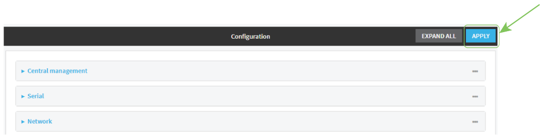
i. Click **Enable** to enable SSH custom configuration.

ii. Leave **Override** disabled.

iii. For **Configuration file**, type the following:

```
KexAlgorithms +diffie-hellman-group14-sha1
```

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:

   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service ssh acl address end value
(config)>
```

   Where *value* can be:

   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 192.168.1.0/24.
   - **any**: No limit to IPv4 addresses that can access the SSH service.

   Repeat this step to list additional IP addresses or networks.

   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service ssh acl address6 end value
(config)>
```

   Where *value* can be:

   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 2001:db8::/48.
   - **any**: No limit to IPv6 addresses that can access the SSH service.

   Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

  ```
  (config)> add service ssh acl interface end value
  (config)>
  ```

  Where *value* is an interface defined on your device.

  Display a list of available interfaces:

  Use **... network interface ?** to display interface information:

  Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

  ```
  (config)> add service ssh acl zone end value
  ```

  Where *value* is a firewall zone defined on your device, or the **any** keyword.

  Display a list of available firewall zones:

  Type **... firewall zone ?** at the config prompt:

  ```
  (config)> ... firewall zone ?

  Zones: A list of groups of network interfaces that can be
  referred to by packet
  filtering rules and access control lists.

   Additional Configuration
   ---------------------------------------------------------
  -----------------------
    any
    dynamic_routes
    edge
    external
    internal
    ipsec
    loopback
    setup

  (config)>
  ```

  Repeat this step to list additional firewall zones.

4. (Optional) Set the private key in PEM format. If not set, the device will use an automatically-generated key.

   ```
   (config)> service ssh key key.pem
   (config)>
   ```

5. (Optional) Configure Multicast DNS (mDNS)

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

- To enable the mDNS protocol:

  ```
  (config)> service ssh mdns enable true
  (config>
  ```

- To disable the mDNS protocl:

  ```
  (config)> service ssh mdns enable false
  (config)>
  ```

6. (Optional) Set the port number for this service.

   The default setting of 22 normally should not be changed.

   ```
   (config)> service ssh port 24
   (config)>
   ```

7. To create custom SSH configuration settings:

   a. Enable custom configurations:

   ```
   (config)> service ssh custom enable true
   (config)>
   ```

   b. To override the standard SSH configuration and only use the **config_file** parameter:

   ```
   (config)> service ssh custom override true
   (config)>
   ```

   - If **override** is set to **true**, entries in **Configuration file** will be used in place of the standard SSH configuration.
   - If **override** is set to **false**, entries in **Configuration file** will be added to the standard SSH configuration.

     The default is **false**.

   c. Set the configuration settings:

   ```
   (config)> service ssh custom config_file value
   (config)>
   ```

   where *value* is one or more entires in the form of an OpenSSH sshd_config file. For example, to enable the diffie-helman-group-sha-14 key exchange algorithm:

   ```
   (config)> service ssh custom config_file "KexAlgorithms +diffie-
   hellman-group14-sha1"
   (config)>
   ```

8. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use SSH with key authentication

Rather than using passwords, you can use SSH keys to authenticate users connecting via SSH, SFTP, or SCP. SSH keys provide security and scalability:

- **Security**: Using SSH keys for authentication is more secure than using passwords. Unlike a password that can be guessed by an unauthorized user, SSH key pairs provide more sophisticated security. A public key configured on the Connect EZ device is paired with a private key on the user's PC. The private key, once generated, remains on the user’s PC.
- **Scalability**: SSH keys can be used on more than one Connect EZ device.

Generating SSH key pairs

On a Microsoft Windows PC, you can generate SSH key pairs using a terminal emulator application, such as **PuTTY** or **Tera Term**.

On a Linux host, an SSH key pair is usually created automatically in the user’s **.ssh** directory. The private and public keys are named **id_rsa** and **id_rsa.pub**. If you need to generate an SSH key pair, you can use the **ssh-keygen** application.

For example, the following entry generates an RSA key pair in the user's **.ssh** directory:

```
ssh-keygen -t rsa -f ~/.ssh/id_rsa
```

The private key file is named **id_rsa** and the public key file is named **id_rsa.pub**. (The **.pub** extension is automatically appended to the name specified for the private key output file.)

Required configuration items

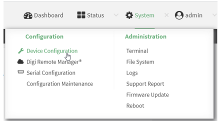
- Name for the user
- SSH public key for the user

Additional configuration items

- If you want to access the Connect EZ device using SSH over a WAN interface, configure the access control list for the SSH service to allow SSH access for the **External** firewall zone.

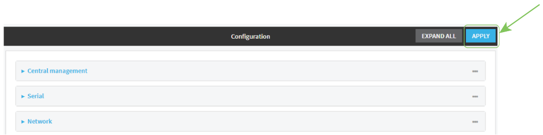
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.
4. Select an existing user or create a new user. See User authentication for information about creating a new user.

5. Click **SSH keys**.
6. In **Add SSH key**, enter a name for the SSH key and click ✚.
7. Enter the public SSH key by pasting or typing a public encryption key that this user can use for passwordless SSH login.
8. Click **Apply** to save the configuration and apply the change.



Command line

You can add configure passwordless SSH login for an existing user or include the support when creating a new user. See User authentication for information about creating a new user. These instructions assume an existing user named **temp_user**.

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Add an SSH key for the user by using the ssh_key command and pasting or typing a public encryption key:

   ```
   (config)> add auth user maria ssh_key key_name key
   (config)>
   ```

   where:

   - *key_name* is a name for the key.
   - *key* is a public SSH key, which you can enter by pasting or typing a public encryption key that this user can use for passwordless SSH login
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure telnet access

By default, the telnet service is disabled.

Note Telnet is an insecure protocol and should only be used for backward-compatibility reasons, and only if the network connection is otherwise secured.

Required configuration items

- Enable telnet access.
- Configure access control for the telnet service.

Additional configuration items

- Port to use for communications with the telnet service.
- Multicast DNS (mDNS) support.

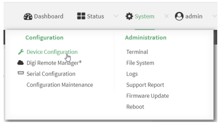
See Set the idle timeout for Connect EZ users for information about setting the inactivity timeout for the telnet service.

Enable the telnet service

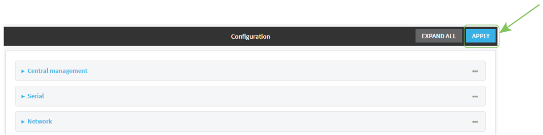
The telnet service is disabled by default. To enable the service:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Services** > **telnet**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the telnet service:

```
(config)> service telnet enable true
(config)>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

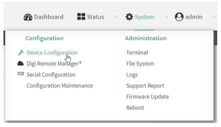
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the service

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **telnet**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's telnet service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the telnet service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.

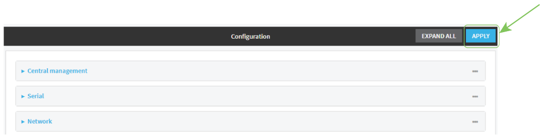
c. For **Address**, enter the IPv6 address or network that can access the device's telnet service. Allowed values are:
   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 2001:db8::/48.
   - **any**: No limit to IPv6 addresses that can access the telnet service.

d. Click ✚ again to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.

     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service telnet acl address end value
(config)>
```

   Where *value* can be:

  - A single IP address or host name.
  - A network designation in CIDR notation, for example, 192.168.1.0/24.
  - **any**: No limit to IPv4 addresses that can access the telnet service.

  Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

  ```
  (config)> add service telnet acl address6 end value
  (config)>
  ```

  Where *value* can be:

  - A single IP address or host name.
  - A network designation in CIDR notation, for example, 2001:db8::/48.
  - **any**: No limit to IPv6 addresses that can access the telnet service.

  Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

  ```
  (config)> add service telnet acl interface end value
  (config)>
  ```

  Where *value* is an interface defined on your device.

  Display a list of available interfaces:

  Use **... network interface ?** to display interface information:

  Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

  ```
  (config)> add service telnet acl zone end value
  ```

  Where *value* is a firewall zone defined on your device, or the **any** keyword.

  Display a list of available firewall zones:

  Type **... firewall zone ?** at the config prompt:

  ```
  (config)> ... firewall zone ?

  Zones: A list of groups of network interfaces that can be
  referred to by packet
  filtering rules and access control lists.

   Additional Configuration
   ---------------------------------------------------------
  -----------------------
    any
    dynamic_routes
    edge
    external
  ```

```
    internal
    ipsec
    loopback
    setup

(config)>
```

Repeat this step to list additional firewall zones.

4. (Optional) Configure Multicast DNS (mDNS)

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is disabled by default. To enable:

   ```
   (config)> service telnet mdns enable true
   (config>
   ```

5. (Optional) Set the port number for this service.

   The default setting of 23 normally should not be changed.

   ```
   (config)> service telnet port 25
   (config)>
   ```

6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure DNS

The Connect EZ device includes a caching DNS server which forwards queries to the DNS servers that are associated with the network interfaces, and caches the results. This server is used within the device, and cannot be disabled. Use the access control list to restrict external access to this server.

Required configuration items

- Configure access control for the DNS service.

Additional configuration items

- Whether the device should cache negative responses.
- Whether the device should always perform DNS queries to all available DNS servers.
- Whether to prevent upstream DNS servers from returning private IP addresses.
- Additional DNS servers, in addition to the ones associated with the device's network interfaces.

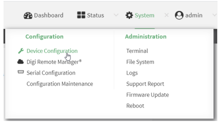
- Specific host names and their IP addresses.

  The device is configured by default with the hostname **digi.device**, which corresponds to the **192.168.210.1** IP address.

To configure the DNS server:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

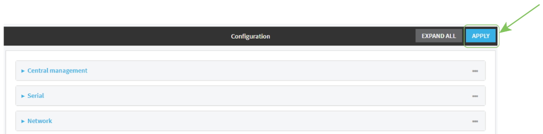
   

   The **Configuration** window is displayed.
3. Click **Services** > **DNS**.
4. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's DNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the DNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's DNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the DNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

5. (Optional) **Cache negative responses** is enabled by default. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable, click **Cache negative responses**.
6. (Optional) **Query all servers** is enabled by default. This option is useful when only some DNS servers will be able to resolve hostnames. To disable, click **Query all servers**.
7. (Optional) **Rebind protection**, if enabled, prevents upstream DNS servers from returning private IP addresses. To enable, click **Rebind protection**.
8. (Optional) **Allow localhost rebinding** is enabled by default if **Rebind protection** is enabled. This is useful for Real-time Black List (RBL) servers.
9. (Optional) To add additional DNS servers:
    a. Click **DNS servers**.
    b. For **Add Server**, click ✚.
    c. (Optional) Enter a label for the DNS server.
    d. For **DNS server**, enter the IP address of the DNS server.
    e. **Domain** restricts the device's use of this DNS server based on the domain. If no domain are listed, then all queries may be sent to this server.
10. (Optional) To add host names and their IP addresses that the device's DNS server will resolve:
    a. Click **Additional DNS hostnames**.
    b. For **Add Host**, click ✚.
    c. Type the **IP address** of the host.
    d. For **Name**, type the hostname.
11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service dns acl address end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the DNS service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service dns acl address6 end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the DNS service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:

     ```
     (config)> add service dns acl interface end value
     (config)>
     ```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.
   - To limit access based on firewall zones:

     ```
     (config)> add service dns acl zone end value
     ```

     Where *value* is a firewall zone defined on your device, or the **any** keyword.

     Display a list of available firewall zones:

     Type **... firewall zone ?** at the config prompt:

     ```
     (config)> ... firewall zone ?

     Zones: A list of groups of network interfaces that can be
     referred to by packet
     filtering rules and access control lists.
     ```

```
 Additional Configuration
 ---------------------------------------------------------
-----------------------
   any
   dynamic_routes
   edge
   external
   internal
   ipsec
   loopback
   setup

(config)>
```

Repeat this step to list additional firewall zones.

4. (Optional) Cache negative responses

   By default, the device's DNS server caches negative responses. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

   ```
   (config)> service dns cache_negative_responses false
   (config>
   ```

5. (Optional) Query all servers

   By default, the device's DNS server queries all available DNS servers. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

   ```
   (config)> service dns query_all_servers false
   (config>
   ```

6. (Optional) Rebind protection

   By default, rebind protection is disabled. If enabled, this prevents upstream DNS servers from returning private IP addresses. To enable:

   ```
   (config)> service dns stop_dns_rebind false
   (config)>
   ```

7. (Optional) Allow localhost rebinding

   By default, localhost rebinding is enabled by default if rebind protection is enabled. This is useful for Real-time Black List (RBL) servers. To disable:

   ```
   (config)> service dns rebind_localhost_ok false
   (config)>
   ```

8. (Optional) Add additional DNS servers

   a. Add a DNS server:

   ```
   (config)> add service dns server end
   (config service dns server 0)>
   ```

b. Set the IP address of the DNS server:

```
(config service dns server 0)> address ip-addr
(config service dns server 0)>
```

c. To restrict the device's use of this DNS server based on the domain, use the **domain** command. If no domain are listed, then all queries may be sent to this server.

```
(config service dns server 0)> domain domain
(config service dns server 0)>
```

d. (Optional) Set a label for this DNS server:

```
(config service dns server 0)> label label
(config service dns server 0)>
```

9. (Optional) Add host names and their IP addresses that the device's DNS server will resolve

   a. Add a host:

   ```
   (config)> add service dns host end
   (config service dns host 0)>
   ```

   b. Set the IP address of the host:

   ```
   (config service dns host 0)> address ip-addr
   (config service dns host 0)>
   ```

   c. Set the host name:

   ```
   (config service dns host 0)> name host-name
   (config service dns host 0)>
   ```

10. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show DNS server

You can display status for DNS servers. This command is available only at the Admin CLI.

Command line

Show DNS information

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show dns command at the system prompt:

```
> show dns

 Interface  Label  Server                    Domain
 ---------  -----  ------------------------  ------
 eth1              192.168.3.1
 eth1              fd00:2704::1
 eth1              fe80::227:4ff:fe2b:ae12
 eth1              fe80::227:4ff:fe44:105b
 eth1              fe80::240:ffff:fe80:23b0

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) is a protocol for remotely managing and monitoring network devices. Network administrators can use the SNMP architecture to manage nodes, including servers, workstations, routers, switches, hubs, and other equipment on an IP network, manage network performance, find and solve network problems, and plan for network growth.

The Connect EZ device supports both SNMPv3 and SNMPv2c in read-only mode. Both are disabled by default. SNMPv1 is not supported.

SNMP Security

By default, the Connect EZ device automatically blocks SNMP packets from being received over WAN and LAN interfaces. As a result, if you want a Connect EZ device to receive SNMP packets, you must configure the SNMP access control list to allow the device to receive the packets. See Configure Simple Network Management Protocol (SNMP).

Configure Simple Network Management Protocol (SNMP)

Required configuration items

- Enable SNMP.
- Firewall configuration using access control to allow remote connections to the SNMP agent.
- The user name and password used to connect to the SNMP agent.

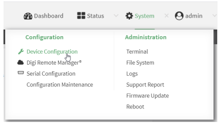
Additional configuration items

- The port used by the SNMP agent.
- Authentication type (either MD5 or SHA).
- Privacy protocol (either DES or AES).
- Privacy passphrase, if different that the SNMP user password.
- Enable Multicast DNS (mDNS) support.

To configure the SNMP agent on your Connect EZ device:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



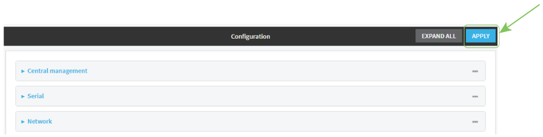
The **Configuration** window is displayed.

3. Click **Services** > **SNMP**.
4. Click **Enable**.
5. Click **Access control list** to configure access control:

- To limit access to specified IPv4 addresses and networks:
    a. Click **IPv4 Addresses**.
    b. For **Add Address**, click ✚.
    c. For **Address**, enter the IPv4 address or network that can access the device's SNMP agent. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the SNMP agent.
    d. Click ✚ again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
    a. Click **IPv6 Addresses**.
    b. For **Add Address**, click ✚.
    c. For **Address**, enter the IPv6 address or network that can access the device's SNMP agent. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the SNMP agent.
    d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the Connect EZ device:
    a. Click **Interfaces**.
    b. For **Add Interface**, click ✚.
    c. For **Interface**, select the appropriate interface from the dropdown.
    d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

6. Type the **Username** used to connect to the SNMP agent.
7. Type the **Password** used to connect to the SNMP agent.
8. (Optional) For **Port**, type the port number. The default is **161**.
9. (Optional) Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
10. (Optional) Select the **Authentication type**, either **MD5** or **SHA**. The default is **MD5**.
11. (Optional) Type the **Privacy passphrase**. If not set, the password, entered above, is used.
12. (Optional) Select the **Privacy protocol**, either **DES** or **AES**. The default is **DES**.
13. (Optional) Click **Enable version 2c access** to enable read-only access to SNMP version 2c.
14. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Enable the SNMP agent:

   ```
   (config)> service snmp enable true
   (config)>
   ```

4. Configure access control:

   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service snmp acl address end value
     (config)>
     ```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the SNMP service.

     Repeat this step to list additional IP addresses or networks.

   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service snmp acl address6 end value
     (config)>
     ```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the SNMP service.

     Repeat this step to list additional IP addresses or networks.

   - To limit access to hosts connected through a specified interface on the Connect EZ device:

     ```
     (config)> add service snmp acl interface end value
     (config)>
     ```

     Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service snmp acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 --------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

5. Set the name of the user that will be used to connect to the SNMP agent.

```
(config)> service snmp username name
(config)>
```

6. Set the password for the user that will be used to connect to the SNMP agent:

```
(config)> service snmp password pwd
(config)>
```

7. (Optional) Set the port number for the SNMP agent. The default is **161**.

```
(config)> service snmp port port
(config)>
```

8. (Optional) Configure Multicast DNS (mDNS)

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. For the SNMP agent, mDNS is disabled by default. To enable:

```
(config)> service snmp mdns enable true
(config>
```

9. (Optional) Set the authentication type. Allowed values are **MD5** or **SHA**. The default is **MD5**.

```
(config)> service snmp auth_type SHA
(config)>
```

10. (Optional) Set the privacy passphrase. If not set, the password, entered above, is used.

```
(config)> service snmp privacy pwd
(config)>
```

11. (Optional) Set the privacy protocol, either **DES** or **AES**. The default is **DES**.

```
(config)> service snmp privacy_protocol AES
(config)>
```

12. (Optional) Enable read-only access to to SNMP version 2c.

```
(config)> service snmp enable 2c true
(config)>
```

13. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Download MIBs

This procedure is available from the WebUI only.

Required configuration items

- Enable SNMP.

To download a .zip archive of the SNMP MIBs supported by this device:

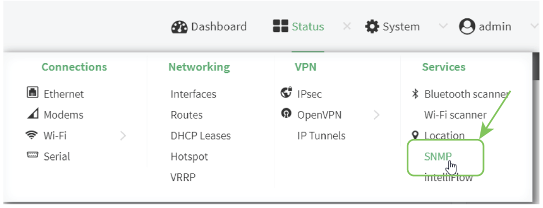
☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. Enable SNMP.

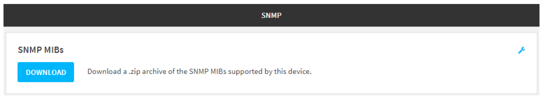
   See Configure Simple Network Management Protocol (SNMP) for information about enabling and configuring SNMP support on the Connect EZ device.

3. On the main menu, click **Status**. Under **Services**, click **SNMP**.

Note If you have recently enabled SNMP and the SNMP option is not visible, refresh your browser.



The **SNMP** page is displayed.


SNMP

SNMP MIBs

DOWNLOAD Download a .zip archive of the SNMP MIBs supported by this device.

4. Click **Download**.

Location information

Your Connect EZ device can be configured to use the following location sources:

- User-defined static location.
- Location messages forwarded to the device from other location-enabled devices.

You can also configure your Connect EZ device to forward location messages, either from the Connect EZ device or from external sources, to a remote host. Additionally, the device can be configured to use a geofence, to allow you to determine actions that will be taken based on the physical location of the device.

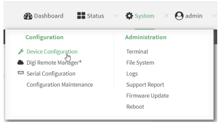
This section contains the following topics:

Configure the location service

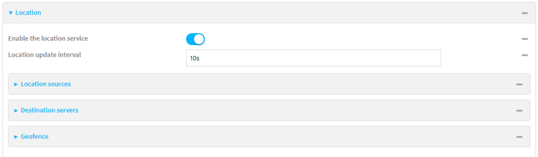
The location service is enabled by default. You can disable it, or you can enable it if it has been disabled.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location**.

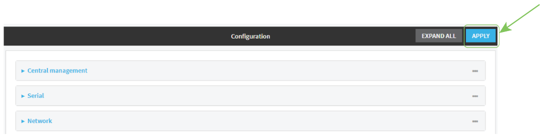
   Enable the location service ●
   Location update interval 10s

4. The location service is enabled by default. To disable, or to enable if it has been disabled, click **Enable**.
5. For **Location update interval**, type the amount of time to wait between polling location sources for new location data. The default is ten seconds.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **Location update interval** to ten minutes, enter **10m** or **600s**.
6. For information about configuring **Location sources**, see the following:
   a. To set a static location for the device, see Configure the device to use a user-defined static location.
   b. To accept location information from an external location-enabled server, see Configure the device to accept location messages from external sources.

   If multiple location sources are enabled at the same time, the device's location will be determined based on the order that the location sources are listed here.
7. For information about configuring **Destination servers**, see Forward location information to a remote host.
8. For information about configuring **Geofence**, see Configure geofencing.
9. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Enable or disable the GNSS module:
   - To enable the module:

     ```
     (config)> service location gnss true
     (config)>
     ```
   - To disable the module:

     ```
     (config)> service location gnss false
     (config)>
     ```
4. Set the amount of time that the Connect EZ device will wait before polling location sources for updated location data:

   ```
   (config)> service location interval value
   (config)>
   ```

   where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

   ```
   (config)> service location interval 600s
   (config)>
   ```

   The default is 10 seconds.
5. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
6. Type **exit** to exit the Admin CLI.

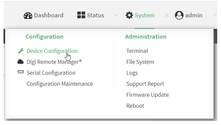
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to use a user-defined static location

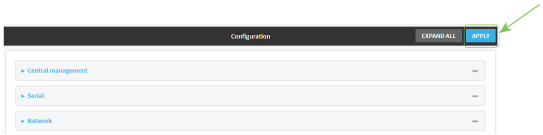
You can configured your Connect EZ device to use a user-defined static location.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Location sources**.
4. Click ✚ to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Latitude**, type the latitude of the device. Allowed values are **-90** and **90**, with up to six decimal places.
7. For **Longitude**, type the longitude of the device. Allowed values are **-180** and **180**, with up to six decimal places.
8. For **Altitude**, type the altitude of the device. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.
9. The location source is enabled by default. Click **Enable the location source** to disable the location source, or to enable it if it has been disabled.
10. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config)>
```

5. Set the **type** of location source to **server**:

   ```
   (config service location source 0)> type user_defined
   (config service location source 0)>
   ```

6. Set the latitude of the device:

   ```
   (config service location source 0 coordinates latitude int
   (config service location source 0)>
   ```

   where *int* is any integer between **-90** and **90**, with up to six decimal places.

7. Set the longitude of the device:

   ```
   (config service location source 0 coordinates longitude int
   (config service location source 0)>
   ```

   where *int* is any integer between **-180** and **180**, with up to six decimal places.

8. Set the altitude of the device:

   ```
   (config service location source 0 coordinates altitude alt
   (config service location source 0)>
   ```

   Where *alt* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

9. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the device to accept location messages from external sources

You can configure the Connect EZ device to accept NMEA and TAIP messages from external sources. For example, location-enabled devices connected to the Connect EZ device can forward their location information to the device, and then the Connect EZ device can serve as a central repository for this location information and forward it to a remote host. See Forward location information to a remote host for information about configuring the Connect EZ device to forward location messages.

This procedure configures a UDP port on the Connect EZ device that will be used to listen for incoming messages.

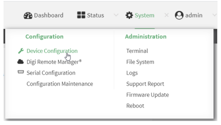
Required configuration items

- The location server must be enabled.
- UDP port that the Connect EZ device will listen to for incoming location messages.
- Access control list configuration to provide access to the port through the firewall.

To configure the device to accept location messages from external sources:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

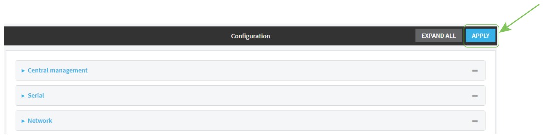
   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Location sources**.
4. Click ✚ to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Type of location source**, select **Server**.
7. For **Location server port**, type the number of the UDP port that will receive incoming location messages.
8. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's location server UDP port. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the location server UDP port.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's location server UDP port. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the location server UDP port.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**.
     b. For **Add Zone**, click ✚.

   c. For **Zone**, select the appropriate firewall zone from the dropdown.

      See Firewall configuration for information about firewall zones.

   d. Click ✚ again to allow access through additional firewall zones.

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config service location source 0)>
```

5. Set the **type** of location source to **server**:

```
(config service location source 0)> type server
(config service location source 0)>
```

6. Set the UDP port that will receive incoming location messages.

```
(config service location source 0)> server port port
(config service location source 0)>
```

7. Click **Access control list** to configure access control:

   ■ To limit access to specified IPv4 addresses and networks:

```
(config)> add service location source 1 acl address end value
(config)>
```

   Where *value* can be:

   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 192.168.1.0/24.
   - **any**: No limit to IPv4 addresses that can access the location server UDP port.

   Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service location source 1 acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the location server UDP port.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

```
(config)> add service location source 1 acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service location source 1 acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 --------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

2. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Forward location information to a remote host

You can configure location clients on the Connect EZ device that forward location messages in either NMEA or TAIP format to a remote host.

Required configuration items

- Enable the location service.
- The hostname or IP address of the remote host to which the location messages will be forwarded.
- The communication protocol, either TCP or UDP.
- The destination port on the remote host to which the messages will be forwarded.
- Message protocol type of the messages being forwarded, either NMEA or TAIP.

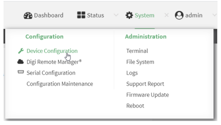
Additional configuration items

- Additional remote hosts to which the location messages will be forwarded.
- Location update interval, which determines how often the device will forward location information to the remote hosts.
- A description of the remote hosts.
- Specific types of NMEA or TAIP messages that should be forwarded.
- If the message protocol is NMEA, configure a talker ID to be used for all messages.
- Text that will be prepended to the forwarded message.
- A vehicle ID that is used in the TAIP ID message and can also be prepended to the forwarded message.

Configure the Connect EZ device to forward location information:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

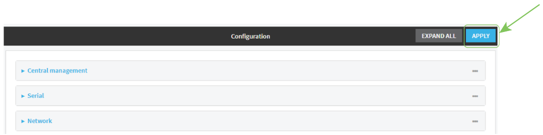
3. Click **Services** > **Location** > **Destination servers**.
4. For **Add destination server**, click ✚.
5. (Optional) For **Label**, type a description of the location destination server.
6. For **Destination server**, enter the hostname or IP address of the remote host to which location messages will be sent.
7. For **Destination server port**, enter the UDP or TCP port on the remote host to which location messages will be sent.
8. For **Communication protocol**, select either **UDP** or **TCP**.
9. For **Forward interval multiplier**, select the number of **Location update intervals** to wait before forwarding location data to this server. See Configure the location service for more information about setting the **Location update interval**.
10. For **NMEA filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
    - To remove a filter:
        a. Click the down arrow (▾) next to the appropriate message type.
        b. Click **Delete**.
    - To add a message type:
        a. For **Add NMEA filter** or **Add TAIP filter**, click ✚.
        b. Select the filter type. Allowed values are:
            - **GGA**: Reports time, position, and fix related data.
            - **GLL**: Reports position data: position fix, time of position fix, and status.
            - **GSA**: Reports GPS DOP and active satellites.
            - **GSV**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.
            - **RMC**: Reports position, velocity, and time.
            - **VTG**: Reports direction and speed over ground.
11. For **TAIP filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
    - To remove a filter:
        a. Click the down arrow (▾) next to the appropriate message type.
        b. Click **Delete**.
    - To add a message type:
        a. For **Add NMEA filter** or **Add TAIP filter**, click ✚.
        b. Select the filter type. Allowed values are:
            - **AL**: Reports altitude and vertical velocity.
            - **CP**: Compact position: reports time, latitude, and longitude.
            - **ID**: Reports the vehicle ID.
            - **LN**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
            - **PV**: Position/velocity: reports the latitude, longitude, and heading.

12. For **Outgoing message type**, select either **NMEA** or **TAIP** for the type of message that the device will forward to a remote host.
    - (Optional) If **NMEA** is selected, select a **Talker ID**.

      The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID. The default setting is **Default**, which means that the talker ID provided by the source will be used.
13. (Optional) For **Prepend text**, enter text to prepend to the forwarded message. Two variables can be included in the prepended text:
    - **%s**: Includes the Connect EZ device's serial number in the prepended text.
    - **%v**: Includes the vehicle ID in the prepended text.

    For example, to include both the device's serial number and vehicle ID in the prepend message, you can enter the following in the **Prepend** field:

    ```
    __|%s|__|%v|__
    ```
14. Type a four-digit alphanumeric **Vehicle ID** that will be included with to location messages. If no vehicle ID is configured, this setting defaults to 0000.
15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Add a remote host to which location messages will be sent:

   ```
   (config)> add service location forward end
   (config service location forward 0)>
   ```
4. Set the hostname or IP address of the remote host to which location messages will be sent:

   ```
   (config service location forward 0)> server host
   (config service location forward 0)>
   ```
5. Set the communication protocol to either **upd** or **tcp**:

   ```
   (config service location forward 0)> protocol protocol
   (config service location forward 0)>
   ```

6. Set the TCP or UDP port on the remote host to which location messages will be sent:

   ```
   (config service location forward 0)> server_port 8000
   (config service location forward 0)>
   ```

7. Set the number of **Location update intervals** to wait before forwarding location data to this server. See Configure the location service for more information about setting the **Location update interval**.

   ```
   (config service location forward 0)> interval_multiplier int
   (config service location forward 0)>
   ```

8. Set the protocol type for the messages. Allowed values are **taip** or **nmea**; the default is **taip**:

   ```
   (config service location forward 0)> type nmea
   (config service location forward 0)>
   ```

   - (Optional) If the protocol type is set to **nmea**, configure a **Talker ID**.

     The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID.

     a. Use the **?** to determine available talker IDs:

        ```
        (config service location forward 0)> talker_id ?

        Talker ID: Setting a talker ID will override the talker ID from
        all remote
        sources, and all forwarded sentences from remote sources will
        use the configured
        ID.
        Format:
          Default
          GA
          GB
          GI
          GL
          GN
          GP
          GQ
        Default value: Default
        Current value: Default

        (config service location forward 0)>
        ```

     b. Set the talker ID:

        ```
        (config service location forward 0)> talker_id value
        (config service location forward 0)>
        ```

     The default setting is **Default**, which means that the talker ID provided by the source will be used.

9. (Optional) Set the text to prepend to the forwarded message. Two variables can be included in the prepended text:
   - **%s**: Includes the Connect EZ device's serial number in the prepended text.
   - **%v**: Includes the vehicle ID in the prepended text.

   ```
   (config service location forward 0)> prepend __|%s|__|%v|__
   (config service location forward 0)>
   ```

10. (Optional) Set the vehicle ID.

    Allowed value is a four digit alphanumerical string (for example, 01A3 or 1234). If no vehicle ID is configured, this setting defaults to 0000.

    ```
    (config service location forward 0)> vehicle-id 1234
    (config service location forward 0)>
    ```

11. (Optional) Provide a description of the remote host:

    ```
    (config service location forward 0)> label "Remote host 1"
    (config service location forward 0)>
    ```

12. (Optional) Specify types of messages that will be forwarded. Allowed values vary depending on the message protocol type. By default, all message types are forwarded.
    - If the message protocol type is NMEA:

      Allowed values are:
      - **gga**: Reports time, position, and fix related data.
      - **gll**: Reports position data: position fix, time of position fix, and status.
      - **gsa**: Reports GPS DOP and active satellites.
      - **gsv**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.
      - **rmc**: Reports position, velocity, and time.
      - **vtg**: Reports direction and speed over ground.

      To remove a message type:

      a. Use the **show** command to determine the index number of the message type to be deleted:

      ```
      (config service location forward 0)> show filter_nmea
      0 gga
      1 gll
      2 gsa
      3 gsv
      4 rmc
      5 vtg
      (config service location forward 0)>
      ```

      b. Use the index number to delete the message type. For example, to delete the **gsa** (index number 2) message type:

      ```
      (config service location forward 0)> del filter_nmea 2
      (config service location forward 0)>
      ```

To add a message type:

a. Change to the **filter_nmea** node:

```
(config service location forward 0)> filter_nmea
(config service location forward 0 filter_nmea)>
```

b. Use the **add** command to add the message type. For example, to add the **gsa** message type:

```
(config service location forward 0 filter_nmea)> add gsa end
(config service location forward 0 filter_nmea)>
```

- If the message protocol type is TAIP:

  Allowed values are:

  - **al**: Reports altitude and vertical velocity.
  - **cp**: Compact position: reports time, latitude, and longitude.
  - **id**: Reports the vehicle ID.
  - **ln**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
  - **pv**: Position/velocity: reports the latitude, longitude, and heading.

  To remove a message type:

  a. Use the **show** command to determine the index number of the message type to be deleted:

  ```
  (config service location forward 0)> show filter_taip
  0 al
  1 cp
  2 id
  3 ln
  4 pv
  (config service location forward 0)>
  ```

  b. Use the index number to delete the message type. For example, to delete the **id** (index number 2) message type:

  ```
  (config service location forward 0)> del filter_taip 2
  (config service location forward 0)>
  ```

  To add a message type:

  a. Change to the **filter_taip** node:

  ```
  (config service location forward 0)> filter_taip
  (config service location forward 0 filter_taip)>
  ```

  b. Use the **add** command to add the message type. For example, to add the **id** message type:

  ```
  (config service location forward 0 filter_taip)> add id end
  (config service location forward 0 filter_taip)>
  ```

13. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure geofencing

Geofencing is a mechanism to create a virtual perimeter that allows you configure your Connect EZ device to perform actions when entering or exiting the perimeter. For example, you can configure a device to factory default if its location service indicates that it has been moved outside of the geofence.

Multiple geofences can be defined for one device, allowing for a complex configuration in which different actions are taken depending on the physical location of the device.

Required configuration items

- Location services must be enabled.
- The geofence must be enabled.
- The boundary type of the geofence, either circular or polygonal.
    - If boundary type is circular, the latitude and longitude of the center point of the circle, and the radius.
    - If boundary type is polygonal, the latitude and longitude of the polygon's vertices (a vertex is the point at which two sides of a polygon meet). Three vertices will create a triangular polygon; four will create a square, etc. Complex polygons can be defined.
- Actions that will be taken when the device's location triggers a geofence event. You can define actions for two types of events:
    - Actions taken when the device enters the boundary of the geofence, or is inside the boundary when the device boots.
    - Actions taken when the device exits the boundary of the geofence, or is outside the boundary when the device boots.

  For each event type:

    - Determine if the action(s) associated with the event type should be performed when the device boots inside or outside of the geofence boundary.
    - The number of update intervals that should take place before the action(s) are taken.

  Multiple actions can be configured for each type of event. For each action:

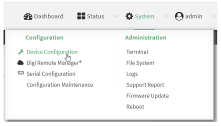
    - The type of action, either a factory erase or executing a custom script.
    - If a custom script is used:
        - The script that will be executed.
        - Whether to log output and errors from the script.
        - The maximum memory that the script will have available.
        - Whether the script should be executed within a sandbox that will prevent the script from affecting the system itself.

Additional configuration items

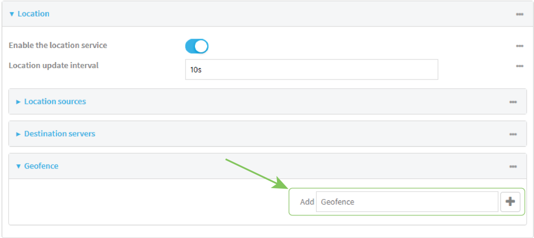
- Update interval, which determines the amount of time that the geofence should wait between polling for updated location data.

≡ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Geofence**.
4. For **Add Geofence**, type a name for the geofence and click ✚.

   Enable the location service ●

   Location update interval 10s

   The geofence is enabled by default. Click **Enable** to disable, or to enable if it has been disabled.
5. For **Update interval**, type the amount of time that the geofence should wait between polling for updated location data. The default is one minute.

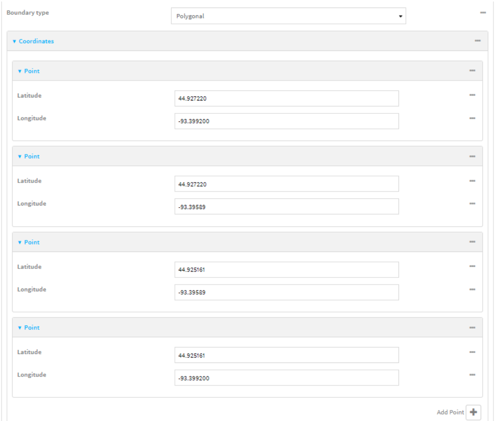
   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **Update interval** to ten minutes, enter **10m** or **600s**.
6. For **Boundary type**, select the type of boundary that the geofence will have.
   - If **Circular** is selected:
     a. Click to expand **Center**.
     b. Type the **Latitude** and **Longitude** of the center point of the circle. Allowed values are:
        - For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
        - For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.
     c. For **Radius**, type the radius of the circle. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.
   - If **Polygonal** is selected:
     a. Click to expand **Coordinates**.
     b. Click ✚ to add a point that represents a vertex of the polygon. A vertex is the point at which two sides of a polygon meet.
     c. Type the **Latitude** and **Longitude** of one of the vertices of the polygon. Allowed values are:

- For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.

d. Click ✚ again to add an additional point, and continue adding points to create the desired polygon.

For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:



Boundary type: Polygonal

▾ Coordinates

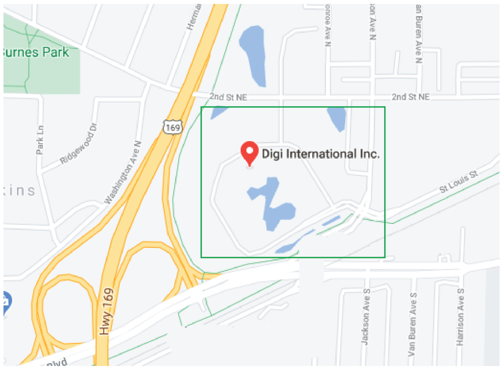
▾ Point
Latitude: 44.927220
Longitude: -93.399200

▾ Point
Latitude: 44.927220
Longitude: -93.39589

▾ Point
Latitude: 44.925161
Longitude: -93.39589

▾ Point
Latitude: 44.925161
Longitude: -93.399200

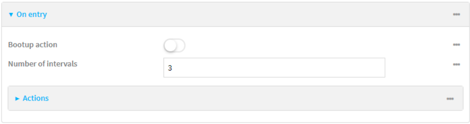
This defines a square-shaped polygon equivalent to the following:



7. Define actions to be taken when the device's location triggers a geofence event:

■ To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:

a. Click to expand **On entry**.



▾ On entry
Bootup action: ○
Number of intervals: 3
▸ Actions

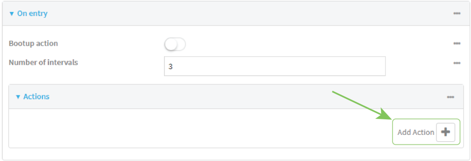
b. (Optional) Enable **Bootup action** to configure the device to perform the **On entry** actions if the device is inside the geofence when it boots.

c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On entry** actions.

   For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

d. Click to expand **Actions**.

e. Click ✚ to create a new action.



▾ On entry

Bootup action

Number of intervals 3

▾ Actions

f. For Action type, select either:

   - **Factory erase** to erase the device configuration when the action is triggered.
   - **Custom script** to execute a custom script when the action is triggered.

   If **Custom script** is selected:

   i. Click to expand **Custom script**.

   ii. For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

   iii. Enable **Log script output** to log the output of the script to the system log.

   iv. Enable **Log script errors** to log errors from the script to the system log.

   v. (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.

      Allowed values are any integer followed by one of the following: **b**|**bytes**|**KB**|**k**|**MB**|**M**|**GB**|**G**|**TB**|**T**.

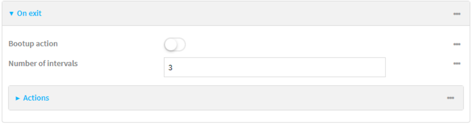
      For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.

   vi. **Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.

   vii. Repeat for any additional actions.

■ To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:

a. Click to expand **On exit**.



▾ On exit

Bootup action

Number of intervals 3

▸ Actions

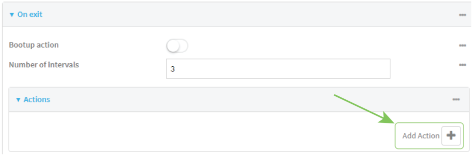
b. (Optional) Enable **Bootup action** to configure the device to perform the **On exit** actions if the device is inside the geofence when it boots.

c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On exit** actions.

   For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

d. Click to expand **Actions**.

e. Click ✚ to create a new action.



Bootup action

Number of intervals: 3

f. For Action type, select either:

   - **Factory erase** to erase the device configuration when the action is triggered.
   - **Custom script** to execute a custom script when the action is triggered.

   If **Custom script** is selected:

   i. Click to expand **Custom script**.

   ii. For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

   iii. Enable **Log script output** to log the output of the script to the system log.

   iv. Enable **Log script errors** to log errors from the script to the system log.

   v. (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.

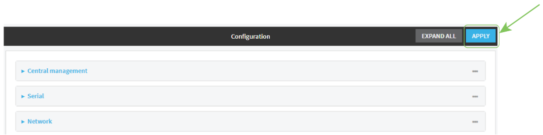
      Allowed values are any integer followed by one of the following: **b**|**bytes**|**KB**|**k**|**MB**|**M**|**GB**|**G**|**TB**|**T**.

      For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.

   vi. **Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.

   vii. Repeat for any additional actions.

8. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a geofence:

```
(config)> add service location geofence name
(config service location geofence name)>
```

where *name* is a name for the geofence. For example:

```
(config)> add service location geofence test_geofence
(config service location geofence test_geofence)>
```

The geofence is enabled by default. To disable:

```
(config service location geofence test_geofence)> enable false
(config service location geofence test_geofence)>
```

4. Set the amount of time that the geofence should wait between polling for updated location data:

```
(config service location geofence test_geofence)> update_interval value
(config service location geofence test_geofence)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **update_interval** to ten minutes, enter either **10m** or **600s**:

```
(config service location geofence test_geofence)> update_interval 600s
(config service location geofence test_geofence)>
```

The default is **1m** (one minute).

5. Set the boundary type for the geofence:

```
(config service location geofence test_geofence)> boundary value
(config service location geofence test_geofence)>
```

where *value* is either **circular** or **polygonal**.

- If **boundary** is set to **circular** :
    a. Set the latitude and longitude of the center point of the circle:

    ```
    (config service location geofence test_geofence)> center
    latitude int
    (config service location geofence test_geofence)> center
    longitude int
    (config service location geofence test_geofence)>
    ```

    where *int* is:

    - For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
    - For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

  b. Set the radius of the circle:

```
(config service location geofence test_geofence)> radius radius
(config service location geofence test_geofence)>
```

  where *radius* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

- If **boundary** is set to **polygonal**:

  a. Set the coordinates of one vertex of the polygon. A vertex is the point at which two sides of a polygon meet.

    i. Add a vertex:

```
(config service location geofence test_geofence)> add
coordinates end
(config service location geofence test_geofence coordinates
0)>
```

    ii. Set the latitude and longitude of the vertex:

```
(config service location geofence test_geofence coordinates
0)> latitude int
(config service location geofence test_geofence coordinates
0)> longitude int
(config service location geofence test_geofence coordinates
0)>
```

    where *int* is:

      - For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
      - For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

    iii. Configure additional vortices:

```
(config service location geofence test_geofence coordinates
0)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
1)> latitude int
(config service location geofence test_geofence coordinates
1)> longitude int
(config service location geofence test_geofence coordinates
1)>
```

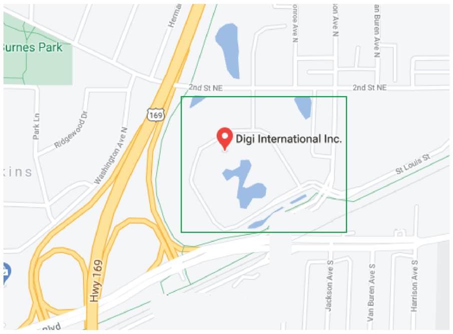
    where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

Repeat for each vortex of the polygon.
For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:

```
(config service location geofence test_geofence)> add
coordinates end
(config service location geofence test_geofence coordinates
0)> latitude 44.927220
(config service location geofence test_geofence coordinates
0)> longitude -93.399200
(config service location geofence test_geofence coordinates
0)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
1)> latitude 44.927220
(config service location geofence test_geofence coordinates
1)> longitude -93.39589
(config service location geofence test_geofence coordinates
1)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
2)> latitude 44.925161
(config service location geofence test_geofence coordinates
2)> longitude -93.39589
(config service location geofence test_geofence coordinates
2)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
3)> latitude 44.925161
(config service location geofence test_geofence coordinates
3)> longitude -93.399200
(config service location geofence test_geofence coordinates
3)>
```

This defines a square-shaped polygon equivalent to the following:



6. Define actions to be taken when the device's location triggers a geofence event:
   - To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:
     a. (Optional) Configure the device to preform the actions if the device is inside the geofence when it boots:

```
(config)> service location geofence test_geofence on_entry
bootup true
(config)>
```

     b. Set the number of update_intervals that must take place prior to performing the actions:

```
(config)> service location geofence test_geofence on_entry num_
intervals int
(config)>
```

     For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been inside the geofence for three minutes.

     c. Add an action:

        i. Type **...** to return to the root of the configuration:

```
(config service location geofence test_geofence coordinates
3)> ...
(config)>
```

        ii. Add the action:

```
(config)> add service location geofence test_geofence on_
entry action end
(config service location geofence test_geofence on_entry
action 0)>
```

     d. Set the type of action:

```
(config service location geofence test_geofence on_entry action
0)> type value
```

```
(config service location geofence test_geofence on_entry action
0)>
```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

factory_erase or **script**.

If **type** is set to **script**:

i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_entry
action 0)> commands "script"
(config service location geofence test_geofence on_entry
action 0)>
```

If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

ii. To log the output of the script to the system log:

```
(config service location geofence test_geofence on_entry
action 0)> syslog_stdout true
(config service location geofence test_geofence on_entry
action 0)>
```

iii. To log the errors from the script to the system log:

```
(config service location geofence test_geofence on_entry
action 0)> syslog_stderr true
(config service location geofence test_geofence on_entry
action 0)>
```

iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_entry
action 0)> max_memory value
(config service location geofence test_geofence on_entry
action 0)>
```

where *value* is any integer followed by one of the following: **b**|**bytes**|**KB**|**k**|**MB**|**M**|**GB**|**G**|**TB**|**T**.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_entry
action 0)> max_memory 1MB
(config service location geofence test_geofence on_entry
action 0)>
```

v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_entry
action 0)> sandbox false
(config service location geofence test_geofence on_entry
action 0)>
```

If you disable the sandbox, the script may render the system unusable.

vi. Repeat for any additional actions.

- To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:

  a. (Optional) Configure the device to preform the actions if the device is outside the geofence when it boots:

  ```
  (config)> service location geofence test_geofence on_exit bootup
  true
  (config)>
  ```

  b. Set the number of update_intervals that must take place prior to performing the actions:

  ```
  (config)> service location geofence test_geofence on_exit num_
  intervals int
  (config)>
  ```

  For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been outside the geofence for three minutes.

  c. Add an action:

  i. Type **...** to return to the root of the configuration:

  ```
  (config service location geofence test_geofence coordinates
  3)> ...
  (config)>
  ```

  ii. Add the action:

  ```
  (config)> add service location geofence test_geofence on_exit
  action end
  (config service location geofence test_geofence on_exit
  action 0)>
  ```

  d. Set the type of action:

  ```
  (config service location geofence test_geofence on_exit action
  0)> type value
  (config service location geofence test_geofence on_exit action
  0)>
  ```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

factory_erase or **script**.

If **type** is set to **script**:

i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_exit
action 0)> commands "script"
(config service location geofence test_geofence on_exit
action 0)>
```

If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

ii. To log the output of the script to the system log:

```
(config service location geofence test_geofence on_exit
action 0)> syslog_stdout true
(config service location geofence test_geofence on_exit
action 0)>
```

iii. To log the errors from the script to the system log:

```
(config service location geofence test_geofence on_exit
action 0)> syslog_stderr true
(config service location geofence test_geofence on_exit
action 0)>
```

iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_exit
action 0)> max_memory value
(config service location geofence test_geofence on_exit
action 0)>
```

where *value* is any integer followed by one of the following: **b**|**bytes**|**KB**|**k**|**MB**|**M**|**GB**|**G**|**TB**|**T**.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_exit
action 0)> max_memory 1MB
(config service location geofence test_geofence on_exit
action 0)>
```

v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_exit
action 0)> sandbox false
(config service location geofence test_geofence on_exit
action 0)>
```

If you disable the sandbox, the script may render the system unusable.

vi. Repeat for any additional actions.

7. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show location information

You can view status and statistics about location information from either the WebUI or the command line.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **Status**.
3. Under **Services**, click **Location**.

   The device's current location is displayed, along with the status of any configured geofences.

Command line

Show location information

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show location command at the system prompt:

   ```
   > show location

    Location Status
    ---------------
    State                : enabled
    Source               : 192.168.2.3
    Latitude             : 44* 55' 14.809" N (44.92078)
    Longitude            : 93* 24' 47.262" w (-93.413128)
    Altitude             : 279 meters
    Velocity             : 0 meters per second
   ```

```
 Direction          : None
 Quality            : Standard GNSS (2D/3D)
 UTC Date and Time  : Thurs, 03 March 2022 10:16:23 03
 No. of Satellites  : 7

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show geofence information

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show location geofence command at the system prompt:

```
> show location geofence

 Geofence       Status  State   Transitions  Last Transition
 -------------  ------  ------  -----------  ---------------
 test_geofence  Up      Inside  0

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Modbus gateway

The Connect EZ supports the ability to function as a Modbus gateway, to provide serial-to-Ethernet connectivity to Programmable Logic Controllers (PLCs), Remote Terminal Units (RTUs), and other industrial devices. MODBUS provides client/server communication between devices connected on different types of buses and networks, and the Connect EZ gateway allows for communication between buses and and networks that use the Modbus protocol.

This section contains the following topics:

Configure the Modbus gateway

Required configuration items

- Server configuration:
  - Enable the server.
  - Connection type, either socket or serial.
    - If the connection type is socket, the IP protocol to be used.
    - If the connection type is serial, the serial port to be used.
- Client configuration:
  - Enable the client.
  - Connection type, either socket or serial.
    - If the connection type is socket:
      - The IP protocol to be used.
      - The hostname or IPv4 address of the remote host on which the Modbus server is running.
    - If the connection type is serial:
      - The serial port to be used.
  - Modbus address or addresses to determine if messages should be forwarded to a destination device.

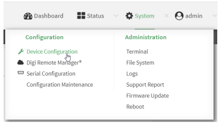
Additional configuration items

- Server configuration:
  - The packet mode.
  - The maximum time between bytes in a packet.
  - If the connection type is set to socket:
    - The port to use.
    - The inactivity timeout.
    - Access control list.
  - If the connection type is set to serial:
    - Whether to use half duplex (two wire) mode.
- Client configuration:
  - The packet mode.
  - The maximum time between bytes in a packets.
  - Whether to send broadcast messages.
  - Response timeout
  - If connection type is set to socket:
    - The port to use.
    - The inactivity timeout.
  - If connection type is set to serial:
    - Whether to use half duplex (two wire) mode.

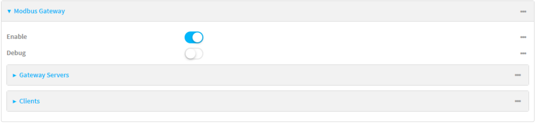
- Whether packets should be delivered to a fixed Modbus address.
- Whether packets should have their Modbus address adjusted downward before to delivery.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



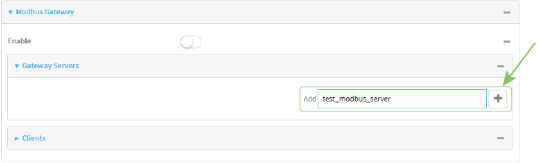
   The **Configuration** window is displayed.
3. Click **Services** > **Modbus Gateway**.



4. Click **Enable** to enable the gateway.
5. Click **Debug** to allow verbose logging in the system log.

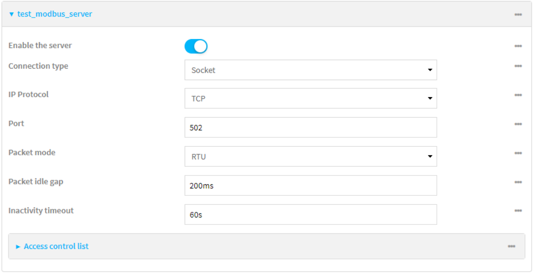
Configure gateway servers

1. Click to expand **Gateway Servers**.
2. For **Add Modbus server**, type a name for the server and click ✚.



test_modbus_server

   The new Modbus gateway server configuration is displayed.



Enable the server
Connection type Socket
IP Protocol TCP
Port 502
Packet mode RTU
Packet idle gap 200ms
Inactivity timeout 60s

3. The new Modbus gateway server is enabled by default. Toggle off **Enable the server** to disable.
4. For **Connection type**, select **Socket** or **Serial**. Available options in the gateway server configuration vary depending on this setting.

- If **Socket** is selected for **Connection type**:
    a. For **IP Protocol**, select **TCP** or **UDP**. The default is **TCP**.
    b. For **Port**, enter or select an appropriate port. The default is port **502**.
- If **Serial** is selected for **Connection type**:
    a. For **Serial port**, select the appropriate serial port on the Connect EZ device.

5. For **Packet mode**, select **RTU** or **RAW** (if **Connection type** is set to **Socket**) or **ASCII** (if **Connection type**is set to **Serial**) for the type of packet that will be used by this connection. The default is **RTU**.
6. For **Packet idle gap**, type the maximum allowable time between bytes in a packet.

   Allowed values are between 10 milliseconds and one second, and take the format ***number*** {**ms|s**}.

   For example, to set **Packet idle gap** to 20 milliseconds, enter **20ms**.
7. If **Connection type** is set to **Socket**, for **Inactivity timeout**, type the amount of time to wait before disconnecting the socket when it has become inactive.

   Allowed values are any number of minutes or seconds up to a maximum of 15 minutes, and take the format ***number***{**m|s**}.

   For example, to set **Inactivity timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) If **Connection type** is set to **Serial**, click **Half duplex** to enable half duplex (two wire) mode.
9. (Optional) If **Connection type** is set to **Socket**, click to expand **Access control list**:
    - To limit access to specified IPv4 addresses and networks:
        a. Click **IPv4 Addresses**.
        b. For **Add Address**, click ✚.
        c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:
            - A single IP address or host name.
            - A network designation in CIDR notation, for example, 192.168.1.0/24.
            - **any**: No limit to IPv4 addresses that can access the web administration service.
        d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to specified IPv6 addresses and networks:
        a. Click **IPv6 Addresses**.
        b. For **Add Address**, click ✚.
        c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
            - A single IP address or host name.
            - A network designation in CIDR notation, for example, 2001:db8::/48.
            - **any**: No limit to IPv6 addresses that can access the web administration service.
        d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to hosts connected through a specified interface on the Connect EZ device:

    a. Click **Interfaces**.
    b. For **Add Interface**, click ✚.
    c. For **Interface**, select the appropriate interface from the dropdown.
    d. Click ✚ again to allow access through additional interfaces.

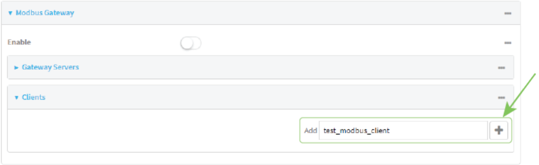
- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

10. Repeat these steps to configure additional servers.

Configure clients

1. Click to expand **Clients**.
2. For **Add Modbus client**, type a name for the client and click ✚.



▾ Modbus Gateway

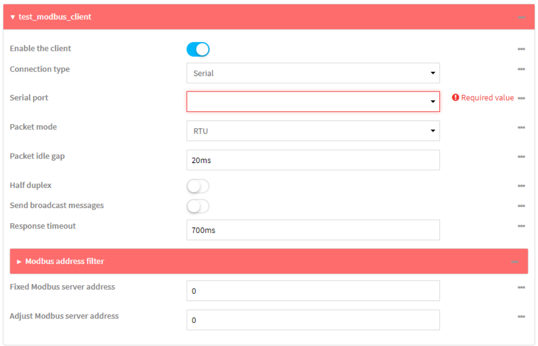
Enable ○

▸ Gateway Servers

▾ Clients

Add test_modbus_client ✚

The new Modbus gateway client configuration is displayed.



▾ test_modbus_client

Enable the client ●

Connection type: Serial

Serial port: ❗ Required value

Packet mode: RTU

Packet idle gap: 20ms

Half duplex ○

Send broadcast messages ○

Response timeout: 700ms

▸ Modbus address filter

Fixed Modbus server address: 0

Adjust Modbus server address: 0

3. The new Modbus gateway client is enabled by default. Toggle off **Enable the client** to disable.
4. For **Connection type**, select **Socket** or **Serial**. Available options in the gateway server configuration vary depending on this setting.
    - If **Socket** is selected for **Connection type**:
        a. For **IP Protocol**, select **TCP** or **UDP**. The default is **TCP**.
        b. For **Port**, enter or select an appropriate port. The default is port **502**.
        c. For **Remote host**, type the hostname or IP address of the remote host on which the Modbus server is running.
    - If **Serial** is selected for **Connection type**:
        a. For **Serial port**, select the appropriate serial port on the Connect EZ device.

5. For **Packet mode**, select **RTU** or **RAW** (if **Connection type** is set to **Socket**) or **ASCII** (if **Connection type**is set to **Serial**) for the type of packet that will be used by this connection. The default is **RTU**.
6. For **Packet idle gap**, type the maximum allowable time between bytes in a packet.

   Allowed values are between 10 milliseconds and one second, and take the format ***number*** {**ms|s**}.

   For example, to set **Packet idle gap** to 20 milliseconds, enter **20ms**.
7. If **Connection type** is set to **Socket**, for **Inactivity timeout**, type the amount of time to wait before disconnecting the socket when it has become inactive.

   Allowed values are any number of minutes or seconds up to a maximum of 15 minutes, and take the format ***number***{**m|s**}.

   For example, to set **Inactivity timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) If **Connection type** is set to **Serial**, click **Half duplex** to enable half duplex (two wire) mode.
9. (Optional) If **Connection type** is set to **Socket**, click to expand **Access control list**:
   - To limit access to specified IPv4 addresses and networks:

     a. Click **IPv4 Addresses**.

     b. For **Add Address**, click ✚.

     c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:

       - A single IP address or host name.
       - A network designation in CIDR notation, for example, 192.168.1.0/24.
       - **any**: No limit to IPv4 addresses that can access the web administration service.

     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     a. Click **IPv6 Addresses**.

     b. For **Add Address**, click ✚.

     c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:

       - A single IP address or host name.
       - A network designation in CIDR notation, for example, 2001:db8::/48.
       - **any**: No limit to IPv6 addresses that can access the web administration service.

     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:

     a. Click **Interfaces**.

     b. For **Add Interface**, click ✚.

     c. For **Interface**, select the appropriate interface from the dropdown.

     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

10. (Optional) Enable **Send broadcast messages** to configure the gateway to send broadcast messages to this client.
11. For **Response timeout**, type the maximum time to wait for a response to a message.

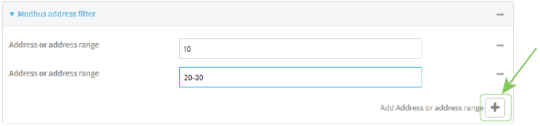
    Allowed values are between 1 millisecond and 700 milliseconds, and take the format ***number*ms**.

    For example, to set **Response timeout** to 100 milliseconds, enter **100ms**. The default is **700ms**.
12. Click to expand **Modbus address filter**.

    This filter is used by the gateway to determine if a message should be forwarded to a destination device. If the Modbus address in the message matches one or more of the filters, the message is forwarded. If it does not match the filters, the message is not forwarded.
13. For **Address or address range**, type a Modbus address or range of addresses. Allowed values are **1** through **255** or a hyphen-separated range.

    For example, to have this client filter for incoming messages that contain the Modbus address of 10, type **10**. To filter for all messages with addresses in the range of 20 to 30, type **20-30**.

    To add additional address filters for this client, click ✚.

    ▾ Modbus address filter

    Address or address range: 10

    Address or address range: 20-30

14. For **Fixed Modbus server address**, if request messages handled by this client should always be forwarded to a specific device, type the device's Modbus address. Leave at the default setting of **0** to allow messages that match the **Modbus address filter** to be forwarded to devices based on the Modbuss address in the message.
15. For **Adjust Modbus server address**, type a value to adjust the Modbus server address downward by the specified value prior to delivering the message. Allowed values are **0** through **255**. Leave at the default setting of **0** to not adjust the server address.

    If a packet contains a Modbus server address above the amount entered here, the address will be adjusted downward by this amount before the packet is delivered. This allows you to configure clients on the gateway that will forward messages to remote devices with the same Modbus address on different buses. For example, if there are two devices on two different buses that have the same Modbus address of 10, you can create two clients on the gateway:

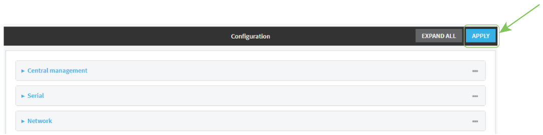
    - Client one:
        - **Modbus address filter** set to **10**.

        This will configure the gateway to deliver all messages that have the Modbus server address of 10 to this device.

- Client two:
    - **Modbus address filter** set to **20**.
    - **Adjust Modbus server address** set to **10**.

  This will configure the gateway to deliver all messages that have the Modbus server address address of 20 to the device with address 10.

16. Repeat these steps to configure additional clients.
17. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the Modbus gateway:

```
(config)> service modbus_gateway enable true
(config)>
```

4. Configure servers:
   a. Add a server:

```
(config)> add service modbus_gateway server name
(config service modbus_gateway  server name)>
```

   where *name* is a name for the server, for example:

```
(config)> add service modbus_gateway server test_modbus_server
(config service modbus_gateway server test_modbus_server)>
```

   The Modbus server is enabled by default. To disable:

```
(config service modbus_gateway server test_modbus_server)> enable
false
(config service modbus_gateway server test_modbus_server)>
```

   b. Set the connection type:

```
(config service modbus_gateway server test_modbus_server)> connection_
type type
(config service modbus_gateway server test_modbus_server)>
```

where *type* is either **socket** or **serial**. The default is **socket**.

- If **connection_type** is set to **socket**:

  i. Set the IP protocol:

  ```
  (config service modbus_gateway server test_modbus_server)>
  socket protocol value
  (config service modbus_gateway server test_modbus_server)>
  ```

  where *value* is either **tcp** or **udp**.

  ii. Set the port:

  ```
  (config service modbus_gateway server test_modbus_server)>
  socket port
  (config service modbus_gateway server test_modbus_server)>
  ```

  where *port* is an integer between **1** and **65535**. The default is **502**.

  iii. Set the packet mode:

  ```
  (config service modbus_gateway server test_modbus_server)>
  socket packet_mode value
  (config service modbus_gateway server test_modbus_server)>
  ```

  where *value* is either **rtu** or **raw**. The default is **rtu**.

  iv. Set the maximum allowable time between bytes in a packet:

  ```
  (config service modbus_gateway server test_modbus_server)>
  socket idle_gap value
  (config service modbus_gateway server test_modbus_server)>
  ```

  where *value* is any number between 10 milliseconds and one second, and take the format ***number*****{ms|s}**.

  For example, to set idle_gap to 20 milliseconds, enter **20ms**.

  v. Set the amount of time to wait before disconnecting the socket when it has become inactive:

  ```
  (config service modbus_gateway server test_modbus_server)>
  inactivity_timeout value
  (config service modbus_gateway server test_modbus_server)>
  ```

  where *value* is any number of minutes or seconds up to a maximum of 15 minutes, and takes the format ***number***{**m|s**}.

  For example, to set **inactivity_timeout** to ten minutes, enter either **10m** or **600s**:

  ```
  (config service modbus_gateway server test_modbus_server)>
  inactivity_timeout 600s
  (config service modbus_gateway server test_modbus_server)>
  ```

- If **connection_type** is set to **serial**:

    i. Set the serial port:

        i. Use the **?** to determine available serial ports:

        ```
        (config service modbus_gateway server test_modbus_
        server)> ... serial port ?

        Serial

          Additional Configuration
          -------------------------------------------------------
        ------------------------
          port1                    Port 1

        (config service modbus_gateway server test_modbus_
        server)>
        ```

        ii. Set the port:

        ```
        (config service modbus_gateway server test_modbus_
        server)> serial port
        (config service modbus_gateway server test_modbus_
        server)>
        ```

    ii. Set the packet mode:

    ```
    (config service modbus_gateway server test_modbus_server)>
    serial packet_mode value
    (config service modbus_gateway server test_modbus_server)>
    ```

    where *value* is either **rtu** or **ascii**. The default is **rtu**.

    iii. Set the maximum allowable time between bytes in a packet:

    ```
    (config service modbus_gateway server test_modbus_server)>
    serial idle_gap value
    (config service modbus_gateway server test_modbus_server)>
    ```

    where *value* is any number between 10 milliseconds and one second, and take the format ***number*****{ms|s}**.

    For example, to set idle_gap to one second, enter **1000ms** or **1s**.

    iv. (Optional) Enable half-duplex (two wire) mode:

    ```
    (config service modbus_gateway server test_modbus_server)>
    serial half_duplex true
    (config service modbus_gateway server test_modbus_server)>
    ```

c. Repeat the above instructions for additional servers.

5. Configure clients:

   a. Type **...** to return to the root of the configuration:

   ```
   (config)> add service modbus_gateway server test_modbus_server)> ...
   (config)>
   ```

   b. Add a client:

   ```
   (config)> add service modbus_gateway client name
   (config service modbus_gateway  client name)>
   ```

   where *name* is a name for the client, for example:

   ```
   (config)> add service modbus_gateway client test_modbus_client
   (config service modbus_gateway client test_modbus_client)>
   ```

   The Modbus client is enabled by default. To disable:

   ```
   (config service modbus_gateway client test_modbus_client)> enable
   false
   (config service modbus_gateway client test_modbus_client)>
   ```

   c. Set the connection type:

   ```
   (config service modbus_gateway client test_modbus_client)> connection_
   type type
   (config service modbus_gateway client test_modbus_client)>
   ```

   where *type* is either **socket** or **serial**. The default is **socket**.

   - If **connection_type** is set to **socket**:

     i. Set the IP protocol:

     ```
     (config service modbus_gateway client test_modbus_client)>
     socket protocol value
     (config service modbus_gateway client test_modbus_client)>
     ```

     where *value* is either **tcp** or **udp**.

     ii. Set the port:

     ```
     (config service modbus_gateway client test_modbus_client)>
     socket port
     (config service modbus_gateway client test_modbus_client)>
     ```

     where *port* is an integer between **1** and **65535**. The default is **502**.

     iii. Set the packet mode:

     ```
     (config service modbus_gateway client test_modbus_client)>
     socket packet_mode value
     (config service modbus_gateway client test_modbus_client)>
     ```

     where *value* is either **rtu** or **ascii**. The default is **rtu**.

iv. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway client test_modbus_client)>
socket idle_gap value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

For example, to set idle_gap to 20 milliseconds, enter **20ms**.

v. Set the amount of time to wait before disconnecting the socket when it has become inactive:

```
(config service modbus_gateway client test_modbus_client)>
inactivity_timeout value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is any number of minutes or seconds up to a maximum of 15 minutes, and takes the format ***number***{**m|s**}.

For example, to set **inactivity_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config service modbus_gateway client test_modbus_client)>
inactivity_timeout 600s
(config service modbus_gateway client test_modbus_client)>
```

vi. Set the hostname or IP address of the remote host on which the Modbus server is running:

```
(config service modbus_gateway client test_modbus_client)>
remote_host ip_address|hostname
(config service modbus_gateway client test_modbus_client)>
```

- If **connection_type** is set to **serial**:

  i. Set the serial port:

    i. Use the **?** to determine available serial ports:

```
(config service modbus_gateway client test_modbus_
client)> ... serial port ?

Serial

  Additional Configuration
  --------------------------------------------------------
------------------------
  port1                     Port 1

(config service modbus_gateway client test_modbus_
client)>
```

ii. Set the port:

```
(config service modbus_gateway client test_modbus_
client)> serial port
(config service modbus_gateway client test_modbus_
client)>
```

ii. Set the packet mode:

```
(config service modbus_gateway client test_modbus_client)>
serial packet_mode value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is either **rtu** or **ascii**. The default is **rtu**.

iii. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway client test_modbus_client)>
serial idle_gap value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

For example, to set idle_gap to one second, enter **1000ms** or **1s**.

iv. (Optional) Enable half-duplex (two wire) mode:

```
(config service modbus_gateway client test_modbus_client)>
serial half_duplex true
(config service modbus_gateway client test_modbus_client)>
```

d. (Optional) Enable the gateway to send broadcast messages to this client:

```
(config service modbus_gateway client test_modbus_client)> broadcast
true
(config service modbus_gateway client test_modbus_client)>
```

e. Set the maximum time to wait for a response to a message:

```
(config service modbus_gateway client test_modbus_client)> response_
timeout value
(config service modbus_gateway client test_modbus_client)>
```

Allowed values are between 1 millisecond and 700 milliseconds, and take the format ***number*ms**.

For example, to set response_timeout to 100 milliseconds:

```
(config service modbus_gateway client test_modbus_client)> response_
timeout 100ms
(config service modbus_gateway client test_modbus_client)>
```

The default is **700ms**.

f. Configure the address filter:

This filter is used by the gateway to determine if a message should be forwarded to a destination device. If the Modbus address in the message matches one or more of the filters, the message is forwarded. If it does not match the filters, the message is not forwarded. Allowed values are **1** through **255** or a hyphen-separated range.

For example:

- To have this client filter for incoming messages that contain the Modbus address of 10, set the index **0** entry to **10**:

```
(config service modbus_gateway client test_modbus_client)>
filter 0 10
(config service modbus_gateway client test_modbus_client)>
```

- To filter for all messages with addresses in the range of 20 to 30, set the index **0** entry to **20-30**:

```
(config service modbus_gateway client test_modbus_client)>
filter 0 20-30
(config service modbus_gateway client test_modbus_client)>
```

To add additional filters, increment the index number. For example, to add an additional filter for addresses in the range of 50-100:

```
(config service modbus_gateway client test_modbus_client)> filter 1
50-100
(config service modbus_gateway client test_modbus_client)>
```

g. If request messages handled by this client should always be forwarded to a specific device, , use **fixed_server_address** to set the device's Modbus address:

```
(config service modbus_gateway client test_modbus_client)> fixed_
server_address value
(config service modbus_gateway client test_modbus_client)>
```

Leave at the default setting of **0** to allow messages that match the Modbus address filter to be forwarded to devices based on the Modbuss address in the message.

h. To adjust the Modbus server address downward by the specified value prior to delivering the message, use **adjust_server_address**:

```
(config service modbus_gateway client test_modbus_client)> adjust_
server_address value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is an integer from **0** to **255**. Leave at the default setting of **0** to not adjust the server address.

If a packet contains a Modbus server address above the amount entered here, the address will be adjusted downward by this amount before the packet is delivered. This allows you to configure clients on the gateway that will forward messages to remote devices with the same Modbus address on different buses. For example, if there are two devices on two different buses that have the same Modbus address of 10, you can create two clients on the gateway:

- Client one:
  - **filter** set to **10**.

  This will configure the gateway to deliver all messages that have the Modbus server address of 10 to this device.
- Client two:
  - **filter** set to **20**.
  - **adjust_server_address** set to **10**.

  This will configure the gateway to deliver all messages that have the Modbus server address address of 20 to the device with address 10.

i. Repeat the above instructions for additional clients.

6. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show Modbus gateway status and statistics

You can view status and statistics about location information from either the WebUI or the command line.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, select **Status** > **Modbus Gateway**.

   The **Modbus Gateway** page appears.

   Statistics related to the Modbus gateway server are displayed. If the message **Server connections not available** is displayed, this indicates that there are no connected clients.

   - To view information about Modbus gateway clients, click **Clients**.
   - To view statistics that are common to both the clients and server, click **Common Statistics**.
   - To view configuration details about the gateway, click the 🔧 (configuration) icon in the upper right of the gateway's status pane.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show modbus-gateway command at the system prompt:

```
> show modbus-gateway

 Server Connection  IP Address   Port   Uptime
 -----------------  -----------  -----  ------
 modbus_socket      10.45.1.139  49570  6
 modbus_socket      10.45.1.139  49568  13

 Client                Uptime
 --------------------  ------
 modbus_socket_41      0
 modbus_socket_21      0
 modbus_serial_client  428

>
```

   If the message **Server connections not available** is displayed, this indicates that there are no connected clients.

3. Use the show modbus-gateway verbose command at the system prompt to display more information:

```
> show modbus-gateway verbose

 Client                Uptime
 --------------------  ------
 modbus_socket_41      0
 modbus_socket_21      0
 modbus_serial_client  506

 Common Statistics
 -----------------
 Configuration Updates          : 1
 Client Configuration Failure   : 0
 Server Configuration Failure   : 0
 Configuration Load Failure     : 0
 Incoming Connections           : 4
 Internal Error                 : 0
 Resource Shortages             : 0

 Servers
 -------

 modbus_socket
 -------------
 Client Lookup Errors           : 0
 Incoming Connections           : 4
 Packet Errors                  : 0
 RX Broadcasts                  : 0
 RX Requests                    : 12
 TX Exceptions                  : 0
 TX Responses                    : 12

 Clients
 -------

 modbus_socket_41
 ----------------
 Address Translation Errors      : 0
 Connection Errors               : 0
 Packet Errors                   : 0
 RX Responses                    : 4
 RX Timeouts                     : 0
 TX Broadcasts                   : 0
 TX Requests                     : 4

 modbus_socket_21
 ----------------
 Address Translation Errors      : 0
 Connection Errors               : 0
 Packet Errors                   : 0
 RX Responses                    : 4
 RX Timeouts                     : 0
 TX Broadcasts                   : 0
 TX Requests                     : 4

 modbus_serial_client
 --------------------
 Address Translation Errors      : 0
 Connection Errors               : 0
 Packet Errors                   : 0
 RX Responses                    : 4
 RX Timeouts                     : 0
 TX Broadcasts                   : 0
 TX Requests                     : 4

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

System time

By default, the Connect EZ device synchronizes the system time by periodically connecting to the Digi NTP server, **time.devicecloud.com**. In this mode, the device queries the time server based on following events and schedule:

- At boot time.
- Once a day.

The default configuration has the system time zone set to UTC. No additional configuration is required for the system time if the default configuration is sufficient. However, you can change the default time zone and the default NTP server, as well as configuring additional NTP servers. If multiple servers are configured, a number of time samples are obtained from each of the servers and a subset of the NTP clock filter and selection algorithms are applied to select the best of these. See Configure the system time for details about changing the default configuration.

The Connect EZ device can also be configured to serve as an NTP server, providing NTP services to downstream devices. See Network Time Protocol for more information about NTP server support.

You can also set the local date and time manually, if there is no access to NTP servers. See Manually set the system date and time for information

Configure the system time

This procedure is optional.

The Connect EZ device's default system time configuration uses the Digi NTP server, **time.devicecloud.com**, and has the time zone set to **UTC**. You can change the default NTP server and the default time zone. You can also set the local date and time without using an upstream NTP server, as well as configuring additional NTP servers.

Required Configuration Items

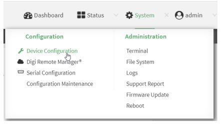
- The time zone for the Connect EZ device.
- If t least one upstream NTP server for synchronization.

Additional Configuration Options

- Additional upstream NTP servers.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



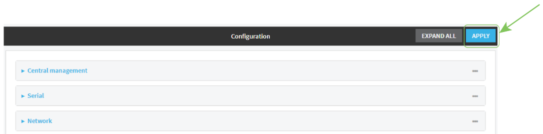
The **Configuration** window is displayed.

3. Click **System** > **Time**

4. (Optional) For **Timezone**, select either **UTC** or select the location nearest to your current location to set the timezone for your Connect EZ device. The default is **UTC**.
5. (Optional) Add upstream NTP servers that the device will use to synchronize its time. The default setting is **time.devicecloud.com**.
   - To change the default value of the NTP server:
     a. Click **NTP servers**.
     b. For **Server**, type a new server name.
   - To add an NTP server:
     a. Click **NTP servers**.
     b. For **Add Server**, click ✚.
     c. For **Server**, enter the hostname of the upstream NTP server that the device will use to synchronize its time.
     d. Click ✚ to add additional NTP servers. If multiple servers are included, servers are tried in the order listed until one succeeds.

Note This list is synchronized with the list of servers included with NTP server configuration, and changes made to one will be reflected in the other. See Configure the device as an NTP server for more information about NTP server configuration.

6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Set the timezone for the location of your Connect EZ device. The default is **UTC**.

```
(config)> system time timezone value
(config)>
```

   Where *value* is the timezone using the format specified with the following command:

```
(config)> system time timezone ?

Timezone: The timezone for the location of this device. This is used to
adjust the time for log
messages. It also affects actions that occur at a specific time of day.
```

```
Format:
  Africa/Abidjan
  Africa/Accra
  Africa/Addis_Ababa
  ...

(config)>
```

4. (Optional) Add an upstream NTP server that the device will use to synchronize its time to the appropriate location in the list of NTP servers. The default setting is **time.devicecloud.com**.
   - To delete the default NTP server, **time.devicecloud.com**:

     ```
     (config)> del service ntp server 0
     (config)>
     ```

   - To add the NTP server to the beginning of the list, use the index value of **0** to indicate that it should be added as the first server:

     ```
     (config)> add service ntp server 0 time.server.com
     (config)>
     ```

   - To add the NTP server to the end of the list, use the index keyword **end**:

     ```
     (config)> add service ntp server end time.server.com
     (config)>
     ```

   - To add the NTP server in another location in the list, use an index value to indicate the appropriate position. For example:

     ```
     (config)> add service ntp server 1 time.server.com
     (config)>
     ```

   Note This list is synchronized with the list of servers included with NTP server configuration, and changes made to one will be reflected in the other. See Configure the device as an NTP server for more information about NTP server configuration.

5. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Test the connection to the NTP servers

The following procedure tests the configured NTP servers for connectivity. This test does not affect the device's current local date and time.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Test the configured NTP servers for connectivity:

```
> system time test
Testing NTP server time.devicecloud.com on UDP port 123...
server 52.2.40.158, stratum 2, offset -0.000216, delay 0.05800
server 35.164.164.69, stratum 2, offset -0.000991, delay 0.07188
24 Aug 22:01:20 ntpdate[28496]: adjust time server 52.2.40.158 offset -
0.000216 sec
NTP test sync successful

Testing NTP server time.accns.com on UDP port 123...
server 128.136.167.120, stratum 3, offset -0.001671, delay 0.08455
24 Aug 22:01:20 ntpdate[28497]: adjust time server 128.136.167.120 offset
-0.001671 sec
NTP test sync successful
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Manually synchronize with the NTP server

The following procedure perform a NTP query to the configured servers and set the local time to the first server that responds.

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Synchronize the device's local date and time:

```
> system time synch
24 Aug 22:03:55 ntpdate[2520]: step time server 52.2.40.158 offset -
0.000487 sec
NTP sync to time.devicecloud.com successful
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Manually set the system date and time

If your network restricts access to NTP servers, use this procedure to set the local date and time.

This procedure is available at the Admin CLI only.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Set the device's local date and time:

   ```
   > system time set value
   >
   ```

   where *value* is the The date in year-month-day hour:minute:second format. For example:

   ```
   > system time set 2022-03-03 10:16:23
   >
   ```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Network Time Protocol

Network Time Protocol (NTP) enables devices connected on local and worldwide networks to synchronize their internal software and hardware clocks to the same time source. The Connect EZ device can be configured as an NTP server, allowing downstream hosts that are attached to the device's Local Area Networks to synchronize with the device.

When the device is configured as an NTP server, it also functions as an NTP client. The NTP client will be consistently synchronized with one or more upstream NTP servers, which means that NTP packets are transferred every few seconds. A minimum of one upstream NTP server is required. Additional NTP servers can be configured. If multiple servers are configured, a number of time samples are obtained from each of the servers and a subset of the NTP clock filter and selection algorithms are applied to select the best of these.

See Configure the device as an NTP server for information about configuring your device as an NTP server.

Configure the device as an NTP server

Required Configuration Items

- Enable the NTP service.
- At least one upstream NTP server for synchronization. The default setting is the Digi NTP server, **time.devicecloud.com**.

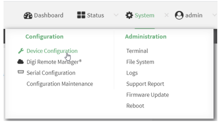
Additional Configuration Options

- Additional upstream NTP servers.
- Access control list to limit downstream access to the Connect EZ device's NTP service.
- The time zone setting, if the default setting of UTC is not appropriate.

To configure the Connect EZ device's NTP service:

☰ **WebUI**

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **NTP**.
4. Enable the Connect EZ device's NTP service by clicking **Enable**.
5. (Optional) Configure the access control list to limit downstream access to the Connect EZ device's NTP service.
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's NTP service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the NTP service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's NTP service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the NTP service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.

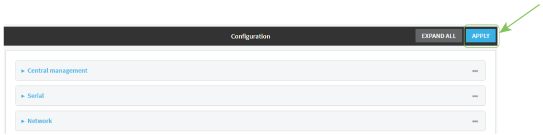
        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.

Note By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the Connect EZ device can use the NTP service.

6. Enable **Fall back to local clock** to allow the device's local system clock to be used as backup time source.
7. (Optional) Add upstream NTP servers that the device will use to synchronize its time. The default setting is **time.devicecloud.com**.
    - To change the default value of the NTP server:
        a. Click **NTP servers**.
        b. For **Server**, type a new server name.
    - To add an NTP server:
        a. Click **NTP servers**.
        b. For **Add Server**, click ✚.
        c. For **Server**, enter the hostname of the upstream NTP server that the device will use to synchronize its time.
        d. Click ✚ to add additional NTP servers. If multiple servers are included, servers are tried in the order listed until one succeeds.

Note This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See Configure the system time for more information about NTP client configuration.

8. (Optional) Configure the system time zone. The default is **UTC**.
    a. Click **System** > **Time**
    b. Select the **Timezone** for the location of your Connect EZ device.
9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the ntp service:

```
(config)> service ntp enable true
(config)>
```

4. (Optional) Add an upstream NTP server that the device will use to synchronize its time to the appropriate location in the list of NTP servers. The default setting is **time.devicecloud.com**.
   - To delete the default NTP server, **time.devicecloud.com**:

     ```
     (config)> del service ntp server 0
     (config)>
     ```

   - To add the NTP server to the beginning of the list, use the index value of **0** to indicate that it should be added as the first server:

     ```
     (config)> add service ntp server 0 time.server.com
     (config)>
     ```

   - To add the NTP server to the end of the list, use the index keyword **end**:

     ```
     (config)> add service ntp server end time.server.com
     (config)>
     ```

   - To add the NTP server in another location in the list, use an index value to indicate the appropriate position. For example:

     ```
     (config)> add service ntp server 1 time.server.com
     (config)>
     ```

   Note This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See Configure the system time for more information about NTP client configuration.

5. Allow the device's local system clock to be used as backup time source:

   ```
   (config)> service ntp local true
   (config)>
   ```

6. (Optional) Configure the access control list to limit downstream access to the Connect EZ device's NTP service.
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service ntp acl address end value
     (config)>
     ```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the NTP server agent.

     Repeat this step to list additional IP addresses or networks.

   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service ntp acl address6 end value
     (config)>
     ```

     Where *value* can be:

    - A single IP address or host name.
    - A network designation in CIDR notation, for example, 2001:db8::/48.
    - **any**: No limit to IPv6 addresses that can access the NTP server agent.

  Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

```
(config)> add service ntp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service ntp acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ---------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

Note By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the Connect EZ device can use the NTP service.

7. (Optional) Set the timezone for the location of your Connect EZ device. The default is **UTC**.

```
(config)> system time timezone value
(config)>
```

Where *value* is the timezone using the format specified with the following command:

```
(config)> system time timezone ?

Timezone: The timezone for the location of this device. This is used to
adjust the time for log
messages. It also affects actions that occur at a specific time of day.
Format:
  Africa/Abidjan
  Africa/Accra
  Africa/Addis_Ababa
  ...

(config)>
```

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Show status and statistics of the NTP server

You can display status and statistics for active NTP servers

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **Status**.
3. Under **Services**, click **NTP**.

   The NTP server status page is displayed.

Command line

Show NTP information

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show ntp command at the system prompt:

```
> show ntp

 NTP Status Status
 -----------------
 Status      : Up
 Sync Status : Up

 Remote             Refid           ST  T  When  Poll  Reach  Delay
Offset  Jitter
 ----------------  -------------  --  -  ----  ----  -----  ------  -----
-  ------
 *ec2-52-2-40-158  129.6.15.32    2   u  191   1024  377    33.570
+1.561  0.991
 128.136.167.120   128.227.205.3  3   u  153   1024  1      43.583  -
1.895  0.382

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

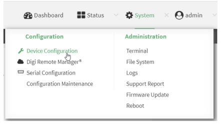
Configure a multicast route

Multicast routing allows a device to transmit data to a single multicast address, which is then distributed to a group of devices that are configured to be members of that group.

To configure a multicast route:

WebUI

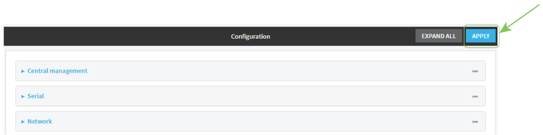
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Services** > **Multicast**.
4. For **Add Multicast route**, type a name for the route and click ✚.
5. The new route is enabled by default. To disable, uncheck **Enable**.
6. Type the **Source address** for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.
7. Select a **Source interface** where multicast packets will arrive.
8. To add one or more destination interface that the Connect EZ device will send mutlicast packets to:

   a. Click to expand **Destination interfaces**.
   b. Click ✚.
   c. For **Destination interface**, select the interface.
   d. Repeat for additional destination interfaces.

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the multicast route. For example, to add a route named **test**:

```
(config)> add service multicast test
(config service multicast test)>
```

4. The multicast route is enabled by default. If it has been disabled, enable the route:

```
(config service multicast test)> enable true
(config service multicast test)>
```

5. Set the source address for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.

```
(config service multicast test)> dst ip-address
(config service multicast test)>
```

6. Set the source interface for the route where multicast packets will arrive:

   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config service multicast test)> src_interface /network/interface/eth1
(config service multicast test)>
```

7. Set a destination interface that the Connect EZ device will send mutlicast packets to:

   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config service multicast test)> add interface end
/network/interface/eth1
(config service multicast test)>
```

c. Repeat for each additional destination interface.

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

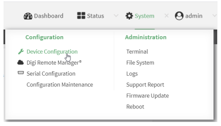
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Enable service discovery (mDNS)

Multicast DNS mDNS is a protocol that resolves host names in small networks that do not have a DNS server. You can enable the Connect EZ device to use mDNS.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

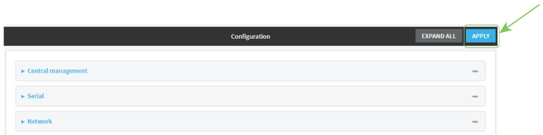
   

   The **Configuration** window is displayed.
3. Click **Services** > **Service Discovery (mDNS)**.
4. **Enable** the mDNS service.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's mDNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the mDNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's mDNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the mDNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.

       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the mDNS service:

```
(config)> service mdns enable true
(config)>
```

4. Configure access control:
    - To limit access to specified IPv4 addresses and networks:

```
(config)> add service mdns acl address end value
(config)>
```

      Where *value* can be:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the mDNS service.

      Repeat this step to list additional IP addresses or networks.
    - To limit access to specified IPv6 addresses and networks:

```
(config)> add service mdns acl address6 end value
(config)>
```

      Where *value* can be:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the mDNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

```
(config)> add service mdns acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service mdns acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 --------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use the iPerf service

Your Connect EZ device includes an iPerf3 server that you can use to test the performance of your network.

iPerf3 is a command-line tool that measures the maximum network throughput an interface can handle. This is useful when diagnosing network speed issues.

The Connect EZ implementation of iPerf3 supports testing with both TCP and UDP.

Note Using iPerf clients that are at a version earlier than iPerf3 to connect to the Connect EZ device's iPerf3 server may result in unpredictable results. As a result, Digi recommends using an iPerf client at version 3 or newer to connect to the Connect EZ device's iPerf3 server.

Required configuration items

- Enable the iPerf server on the Connect EZ device.
- An iPerf3 client installed on a remote host. iPerf3 software can be downloaded at https://iperf.fr/iperf-download.php.

Additional configuration Items

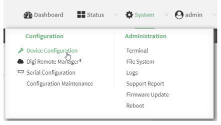
- The port that the Connect EZ device's iPerf server will use to listen for incoming connections.
- The access control list for the iPerf server.

  When the iPerf server is enabled, the Connect EZ device will automatically configure its firewall rules to allow incoming connections on the configured listening port. You can restrict access by configuring the access control list for the iPerf server.

To enable the iPerf3 server:

WebUI

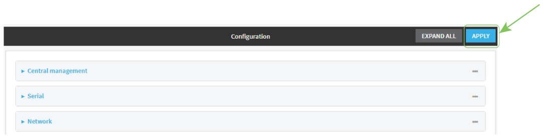
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **iPerf**.
4. Click **Enable**.
5. (Optional) For **IPerf Server Port**, type the appropriate port number for the iPerf server listening port.
6. (Optional) Click to expand **Access control list** to restrict access to the iPerf server:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's iperf service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the iperf service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's iperf service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the iperf service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
    a. Click **Zones**.
    b. For **Add Zone**, click ✚.
    c. For **Zone**, select the appropriate firewall zone from the dropdown.
       See Firewall configuration for information about firewall zones.
    d. Click ✚ again to allow access through additional firewall zones.

7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:
   - To limit access to specified IPv4 addresses and networks:

   ```
   (config)> add service iperf acl address end value
   (config)>
   ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

   ```
   (config)> add service iperf acl address6 end value
   (config)>
   ```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

■ To limit access to hosts connected through a specified interface on the Connect EZ device:

```
(config)> add service iperf acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

■ To limit access based on firewall zones:

```
(config)> add service iperf acl zone end value
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ---------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to list additional firewall zones.

6. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example performance test using iPerf3

On a remote host with iPerf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the Connect EZ device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[  4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
[  4]   0.00-1.00   sec  26.7 MBytes   224 Mbits/sec    8   2.68 MBytes
[  4]   1.00-2.00   sec  28.4 MBytes   238 Mbits/sec   29   1.39 MBytes
[  4]   2.00-3.00   sec  29.8 MBytes   250 Mbits/sec    0   1.46 MBytes
[  4]   3.00-4.00   sec  31.2 MBytes   262 Mbits/sec    0   1.52 MBytes
[  4]   4.00-5.00   sec  32.1 MBytes   269 Mbits/sec    0   1.56 MBytes
[  4]   5.00-6.00   sec  32.5 MBytes   273 Mbits/sec    0   1.58 MBytes
[  4]   6.00-7.00   sec  33.9 MBytes   284 Mbits/sec    0   1.60 MBytes
[  4]   7.00-8.00   sec  33.7 MBytes   282 Mbits/sec    0   1.60 MBytes
[  4]   8.00-9.00   sec  33.5 MBytes   281 Mbits/sec    0   1.60 MBytes
[  4]   9.00-10.00  sec  33.2 MBytes   279 Mbits/sec    0   1.60 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec   315 MBytes   264 Mbits/sec   37             sender
[  4]   0.00-10.00  sec   313 MBytes   262 Mbits/sec                  receiver

iperf Done.
$
```

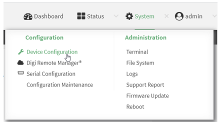
Configure the ping responder service

Your Connect EZ device's ping responder service replies to ICMP and ICMPv6 echo requests. The service is enabled by default. You can disable the service, or you can configure the service to use an access control list to limit the service to specified IP address, interfaces, and/or zones.

To enable the iPerf3 server:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

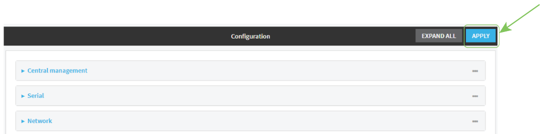
   The **Configuration** window is displayed.
3. Click **Services** > **Ping responder**.

   The ping responder service is enabled by default. Click **Enable** to disable all ping responses.
4. Click to expand **Access control list** to restrict ping responses to specified IP address, interfaces, and/or zones:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's ping responder. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the ping responder.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's ping responder. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the ping responder.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.

        See Firewall configuration for information about firewall zones.

d. Click ✚ again to allow access through additional firewall zones.

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:

   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service iperf acl address end value
(config)>
```

   Where *value* can be:

   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 192.168.1.0/24.
   - **any**: No limit to IPv4 addresses that can access the service-type.

   Repeat this step to list additional IP addresses or networks.

   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service iperf acl address6 end value
(config)>
```

   Where *value* can be:

   - A single IP address or host name.
   - A network designation in CIDR notation, for example, 2001:db8::/48.
   - **any**: No limit to IPv6 addresses that can access the service-type.

   Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ device:

  ```
  (config)> add service iperf acl interface end value
  (config)>
  ```

  Where *value* is an interface defined on your device.

  Display a list of available interfaces:

  Use **... network interface ?** to display interface information:

  Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

  ```
  (config)> add service iperf acl zone end value
  ```

  Where *value* is a firewall zone defined on your device, or the **any** keyword.

  Display a list of available firewall zones:

  Type **... firewall zone ?** at the config prompt:

  ```
  (config)> ... firewall zone ?

  Zones: A list of groups of network interfaces that can be
  referred to by packet
  filtering rules and access control lists.

   Additional Configuration
   ---------------------------------------------------------
  -----------------------
    any
    dynamic_routes
    edge
    external
    internal
    ipsec
    loopback
    setup

  (config)>
  ```

  Repeat this step to list additional firewall zones.

6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example performance test using iPerf3

On a remote host with Iperf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the Connect EZ device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[  4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
[  4]   0.00-1.00   sec  26.7 MBytes   224 Mbits/sec    8   2.68 MBytes
[  4]   1.00-2.00   sec  28.4 MBytes   238 Mbits/sec   29   1.39 MBytes
[  4]   2.00-3.00   sec  29.8 MBytes   250 Mbits/sec    0   1.46 MBytes
[  4]   3.00-4.00   sec  31.2 MBytes   262 Mbits/sec    0   1.52 MBytes
[  4]   4.00-5.00   sec  32.1 MBytes   269 Mbits/sec    0   1.56 MBytes
[  4]   5.00-6.00   sec  32.5 MBytes   273 Mbits/sec    0   1.58 MBytes
[  4]   6.00-7.00   sec  33.9 MBytes   284 Mbits/sec    0   1.60 MBytes
[  4]   7.00-8.00   sec  33.7 MBytes   282 Mbits/sec    0   1.60 MBytes
[  4]   8.00-9.00   sec  33.5 MBytes   281 Mbits/sec    0   1.60 MBytes
[  4]   9.00-10.00  sec  33.2 MBytes   279 Mbits/sec    0   1.60 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec   315 MBytes   264 Mbits/sec   37             sender
[  4]   0.00-10.00  sec   313 MBytes   262 Mbits/sec                  receiver

iperf Done.
$
```

Applications

The Connect EZ supports Python 3.6 and provides you with the ability to run Python applications on the device interactively or from a file. You can also specify Python applications and other scripts to be run each time the device system restarts, at specific intervals, or at a specified time.

This chapter contains the following topics:

Configure scripts to run automatically

You can configure a script or a python application to run automatically when the system restarts, at specific intervals, or at a specified time. By default, scripts execute in a "sandbox," which restricts access to the file system and available commands that can be used by the script.

Required configuration items

- Upload or create the script.
- Enable the application to be run script .
- Select whether the script should run:
  - When the device boots.
  - At a specified time.
  - At a specified interval.
  - During system maintenance.

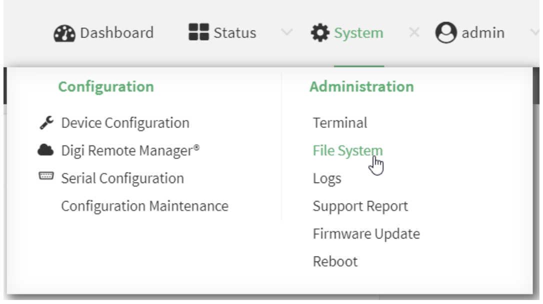
Additional configuration items

- A label used to identify the script .
- The action to take if the script finishes. The actions that can be taken are:
  - None.
  - Restart the script.
  - Reboot the device.
- Whether to write the script output and errors to the system log.
- If the script is set to run at a specified interval, whether another instance of the script should be run at the specified interval if the previous instance is still running.
- The memory available to be used by the script .
- Whether the script should run one time only.

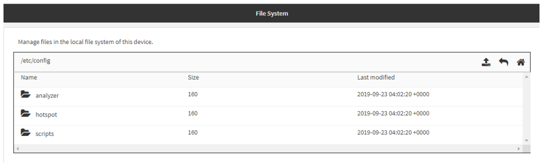
Task one: Upload the application

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight the **scripts** directory and click ↪ to open the directory.
4. Click ⭱ (upload).
5. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, use the scp command to upload the Python application script to the Connect EZ device:

   ```
   > scp host hostname-or-ip user username remote remote-path local local-
   path to local
   ```

   where:

   - *hostname-or-ip* is the hostname or ip address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
   - *local-path* is the location on the Connect EZ device where the copied file will be placed.

   For example:

   To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ device, issue the following command:

   ```
   > scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
   /etc/config/scripts/ to local
   admin@192.168.4.1's password: adminpwd
   test.py                        100%    36MB    11.1MB/s        00:03
   >
   ```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

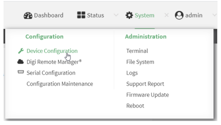
Note You can also create scripts by using the **vi** command when logged in with shell access.

Task two: Configure the application to run automatically

Note This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

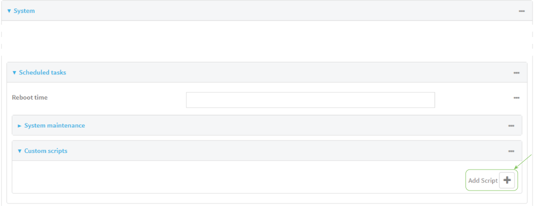
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

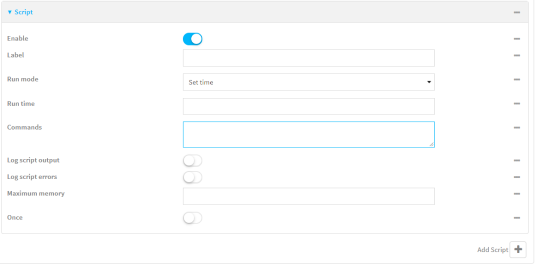


The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks** > **Custom scripts**.
4. For **Add Script**, click ✚.



The script configuration window is displayed.



Custom scripts are enabled by default. To disable, click **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select the mode that will be used to run the script. Available options are:
   - **On boot**: The script will run once each time the device boots.
     - If **On boot** is selected, select the action that will be taken when the script completes in **Exit action**. Available options are:
       - **None**: Action taken when the script exits.
       - **Restart script**: Runs the script repeatedly.
       - **Reboot**: The device will reboot when the script completes.
   - **Interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved.

        - If **Interval** is selected, in **Interval**, type the interval.

          Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

          For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

        - Click to enable **Run single** to run only a single instance of the script at a time.

          If **Run single** is not enabled, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.

    - **Set time**: Runs the script at a specified time of the day.

        - If **Set Time** is selected, specify the time that the script should run in **Run time**, using the format *HH*:*MM*.

    - **During system maintenance**: The script will run during the system maintenance time window.

7. For **Commands**, enter the commands that will execute the script.

   If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

8. Script logging options:

   a. Click to enable **Log script output** to log the script's output to the system log.

   b. Click to enable **Log script errors** to log script errors to the system log.

   If neither option is selected, only the script's exit code is written to the system log.

9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number*{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

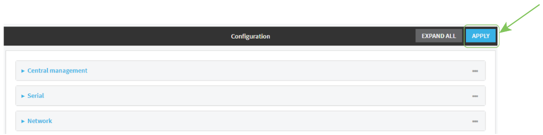
10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.

11. Click to enable **Once** to configure the script to run only once at the specified time.

    If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:

    - Remove the script from the device and add it again.
    - Make a change to the script.
    - Uncheck **Once**.

12. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Add a script:

   ```
   (config)> add system schedule script end
   (config system schedule script 0)>
   ```

   Scheduled scripts are enabled by default. To disable:

   ```
   (config system schedule script 0)> enable false
   (config system schedule script 0)>
   ```

4. (Optional) Provide a label for the script.

   ```
   (config system schedule script 0)> label value
   (config system schedule script 0)>
   ```

   where *value* is any string. if spaces are used, enclose *value* within double quotes.

5. Set the mode that will be used to run the script:

   ```
   (config system schedule script 0)> when mode
   (config system schedule script 0)>
   ```

   where *mode* is one of the following:

   - **boot**: The script will run once each time the device boots.
     - If **boot** is selected, set the action that will be taken when the script completes:

       ```
       (config system schedule script 0)> exit_action action
       (config system schedule script 0)>
       ```

       where *action* is one of the following:

       - **none**: Action taken when the script exits.
       - **restart**: Runs the script repeatedly.
       - **reboot**: The device will reboot when the script completes.
   - **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected:
     - Set the interval:

       ```
       (config system schedule script 0)> on_interval value
       (config system schedule script 0)>
       ```

       where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

       For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

       ```
       (config system schedule script 0)> on_interval  600s
       (config system schedule script 0)>
       ```

        - (Optional) Configure the script to run only a single instance at a time:

          ```
          (config system schedule script 0)> once true
          (config system schedule script 0)>
          ```

          If **once** is set to **false**, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.

    - **set_time**: Runs the script at a specified time of the day.
        - If **set_time** is set, set the time that the script should run, using the format *HH*:*MM*:

          ```
          (config system schedule script 0)> run_time HH:MM
          (config system schedule script 0)>
          ```

    - **maintenance_time**: The script will run during the system maintenance time window.

6. Set the commands that will execute the script:

   ```
   (config system schedule script 0)> commands filename
   (config system schedule script 0)>
   ```

   where *filename* is the path and filename of the script, and any related command line information.

   If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:
    - To log the script's output to the system log:

      ```
      (config system schedule script 0)> syslog_stdout true
      (config system schedule script 0)>
      ```

    - To log script errors to the system log:

      ```
      (config system schedule script 0)> syslog_stderr true
      (config system schedule script 0)>
      ```

   If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.

8. Set the maximum amount of memory available to be used by the script and its subprocesses:

   ```
   (config system schedule script 0)> max_memory value
   (config system schedule script 0)>
   ```

   where *value* uses the syntax ***number***{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

9. To run the script only once at the specified time:

   ```
   (config system schedule script 0)> once true
   (config system schedule script 0)>
   ```

   If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:

- Remove the script from the device and add it again.
- Make a change to the script.
- Disable **once**.

10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure scripts to run manually

You can configure an scripts to be manually run.

Required configuration items

- Upload or create the script.
- Enable the script.
- Set the script to run manually.

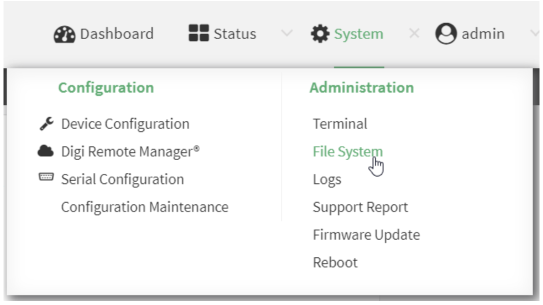
Additional configuration items

- A label used to identify the script.
- The arguments for the script.
- Whether to write the script output and errors to the system log.
- The memory available to be used by the script.
- Whether the script should run one time only.

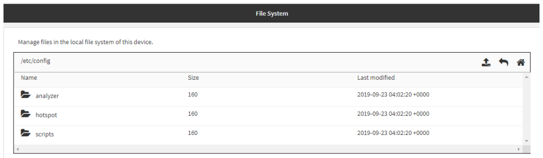
Task one: Upload the application

☰ **WebUI**

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.

   The **File System** page appears.

   File System

   Manage files in the local file system of this device.

   /etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight the **scripts** directory and click ↪ to open the directory.
4. Click ⭱ (upload).
5. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, use the scp command to upload the Python application script to the Connect EZ device:

   ```
   > scp host hostname-or-ip user username remote remote-path local local-
   path to local
   ```

   where:

   - *hostname-or-ip* is the hostname or ip address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
   - *local-path* is the location on the Connect EZ device where the copied file will be placed.

   For example:

   To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
/etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py                        100%    36MB    11.1MB/s        00:03
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

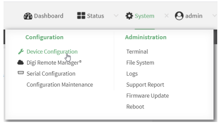
Note You can also create scripts by using the **vi** command when logged in with shell access.

Task two: Configure the application to run automatically

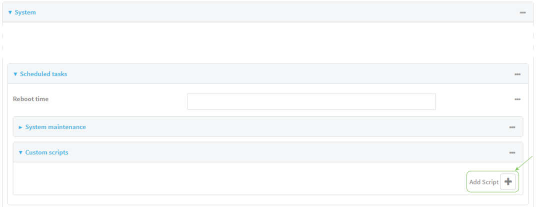
Note This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

WebUI

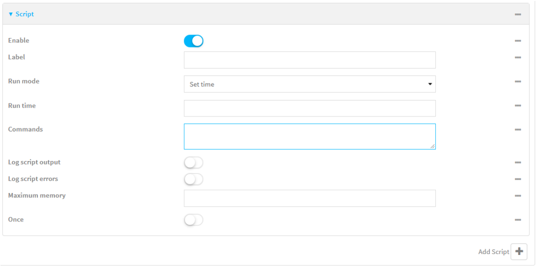
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Scheduled tasks** > **Custom scripts**.
4. For **Add Script**, click ✚.

   The script configuration window is displayed.

   Run mode Set time

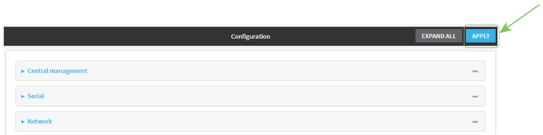
Custom scripts are enabled by default. To disable, click **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select **Manual**.
7. For **Commands**, enter the commands that will execute the script.

   If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).
8. Script logging options:
   a. Click to enable **Log script output** to log the script's output to the system log.
   b. Click to enable **Log script errors** to log script errors to the system log.

   If neither option is selected, only the script's exit code is written to the system log.
9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number*{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.
10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.
11. Click to enable **Once** to configure the script to run only once at the specified time.

    If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:
    - Remove the script from the device and add it again.
    - Make a change to the script.
    - Uncheck **Once**.
12. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

4. (Optional) Provide a label for the script.

   ```
   (config system schedule script 0)> label value
   (config system schedule script 0)>
   ```

   where *value* is any string. if spaces are used, enclose *value* within double quotes.

5. Set the run mode to manual:

   ```
   (config system schedule script 0)> when manual
   (config system schedule script 0)>
   ```

6. Set the commands that will execute the script:

   ```
   (config system schedule script 0)> commands filename
   (config system schedule script 0)>
   ```

   where *filename* is the path and filename of the script, and any related command line information.

   If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:
   - To log the script's output to the system log:

     ```
     (config system schedule script 0)> syslog_stdout true
     (config system schedule script 0)>
     ```

   - To log script errors to the system log:

     ```
     (config system schedule script 0)> syslog_stderr true
     (config system schedule script 0)>
     ```

   If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.

8. Set the maximum amount of memory available to be used by the script and its subprocesses:

   ```
   (config system schedule script 0)> max_memory value
   (config system schedule script 0)>
   ```

   where *value* uses the syntax ***number***{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

9. To run the script only once at the specified time:

   ```
   (config system schedule script 0)> once true
   (config system schedule script 0)>
   ```

   If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:

- Remove the script from the device and add it again.
- Make a change to the script.
- Disable **once**.

10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

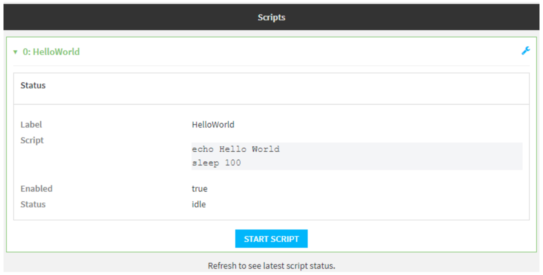
Start a manual script

You can start a script that is enabled and configured to have a run mode of **Manual**. See

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:



Scripts

0: HelloWorld

Status

Label HelloWorld

Script

```
echo Hello World
sleep 100
```

Enabled true

Status idle

Refresh to see latest script status.

3. For scripts that are enabled and configured to have a run mode of **Manual**, click **Start Script** to start the script.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Determine the name of scripts that are currently running:

```
> show scripts

 Index  Label          Enabled  Status  Run time
 -----  -----------    -------  ------  --------
 0      script1        true     active
 1      script2        true     idle     01:00
>
```

3. Start the script:

```
)> system script start script1
>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

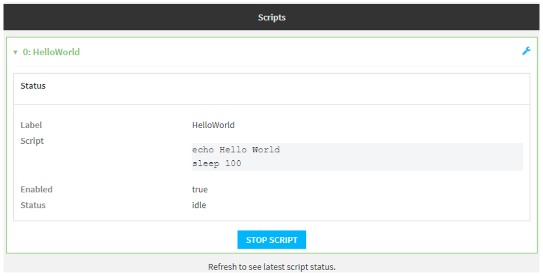
Stop a script that is currently running

You can stop a script that is currently running.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:



Status

Label: HelloWorld

Script:

```
echo Hello World
sleep 100
```

Enabled: true

Status: idle

Refresh to see latest script status.

3. For scripts that are currently running, click **Stop Script** to stop the script.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Determine the name of scripts that are currently running:

```
> show scripts

 Index  Label         Enabled  Status  Run time
 -----  -----------   -------  ------  --------
 0      script1       true     active
 1      script2       true     idle     01:00
>
```

   Scripts that are currently running have the status of **active**.

3. Stop the appropriate script:

```
)> system script stop script1
>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

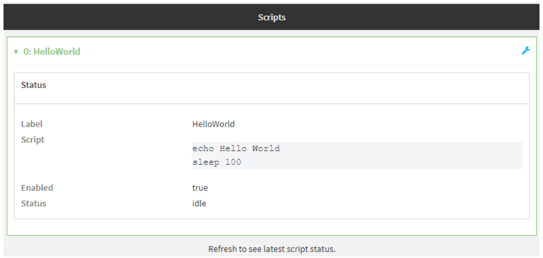
Show script information

You can view status and statistics about location information from either the WebUI or the command line.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:



Scripts

0: HelloWorld

Status

Label	HelloWorld

Script	`echo Hello World`
	`sleep 100`

Enabled	true
Status	idle

Refresh to see latest script status.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show scripts command at the system prompt:

```
> show scripts

 Index  Label          Enabled  Status  Run time
 -----  -----------    -------  ------  --------
 0      script1        true     active
 1      script2        true     idle     01:00
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Run a Python application at the shell prompt

Python applications can be run from a file at the shell prompt. The Python application will run until it completes, displaying output and prompting for additional user input if needed. To interrupt the application, enter **CTRL-C**.

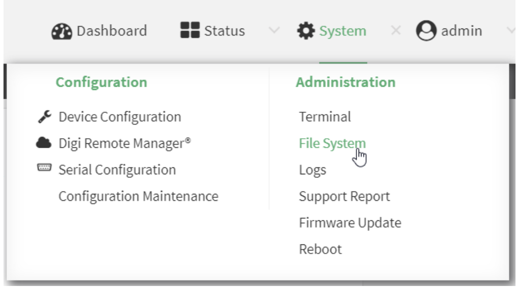
Note Python applications cannot be run from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See Authentication groups for information about configuring authentication groups that include shell access.

1. Upload the Python application to the Connect EZ device:

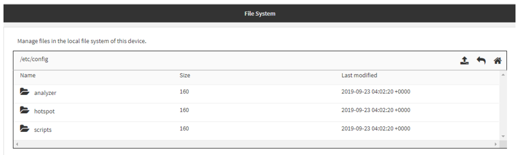
WebUI

a. Log into the Connect EZ WebUI as a user with Admin access.

b. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



File System

Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

c. Highlight the **scripts** directory and click ↪ to open the directory.

d. Click ⭱ (upload).

e. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

⌨ Command line

a. Log into the Connect EZ command line as a user with Admin access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

b. At the command line, use the scp command to upload the Python application script to the Connect EZ device:

```
> scp host hostname-or-ip user username remote remote-path local
local-path to local
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
- *local-path* is the location on the Connect EZ device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
/etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py                        100%    36MB    11.1MB/s       00:03
>
```

c. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Note You can also create scripts by using the **vi** command when logged in with shell access.

2. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. Use the **python** command to run the Python application. In the following example, the Python application, **test.py**, takes 3 parameters: **120**, **ports** and **storage**:

```
# python /etc/config/scripts/test.py 120 ports storage
```

Start an interactive Python session

Use the **python** command without specifying any parameters to start an interactive Python session. The Python session operates interactively using REPL (Read Evaluate Print Loop) to allow you to write Python code on the command line.

Note The Python interactive session is not available from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See Authentication groups for information about configuring authentication groups that include shell access.

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Type Python commands at the Python prompt. For example, to view help for the digidevice module, type:

```
>>> help("digidevice")
Help on package digidevice:

NAME
    digidevice - Digi device python extensions

DESCRIPTION
    This module includes various extensions that allow Python
    to interact with additional features offered by the device.
...
```

4. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Digidevice module

The Python **digidevice** module provides platform-specific extensions that allow you to interact with the device's configuration and interfaces. The following submodules are included with the **digidevice** module:

This section contains the following topics:

Use digidevice.cli to execute CLI commands

Use the **digidevice.cli** Python module to issue CLI commands from Python to retrieve status and statistical information about the device.

For example, to display the system status and statistics by using an interactive Python session, use the show system command with the **cli** module:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **cli** submodule:

```
>>> from digidevice import cli
>>>
```

4. Execute a CLI command using the **cli.execute(*command*)** function. For example, to print the system status and statistics to stdout using the **show system** command:

```
>>> response = cli.execute("show system")
>>>
>>> print (response)

  Model                     : Digi Connect EZ
  Serial Number             : Connect EZ-000065
  SKU                       : Connect EZ
  Hostname                  : Connect EZ
  MAC Address               : DF:DD:E2:AE:21:18

  Hardware Version          : 50001947-01 1P
  Firmware Version          : 22.2.9.85
  Alt. Firmware Version     : 22.2.9.85
  Alt. Firmware Build Date : Thurs, 03 March 2022 10:16:23
  Bootloader Version        : 19.7.23.0-15f936e0ed

  Current Time              : Thurs, 03 March 2022 10:16:23 +0000
  CPU                       : 1.4%
  Uptime                    : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Temperature               : 40C

>>>
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for using Python to execute Connect EZ CLI commands

Get help executing a CLI command from Python by accessing help for **cli.execute**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **cli** submodule:

   ```
   >>> from digidevice import cli
   >>>
   ```
4. Use the help command with **cli.execute**:

   ```
   >>> help(cli.execute)
   Help on function execute in module digidevice.cli:

   execute(command, timeout=5)
   Execute a CLI command with the timeout specified returning the results.
   ...
   ```
5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice.datapoint to upload custom datapoints to Digi Remote Manager

Use the **datapoint** Python module to upload custom datapoints to Digi Remote Manager.

The following characteristics can be defined for a datapoint:

- Stream ID
- Value
- (Optional) Data type
  - integer
  - long
  - float
  - double
  - string
  - binary
- Units (optional)
- Timestamp (optional)

- Location (optional)
  - Tuple of latitude, longitude and altitude
- Description (optional)
- Quality (optional)
  - An integer describing the quality of the data point

For example, to use an interactive Python session to upload datapoints related to velocity, temperature, and the state of the emergency door:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **datapoint** submodule and other necessary modules:

   ```
   >>> from digidevice import datapoint
   >>> import time
   >>>
   ```
4. Upload the datapoints to Remote Manager:

   ```
   >>> datapoint.upload("Velocity", 69, units="mph")
   >>> datapoint.upload("Temperature", 24, geo_location=(54.409469, -
   1.718836, 129))
   >>> datapoint.upload("Emergency_Door", "closed", timestamp=time.time())
   ```
5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

You can also upload multiple datapoints:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>> import time
>>>
```

4. Create datapoint objects:

```
>>> p1 = datapoint.DataPoint("Velocity", 69, units="mph")
>>> p2 = datapoint.DataPoint("Temperature", 24, geo_location=(54.409469,
-1.718836, 129))
>>> p3 = datapoint.DataPoint("Emergency_Door", "closed",
timestamp=time.time())
>>>
```

5. Upload the datapoints to Remote Manager:

```
>>> datapoint.upload_multiple([p1, p2, p3])
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Once the datapoints have been uploaded to Remote Manager, they can be viewed via Remote Manager or accessed using Web Services calls. See the *Digi Remote Manager Programmers Guide* for more information on web services and datapoints.

Help for using Python to upload custom datapoints to Remote Manager

Get help for uploading datapoints to your Digi Remote Manager account by accessing help for **datapoint.upload** and **datapoint.upload_multiple**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>>
```

4. Use the help command with **datapoint.upload**:

```
>>> help(datapoint.upload)
Help on function upload in module digidevice.datapoint:

upload(stream_id:str, data, *, description:str=None,
timestamp:float=None, units:str=None,
geo_location:Tuple[float, float, float]=None, quality:int=None,
data_type:digidevice.datapoint.DataType=None, timeout:float=None)
...
```

5. Use the help command with **datapoint.upload_multiple**:

```
>>> help(datapoint.upload_multiple)
Help on function upload_multiple in module digidevice.datapoint:

upload_multiple(datapoints:List[digidevice.datapoint.DataPoint],
timeout:float=None)
...
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice.config for device configuration

Use the **config** Python module to access and modify the device configuration.

Read the device configuration

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use **config.load()** and the **get()** method to return the device's configuration:
   a. Return the entire configuration:

```
>>> from pprint import pprint # use pprint vs. print to make the
output easier to read
>>> cfg = config.load()
>>> pprint(cfg.dump().splitlines())
```

   This returns the device configuration:

```
...
network.interface.lan1.device=/network/bridge/lan1
network.interface.lan1.enable=true
network.interface.lan1.ipv4.address=192.168.2.1/24
network.interface.lan1.ipv4.connection_monitor.attempts=3
...
```

b. Print a list of available interfaces:

```
>>> cfg = config.load()
>>> interfaces = cfg.get("network.interface")
>>> print(interfaces.keys())
```

This returns the following:

```
['defaultip', 'defaultlinklocal', 'lan1', 'loopback', 'wan1'']
```

c. Print the IPv4 address of the LAN interface:

```
>>> cfg = config.load()
>>> interfaces = cfg.get(“network.interfaces”)
>>> print(interfaces.get("lan.ipv4.address"))
```

Which returns:

```
192.168.2.1/24
```

Modify the device configuration

Use the **set()** and **commit()** methods to modify the device configuration:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **config** submodule:

   ```
   >>> from digidevice import config
   >>>
   ```
4. Use **config.load(writable=True)** to enable write mode for the configuration:

   ```
   >>> cfg = config.load(writable=True)
   >>>
   ```

5. Use the **set()** method to make changes to the configuration:

   ```
   >>> cfg.set("system.name", "New-Name")
   >>>
   ```

6. Use the **commit()** method to save the changes:

   ```
   >>> cfg.commit()
   True
   >>>
   ```

7. Use the **get()** method to verify the change:

   ```
   >>> print(cfg.get("system.name"))
   New-Name
   >>>
   ```

Help for using Python to read and modify device configuration

Get help for reading and modifying the device configuration by accessing help for **digidevice.config**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```

3. Import the **config** submodule:

   ```
   >>> from digidevice import config
   >>>
   ```

4. Use the help command with **config**:

   ```
   >>> help(config)
   Help on module acl.config in acl:

   NAME
   acl.config - Python interface to ACL configuration (libconfig).
   ...
   ```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to respond to Digi Remote Manager SCI requests

The **device_request** Python module allows you to interact with Digi Remote Manager by using Remote Manager's Server Command Interface (SCI), a web service that allows users to access information and perform commands that relate to their devices.

Use Remote Manager's SCI interface to create SCI requests that are sent to your Connect EZ device, and use the **device_request** module to send responses to those requests to Remote Manager.

See the *Digi Remote Manager Programmers Guide* for more information on SCI.

Task one: Use the device_request module on your Connect EZ device to create a response

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **device_request** module:

```
>>> from digidevice import device_request
>>>
```

4. Create a function to handle the request from Remote Manager:

```
>>> def handler(target, request):
     print ("received request %s for target %s" % (request, target))
     return "OK"
>>>
```

5. Register a callbackup function that will be called when the device receives a SCI request from Remote Manager:

```
>>> device_request.register("myTarget", handler)
>>>
```

Note Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

Task two: Create and send an SCI request from Digi Remote Manager

The second step in using the **device_request** module is to create an SCI request that Remote Manager will forward to the device. For example, you can create in SCI request a the Remote Manager API explorer:

1. In Remote Manager, click **Documentation** > **API Explorer**.
2. Select the device to use as the SCI target:
   a. Click **SCI Targets**.
   b. Click **Add Targets**.

c. Enter or select the device ID of the device.

d. Click **Add**.

e. Click **OK**.

3. Click **Examples** > **SCI** > **Data Service** > **Send Request**.

   Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
  <targets>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
  </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

Note The value of the **target_name** parameter in the **device_request** element must correspond to the **target** parameter of the **device_request.register** function in the Python script. In this example, the two are the same.

4. Click **Send**.

   Once that the request has been sent to the device, the handler on the device is executed.

   - On the device, you will receive the following output:

```
>>> received request
       my payload string
      for target myTarget
>>>
```

   - In Remote Manager, you will receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
      <requests>
        <device_request target_name="myTarget"
status="0">OK</device_request>
      </requests>
    </device>
  </data_service>
</sci_request>
```

Example: Use digidevice.cli with digidevice.device_request

In this example, we will use the **digidevice.cli** module in conjunction with the **digidevice.device_request** module to return information about multiple devices to Remote Manager.

1. Create a Python application, called showsystem.py, that uses the **digidevice.cli** module to create a response containing information about device and the **device_request** module to respond with this information to a request from Remote Manager:

```
from digidevice import device_request
from digidevice import cli
import time

def handler(target, request):
    return cli.execute("show system verbose")

def status_cb(error_code, error_description):
    if error_code != 0:
        print("error handling showSystem device request: %s" % error_
description)

device_request.register("showSystem", handler, status_callback = status_
cb)

# Do not let the process finish so that it handles device requests
while True:
    time.sleep(10)
```

2. Upload the showsystem.py application to the /etc/config/scripts directory on two or more Digi devices. In this example, we will upload it to two devices, and use the same request in Remote Manager to query both devices.

   See Configure scripts to run automatically for information about uploading Python applications to your device. You can also create the script on the device by using the **vi** command when logged in with shell access.

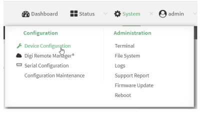
3. For both devices:

   a. Configure the device to automatically run the showsystem.py application on reboot, and to restart the application if it crashes. This can be done from either the WebUI or the command line:

   ### WebUI

   i. Log into the Connect EZ WebUI as a user with full Admin access rights.

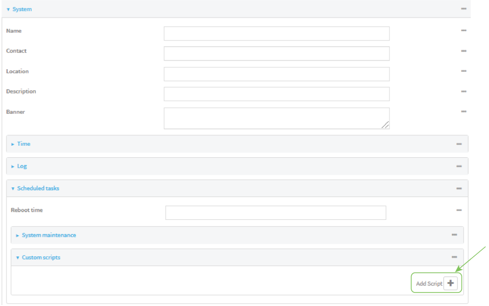
   ii. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

   iii. Click **System** > **Scheduled tasks** > **Custom scripts**.

iv. Click ✚ to add a custom script.

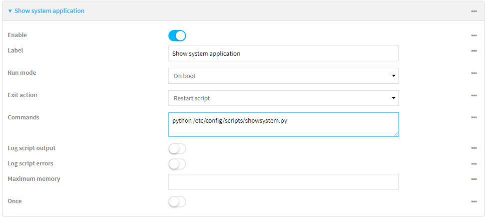


v. For **Label**, type **Show system application**.

vi. For **Run mode**, select **On boot**.

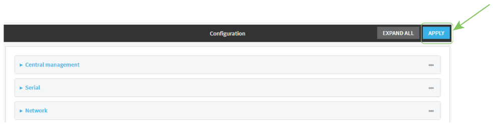
vii. For **Exit action**, select **Restart script**.

viii. For **Commands**, type **python /etc/config/scripts/showsystem.py**.



Enable: on
Label: Show system application
Run mode: On boot
Exit action: Restart script
Commands: python /etc/config/scripts/showsystem.py

ix. Click **Apply** to save the configuration and apply the change.



Command line

i. Log into the Connect EZ command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

ii. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

iii. Add an application entry:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

iv. Provide a label for the script:

```
(config system schedule script 0)> label "Show system application"
```

v. Configure the application to run automatically when the device reboots:

```
(config system schedule script 0)> when boot
(config system schedule script 0)>
```

vi. Configure the application to restart if it crashes:

```
(config system schedule script 0)> exit_action restart
(config system schedule script 0)>
```

vii. Set the command that will execute the application:

```
(config system schedule script 0)> commands "python
/etc/config/scripts/showsystem.py"
(config system schedule script 0)>
```

viii. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

b. Run the showsystem.py application. You can run the application by either rebooting the device, or by running it from the shell prompt.

- To reboot the device:
  - i. From the WebUI:
    - i. From the main menu, click **System**.
    - ii. Click **Reboot**.
  - i. From the command line, at the Admin CLI prompt, type:

    ```
    > reboot
    ```

- To run the application from the shell prompt:
  - i. Log into the Connect EZ command line as a user with shell access.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
  - ii. Type the following at the shell prompt:

    ```
    # python /etc/config/scripts/showsystem.py &
    #
    ```

iii. Exit the shell:

```
# exit
```

4. In Remote Manager, click **Documentation** > **API Explorer**.
5. Select the devices to use as the SCI targest:
   a. Click **SCI Targets**.
   b. Click **Add Targets**.
   c. Enter or select the device ID of one of the devices.
   d. Click **Add**.
   e. Enter or select the device ID of the second device and click **Add**.
   f. Click **OK**.
6. Click **Examples** > **SCI** > **Data Service** > **Send Request**.

   Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
  <targets>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
    <device id="00000000-00000000-0000FFFF-485740BC"/>
  </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

7. For the **device_request** element, replace the value of **target_name** with **showSystem**. This matches the **target** parameter of the **device_request.register** function in the showsystem.py application.

```
      <device_request target_name="showSystem">
```

8. Click **Send**.

   You should receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
      <requests>
        <device_request target_name="showSystem" status="0">Model
           : Digi Connect EZ
          Serial Number            : Connect EZ-000068
          Hostname                 : Connect EZ
          MAC                      : 00:40:D0:13:35:36

          Hardware Version         : 50001959-01 A
          Firmware Version         : 22.2.9.85
          Bootloader Version       : 1
          Firmware Build Date      : Thurs, 03 March 2022 10:16:23
          Schema Version           : 461

          Timezone                 : UTC
          Current Time             : Thurs, 03 March 2022 10:16:23
          CPU                      : 1.1
          Uptime                   : 1 day, 21 hours, 49 minutes, 47
seconds (164987s)
          Temperature              : 39C

          Contact                  : Jane Smith

          Disk
          ----
          Load Average             : 0.10, 0.05, 0.00
          RAM Usage                : 85.176MB/250.484MB(34%)
          Disk /etc/config Usage   : 0.068MB/13.416MB(1%)
          Disk /opt Usage          : 47.724MB/5309.752MB(1%)
          Disk /overlay Usage      : MB/MB(%)
          Disk /tmp Usage          : 0.004MB/40.96MB(0%)
          Disk /var Usage          : 0.820MB/32.768MB(3%)</device_
request>
      </requests>
    </device>
    <device id="00000000-00000000-0000FFFF-485740BC"/>
      <requests>
        <device_request target_name="showSystem" status="0">Model
           : Digi Connect EZ
          Serial Number            : Connect EZ-000023
          Hostname                 : Connect EZ
          MAC                      : 00:40:D0:26:79:1C

          Hardware Version         : 50001959-01 A
          Firmware Version         : 22.2.9.85
          Bootloader Version       : 1
          Firmware Build Date      : Thurs, 03 March 2022 10:16:23
          Schema Version           : 461

          Timezone                 : UTC
          Current Time             : Thurs, 03 March 2022 10:16:23
          CPU                      : 1.1
          Uptime                   : 4 day, 13 hours, 43 minutes, 22
seconds (395002s)
          Temperature              : 37C

          Contact                  : Omar Ahmad
          Disk
          ----
          Load Average             : 0.10, 0.05, 0.00
          RAM Usage                : 85.176MB/250.484MB(34%)
          Disk /etc/config Usage   : 0.068MB/13.416MB(1%)
          Disk /opt Usage          : 47.724MB/5309.752MB(1%)
          Disk /overlay Usage      : MB/MB(%)
          Disk /tmp Usage          : 0.004MB/40.96MB(0%)
          Disk /var Usage          : 0.820MB/32.768MB(3%)</device_
request>
      </requests>
    </device>
  </data_service>
</sci_request>
```

Help for using Python to respond to Digi Remote Manager SCI requests

Get help for respond to Digi Remote Manager Server Command Interface (SCI) requests by accessing help for **digidevice.device_request**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **device_request** submodule:

   ```
   >>> from digidevice import device_request
   >>>
   ```
4. Use the help command with **device_request**:

   ```
   >>> help(device_request)
   Help on module digidevice.device_request in digidevice:

   NAME
   digidevice.device_request - APIs for registering device request handlers
   ...
   ```

   You can also use the help command with available **device_request** functions:

   - Use the help command with **device_request.register**:

     ```
     >>> help(device_request.register)
     Help on function register in module digidevice.device_request:

     register(target:str, response_callback:Callable[[str, str], str],
     status_callback:Callable[[int, str], NoneType]=None, xml_
     encoding:str='UTF-8')
     ...
     ```
   - Use the help command with **device_request.unregister**:

     ```
     >>> help(device_request.unregister)
     Help on function unregister in module digidevice.device_request:

     unregister(target:str) -> bool
     ...
     ```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use digidevice runtime to access the runtime database

Use the **runt** submodule to access and modify the device runtime database.

Read from the runtime database

Use the **keys()** and **get()** methods to read the device configuration:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **runt** submodule:

   ```
   >>> from digidevice import runt
   >>>
   ```
4. Use the **start()** method to open the runtime database:

   ```
   >>> runt.start()
   >>>
   ```
5. Use the **keys()** method to display available keys in the runtime database, and use the **get()** method to print information from the runtime database:

   a. Print available keys:

   ```
   >>> print(runt.keys(""))
   ```

   This returns available keys:

   ```
   ['advanced', 'drm', 'firmware', 'location', 'manufacture', 'metrics',
   'mm', 'network', 'pam', 'serial', 'system']
   ```

   b. Print available keys for the system key:

   ```
   >>> print(runt.keys("system"))
   ```

   This will return the following:

   ```
   ['boot_count', 'chassis', 'cpu_temp', 'cpu_usage', 'disk', 'load_avg',
   'local_time', 'mac', 'mcu', 'model', 'ram', 'serial', 'uptime']
   ```

c. Use the **get()** method to print the device's MAC address:

```
>>> print(runt.get("system.mac"))
```

This will return the MAC address of the device.

6. Use the **stop()** method to close the runtime database:
7. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Modify the runtime database

Use the **set()** method to modify the runtime database:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use **start()** method to open the runtime database:

```
>>> runt.start()
>>>
```

5. Use the **set()** method to make changes to the runtime database:

```
>>> runt.set("my-variable", "my-value")
>>>
```

6. Use the **get()** method to verify the change:

```
>>> print(runt.get("my-variable"))
my-variable
>>>
```

7. Close the runtime database:

```
>>> runt.stop()
>>>
```

8. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for using Python to access the runtime database

Get help for reading and modifying the device runtime database by accessing help for **digidevice.runt**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use the help command with **runt**:

```
>>> help(runt)

Help on module acl.runt in digidevice:

NAME
acl.runt - Python interface to ACL runtime database (runtd).
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to upload the device name to Digi Remote Manager

The **name** submodule can be used to upload a custom name for your device to Digi Remote Manager.

When you use the **name** submodule to upload a custom device name to Remote Manager, the following issues apply:

- If the name is being used by to another device in your Remote Manager account, the name will be removed from the previous device and added to the new device.
- If Remote Manager is configured to apply a profile to a device based on the device name, changing the name of the device may cause Remote Manager to automatically push a profile onto the device.

Together, these two features allow you to swap one device for another by using the **name** submodule to change the device name, while guaranteeing that the new device will have the same configuration as the previous one.

Note Because causing a profile to be automatically pushed from Remote Manager may change the behavior of the device, including overwriting existing usernames and passwords, the **name**

submodule should be used with caution. As a result, support for this functionality is disabled by default on Remote Manager.

Enable support on Digi Remote Manager for uploading custom device names

1. In Remote Manager, click **API Explorer**.
2. For the HTTP method, select **PUT**.
3. For **Enter and API or select an example**, type **/ws/v1/settings/inventory/AllowDeviceToSetOwnNameEnabled**.
4. In the HTTP message body text box, type the following:

```
{
   "name" : "AllowDeviceToSetOwnNameEnabled",
   "value" : "true"
}
```

5. Click **Send**.

Upload a custom name

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
```

4. Upload the name to Remote Manager:

```
>>> name.upload("my_name")
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for uploading the device name to Digi Remote Manager

Get help for uploading the device name to Digi Remote Managerby accessing help for **digidevice.name**:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
>>>
```

4. Use the help command with **name**:

```
>>> help(name)

Help on module digidevice.name in digidevice:

NAME
digidevice.name - API for uploading name from the device
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to access the device location data

The **location** submodule enables access to the location data for the Connect EZ device.

The module takes a snapshot of location data stored in the runt database. The location data snapshot can be subsequently updated by using the update method.

Determine if the device's location

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **location** submodule:

```
>>> from digidevice import location
```

4. Use the **valid_fix** object to determine if the device has a valid fix:

   ```
   >>> loc = location.Location()
   >>> loc.valid_fix
   True
   >>>
   ```

5. Use the **position** object to return the device's position:

   ```
   >>> loc.position
   (44.926195299999998, -93.397084499999999, 292.39999399999999)
   >>>
   ```

   The coordinates are returned in the following order:

   latitude, *longitude*, *altitude*

   altitude is in meters.

6. You can also return only one of the coordinate positions:
   - Use the **latitude** object to return the latitude:

     ```
     >>> loc.latitude
     44.926195299999998
     >>>
     ```

   - Use the **longitude** object to return the longitude:

     ```
     >>> loc.longitude
     -93.397084499999999
     >>>
     ```

   - Use the **altitude** object to return the altitude, in meters:

     ```
     >>> loc.altitude
     292.39999399999999
     >>>
     ```

7. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Update the location data

The **location** submodule takes a snapshot of the current location and stores it in the runtime database. You can update this snapsot:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.6.13 (default, May  9 2021, 22:49:59)
   [GCC 8.3.0] on linux
   ```

```
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **location** submodule:

```
>>> from digidevice import location
```

4. Update the location object with the latest location data:

```
>>> loc = location.Location()
>>> loc.position
>>> (44.926195299999998, -93.397084499999999, 292.39999399999999)
>>> loc.update()
>>> loc.position
44.926231, -93.397923, 289.439229
>>>
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Output location data in json format

The **location** submodule takes a snapshot of the current location and stores it in the runtime database. You can update this snapsot

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **json** submodule:

```
>>> import json
```

4. Import the **location** submodule:

```
>>> from digidevice import location
```

5. Print the location data in json format:

```
>>> geojson_data = location.Location().geojson
>>> print(json.dumps(geojson_data, indent=4))
{
    "type": "Feature",
    "geometry": {
        "type": "Point",
        "coordinates" [
            44.926195299999998,
            -93.397084499999999,
            273.20001200000002
        ]
    },
    "properties": {
        "direction": "None",
        "horizontal_velocity": "0.0",
        "latitude.deg_min_sec": "44* 54' 45.586\" N",
        "longitude.deg_min_sec": "93* 33' 52.334\" W",
        "num_satellites": "12",
        "quality": "Standard GNSS (2D/3D)",
        "selected_source_idx": "0",
        "source": "USB (/dev/ttyACM0)",
        "source_idx.0.altitude": "273.200012",
        "source_idx.0.direction": "None",
        "source_idx.0.horizontal_velocity": "0.195489",
        "source_idx.0.label": "usb",
        "source_idx.0.latitude": "44.902662",
        "source_idx.0.latitude.deg_min_sec": "44* 55' 45.065\" N",
        "source_idx.0.longitude": "-93.560648",
        "source_idx.0.longitude.deg_min_sec": "93* 16' 52.966\" W",
        "source_idx.0.num_satellites": "12",
        "source_idx.0.quality": "Standard GNSS (2D/3D)",
        "source_idx.0.utc_date_time": "Mar-03-2022 10:16:23",
        "source_idx.0.vertical_velocity": "0.0",
        "source_idx.1.label": "gnss",
        "source_idx.1.quality": "No Fix / Invalid",
        "state": "Enabled, signal",
        "utc_date_time": "Mar-03-2022 10:16:23",
        "vertical_velocity": "0.0"
    }
}
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Help for the digidevice location module

Get help for the digidevice location module:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux

```

```
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **location** submodule:

```
>>> from digidevice import location
>>>
```

4. Use the help command with **location**:

```
>>> help(location)
Help on module digidevice.location in digidevice:

NAME
digidevice.location - digidevice.location - API for accessing location
data
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use Python to set the maintenance window

The **maintenance** Python module allows you to set the service state of a device. When the module sets the device to out of service, this can be used as trigger to begin maintenance activity. See Schedule system maintenance tasks for more details.

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** module:

```
>>> from digidevice import maintenance
>>>
```

4. To determine the current service state of the device:

```
>>> maintenance.state()
'IN_SERVICE'
>>>
```

5. To set the device to out of service:

```
>>> maintenance.out_of_service()
>>> maintenance.state()
'OUT_OF_SERVICE'
>>>
```

6. To set the device to in service:

```
>>> maintenance.in_service()
>>> maintenance.state()
'IN_SERVICE'
>>>
```

Note Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

Help for the digidevice maintenance module

Get help for the digidevice maintenance module:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** submodule:

```
>>> from digidevice import maintenance
>>>
```

4. Use the help command with **maintenance** :

```
>>> help(maintenance )
Help on module digidevice.maintenance in digidevice:

NAME
    digidevice.maintenance

DESCRIPTION
    API for setting the device's service state. The service state is
stored
    in runt.
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

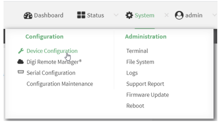
Use Python to send and receive SMS messages

You can create Python scripts that send and receive SMS message in tandem with the Digi Remote Manager or Digi aView by using the digidevice.sms module. To use a script to send or receive SMS messages, you must also enable the ability to schedule SMS scripting.

Enable the ability to schedule SMS scripting

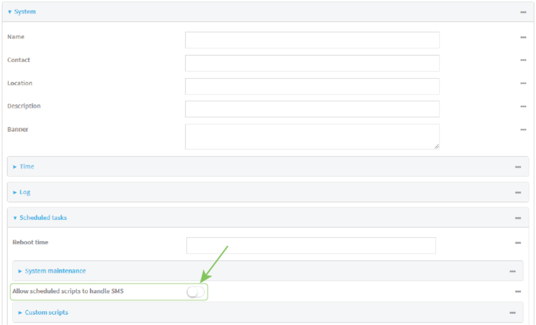
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

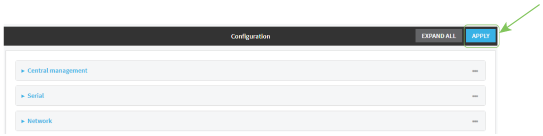


The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks**.
4. Click to enable **Allow scheduled scripts to handle SMS**.



5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, type:

   ```
   (config)> system schedule sms_script_handling true
   (config)>
   ```

4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Configure scripts to run automatically for more information about scheduling scripts.

Example digidevice.sms code

The following example code receives an SMS message and sends a response:

```
#!/usr/bin/python3.6


import os
import threading
import sys
from digidevice.sms import Callback, send
COND = threading.Condition()

def sms_test_callback(sms, info):
    print(f"SMS message from {info['content.number']} received")
    print(sms)
    print(info)
    COND.acquire()
    COND.notify()
    COND.release()

def send_sms(destination, msg):
    print("sending SMS message", msg)
    if len(destination) == 10:
        destination = "+1" + destination
    send(destination, msg)

if __name__ == '__main__':
    if len(sys.argv) > 1:
        dest = sys.argv[1]
    else:
        dest = '+15005550006'
    my_callback = Callback(sms_test_callback, metadata=True)
    send_sms(dest, 'Hello World!')
    print("Please send an SMS message now.")
    print("Execution halted until a message is received or 60 seconds have
```

```
passed.")
    # acquire the semaphore and wait until a callback occurs
    COND.acquire()
    try:
        COND.wait(60.0)
    except Exception as err:
        print("exception occured while waiting")
        print(err)
    COND.release()
    my_callback.unregister_callback()
```

Use Python to access serial ports

You can use the Python **serial** module to access serial ports on your Connect EZ device that are configured to be in Application mode. See Configure Application mode for information about configuring a serial port in Application mode.

To use Python to access serial ports:

1. Log into the Connect EZ command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. Determine the path to the serial port:

```
# ls /dev/serial/
by-id   by-path   by-usb   port1
#
```

3. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.6.13 (default, May  9 2021, 22:49:59)
[GCC 8.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

4. Import the **serial** module:

```
>>> import serial
>>>
```

5. You can now perform operations on the serial port. For example, to write a message to the serial port:

```
>>> s = serial.Serial("/dev/serial/port1", 115200)
>>> s.write(b"Hello from serial port")
26
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Use the Paho MQTT python library

Your Connect EZ device includes support for the Paho MQTT python library. MQTT is a lightweight messaging protocol used to communicate with various applications including cloud-based applications such as Amazon Web Services and Microsoft Azure. The following is example code that reads CPU and RAM usage on the device, updates the device firmware, then publishes information about DHCP clients and system information to the MQTT server at 192.168.1.100. The MQTT server IP is configurable.

```
"""
MQTT client example:
- Reporting some device metrics from runt
- Reporting DHCP clients
- Firmware update feature (simple implementation, read TODO in cmd_fwupdate)
"""

import sys
import time
import paho.mqtt.client as mqtt
import json
from acl import runt, config
from http import HTTPStatus
import urllib.request
import tempfile
import os
from digidevice import cli

POLL_TIME = 60

def cmd_reboot(params):
    print("Rebooting unit...")
    try:
        cli.execute("reboot", 10)
    except:
        print("Failed to run 'reboot' command")
        return HTTPStatus.INTERNAL_SERVER_ERROR

return HTTPStatus.OK

def cmd_fwupdate(params):
    try:
        fw_uri = params["uri"]
    except:
        print("Firmware file URI not passed")
        return HTTPStatus.BAD_REQUEST

    print("Request to update firmware with URI: {}".format(fw_uri))

       try:
        fd, fname = tempfile.mkstemp()
        os.close(fd)
        try:
            urllib.request.urlretrieve(fw_uri, fname)
        except:
            print("Failed to download FW file from URI {}".format(fw_uri))
            return HTTPStatus.NOT_FOUND

        try:
            ret = cli.execute("system firmware update file " + fname, 60)
        except:
            print("Failed to run firmware update command")
            return HTTPStatus.INTERNAL_SERVER_ERROR

        if not "Firmware update completed" in ret:
            print("Failed to update firmware")
            return HTTPStatus.INTERNAL_SERVER_ERROR
    finally:
        os.remove(fname)

    print("Firmware update finished")

    return HTTPStatus.OK

CMD_HANDLERS = {
    "reboot": cmd_reboot,
    "fw-update": cmd_fwupdate
}


def send_cmd_reply(client, cmd_path, cid, cmd, status):
    if not status or not cid:
        return

    if cmd_path.startswith(PREFIX_CMD):
        path = cmd_path[len(PREFIX_CMD):]
    else:
        print("Invalid command path ({}), cannot send reply".format(cmd_path))
        return

    reply = {
        "cmd": cmd,
        "status": status
    }

    client.publish(PREFIX_RSP + path + "/" + cid, json.dumps(reply, separators=
(',',':')))

def on_connect(client, userdata, flags, rc):
    print("Connected to MQTT server")
    client.subscribe(PREFIX_CMD + "/system")

def on_message(client, userdata, msg):
    """ Supporting only a single topic for now, no need for filters
    Expects the following message format:
    {
        "cid": "<client-id>",
        "cmd": "<command>",
        "params": {
           <optional_parameters>
        }
    }

    Supported commands:
    - "fw-update"
        params:
            - "uri": "<firmware_file_URL>"
    - "reboot"
        params:
```

```
    """

    try:
        m = json.loads(msg.payload)
        cid = m["cid"]
        cmd = m["cmd"]
        try:
            payload = m["params"]
        except:
            payload = None
    except:
        print("Invalid command format: {}".format(msg.payload))
        if not cid:
            # Return if client-ID not passed
            return None
        send_cmd_reply(client, msg.topic, cid, cmd, HTTPStatus.BAD_REQUEST)

    try:
        status = CMD_HANDLERS[cmd](payload)
    except:
        print("Invalid command: {}".format(cmd))
        status = HTTPStatus.NOT_IMPLEMENTED

    send_cmd_reply(client, msg.topic, cid, cmd, status)


def publish_dhcp_leases():
    leases = []
    try:
        with open('/etc/config/dhcp.leases', 'r') as f:
            for line in f:
                elems = line.split()
                if len(elems) != 5:
                    continue
                leases.append({"mac": elems[1], "ip": elems[2], "host": elems
[3]})
        if leases:
            client.publish(PREFIX_EVENT + "/leases", json.dumps(leases,
separators=(',',':')))
    except:
        print("Failed to open DHCP leases file")

def publish_system():
    avg1, avg5, avg15 = runt.get("system.load_avg").split(', ')
    ram_used = runt.get("system.ram.per")
    disk_opt = runt.get("system.disk./opt.per")
    disk_config = runt.get("system.disk./etc/config.per")

    msg = json.dumps({
        "load_avg": {
            "1min": avg1,
            "5min": avg5,
            "15min": avg15
        },
        "disk_usage": {
            "/opt": disk_opt,
            "/etc/config:": disk_config,
            "ram": ram_used
        }
    })
    client.publish(PREFIX_EVENT + "/system", json.dumps(msg))

runt.start()
serial = runt.get("system.serial")

PREFIX = "router/" + serial
PREFIX_EVENT = "event/" + PREFIX
PREFIX_CMD = "cmd/" + PREFIX
PREFIX_RSP = "rsp/" + PREFIX

client = mqtt.Client()
client.on_connect = on_connect
client.on_message = on_message

try:
    client.connect("192.168.1.100", 1883, 60)
    client.loop_start()
except:
    print("Failed to connect to MQTT server")
    sys.exit(1)

while True:
    publish_dhcp_leases()
    publish_system()
    time.sleep(POLL_TIME)
```

User authentication

This chapter contains the following topics:

Connect EZ user authentication

User authentication on the Connect EZ has the following features and default configuration:

Feature	Description	Default configuration
Idle timeout	Determines how long a user session can be idle before the system automatically disconnects.	■ 10 minutes.
Allow shell	If disabled, prevents all authentication prohibits access to the shell prompt for all authentication groups. This does not prevent access to the Admin CLI. **Note** If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.	■ Enabled.
Methods	Determines how users are authenticated for access: **local users**, **TACACS+**, or **RADIUS**.	■ **local users**.
Groups	Associates access permissions for a group. . You can modify the released groups and create additional groups as needed for your site. A user can be assigned to more than one group.	■ **admin**: Provides the logged-in user with administrative and shell access. ■ **serial**: Provides the logged-in user with access to serial ports.
Users	Defines local users for the Connect EZ.	■ **admin**: Belongs to both the **admin** and **serial** groups.
TACACS+	Configures support for TACACS+ (Terminal Access Controller Access-Control System Plus) servers and users.	■ Not configured.
RADIUS	Configures support for RADIUS (Remote Authentication Dial-In User Service) servers and users.	■ Not configured.
LDAP	Configures support for LDAP (Lightweight Directory Access Protocol) servers and users.	■ Not configured.
Serial	Configures authentication for serial TCP and autoconnect services.	■ Not configured.

User authentication methods

Authentication methods determine how users of the Connect EZ device are authenticated. Available authentication methods are:

- **Local users**: User are authenticated on the local device.
- **RADIUS**: Users authenticated by using a remote RADIUS server for authentication.

  See Remote Authentication Dial-In User Service (RADIUS) for information about configuring RADIUS authentication.
- **TACACS+**: Users authenticated by using a remote TACACS+ server for authentication.

  See Terminal Access Controller Access-Control System Plus (TACACS+) for information about configuring TACACS+ authentication.
- **LDAP**: Users authenticated by using a remote LDAP server for authentication.

  See LDAP for information about configuring LDAP authentication.

Add a new authentication method

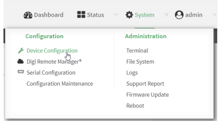
Required configuration items

- The types of authentication method to be used:

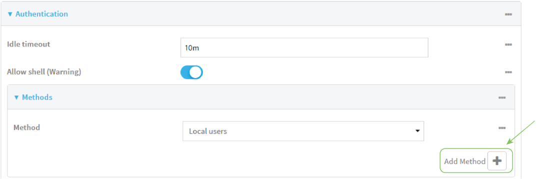
To add an authentication method:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.
3. Click **Authentication** > **Methods**.
4. For **Add Method**, click ✚.

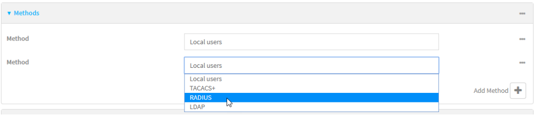


Idle timeout: 10m

Allow shell (Warning)

Method: Local users

5. Select the appropriate authentication type for the new method from the **Method** drop-down.

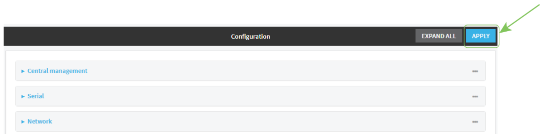


Method: Local users

Method: Local users

> **Note** Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See Rearrange the position of authentication methods for information about how to reorder the authentication methods.

6. Repeat these steps to add additional methods.
7. Click **Apply** to save the configuration and apply the change.



Command line

Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This procedure describes how to add methods to various places in the list.

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Add the new authentication method to the appropriate location in the list:
   - To determine the current list of authentication methods:
     a. Log into the Connect EZ command line as a user with full Admin access rights.

        Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

     b. At the command line, type **config** to enter configuration mode:

        ```
        > config
        (config)>
        ```

     c. Use the **show auth method** command to display the current authentication methods configuration:

        ```
        (config)> show auth method
        0 local
        (config)>
        ```

   - To add the new authentication method to the beginning of the list, use the index value of **0** to indicate that it should be added as the first method:

     ```
     (config)> add auth method 0 auth_type
     (config)>
     ```

     where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

   - To add the new authentication method to the end of the list, use the index keyword **end**:

     ```
     (config)> add auth method end auth_type
     (config)>
     ```

     where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

   - To add the new authentication in another location in the list, use an index value to indicate the appropriate position. For example:

     ```
     (config)> add auth method 1 auth_type
     (config)>
     ```

     where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- You can also use the **move** command to rearrange existing methods. See Rearrange the position of authentication methods for information about how to reorder the authentication methods.

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

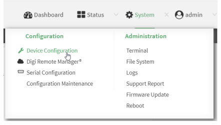
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete an authentication method

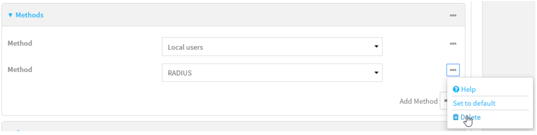
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

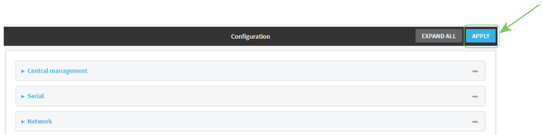
3. Click **Authentication** > **Methods**.
4. Click the menu icon (**...**) next to the method and select **Delete**.



Method Local users

Method RADIUS

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show auth method** command to determine the index number of the authentication method to be deleted:

```
(config)> show auth method
0 local
1 radius
2 tacacs+
(config)>
```

4. Delete the appropriate authentication method:

```
(config)> del auth method n
```

   Where *n* is index number of the authentication method to be deleted. For example, to delete the TACACS+ authentication method as displayed by the example **show** command, above:

```
(config)> del auth method 2
```

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

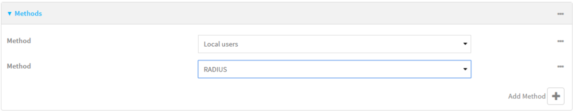
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Rearrange the position of authentication methods

WebUI

Authentication methods are reordered by changing the method type in the **Method** drop-down for each authentication method to match the appropriate order.

For example, the following configuration has **Local users** as the first method, and **RADIUS** as the second.



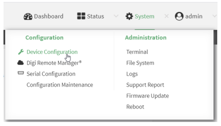
▼ Methods

Method: Local users

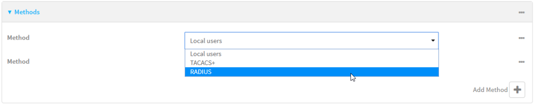
Method: RADIUS

To reorder these so that **RADIUS** is first and **Local users** is second:

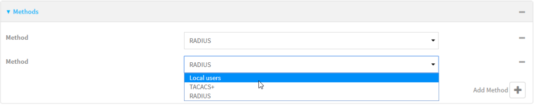
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



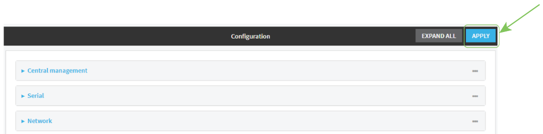
   The **Configuration** window is displayed.
3. Click to expand the first **Method**.
4. In the **Method** drop-down, select **RADIUS**.



5. Click to expand the second **Method**.
6. In the **Method** drop-down, select **Local users**.



7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show** command to display current configuration:

```
(config)> show auth method
0 local
1 radius
(config)>
```

4. Use the **move** command to rearrange the methods:

```
(config)> move auth method 1 0
(config)>
```

5. Use the **show** command again to verify the change:

```
(config)> show auth method
0 radius
1 local
(config)>
```

6. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Authentication groups

Authentication groups are used to assign access rights to Connect EZ users. Three types of access rights can be assigned:

- **Admin access**: Users with Admin access can be configured to have either:
  - The ability to manage the Connect EZ device by using the WebUI or the Admin CLI.
  - Read-only access to the WebUI and Admin CLI.
- **Shell access**: Users with Shell access have the ability to access the shell when logging into the Connect EZ via ssh, telnet, or the serial console.

  Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.
- **Serial access**: Users with Serial access have the ability to log into the Connect EZ device by using the serial console.

Preconfigured authentication groups

The Connect EZ device has two preconfigured authentication groups:

- The **admin** group is configured by default to have full **Admin access**.
- The **serial** group is configured by default to have **Serial access**.

The preconfigured authentication groups cannot be deleted, but the access rights defined for the group are configurable.

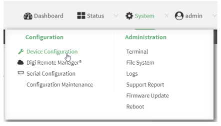
This section contains the following topics:

Change the access rights for a predefined group

By default, two authentication groups are predefined: **admin** and **serial**. To change the access rights of the predefined groups:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

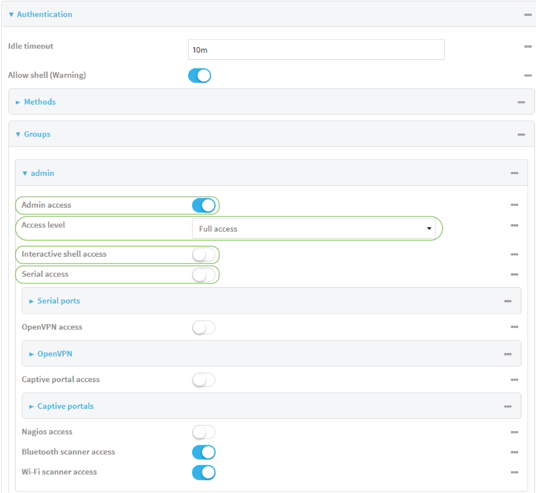
   The **Configuration** window is displayed.
3. Click **Authentication** > **Groups**.
4. Click the authentication group to be changed, either **admin** or **serial**, to expand its configuration node.
5. Click the box next to the following options, as appropriate, to enable or disable access rights for each:
   - **Admin access**

     For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.

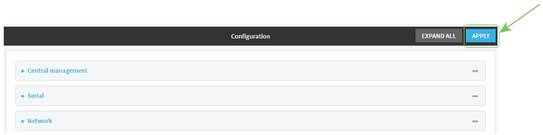
     - **Full access** provides users of this group with the ability to manage the Connect EZ device by using the WebUI or the Admin CLI.
     - **Read-only access** provides users of this group with read-only access to the WebUI and Admin CLI.

     The default is **Full access**.
   - **Interactive shell access**

     Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.
   - **Serial access**



6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable access rights for the group. For example:
   - Admin access:
     - To set the access level for Admin access of the **admin** group:

       ```
       (config)> auth group admin acl admin level value
       (config)>
       ```

       where *value* is either:
       - **full**: provides users of this group with the ability to manage the Connect EZ device by using the WebUI or the Admin CLI.
       - **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

       The default is **full**.

        - To disable Admin access for the **admin** group:

          ```
          (config)> auth group admin acl admin enable false
          (config)>
          ```

    - Shell access:
        - To enable Shell access for the **serial** group:

          ```
          (config)> auth group serial acl shell enable true
          (config)>
          ```

          Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.

    - Serial access:
        - To enable Serial access for the **admin** group:

          ```
          (config)> auth group admin acl serial enable true
          (config)>
          ```

4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Add an authentication group

Required configuration items

- The access rights to be assigned to users that are assigned to this group.

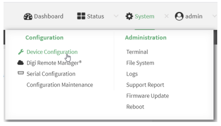
Additional configuration items

- Access rights to OpenVPN tunnels, and the tunnels to which they have access.
- Access rights to captive portals, and the portals to which they have access.
- Access rights to query the device for Nagios monitoring.

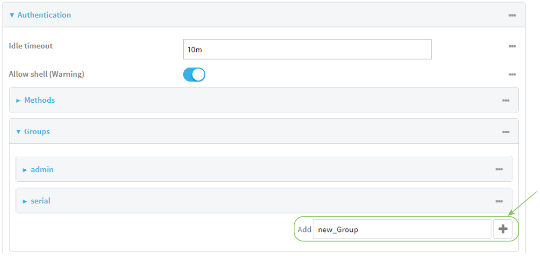
To add an authentication group:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Groups**.
4. For **Add**, type a name for the group and click ✚.

   ▾ Authentication

   Idle timeout: 10m

   Allow shell (Warning): ●

   ▸ Methods

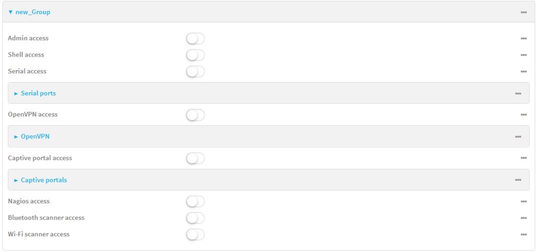
   ▾ Groups

   ▸ admin

   ▸ serial

   Add: new_Group ✚

   The group configuration window is displayed.

   ▾ new_Group

   Admin access ○

   Shell access ○

   Serial access ○

   ▸ Serial ports

   OpenVPN access ○

   ▸ OpenVPN

   Captive portal access ○

   ▸ Captive portals

   Nagios access ○

   Bluetooth scanner access ○

   Wi-Fi scanner access ○

5. Click the following options, as appropriate, to enable or disable access rights for each:
   - **Admin access**

     For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.

     where *value* is either:

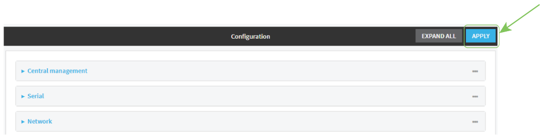
     - **Full access full**: provides users of this group with the ability to manage the Connect EZ device by using the WebUI or the Admin CLI.
     - **Read-only access read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

     The default is **Full access full**.
   - **Shell access**

     Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.
   - **Serial access**
6. (Optional) Configure OpenVPN access. See for further information.
7. (Optional) Configure captive portal access:

   a. Enable captive portal access rights for users of this group by checking the box next to **Captive portal access**.
   b. Click **Captive portals** to expand the **Captive portal** node.
   c. For **Add Captive portal**, click ✚.
   d. In the **Captive portal** dropdown, select a captive portal to which users of this group will have access.
   e. Click ✚ again to add additional captive portals.

8. (Optional) Enable users that belong to this group to query the device for Nagios monitoring by checking the box next to **Nagios access**.
9. (Optional) Enable users that belong to this group to access the Bluetooth scanning service by checking the box next to **Bluetooth scanner access**.
10. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **test**:

```
(config)> add auth group test
(config auth group test)>
```

4. Enable access rights for the group:
   - Admin access:

```
(config auth group test)> acl admin enable true
(config)>
```

   - Set the access level for Admin access:

```
(config)> auth group admin acl admin level value
(config)>
```

   where *value* is either:
   - **full**: provides users of this group with the ability to manage the Connect EZ device by using the WebUI or the Admin CLI.

        - **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

      The default is **full**.

    - Shell access:

      ```
      (config auth group test)> acl shell enable true
      (config)>
      ```

      Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.

    - Serial access:

      ```
      (config auth group test)> acl serial enable true
      (config)>
      ```

5. (Optional) Configure captive portal access:

    a. Return to the config prompt by typing three periods (**...**):

    ```
    (config auth group test)> ...
    (config)>
    ```

    b. Enable captive portal access rights for users of this group:

    ```
    (config)> auth group test acl portal enable true
    (config)>
    ```

    c. Add a captive portal to which users of this group will have access:

        i. Determine available portals:

        ```
        (config)> show firewall portal
        portal1
               auth none
               enable true
               http redirect
               no interface
               no message
               no redirect_url
               no terms
               timeout 24h
               no title
        (config)>
        ```

        ii. Add a captive portal:

        ```
        (config)> add auth group test acl portal portals end portal1
        (config)>
        ```

6. (Optional) Configure Nagios monitoring:

    ```
    (config)> auth group test acl nagios enable true
    (config)>
    ```

7. (Optional) Enable users that belong to this group to access the Bluetooth scanning service:

```
(config)> auth group test acl bluetooth_scanner enable true
(config)>
```

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

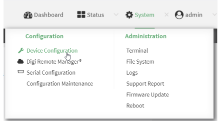
Delete an authentication group

By default, the Connect EZ device has two preconfigured authentication groups: **admin** and **serial**. These groups cannot be deleted.

To delete an authentication group that you have created:

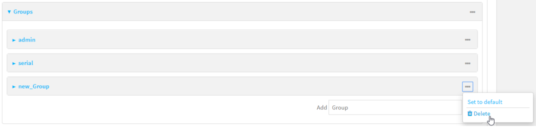
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

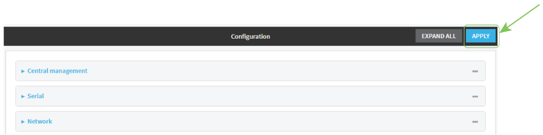


   The **Configuration** window is displayed.

3. Click **Authentication** > **Groups**.
4. Click the menu icon (**...**) next to the group to be deleted and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, type:

   ```
   (config)> del auth group groupname
   ```

4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Local users

Local users are authenticated on the device without using an external authentication mechanism such as TACACS+ or RADIUS. Local user authentication is enabled by default, with one preconfiged default user.

Default user

At manufacturing time, each Connect EZ device comes with a default user configured as follows:

- Username: **admin**.
- Password: The default password is displayed on the label on the bottom of the device.

Note The default password is a unique password for the device, and is the most critical security feature for the device. If you reset the device to factory defaults, you must log in using the default user and password, and you should immediately change the password to a custom password. Before deploying or mounting the Connect EZ device, record the default password, so you have the information available when you need it even if you cannot physically access the label on the bottom of the device.

The default **admin** user is preconfigured with both Admin and Serial access. You can configure the **admin** user account to fit with the needs of your environment.

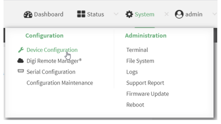
This section contains the following topics:

Change a local user's password

To change a user's password:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

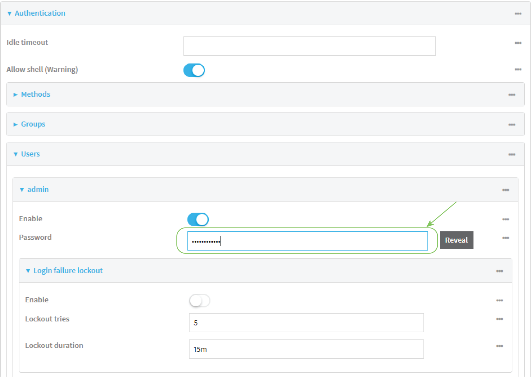


The **Configuration** window is displayed.

3. Click **Authentication** > **Users**.
4. Click the username to expand the user's configuration node.
5. For **Password**, enter the new password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

For the **admin** user, the password field can be left blank:

- If the password field for the **admin** user is left blank, the **admin** user's password will be the default password printed on the device's label.
- If the **admin** user's password has been changed from the default and the configuration saved, if you then clear the password field for the **admin** user, this will result in the device device's configuration being erased and reset to the default configuration.



Idle timeout

Allow shell (Warning)

Enable

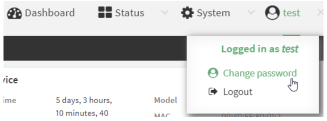
Password ••••••••••••

Enable

Lockout tries 5

Lockout duration 15m

You can also change the password for the active user by clicking the user name in the menu bar:



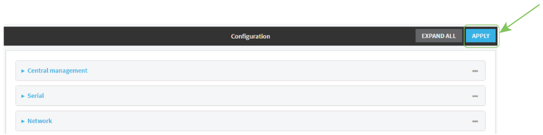
vice

ime 5 days, 3 hours, 10 minutes, 40

Model

The active user must have full Admin access rights to be able to change the password.

6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. At the config prompt, type:

   ```
   (config)> auth user username password pwd
   ```

   Where:

   - *username* is the name of the user.
   - *pwd* is the new password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure a local user

Required configuration items

- A username.
- A password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character. For security reasons, passwords are stored in hash form. There is no way to get or display passwords in clear-text form, although prior to saving the configuration, the password can be shown by clicking **Reveal**.
- The authentication group or groups from which the user will inherit access rights. See Authentication groups for information about configuring groups.

Additional configuration items

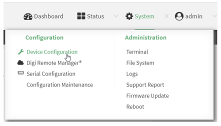
- An alias for the user. Because the username cannot contain any special characters, such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters.
- The number of unsuccessful login attempts before the user is locked out of the system.

- The amount of time that the user is locked out of the system after the specified number of unsuccessful login attempts.
- An optional public ssh key, to authenticate the user when using passwordless SSH login.
- Two-factor authentication information for user login over SSH, telnet, and the serial console:
  - The verification type for two-factor authentication: Either time-based or counter-based.
  - The security key.
  - Whether to allow passcode reuse (time based verification only).
  - The passcode refresh interval (time based verification only).
  - The valid code window size.
  - The login limit.
  - The login limit period.
  - One-time use eight-digit emergency scratch codes.

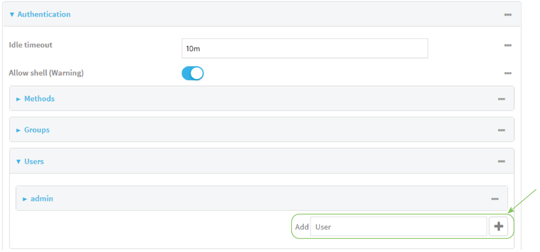
To configure a local user:

WebUI

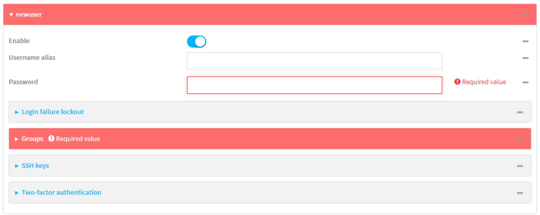
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.
4. In **Add User**, type a name for the user and click ✚.

   
   Idle timeout: 10m
   Allow shell (Warning)

   The user configuration window is displayed.

   The user is enabled by default. To disable, click to toggle off **Enable**.

5. (Optional) For **Username alias**, type an alias for the user.

   Because the name used to create the user and cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.
6. Enter a password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.
7. Click to expand **Login failure lockout**.

   The login failure lockout feature is enabled by default. To disable, click to toggle off **Enable**.

   a. For **Lockout tries**, type the number of unsuccessful login attempts before the user is locked out of the device. The default is **5**.

   b. For **Lockout duration**, type the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **Lockout tries**.

      Allowed values are any number of minutes, or seconds, and take the format ***number*{m|s}**.

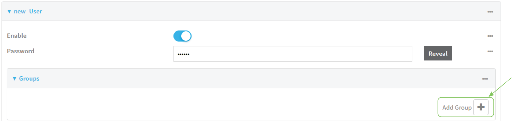
      For example, to set **Lockout duration** to ten minutes, enter **10m** or **600s**.

      The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.
8. Add groups for the user.

   Groups define user access rights. See Authentication groups for information about configuring groups.

   a. Click to expand **Groups**.

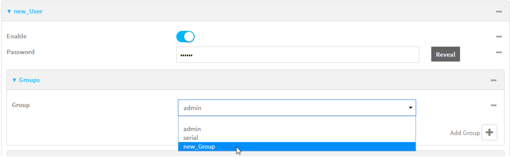
   b. For **Add Group**, click ✚.

   Enable

   Password ••••••

   c. For **Group**, select an appropriate group.

   Enable

   Password ••••••

   Group admin

   Note Every user must be configured with at least one group. You can add multiple groups to a user by clicking **Add** again and selecting the next group.
9. (Optional) Add SSH keys for the user to use passwordless SSH login:

   a. Click **SSH keys**.

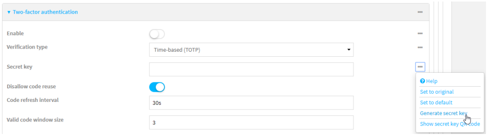
   b. In **Add SSH key**, paste or type a public encryption key that this user can use for passwordless SSH login and click ✚.
10. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:

    a. Click **Two-factor authentication**.

    b. Check **Enable** to enable two-factor authentication for this user.

c. Select the **Verification type**:
   - **Time-based (TOTP)**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
   - **Counter-based (HOTP)**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.

d. Generate a **Secret key**:
   i. Click **...** next to the field label and select **Generate secret key**.



▾ Two-factor authentication

Enable: ○

Verification type: Time-based (TOTP)

Secret key:

Disallow code reuse: ●

Code refresh interval: 30s

Valid code window size: 3

   ii. Copy the secret key for use with an application or mobile device to generate passcodes.

e. For time-based verification only, select **Disallow code reuse** to prevent a code from being used more than once during the time that it is valid.

f. For time-based verification only, in **Code refresh interval**, type the amount of time that a code will remain valid.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}. For example, to set **Code refresh interval** to ten minutes, enter **10m** or **600s**.

g. In **Valid code window size**, type the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the **Valid code window size** may be necessary when the clocks used by the server and client are not synchronized.

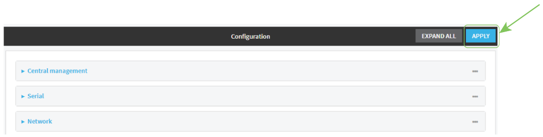
h. For **Login limit**, type the number of times that the user is allowed to attempt to log in during the **Login limit period**. Set **Login limit** to **0** to allow an unlimited number of login attempts during the **Login limit period**.

i. For **Login limit period**, type the amount of time that the user is allowed to attempt to log in.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}. For example, to set **Login limit period** to ten minutes, enter **10m** or **600s**.

j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:
   i. Click **Scratch codes**.
   ii. For **Add Code**, click ✚.
   iii. For **Code**, enter the scratch code. The code must be eight digits, with a minimum of 10000000.
   iv. Click ✚ again to add additional scratch codes.

11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a user. For example, to create a user named **new_user**:

```
(config)> add auth user new_user
(config auth user new_user)>
```

   The user is enabled by default. To disable the user, type:

```
(config auth user new_user)> enable false
(config auth user new_user)>
```

4. (Optional) Create a username alias for the user.

   Because the name to create the user cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.

```
(config auth user new_user> username username_alias
(config auth user new_user)>
```

5. Set the user's password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config auth user new_user> password pwd
(config auth user new_user)>
```

6. Configure login failure lockout settings:

   The login failure lockout feature is enabled by default. To disable:

```
(config auth user new_user> lockout enable false
(config auth user new_user)>
```

   a. Set the number of unsuccessful login attempts before the user is locked out of the device.

      where *value* is any integer. The minimum value is **1**, and the default value is **5**.

   b. Set the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **lockout tries**:

```
(config auth user new_user> lockout duration value
(config auth user new_user)>
```

where *value* is any number of minutes, or seconds, and takes the format ***number***{**m**|**s**}.

For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config auth user new_user)> lockout duration 600s
(config auth user new_user)>
```

The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.

7. Add groups for the user.

   Groups define user access rights. See Authentication groups for information about configuring groups.

   a. Add a group to the user. For example, to add the admin group to the user:

   ```
   (config auth user new_user> add group end admin
   (config auth user new_user)>
   ```

   Note Every user must be configured with at least one group.

   b. (Optional) Add additional groups by repeating the add group command:

   ```
   (config auth user new_user> add group end serial
   (config auth user new_user)>
   ```

   To remove a group from a user:

   a. Use the **show** command to determine the index number of the group to be deleted:

   ```
   (config auth user new_user> show group
   0 admin
   1 serial
   (config auth user new_user>
   ```

   b. Type the following:

   ```
   (config auth user new_user)> del group n
   (config auth user new_user)>
   ```

   Where *n* is index number of the authentication method to be deleted. For example, to delete the serial group as displayed by the example **show** command, above:

   ```
   (config auth user new_user)> del group 1
   (config auth user new_user)>
   ```

8. (Optional) Add SSH keys for the user to use passwordless SSH login:

   a. Change to the user's ssh_key node:

   ```
   (config auth user new_user)> ssh_key
   (config auth user new_user ssh_key)>
   ```

   b. Add the key by using the ssh_key command and pasting or typing a public encryption key that this user can use for passwordless SSH login:

```
(config auth user new_user ssh_key)> ssh_key key
(config auth user new_user ssh_key)>
```

9. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:
   a. Change to the user's two-factor authentication node:

```
(config auth user new_user)> 2fa
(config auth user new_user 2fa)>
```

   b. Enable two-factor authentication for this user:

```
(config auth user new_user 2fa)> enable true
(config auth user new_user 2fa)>
```

   c. Configure the verification type. Allowed values are:
      - **totp**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
      - **hotp**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.

   The default value is **totp**.

```
(config auth user new_user 2fa)> type totp
(config auth user new_user 2fa)>
```

   d. Add a secret key:

```
(config auth user new_user 2fa)> secret key
(config auth user new_user 2fa)>
```

   This key should be used by an application or mobile device to generate passcodes.

   e. For time-based verification only, enable **disallow_reuse** to prevent a code from being used more than once during the time that it is valid.

```
(config auth user new_user 2fa)> disallow_reuse true
(config auth user new_user 2fa)>
```

   f. For time-based verification only, configure the code refresh interval. This is the amount of time that a code will remain valid.

```
(config auth user new_user 2fa)> refresh_interval value
(config auth user new_user 2fa)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **refresh_interval** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> refresh_interval 600s
(config auth user name 2fa)>
```

The default is **30s**.

g. Configure the valid code window size. This represents the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the valid code window size may be necessary when the clocks used by the server and client are not synchronized.

```
(config auth user new_user 2fa)> window_size 3
(config auth user new_user 2fa)>
```

h. Configure the login limit. This represents the number of times that the user is allowed to attempt to log in during the Login limit period. Set to 0 to allow an unlimited number of login attempts during the Login limit period

```
(config auth user new_user 2fa)> login_limit 3
(config auth user new_user 2fa)>
```

i. Configure the login limit period. This is the amount of time that the user is allowed to attempt to log in.

```
(config auth user new_user 2fa)> login_limit_period value
(config auth user new_user 2fa)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **login_limit_period** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> login_limit_period 600s
(config auth user name 2fa)>
```

The default is **30s**.

j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:

i. Change to the user's scratch code node:

```
(config auth user new_user 2fa)> scratch_code
(config auth user new_user 2fa scratch_code)>
```

ii. Add a scratch code:

```
(config auth user new_user 2fa scratch_code)> add end code
(config auth user new_user 2fa scratch_code)>
```

Where code is an digit number, with a minimum of 10000000.

iii. To add additional scratch codes, use the **add end *code*** command again.

10. Save the configuration and apply the change:

```
(config auth user new 2fa scratch_code)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

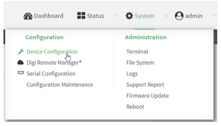
    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a local user

To delete a user from your Connect EZ:

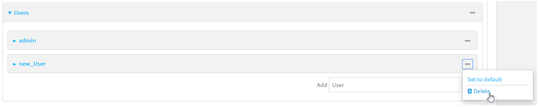
☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

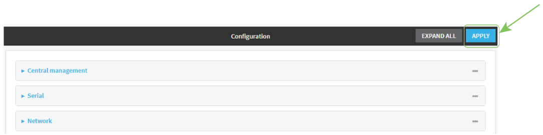


   The **Configuration** window is displayed.

3. Click **Authentication** > **Users**.
4. Click the menu icon (**...**) next to the name of the user to be deleted and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, type:

   ```
   (config)> del auth user username
   ```

4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Terminal Access Controller Access-Control System Plus (TACACS+)

Your Connect EZ device supports Terminal Access Controller Access-Control System Plus (TACACS+), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With TACACS+ support, the Connect EZ device acts as a TACACS+ client, which sends user credentials and connection parameters to a TACACS+ server over TCP. The TACACS+ server then authenticates the TACACS+ client requests and sends back a response message to the device.

When you are using TACACS+ authentication, you can have both local users and TACACS+ users able to log in to the device. To use TACACS+ authentication, you must set up a TACACS+ server that is accessible by the Connect EZ device prior to configuration. The process of setting up a TACACS+ server varies by the server environment.

This section contains the following topics:

TACACS+ user configuration

When configured to use TACACS+ support, the Connect EZ device uses a remote TACACS+ server for user authentication (password verification) and authorization (assigning the access level of the user). Additional TACACS+ servers can be configured as backup servers for user authentication.

This section outlines how to configure a TACACS+ server to be used for user authentication on your Connect EZ device.

Example TACACS+ configuration

With TACACS+, users are defined in the server configuration file. On Ubuntu, the default location and filename for the server configuration file is **/etc/tacacs+/tac_plus.conf**.

Note TACACS+ configuration, including filenames and locations, may vary depending on your platform and installation. This example assumes a Ubuntu installation.

To define users:

1. Open the TACACS+ server configuration file in a text editor. For example:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

2. Add users to the file using the following format. This example will create two users, one with admin and serial access, and one with only serial access.

```
user = user1 {
       name ="User1 for Connect EZ"
       pap = cleartext password1
       service = system {
         groupname = admin,serial
       }
}
user = user2 {
       name ="User2 for Connect EZ"
       pap = cleartext password2
       service = system {
         groupname = serial
       }
}
```

The **groupname** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ. Alternatively, if the user is also configured as a local user on the Connect EZ device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups. The **groupname** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

```
$ sudo tac_plus -C /etc/tacacs+/tac_plus.conf -P
```

If successful, this command will echo the configuration file to standard out. If the command encounters any syntax errors, a message similar to this will display:

```
Error: Unrecognised token on line 1
```

5. Restart the TACACS+ server:

```
$ sudo /etc/init.d/tacacs_plus restart
```

TACACS+ server failover and fallback to local authentication

In addition to the primary TACACS+ server, you can also configure your Connect EZ device to use backup TACACS+ servers. Backup TACACS+ servers are used for authentication requests when the primary TACACS+ server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your Connect EZ device to use multiple types of authentication. For example, you can configure both TACACS+ authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup TACACS+ servers are unavailable. Additionally, users who are configured locally but are not configured on the TACACS+ server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the TACACS+ server, and only authenticated locally if the TACACS+ server is unavailable or if the user is not defined on the TACACS+ server, then you should list the TACACS+ authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the TACACS+ servers are unavailable and the Connect EZ device falls back to local authentication, only users defined locally on the device are able to log in. TACACS+ users cannot log in until the TACACS+ servers are brought back online.

Configure your Connect EZ device to use a TACACS+ server

This section describes how to configure a Connect EZ device to use a TACACS+ server for authentication and authorization.

Required configuration items

- Define the TACACS+ server IP address or domain name.
- Define the TACACS+ server shared secret.
- The group attribute configured in the TACACS+ server configuration.
- The service field configured in the TACACS+ server configuration.
- Add TACACS+ as an authentication method for your Connect EZ device.

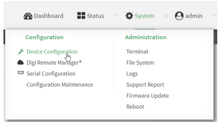
Additional configuration items

- Whether other user authentication methods should be used in addition to the TACACS+ server, or if the TACACS+ server should be considered the authoritative login method.
- Enable command authorization, so that the device will communicate with the TACACS+ server to determine if the user is authorized to execute a specific command.
- Enable command accounting, so that the device will communicate with the TACACS+ server to log commands that the user executes.

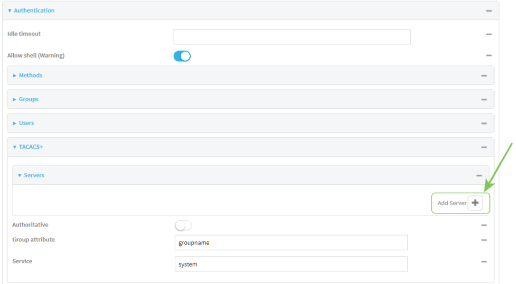
- The TACACS+ server port. It is configured to 49 by default.
- Add additional TACACS+ servers in case the first TACACS+ server is unavailable.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **TACACS+** > **Servers**.
4. Add TACACS+ servers:
   a. For **Add server**, click ✚.

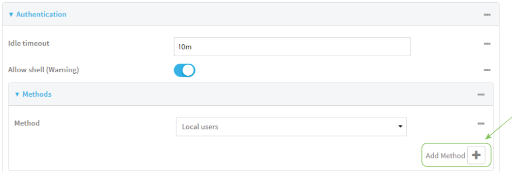
   Idle timeout:
   Allow shell (Warning): ●
   Authoritative: ○
   Group attribute: groupname
   Service: system

   b. For **Hostname**, type the hostname or IP address of the TACACS+ server.
   c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 49.
   d. For **Secret**, type the TACACS+ server's shared secret. This is configured in the key parameter of the TACACS+ server's tac_plus.conf file, for example:

   ```
   key = testing123
   ```

   e. (Optional) Click ✚ again to add additional TACACS+ servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being used if TACACS+ authentication fails. Other authentication methods will only be used if the TACACS+ server is unavailable.
6. (Optional) For **Group attribute**, type the name of the attribute used in the TACACS+ server's configuration to identify the Connect EZ authentication group or groups that the user is a member of. For example, in TACACS+ user configuration, the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting in the Connect EZ configuration.
7. (Optional) For **Service**, type the value of the **service** attribute in the the TACACS+ server's configuration. For example, in TACACS+ user configuration, the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the Connect EZ configuration.

8. (Optional) Enable **Command authorization**, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.
9. (Optional) Enable **Command accounting**, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.
10. Add TACACS+ to the authentication methods:
    a. Click **Authentication** > **Methods**.
    b. For **Add method**, click ✚.

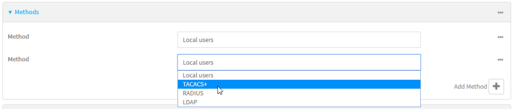


Idle timeout: 10m

Allow shell (Warning)

Method: Local users

    c. Select **TACACS+** for the new method from the **Method** drop-down.

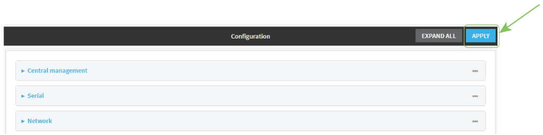


Method: Local users

Method: Local users

Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.

11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if TACACS+ authentication fails. Other authentication methods will only be used if the TACACS+ server is unavailable.

```
(config)> auth tacacs+ authoritative true
(config)>
```

4. (Optional) Configure the group_attribute. This is the name of the attribute used in the TACACS+ server's configuration to identify the Connect EZ authentication group or groups that the user

is a member of. For example, in TACACS+ user configuration, the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting for the group_attribute in the Connect EZ configuration.

```
(config)> auth tacacs+ group_attribute attribute-name
(config)>
```

5. (Optional) Configure the type of service. This is the value of the **service** attribute in the the TACACS+ server's configuration. For example, in TACACS+ user configuration, the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the Connect EZ configuration.

```
(config)> auth tacacs+ service service-name
(config)>
```

6. (Optional) Enable command authorization, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.

```
(config)> auth tacacs+ command_authorization true
(config)>
```

7. (Optional) Enable command accounting, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.

```
(config)> auth tacacs+ command_accounting true
(config)>
```

8. Add a TACACS+ server:
   a. Add the server:

   ```
   (config)> add auth tacacs+ server end
   (config auth tacacs+ server 0)>
   ```

   b. Enter the TACACS+ server's IP address or hostname:

   ```
   (config auth tacacs+ server 0)> hostname hostname|ip-address
   (config auth tacacs+ server 0)>
   ```

   c. (Optional) Change the default port setting to the appropriate port:

   ```
   (config auth tacacs+ server 0)> port port
   (config auth tacacs+ server 0)>
   ```

   d. (Optional) Repeat the above steps to add additional TACACS+ servers.
9. Add TACACS+ to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add TACACS+ to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end tacacs+
(config)>
```

10. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Remote Authentication Dial-In User Service (RADIUS)

Your Connect EZ device supports Remote Authentication Dial-In User Service (RADIUS), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With RADIUS support, the Connect EZ device acts as a RADIUS client, which sends user credentials and connection parameters to a RADIUS server over UDP. The RADIUS server then authenticates the RADIUS client requests and sends back a response message to the device.

When you are using RADIUS authentication, you can have both local users and RADIUS users able to log in to the device. To use RADIUS authentication, you must set up a RADIUS server that is accessible by the Connect EZ device prior to configuration. The process of setting up a RADIUS server varies by the server environment. An example of a RADIUS server is FreeRADIUS.

This section contains the following topics:

RADIUS user configuration

When configured to use RADIUS support, the Connect EZ device uses a remote RADIUS server for user authentication (password verification) and authorization (assigning the access level of the user). Additional RADIUS servers can be configured as backup servers for user authentication.

This section outlines how to configure a RADIUS server to be used for user authentication on your Connect EZ device.

Example FreeRADIUS configuration

With FreeRADIUS, users are defined in the **users** file in your FreeRADIUS installation. To define users:

1. Open the FreeRadius user file in a text editor. For example:

   ```
   $ sudo gedit /etc/freeradius/3.0/users
   ```

2. Add users to the file using the following format:

   ```
   user1 Cleartext-Password := "user1"
          Unix-FTP-Group-Names := "admin"

   user2 Cleartext-Password := "user2"
          Unix-FTP-Group-Names := "serial"
   ```

   The **Unix-FTP-Group-Names** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ. Alternatively, if the user is also configured as a local user on the Connect EZ device and the RADIUS server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups. The **Unix-FTP-Group-Names** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

   ```
   $ sudo freeradius -CX
   ```

   This should return a message that completes similar to:

   ```
   ...
   Configuration appears to be OK
   ```

5. Restart the FreeRADIUS server:

   ```
   $ sudo /etc/init.d/freeradius restart
   ```

RADIUS server failover and fallback to local configuration

In addition to the primary RADIUS server, you can also configure your Connect EZ device to use backup RADIUS servers. Backup RADIUS servers are used for authentication requests when the primary RADIUS server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your Connect EZ device to use multiple types of authentication. For example, you can configure both RADIUS authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup RADIUS servers are unavailable. Additionally, users who are configured locally but are not configured on the RADIUS server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the RADIUS server, and only authenticated locally if the RADIUS server is unavailable or if the user is not defined on the RADIUS server, then you should list the RADIUS authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the RADIUS servers are unavailable and the Connect EZ device falls back to local authentication, only users defined locally on the device are able to log in. RADIUS users cannot log in until the RADIUS servers are brought back online.

Configure your Connect EZ device to use a RADIUS server

This section describes how to configure a Connect EZ device to use a RADIUS server for authentication and authorization.

Required configuration items

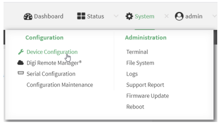
- Define the RADIUS server IP address or domain name.
- Define the RADIUS server shared secret.
- Add RADIUS as an authentication method for your Connect EZ device.

Additional configuration items

- Whether other user authentication methods should be used in addition to the RADIUS server, or if the RADIUS server should be considered the authoritative login method.
- The RADIUS server port. It is configured to 1812 by default.
- Add additional RADIUS servers in case the first RADIUS server is unavailable.
- The server NAS ID. If left blank, the default value is used:
    - If you are access the Connect EZ device by using the WebUI, the default value is for NAS ID is **httpd**.
    - If you are access the Connect EZ device by using ssh, the default value is **sshd**.
- Time in seconds before the request to the server times out. The default is 3 seconds and the maximum possible value is 60 seconds.
- Enable additional debug messages from the RADIUS client.

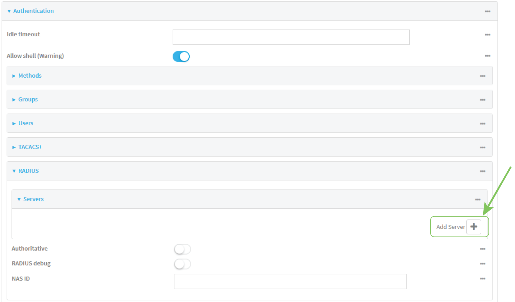
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **RADIUS** > **Servers**.

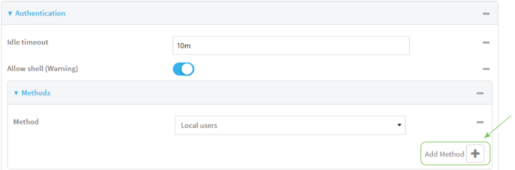
4. Add RADIUS servers:
    a. For **Add server**, click ✚.



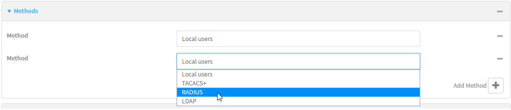
    b. For **Hostname**, type the hostname or IP address of the RADIUS server.
    c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 1812.
    d. For **Secret**, type the RADIUS server's shared secret. This is configured in the secret parameter of the RADIUS server's client.conf file, for example:

```
secret=testing123
```

    e. For **Timeout**, type or select the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.
    f. (Optional) Click ✚ again to add additional RADIUS servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being used if RADIUS authentication fails. Other authentication methods will only be used if the RADIUS server is unavailable.
6. (Optional) Click **RADIUS debug** to enable additional debug messages from the RADIUS client.
7. (Optional) For **NAS ID**, type the unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:
    - If you are accessing the Connect EZ device by using the WebUI, the default value is for NAS ID is **httpd**.
    - If you are accessing the Connect EZ device by using ssh, the default value is **sshd**.
8. Add RADIUS to the authentication methods:
    a. Click **Authentication** > **Methods**.
    b. For **Add method**, click ✚.

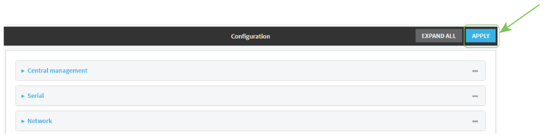

Idle timeout 10m
Method Local users

c. Select **RADIUS** for the new method from the **Method** drop-down.



Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if RADIUS authentication fails. Other authentication methods will only be used if the RADIUS server is unavailable.

```
(config)> auth radius authoritative true
(config)>
```

4. (Optional) Enable debug messages from the RADIUS client:

```
(config)> auth radius debug true
(config)>
```

5. (Optional) Configure the NAS ID. This is a unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:

   - If you are accessing the Connect EZ device by using the WebUI, the default value is for NAS ID is **httpd**.
   - If you are accessing the Connect EZ device by using ssh, the default value is **sshd**.

```
(config)> auth radius nas_id id
(config)>
```

6. Add a RADIUS server:

    a. Add the server:

    ```
    (config)> add auth radius server end
    (config auth radius server 0)>
    ```

    b. Enter the RADIUS server's IP address or hostname:

    ```
    (config auth radius server 0)> hostname hostname|ip-address
    (config auth radius server 0)>
    ```

    c. (Optional) Change the default port setting to the appropriate port:

    ```
    (config auth radius server 0)> port port
    (config auth radius server 0)>
    ```

    d. Configure the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.

    ```
    (config auth radius server 0)> timeout value
    (config auth radius server 0)>
    ```

    e. (Optional) Repeat the above steps to add additional RADIUS servers.

7. Add RADIUS to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add RADIUS to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

    ```
    (config)> add auth method end radius
    (config)>
    ```

8. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

9. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

LDAP

Your Connect EZ device supports LDAP (Lightweight Directory Access Protocol), a protocol used for directory information services over an IP network. LDAP can be used with your Connect EZ device for centralized authentication and authorization management for users who connect to the device. With LDAP support, the Connect EZ device acts as an LDAP client, which sends user credentials and connection parameters to an LDAP server. The LDAP server then authenticates the LDAP client requests and sends back a response message to the device.

When you are using LDAP authentication, you can have both local users and LDAP users able to log in to the device. To use LDAP authentication, you must set up a LDAP server that is accessible by the Connect EZ device prior to configuration. The process of setting up a LDAP server varies by the server environment.

This section contains the following topics:

LDAP user configuration

When configured to use LDAP support, the Connect EZ device uses a remote LDAP server for user authentication (password verification) and authorization (assigning the access level of the user). Additional LDAP servers can be configured as backup servers for user authentication.

This section outlines how to configure a LDAP server to be used for user authentication on your Connect EZ device.

There are several different implementations of LDAP, including Microsoft Active Directory. This section uses OpenLDAP as an example configuration. Other implementations of LDAP will have different configuration methods.

Example OpenLDAP configuration

With OpenLDAP, users can be configured in a text file using the LDAP Data Interchange Format (LDIF). In this case, we will be using a file called **add_user.ldif**.

1. Create the **add_user.ldif** file in a text editor. For example:

   ```
   $ gedit ./add_user.ldif
   ```

2. Add users to the file using the following format:

   ```
   dn: uid=john,dc=example,dc=com
   objectClass: inetOrgPerson
   cn: John Smith
   sn: Smith
   uid: john
   userPassword: password
   ou: admin serial
   ```

   - The value of **uid** and **userPassword** must correspond to the username and password used to log into the Connect EZ device.
   - The **ou** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ. Alternatively, if the user is also configured as a local user on the Connect EZ device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups.

   Other attributes may be required by the user’s objectClass. Any objectClass may be used as long it allows the **uid**, **userPassword**, and **ou** attributes.

3. Save and close the file.
4. Add the user to the OpenLDAP server:

   ```
   $ ldapadd -x -H 'ldap:///' -D 'cn=admin,dc=example,dc=com' -W -f add_
   user.ldif
   adding new entry "uid=john,dc=example,dc=com"
   ```

5. Verify that the user has been added by performing an LDAP search:

   ```
   $ ldapsearch -x -LLL -H 'ldap:///' -b 'dc=example,dc=com'
   uid=john
   dn: uid=john,dc=example,dc=com
   objectClass: inetOrgPerson
   ```

```
cn: John Smith
sn: Smith
uid: john
ou: admin serial
```

LDAP server failover and fallback to local configuration

In addition to the primary LDAP server, you can also configure your Connect EZ device to use backup LDAP servers. Backup LDAP servers are used for authentication requests when the primary LDAP server is unavailable.

Falling back to local authentication

With user authentication methods, you can configure your Connect EZ device to use multiple types of authentication. For example, you can configure both LDAP authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup LDAP servers are unavailable. Additionally, users who are configured locally but are not configured on the LDAP server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the LDAP server, and only authenticated locally if the LDAP server is unavailable or if the user is not defined on the LDAP server, then you should list the LDAP authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the LDAP servers are unavailable and the Connect EZ device falls back to local authentication, only users defined locally on the device are able to log in. LDAP users cannot log in until the LDAP servers are brought back online.

Configure your Connect EZ device to use an LDAP server

This section describes how to configure a Connect EZ device to use an LDAP server for authentication and authorization.

Required configuration items

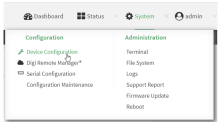
- Define the LDAP server IP address or domain name.
- Add LDAP as an authentication method for your Connect EZ device.

Additional configuration items

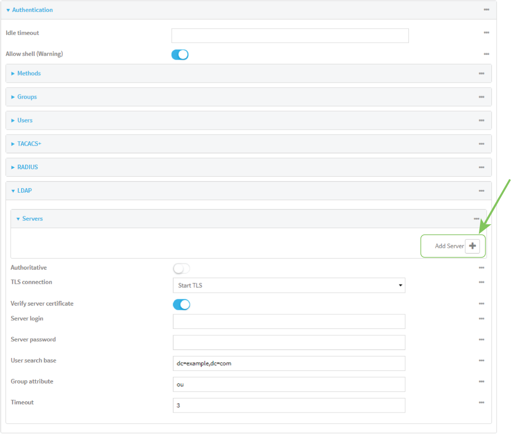
- Whether other user authentication methods should be used in addition to the LDAP server, or if the LDAP server should be considered the authoritative login method.
- The LDAP server port. It is configured to 389 by default.
- Whether to use Transport Layer Security (TLS) when communicating with the LDAP server.
- The distinguished name (DN) and password used to communicate with the server.
- The distinguished name used to search to user base.
- The group attribute.
- The number of seconds to wait to receive a message from the server.
- Add additional LDAP servers in case the first LDAP server is unavailable.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

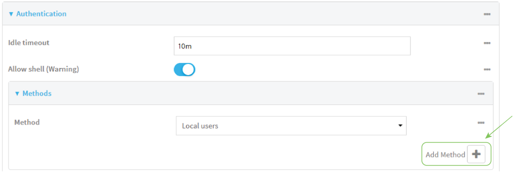
   The **Configuration** window is displayed.
3. Click **Authentication** > **LDAP** > **Servers**.
4. Add LDAP servers:
   a. For **Add server**, click ✚.

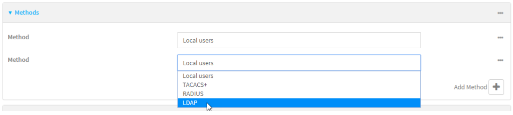
   Idle timeout
   Allow shell (Warning) ●
   Authoritative ○
   TLS connection: Start TLS
   Verify server certificate ●
   Server login
   Server password
   User search base: dc=example,dc=com
   Group attribute: ou
   Timeout: 3

   b. For **Hostname**, type the hostname or IP address of the LDAP server.
   c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 389 for non-TLS and 636 for TLS.
   d. (Optional) Click ✚ again to add additional LDAP servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being used if LDAP authentication fails. Other authentication methods will only be used if the LDAP server is unavailable.
6. For **TLS connection**, select the type of TLS connection used by the server:
   - **Disable TLS**: Uses a non-secure TCP connection on the LDAP standard port, 389.
   - **Enable TLS**: Uses an SSL/TLS encrypted connection on port 636.
   - **Start TLS**: Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.
7. If **Enable TLS** or **Start TLS** are selected for **TLS connection**:
   - Leave **Verify server certificate** at the default setting of enabled to verify the server certificate with a known Certificate Authority.
   - Disable **Verify server certificate** if the server is using a self-signed certificate.
8. (Optional) For **Server login**, type a distinguished name (DN) that is used to bind to the LDAP server and search for users, for example **cn=user,dc=example,dc=com**. Leave this field blank if the server allows anonymous connections.

9. (Optional) For **Server password**, type the password used to log into the LDAP server. Leave this field blank if the server allows anonymous connections.
10. For **User search base**, type the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example. **ou=People,dc=example,dc=com**).
11. For **Login attribute**, enter the user attribute containing the login of the authenticated user. For example, in the LDAP user configuration, the login attribute is **uid**. If this attribute is not set, the user will be denied access.
12. (Optional) For **Group attribute**, type the name of the user attribute that contains the list of Connect EZ authentication groups that the authenticated user has access to. See LDAP user configuration for further information about the group attribute.
13. For **Timeout**, type or select the amount of time in seconds to wait for the LDAP server to respond. Allowed value is between **3** and **60** seconds.
14. Add LDAP to the authentication methods:
    a. Click **Authentication** > **Methods**.
    b. For **Add method**, click ✚.

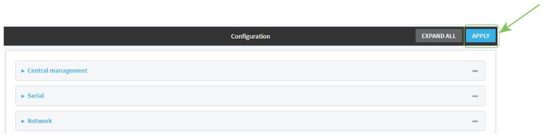


    c. Select **LDAP** for the new method from the **Method** drop-down.



Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.

15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if LDAP authentication fails. Other authentication methods will only be used if the LDAP server is unavailable.

   ```
   (config)> auth ldap authoritative true
   (config)>
   ```

4. Set the type of TLS connection used by the LDAP server:

   ```
   (config)> auth ldap tls value
   (config)>
   ```

   where *value* is one of:

   - **off**: Uses a non-secure TCP connection on the LDAP standard port, 389.
   - **on**: Uses an SSL/TLS encrypted connection on port 636.
   - **start_tls**: Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.

   The default is **off**.

5. If **tls** is set to **on** or **start_tls**, configure whether to verify the server certificate:

   ```
   (config)> auth ldap verify_server_cert value
   (config)>
   ```

   where *value* is either:

   - **true**: Verifies the server certificate with a known Certificate Authority.
   - **false**: Does not verify the certificate. Use this option if the server is using a self-signed certificate.

   The default is **true**.

6. Set the distinguished name (DN) that is used to bind to the LDAP server and search for users. Leave this option unset if the server allows anonymous connections.

   ```
   (config)> auth ldap bind_dn dn_value
   (config)>
   ```

   For example:

   ```
   (config)> auth ldap bind_dn cn=user,dc=example,dc=com
   (config)>
   ```

7. Set the password used to log into the LDAP server. Leave this option unset if the server allows anonymous connections.

   ```
   (config)> auth ldap bind_password password
   (config)>
   ```

8. Set the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example. **ou=People,dc=example,dc=com**).

```
(config)> auth ldap base_dn value
(config)>
```

9. Set the login attribute:

```
(config)> auth ldap login_attribute value
(config)>
```

where value is the user attribute containing the login of the authenticated user. For example, in the LDAP user configuration, the login attribute is **uid**. . If this attribute is not set, the user will be denied access.

10. (Optional) Set the name of the user attribute that contains the list of Connect EZ authentication groups that the authenticated user has access to. See LDAP user configuration for further information about the group attribute.

```
(config)> auth ldap group_attribute value
(config)>
```

For example:

```
(config)> auth ldap group_attribute ou
(config)>
```

11. Configure the amount of time in seconds to wait for the LDAP server to respond.

```
(config)> auth ldap timeout value
(config)>
```

where *value* is any integer from **3** to **60**. The default value is **3**.

12. Add an LDAP server:

    a. Add the server:

    ```
    (config)> add auth ldap server end
    (config auth ldap server 0)>
    ```

    b. Enter the LDAP server's IP address or hostname:

    ```
    (config auth ldap server 0)> hostname hostname|ip-address
    (config auth ldap server 0)>
    ```

    c. (Optional) Change the default port setting to the appropriate port:

    ```
    (config auth ldap server 0)> port port
    (config auth ldap server 0)>
    ```

    d. (Optional) Repeat the above steps to add additional LDAP servers.

13. Add LDAP to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add LDAP to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end ldap
(config)>
```

14. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

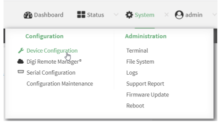
    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure serial authentication

This section describes how to configure authentication for serial access.

☰ WebUI

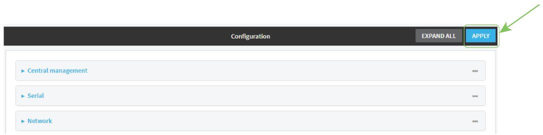
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

3. Click **Authentication** > **Serial**.
4. (Optional) For **TLS identity certificate**, paste a TLS certificate and private key in PEM format. If empty, the certificate for the web administration service is used. See Configure the web administration service for more information.
5. For **Peer authentication**, select the method used to verify the certificate of a remote peer.
6. **Include standard CAs** is enabled by default. This allows peers with certificates that have been signed by standard Certificate Authorities (CAs) to authenticate.
7. Click to expand **Custom certificate authorities** to add the public certificates of custom CAs.
   a. For **Add CA certificate**, type the name of a custom CA and click ✚.
   b. Paste the public certificate for the custom CA in PEM format.
   c. Repeat for additional custom CA certificates.
8. Click to expand **Peer certificates** to add the public certificates of trusted peers.
   a. For **Add Peer certificate**, type the name of a trusted peer and click ✚.
   b. Paste the public certificate for the trusted peer in PEM format.
   c. Repeat for additional trusted peer certificates.

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Paste a TLS certificate and private key in PEM format:

```
(config)> auth serial identiy "cert-and-private-key"
(config)>
```

4. Set the method used to verify the certificate of a remote peer:

```
(config)> auth serial verify value
(config)>
```

   where *value* is either:

   - **ca**: Uses certificate authorities (CAs) to verify.
   - **peer**: Uses the remote peer's public certificate to verify.
5. By default, peers with certificates that have been signed by standard Certificate Authorities (CAs) are allowed to authenticate. To disable:

```
(config)> auth serial ca_standard false
(config)>
```

6. Add the public certificate for a custom certificate authority:

```
(config)> add auth serial ca_certs CA-cert-name "cert-and-private-key"
(config)>
```

   where:

   - *CA-cert-name* is the name of the certificate for the custom certificate authority.
   - *cert-and-private-key* is the certificate and private key for the custom certificate authority.

   Repeat for additional custom certificate authorities.
7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

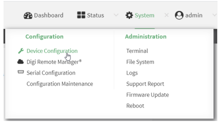
Disable shell access

To prohibit access to the shell prompt for all authentication groups, disable the **Allow shell** parameter.. This does not prevent access to the Admin CLI.

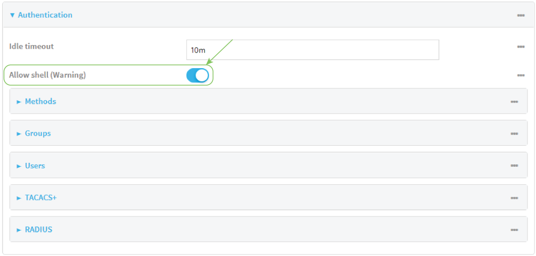
Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Authentication**.
4. Click to disable **Allow shell**.

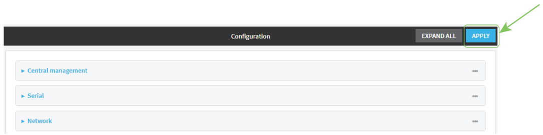


Idle timeout 10m

Allow shell (Warning)

Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Set the **allow_shell** parameter to **false**:

   ```
   (config)> auth allow_shell false
   ```

   Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

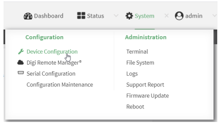
Set the idle timeout for Connect EZ users

To configure the amount of time that the user's active session can be inactive before it is automatically disconnected, set the **Idle timeout** parameter.

By default, the Idle timeout is set to 10 minutes.

WebUI

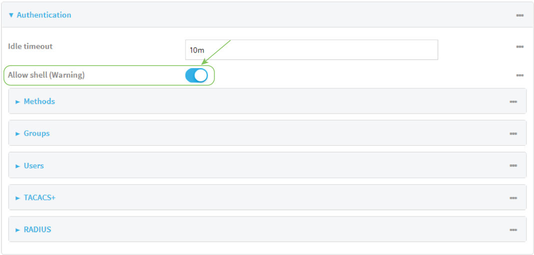
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication**.
4. For **Idle timeout**, enter the amount of time that the active session can be idle before the user is automatically logged out.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number*{w|d|h|m|s}**.

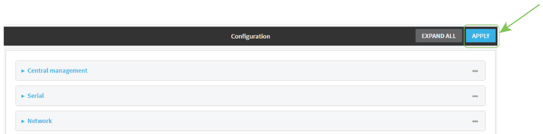
   For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.



Idle timeout 10m

Allow shell (Warning)

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. At the config prompt, type:

   ```
   (config)# auth idle_timeout value
   ```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

   ```
   (config)> auth idle_timeout  600s
   (config)>
   ```
4. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

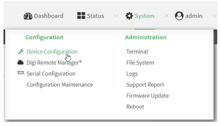
Example user configuration

Example 1: Administrator user with local authentication

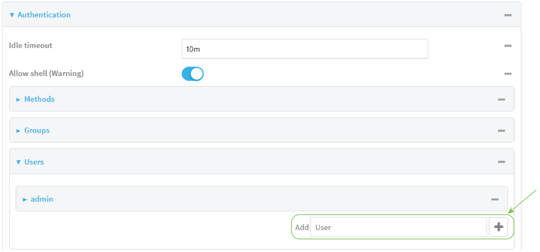
Goal: To create a user with administrator rights who is authenticated locally on the device.

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

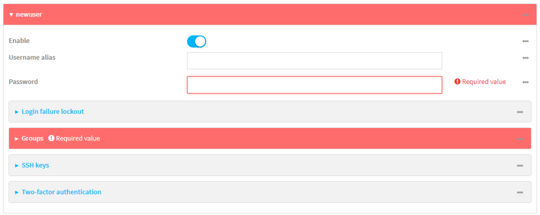
   

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.
4. In **Add User:** enter a name for the user and click ✚.

   Idle timeout 10m

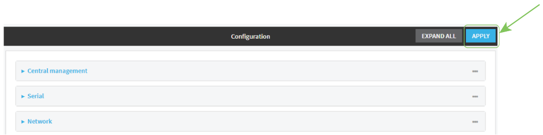
   The user configuration window is displayed.

5. Enter a **Password** for the user.
6. Assign the user to the **admin** group:
   a. Click **Groups**.
   b. For **Add Group**, click ✚.
   c. For **Group**, select the **admin** group.
   d. Verify that the **admin** group has full administrator rights:
      i. Click **Authentication** > **Groups**.
      ii. Click **admin**.
      iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.

    iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.
  e. Verify that **Local users** is one of the configured authentication methods:
    i. Click **Authentication** > **Methods**.
    ii. Verify that **Local users** is one of the methods listed in the list. If not:
      i. For **Add Method**, click ✚.
      ii. For **Method**, select **Local users**.

7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
        enable true
        level full
...
(config)>
```

   If **admin** > **enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

   If **admin** > **level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

4. Verify that **local** is one of the configured authentication methods:

```
(config)> show auth method
0 local
(config)>
```

   If **local** is not listed:

```
(config)> add auth method end local
(config)>
```

5. Create the user. In this example, the user is being created with the username **adminuser**:

```
(config)> add auth user adminuser
(config auth user adminuser)>
```

6. Assign a password to the user:

```
(config auth user adminuser)> password pwd
(config auth user adminuser)>
```

7. Assign the user to the **admin** group:

```
(config auth user adminuser)> add group end admin
(config auth user adminuser)>
```

8. Save the configuration and apply the change:

```
(config auth user adminuser)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example 2: RADIUS, TACACS+, and local authentication for one user

Goal: To create a user with administrator rights who is authenticated by using all three authentication methods.

In this example, when the user attempts to log in to the Connect EZ device, user authentication will occur in the following order:

1. The user is authenticated by the RADIUS server. If the RADIUS server is unavailable,
2. The user is authenticated by the TACACS+ server. If both the RADIUS and TACACS+ servers are unavailable,
3. The user is authenticated by the Connect EZ device using local authentication.

This example uses a FreeRadius 3.0 server running on ubuntu, and a TACACS+ server running on ubuntu. Server configuration may vary depending on the platforms or type of servers used in your environment.

WebUI

1. Configure a user on the RADIUS server:
   a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

   ```
   $ sudo gedit /etc/freeradius/3.0/users
   ```

   b. Add a RADIUS user to the **users** file:

   ```
   admin1 Cleartext-Password := "password1"
          Unix-FTP-Group-Names := "admin"
   ```

   In this example:

   - The user's username is **admin1**.
   - The user's password is **password1**.
   - The authentication group on the Connect EZ device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.

   c. Save and close the **users** file.
2. Configure a user on the TACACS+ server:
   a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

   ```
   $ sudo gedit /etc/tacacs+/tac_plus.conf
   ```

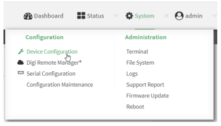
   b. Add a TACACS+ user to the **tac_plus.conf** file:

   ```
   user = admin1 {
          name ="Admin1 for TX64"
          pap = cleartext password1
          service = system {
                  groupname = admin
                  }
          }
   }
   ```

   In this example:

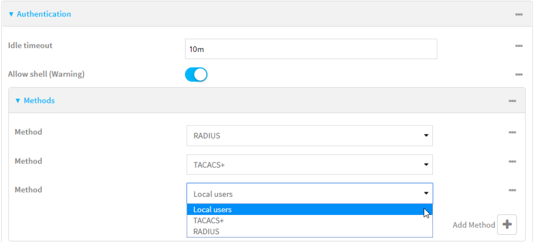
   - The user's username is **admin1**.
   - The user's password is **password1**.
   - The authentication group on the Connect EZ device, **admin**, is identified in the **groupname** parameter.

   c. Save and close the **tac_plus.conf** file.
3. Log into the Connect EZ WebUI as a user with full Admin access rights.
4. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

5. Configure the authentication methods:
   a. Click **Authentication** > **Methods**.
   b. For **Method**, select **RADIUS**.
   c. For **Add Method**, click ✚ to add a new method.
   d. For the new method, select **TACACS+**.
   e. Click ✚ to add another new method.
   f. For the new method, select **Local users**.



▾ Authentication

Idle timeout: 10m

Allow shell (Warning)

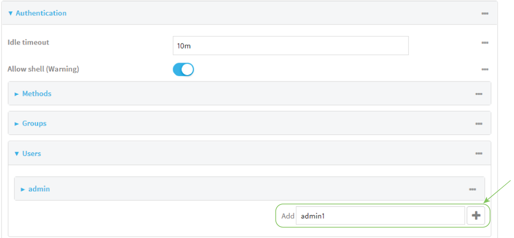
▾ Methods

Method: RADIUS

Method: TACACS+

Method: Local users

6. Create the local user:
   a. Click **Authentication** > **Users**.
   b. In **Add User:**, type **admin1** and click ✚.



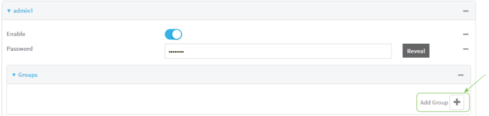
▾ Authentication

Idle timeout: 10m

Allow shell (Warning)

Add: admin1

   c. For **password**, type **password1**.
   d. Assign the user to the **admin** group:
      i. Click **Groups**.
      ii. For **Add Group**, click ✚.

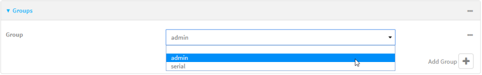


▾ admin1

Enable

Password: ••••••••

      iii. For **Group**, select the **admin** group.



▾ Groups

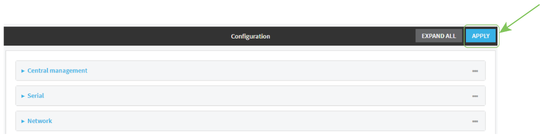
Group: admin

   a. Verify that the **admin** group has full administrator rights:
      i. Click **Authentication** > **Groups**.
      ii. Click **admin**.

   iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.

   iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.

7. Click **Apply** to save the configuration and apply the change.



Command line

1. Configure a user on the RADIUS server:

   a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

   ```
   $ sudo gedit /etc/freeradius/3.0/users
   ```

   b. Add a RADIUS user to the **users** file:

   ```
   admin1 Cleartext-Password := "password1"
          Unix-FTP-Group-Names := "admin"
   ```

   In this example:

   - The user's username is **admin1**.
   - The user's password is **password1**.
   - The authentication group on the Connect EZ device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.

   c. Save and close the **users** file.

2. Configure a user on the TACACS+ server:

   a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

   ```
   $ sudo gedit /etc/tacacs+/tac_plus.conf
   ```

   b. Add a TACACS+ user to the **tac_plus.conf** file:

   ```
   user = admin1 {
          name ="Admin1 for TX64"
          pap = cleartext password1
          service = system {
                  groupname = admin
                  }
          }
   }
   ```

   In this example:

   - The user's username is **admin1**.
   - The user's password is **password1**.

- The authentication group on the Connect EZ device, **admin**, is identified in the **groupname** parameter.

c. Save and close the **tac_plus.conf** file.

3. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

4. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

5. Configure the authentication methods:

   a. Determine the current authentication method configuration:

```
(config)> show auth method
0 local
(config)>
```

   This output indicates that on this example system, only local authentication is configured.

   b. Add RADIUS authentication to the beginning of the list:

```
(config)> add auth method 0 radius
(config)>
```

   c. Add TACACS+ authentication second place in the list:

```
(config)> add auth method 1 tacacs+(config)>
```

   d. Verify that authentication will occur in the correct order:

```
(config)> show auth method
0 radius
1 tacacs+
2 local
(config)>
```

6. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
       enable true
       level full
...
(config)>
```

   If **admin** > **enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

If **admin** > **level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

7. Configure the local user:
   a. Create a local user with the username **admin1**:

      ```
      (config)> add auth user admin1
      (config auth user admin1)>
      ```

   b. Assign a password to the user:

      ```
      (config auth user adminuser)> password password1
      (config auth user adminuser)>
      ```

   c. Assign the user to the **admin** group:

      ```
      (config auth user adminuser)> add group end admin
      (config auth user adminuser)>
      ```

8. Save the configuration and apply the change:

   ```
   (config auth user adminuser)> save
   Configuration saved.
   >
   ```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Firewall

This chapter contains the following topics:

Firewall configuration

Firewall configuration includes the following configuration options:

- **Zones**: A zone is a firewall access group to which network interfaces can be added. You then use zones to configure packet filtering and access control lists for interfaces that are included in the zone. Preconfigured zones include:
  - **Any**: Matches any network interface, even if they are not assigned to this zone.
  - **Loopback**: Zone for interfaces that are used for communication between processes running on the device.
  - **Internal**: Used for interfaces connected to trusted networks. By default, the firewall will allow most access from this zone.
  - **External**: Used for interfaces to connect to untrusted zones, such as the internet. This zone has Network Address Translation (NAT) enabled by default. By default, the firewall will block most access from this zone.
  - **Edge**: Used for interfaces connected to trusted networks, where the device is a client on the edge of the network rather than a router or gateway.
  - **Setup**: Used for interfaces involved in the initial setup of the device. By default, the firewall will only allow this zone to access administration services.
  - **IPsec**: The default zone for IPsec tunnels.
  - **Dynamic routes**: Used for routes learned using routing services.
- **Port forwarding**: A list of rules that allow network connections to the Connect EZ to be forwarded to other servers by translating the destination address.
- **Packet filtering**: A list of packet filtering rules that determine whether to accept or reject network connections that are forwarded through the Connect EZ.
- **Custom rules**: A script that is run to install advanced firewall rules beyond the scope/capabilities of the standard device configuration.
- **Quality Of Service**: Quality of Service (QOS) options for bandwidth allocation and policy-based traffic shaping and prioritizing.

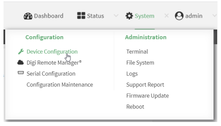
Create a custom firewall zone

In addition to the preconfigured zones, you can create your custom zones that can be used to configure packet filtering and access control lists for network interfaces.

To create a zone:

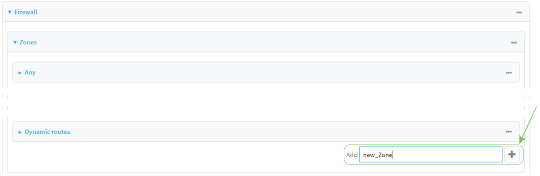
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

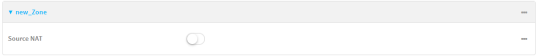
   

   The **Configuration** window is displayed.
3. Click **Firewall** > **Zones**.

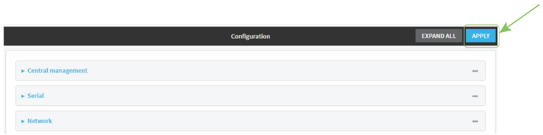
4. In **Add Zone**, enter a name for the zone and click ✚.



The firewall configuration window is displayed.



5. (Optional) If traffic on this zone will be forwarded from a private network to the internet, enable Network Address Translation (NAT).
6. Click **Apply** to save the configuration and apply the change.



See Configure the firewall zone for a network interface for information about how to configure network interfaces to use a zone.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the new zone. For example, to add a zone named **my_zone**:

```
(config)> add firewall zone my_zone
(config firewall zone my_zone)>
```

4. (Optional) Enable Network Address Translation (NAT):

```
(config firewall zone my_zone)> src_nat true
(config firewall zone my_zone)>
```

5. Save the configuration and apply the change:

```
(config firewall zone my_zone)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Configure the firewall zone for a network interface for information about how to configure network interfaces to use a zone.

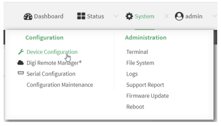
Configure the firewall zone for a network interface

Firewall zones allow you to group network interfaces for the purpose of packet filtering and access control. There are several preconfigured firewall zones, and you can create custom zones as well. The firewall zone that a network interfaces uses is selected during interface configuration.

This example procedure uses an existing network interface named **ETH2** and changes the firewall zone from the default zone, **Internal**, to **External**.

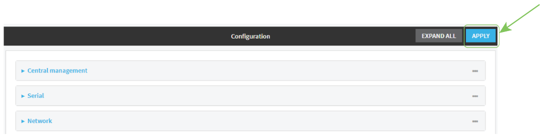
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

3. Click **Network** > **Interfaces** > **ETH2**.
4. For **Zone**, select **External**.
5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface eth2 zone my_zone
(config)>
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

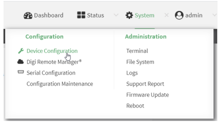
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a custom firewall zone

You cannot delete preconfigured firewall zones. To delete a custom firewall zone:

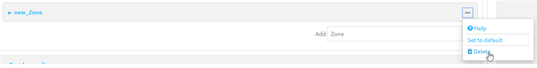
☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

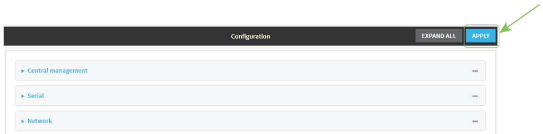


   The **Configuration** window is displayed.

3. Click **Firewall** > **Zones**.
4. Click the menu icon (**...**) next to the appropriate custom firewall zone and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete a custom firewall rule. For example:

```
(config)> del firewall zone my_zone
```

4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Port forwarding rules

Most computers are protected by a firewall that prevents users on a public network from accessing servers on the private network. To allow a computer on the Internet to connect to a specific server on a private network, set up one or more port forwarding rules. Port forwarding rules provide mapping instructions that direct incoming traffic to the proper device on a LAN.

Configure port forwarding

Required configuration items

- The network interface for the rule.

  Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
- The public-facing port number that network connections must use for their traffic to be forwarded.
- The IP address of the server to which traffic should be forwarded.
- The port or range of ports to which traffic should be forwarded.

Additional configuration items

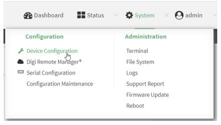
- A label for the port forwarding rule.
- The IP version (either IPv4 or IPv6) that incoming network connections must match.
- The protocols that incoming network connections must match.

- A white list of devices, based on either IP address or firewall zone, that are authorized to leverage this forwarding rule.

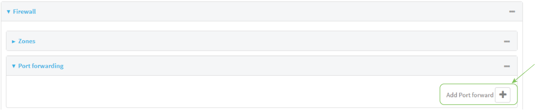
To configure a port forwarding rule:

WebUI

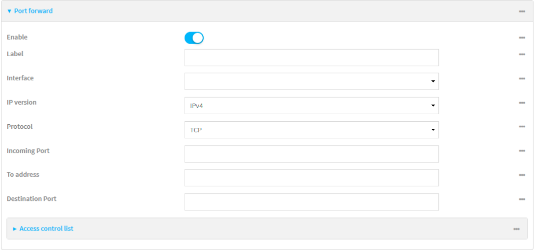
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Port forwarding**.
4. For **Add port forward**, click ✚.

   The port forwarding rule configuration window is displayed.

   ▾ Port forward

   Enable

   Label

   Interface

   IP version IPv4

   Protocol TCP

   Incoming Port

   To address

   Destination Port

   ▸ Access control list

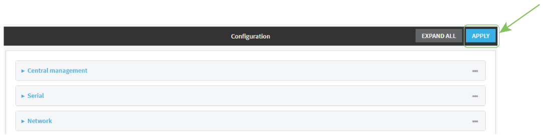
   Port forwarding rules are enabled by default. To disable, click to toggle off **Enable**.
5. (Optional) Type a **Label** that will be used to identify the rule.
6. For **Interface**, select the network interface for the rule.

   Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
7. For **IP version**, select either **IPv4** or **IPv6**.

   Network connections will only be forwarded if they match the selected IP version.
8. For **Protocol**, select the type of internet protocol.

   Network connections will only be forwarded if they match the selected protocol.
9. For **Incoming port(s)**, type the public-facing port number that network connections must use for their traffic to be forwarded.
10. For **To Address**, type the IP address of the server to which traffic should be forwarded.

11. For **Destination Port(s)**, type the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter: **1, 3, 5-10**.
12. (Optional) Click **Access control list** to create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone:
    - To white list IP addresses:
        a. Click **Addresses**.
        b. For **Add Address**, enter an IP address and click ✚.
        c. Repeat for each additional IP address that should be white listed.
    - To specify firewall zones for white listing:
        a. Click **Zones**.
        b. For **Add zone**, click ✚.
        c. For **Zone**, select the appropriate zone.
        d. Repeat for each additional zone.
13. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add firewall dnat end
(config firewall dnat 0)>
```

   Port forwarding rules are enabled by default. To disable the rule:

```
(config firewall dnat 0)> enable false
(config firewall dnat 0)>
```

4. Set the network interface for the rule.

```
(config firewall dnat 0)> interface
(config firewall dnat 0)>
```

   Network connections will only be forwarded if their destination address matches the IP address of this network interface.

   a. Use the **?** to determine available interfaces:

   b. Set the interface. For example:

   ```
   (config firewall dnat 0)> interface eth1
   (config firewall dnat 0)>
   ```

5. Set the IP version. Allowed values are **ipv4** and **ipv6**. The default is **ipv4**.

   ```
   (config firewall dnat 0)> ip_version ipv6
   (config firewall dnat 0)>
   ```

6. Set the public-facing port number that network connections must use for their traffic to be forwarded.

   ```
   (config firewall dnat 0)> port port
   (config firewall dnat 0)>
   ```

7. Set the type of internet protocol .

   ```
   (config firewall dnat 0)> protocol value
   (config firewall dnat 0)>
   ```

   Network connections will only be forwarded if they match the selected protocol. Allowed values are **custom**, **tcp**, **tcpudp**, or **upd**. The default is **tcp**.

8. Set the IP address of the server to which traffic should be forwarded:

   - For IPv4 addresses:

     ```
     (config firewall dnat 0)> to_address ip-address
     (config firewall dnat 0)>
     ```

   - For IPv6 addresses:

     ```
     (config firewall dnat 0)> to_address6 ip-address
     (config firewall dnat 0)>
     ```

9. Set the public-facing port number(s) that network connections must use for their traffic to be forwarded.

   ```
   (config firewall dnat 0)> to_port value
   (config firewall dnat 0)>
   ```

   where *value* is the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter **1, 3, 5-10**.

10. (Optional) To create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone, change to the acl node:

    ```
    (config firewall dnat 0)> acl
    (config firewall dnat 0 acl)>
    ```

- To white list an IP address:
  - For IPv4 addresses:

    ```
    (config firewall dnat 0 acl> add address end ip-address
    (config firewall dnat 0 acl)>
    ```

  - For IPv6 addresses:

    ```
    (config firewall dnat 0 acl> add address6 end ip-address
    (config firewall dnat 0 acl)>
    ```

  Repeat for each appropriate IP address.
- To specify the firewall zone for white listing:

  ```
  (config firewall dnat 0 acl)> add zone end zone
  ```

  Repeat for each appropriate zone.

  To view a list of available zones:

  ```
  (config firewall dnat 0 acl)> .. .. .. zone ?

  Zones: A list of groups of network interfaces that can be referred
  to by packet filtering rules
  and access control lists.

   Additional Configuration
   -------------------------------------------------------------------
  -----------
    any
    dynamic_routes
    edge
    external
    internal
    ipsec
    loopback
    setup

  (config firewall dnat 0 acl)>
  ```

11. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

12. Type **exit** to exit the Admin CLI.

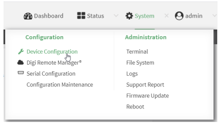
    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a port forwarding rule

To delete a port forwarding rule:

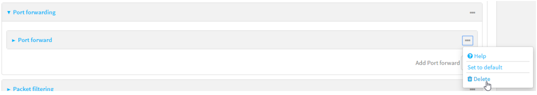
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

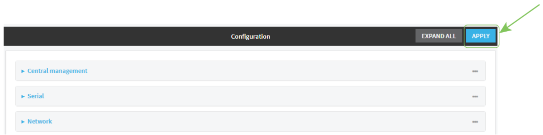


The **Configuration** window is displayed.

3. Click **Firewall** > **Port forwarding**.
4. Click the menu icon (**...**) next to the appropriate port forwarding rule and select **Delete**.



5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the port forwarding rule you want to delete:

```
(config)> show firewall dnat
0
       acl
               no address
               no zone
       enable true
       interface
       ip_version ipv4
       label IPv4 port forwarding rule
       port 10000
       protocol tcp
       to_address6 10.10.10.10
```

```
        to_port 10001

1
        acl
                no address6
                no zone
        enable false
        interface
        ip_version ipv6
        label IPv6 port forwarding rule
        port 10002
        protocol tcp
        to_address6 c097:4533:bd63:bb12:9a6f:5569:4b53:c29a
        to_port 10003
(config)>
```

4. To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall dnat 1
```

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Packet filtering

By default, one preconfigured packet filtering rule, **Allow all outgoing traffic**, is enabled and monitors traffic going to and from the Connect EZ device. The predefined settings are intended to block unauthorized inbound traffic while providing an unrestricted flow of outgoing data. You can modify the default packet filtering rule and create additional rules to define how the device accepts or rejects traffic that is forwarded through the device.

Configure packet filtering

Required configuration items

- The action that the packet filtering rule will perform, either **Accept**, **Reject**, or **Drop**.
- The source firewall zone: Packets originating from interfaces on this zone will be monitored by this rule.
- The destination firewall zone: Packets destined for interfaces on this zone will be accepted, rejected, or dropped by this rule.

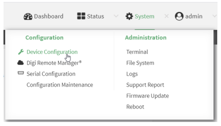
Additional configuration requirements

- A label for the rule.
- The IP version to be matched, either **IPv4**, **IPv6**, or **Any**.
- The protocol to be matched, one of:
  - **TCP**
  - **UDP**
  - **ICMP**
  - **ICMP6**
  - **Any**

To configure a packet filtering rule:

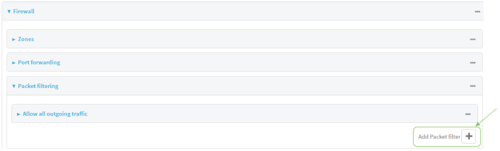
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

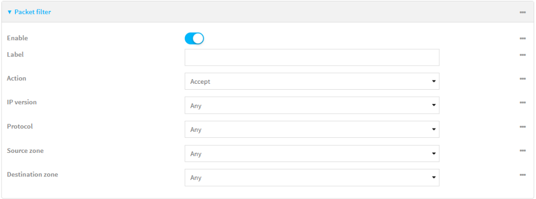
   The **Configuration** window is displayed.

3. Click **Firewall** > **Packet filtering**.
    - To create a new packet filtering rule, for **Add packet filter**, click ✚.



    - To edit the default packet filtering rule or another existing packet filtering rule, click to expand the rule.

    The packet filtering rule configuration window is displayed.

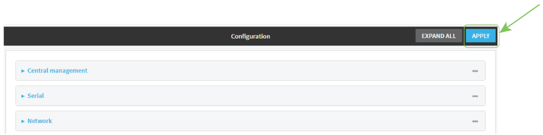


Enable ●
Label
Action Accept
IP version Any
Protocol Any
Source zone Any
Destination zone Any

    Packet filters are enabled by default. To disable, click to toggle off **Enable**.
4. (Optional) Type a **Label** that will be used to identify the rule.
5. For **Action**, select one of:
    - **Accept**: Allows matching network connections.
    - **Reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
    - **Drop**: Blocks matching network connections, and does not send a reply.
6. Select the **IP version**.
7. Select the **Protocol**.
8. For **Source zone**, select the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone.

    See Firewall configuration for more information about firewall zones.
9. For **Destination zone**, select the firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.

    See Firewall configuration for more information about firewall zones.
10. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

To edit the default packet filtering rule or another existing packet filtering rule:

a. Determine the index number of the appropriate packet filtering rule:

```
(config)> show firewall filter
0
    action accept
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label myfilter
    protocol any
    src_zone external
(config)>
```

b. Select the appropriate rule by using its index number:

```
(config)> firewall filter 1
(config firewall filter 1)>
```

To create a new packet filtering rule:

```
(config)> add firewall filter end
(config firewall filter 1)>
```

Packet filtering rules are enabled by default. To disable the rule:

```
(config firewall filter 1)> enable false
(config firewall filter 1)>
```

3. (Optional) Set the label for the rule.

```
(config firewall filter 1)> label "My filter rule"
(config firewall filter 1)>
```

4. Set the action to be performed by the filter rule.

```
(config firewall filter 1)> action value
(config firewall filter 1)>
```

where *value* is one of:

- **accept**: Allows matching network connections.
- **reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
- **drop**: Blocks matching network connections, and does not send a reply.

5. Set the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone:

   See Firewall configuration for more information about firewall zones.

   ```
   (config firewall filter 1)> src_zone my_zone
   (config firewall filter 1)>
   ```

6. Set the destination firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.

   See Firewall configuration for more information about firewall zones.

   ```
   (config firewall filter 1)> dst_zone my_zone
   (config firewall filter 1)>
   ```

7. Set the IP version.

   ```
   (config firewall filter 1)> ip_version value
   (config firewall filter 1)>
   ```

   where *value* is one of:

   - **any**
   - **ipv4**
   - **ipv6**
   - The default is **any**.

8. Set the protocol.

   ```
   (config firewall filter 1)> protocol value
   (config firewall filter 1)>
   ```

   where value is one of:

   - **any**
   - **icmp**
   - **icmpv6**
   - **tcp**
   - **upd**

   The default is **any**.

9. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

10. Type **exit** to exit the Admin CLI.

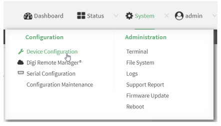
    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Enable or disable a packet filtering rule

To enable or disable a packet filtering rule:

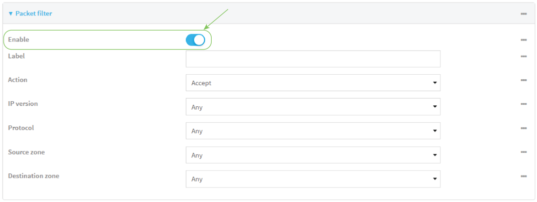
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

3. Click **Firewall** > **Packet filtering**.
4. Click the appropriate packet filtering rule.
5. Click **Enable** to toggle the rule between enabled and disabled.



▾ Packet filter

Enable

Label

Action: Accept

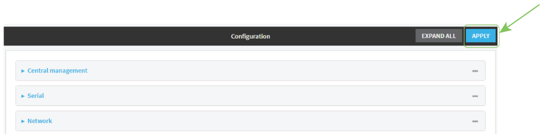
IP version: Any

Protocol: Any

Source zone: Any

Destination zone: Any

6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the appropriate port forwarding rule:

```
(config)> show firewall filter
0
    action accept
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label My packet filter
    protocol any
    src_zone external
(config)>
```

4. To enable a packet filtering rule, use the index number with the **enable true** command. For example:

```
(config)> firewall filter 1 enable true
```

5. To disable a packet filtering rule, use the index number with the **enable false** command. For example:

```
(config)> firewall filter 1 enable false
```

6. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

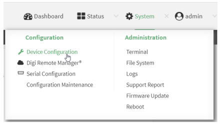
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a packet filtering rule

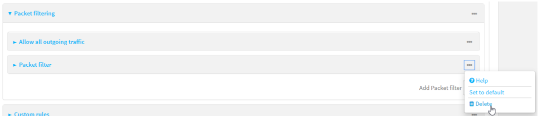
To delete a packet filtering rule:

WebUI

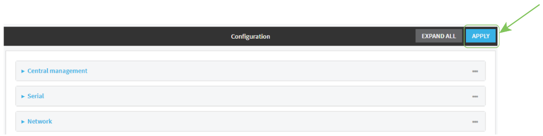
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Packet filtering**.
4. Click the menu icon (**...**) next to the appropriate packet filtering rule and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the packet filtering rule you want to delete:

```
(config)> show firewall filter
0
    action accept
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label My packet filter
    protocol any
    src_zone external
(config)>
```

4. To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall filter 1
```

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

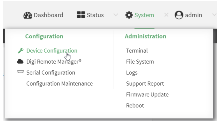
Configure custom firewall rules

Custom firewall rules consist of a script of shell commands that can be used to install firewall rules, ipsets, and other system configuration. These commands are run whenever system configuration changes occur that might cause changes to the firewall.

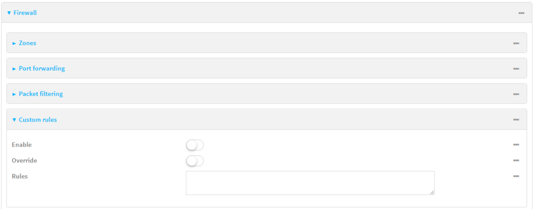
To configure custom firewall rules:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

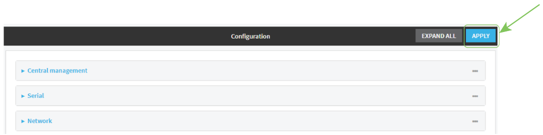


   The **Configuration** window is displayed.
3. Click **Firewall** > **Custom rules**.



4. **Enable** the custom rules.
5. (Optional) Enable **Override** to override all preconfigured firewall behavior and rely solely on the custom firewall rules.
6. For **Rules**, type the shell command that will execute the custom firewall rules script.

7. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Enable custom firewall rules:

   ```
   (config)> firewall custom enable true
   (config)>
   ```
4. (Optional) Instruct the device to override all preconfigured firewall behavior and rely solely on the custom firewall rules:

   ```
   (config)> firewall custom override true
   (config)>
   ```
5. Set the shell command that will execute the custom firewall rules script:

   ```
   (config)> firewall custom rules "shell-command"
   (config)>
   ```
6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure Quality of Service options

Quality of Service (QoS) options allow you to manage the traffic performance of various services, such as Voice over IP (VoIP), cloud computing, traffic shaping, traffic prioritizing, and bandwidth allocation. When configuring QOS, you can only control the queue for outgoing packets on each interface (egress packets), not what is received on the interface (packet ingress).

A QoS *binding* contains the policies and rules that apply to packets exiting the Connect EZ device on the binding's interface. By default, the Connect EZ device has two preconfigured QoS bindings, **Outbound** and **Inbound**. These bindings are an example configuration designed for a typical VoIP site:

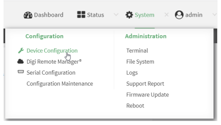
- **Outbound** provides an example of matching packets as they are routed from the device onto the WAN interface.
- **Inbound** provides an example of matching packets as they are routed from the device onto a LAN interface.

These example bindings are disabled by default.

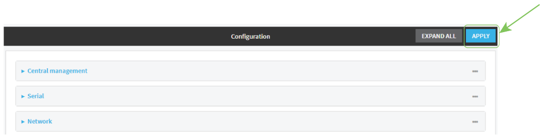
Enable the preconfigured bindings

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Firewall** > **Quality of Service**.
4. Click to expand either **Outbound** or **Inbound**.
5. **Enable** the binding.
6. Select an **Interface**.
7. Examine the remaining default settings and modify as appropriate for your network.
8. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable one of the preconfiged bindings:
   - To enable the Outbound binding:

```
(config)> firewall qos 0 enable true
(config)>
```

   - To enable the Inbound binding:

```
(config)> firewall qos 1 enable true
(config)>
```

4. Set the interface for the binding. Use the index number of the binding; for example, to set the interface for the Outbound binding:

a. Use the **?** to determine available interfaces:

b. Set the interface. For example:

```
(config)> firewall qos 0 interface /network/interface/eth1
(config)>
```

5. Examine the remaining default settings and modify as appropriate for your network.
6. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

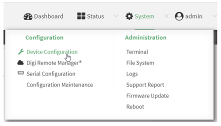
7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a new binding

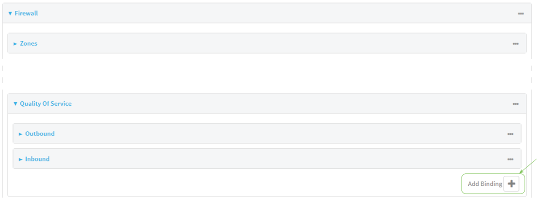
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

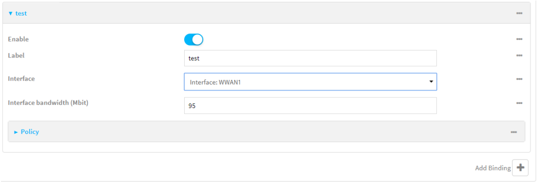


   The **Configuration** window is displayed.

3. Click **Firewall** > **Quality of Service**.
4. For **Add Binding**, click ✚.



   The quality of service binding configuration window is displayed.



Enable ●
Label test
Interface Interface: WWAN1
Interface bandwidth (Mbit) 95

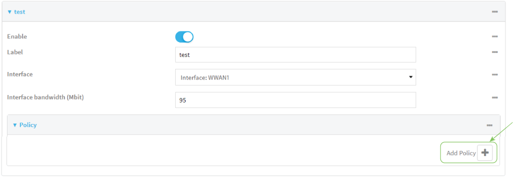
5. **Enable** the binding.
6. (Optional) Type a **Label** for the binding.

7. Select an **Interface** to queue egress packets on. The binding will only match traffic that is being sent out on this interface.
8. (Optional) For **Interface bandwidth (Mbit)**, set the maximum egress bandwidth of the interface, in megabits, allocated to this binding. Typically, this should be 95% of the available bandwidth. Allowed value is any integer between **1** and **1000**.
9. Create a policy for the binding:

   At least one policy is required for each binding. Each policy can contain up to 30 rules.

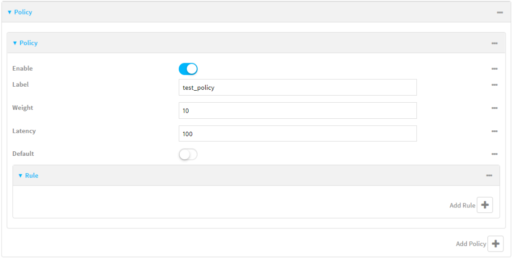
   a. Click to expand **Policy**.

   b. For **Add Policy**, click ✚.

   Enable ●
   Label: test
   Interface: Interface: WWAN1
   Interface bandwidth (Mbit): 95

   The QoS binding policy configuration window is displayed.

   Enable ●
   Label: test_policy
   Weight: 10
   Latency: 100
   Default ○

   New QoS binding policies are enabled by default. To disable, click **Enable**.

   c. (Optional) Type a **Label** for the binding policy.

   d. For **Weight**, type a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.

   The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.

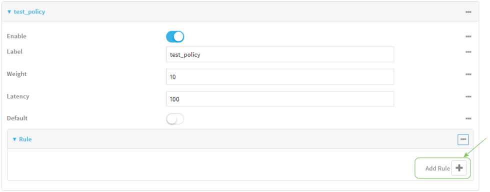
   e. For **Latency**, type the maximum delay before the transmission of packets. A lower latency means that the packets will be scheduled more quickly for transmission.

   f. Select **Default** to identify this policy as a fall-back policy. The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped.

g. If **Default** is disabled, you must configure at least one rule:

  i. Click to expand **Rule**.

  ii. For **Add Rule**, click ✚.



▾ test_policy

Enable ●

Label test_policy

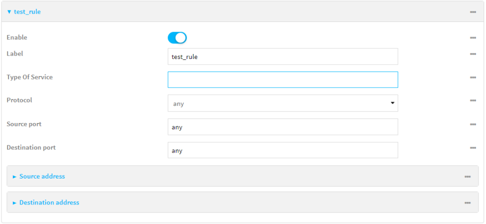
Weight 10

Latency 100

Default ○

▾ Rule

  The QoS binding policy rule configuration window is displayed.



▾ test_rule

Enable ●

Label test_rule

Type Of Service

Protocol any

Source port any

Destination port any

▸ Source address

▸ Destination address

  New QoS binding policy rules are enabled by default. To disable, click **Enable**.

  iii. (Optional) Type a **Label** for the binding policy rule.

  iv. For **Type Of Service**, type the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.

  See https://www.tucny.com/Home/dscp-tos for a list of common TOS values.

  v. For **Protocol**, select the IP protocol matching criteria for this rule.

  vi. For **Source port**, type the port, or **any**, as a source traffic matching criteria.

  vii. For **Destination port**, type the port, or **any**, as a destination traffic matching criteria.

  viii. Click to expand **Source address** and select the **Type**:

  - **Any**: Source traffic from any address will be matched.
  - **Interface**: Only traffic from the selected **Interface** will be matched.
  - **IPv4 address**: Only traffic from the IP address typed in **IPv4 address** will be matched. Use the format ***IPv4_address***[/***netmask***], or use **any** to match any IPv4 address.
  - **IPv6 address**: Only traffic from the IP address typed in **IPv6 address** will be matched. Use the format ***IPv6_address*[/*prefix_length*]**, or use **any** to match any IPv6 address.
  - **MAC address**: Only traffic from the MAC address typed in **MAC address** will be matched.

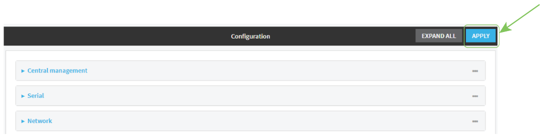
  ix. Click to expand **Destination address** and select the **Type**:

  - **Any**: Traffic destined for anywhere will be matched.
  - **Interface**: Only traffic destined for the selected **Interface** will be matched.
  - **IPv4 address**: Only traffic destined for the IP address typed in **IPv4 address** will be matched. Use the format ***IPv4_address***[/***netmask***], or use **any** to match any IPv4 address.

- **IPv6 address**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Use the format ***IPv6_address*[/*prefix_length*]**, or use **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

10. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Add a binding:

   ```
   (config)> add firewall qos end
   (config firewall qos 2)>
   ```

   New binding are enabled by default. To disable:

   ```
   (config firewall qos 2)> enable false
   (config firewall qos 2)>
   ```

4. (Optional) Set a label for the new binding:

   ```
   (config firewall qos 2)> label my_binding
   (config firewall qos 2)>
   ```

5. Set the interface to queue egress packets on. The binding will only match traffic that is being sent out on this interface:

   a. Use the **?** to determine available interfaces:

   b. Set the interface. For example:

      ```
      (config firewall qos 2)> interface /network/interface/eth1
      (config firewall qos 2)>
      ```

6. (Optional) Set the maximum egress bandwidth of the interface, in megabits, allocated to this binding.

   ```
   (config firewall qos 2)> bandwidth int
   (config firewall qos 2)>
   ```

   where *int* is an integer between **1** and **1000**. Typically, this should be 95% of the available bandwidth. The default is **95**.

7. Create a policy for the binding:

   At least one policy is required for each binding. Each policy can contain up to 30 rules.

   a. Change to the policy node of the configuration:

      ```
      (config firewall qos 2)> policy
      (config firewall qos 2 policy)>
      ```

b. Add a policy:

```
(config firewall qos 2 policy)> add end
(config firewall qos 2 policy 0)>
```

New QoS binding policies are enabled by default. To disable:

```
(config firewall qos 2 policy 0)> enable false
(config firewall qos 2 policy 0)>
```

c. (Optional) Set a label for the new binding policy:

```
(config firewall qos 2 policy 0)> label my_binding_policy
(config firewall qos 2 policy 0)>
```

d. Set a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.

The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.

```
(config firewall qos 2 policy 0)> weight int
(config firewall qos 2 policy 0)>
```

where *int* is any integer between **1** and **65535**. The default is **10**.

e. Set the maximum delay before the transmission of packets. A lower number means that the packets will be scheduled more quickly for transmission.

```
(config firewall qos 2 policy 0)> latency int
(config firewall qos 2 policy 0)>
```

where *int* is any integer, **1** or greater. The default is **100**.

f. To identify this policy as a fall-back policy:

```
(config firewall qos 2 policy 0)> default true
(config firewall qos 2 policy 0)>
```

The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped. If the policy is not a fall-back policy, you must configure at least one rule:

i. Change to the rule node of the configuration:

```
(config firewall qos 2 policy 0)> rule
(config firewall qos 2 policy 0 rule)>
```

ii. Add a rule:

```
(config firewall qos 2 policy 0 rule)> add end
(config firewall qos 2 policy 0 rule 0)>
```

New QoS binding policy rules are enabled by default. To disable:

```
(config firewall qos 2 policy 0 rule 0)> enable false
(config firewall qos 2 policy 0 rule 0)>
```

iii. (Optional) Set a label for the new binding policy rule:

```
(config firewall qos 2 policy 0 rule 0)> label my_binding_policy_
rule
(config firewall qos 2 policy 0 rule 0)>
```

iv. Set the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.

```
(config firewall qos 2 policy 0 rule 0)> tos value
(config firewall qos 2 policy 0 rule 0)>
```

where value is a hexadecimal number. See https://www.tucny.com/Home/dscp-tos for a list of common TOS values.

v. Set the IP protocol matching criteria for this rule:

```
(config firewall qos 2 policy 0 rule 0)> protocol value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is one of **tcp**, **udp**, or **any**.

vi. Set the source port to define a source traffic matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> srcport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

vii. Set the destination port to define a destination matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> dstport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

viii. Set the source address type:

```
(config network qos 2 policy 0 rule 0)> src type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any**: Source traffic from any address will be matched.

  See Firewall configuration for more information about firewall zones.
- **interface**: Only traffic from the selected interface will be matched. Set the interface:

    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

    ```
    (config network qos 2 policy 0 rule 0)> src interface
    /network/interface/eth1
    (config network qos 2 policy 0 rule 0)>
    ```

- **address**: Only traffic from the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

  ```
  (config network qos 2 policy 0 rule 0)> src address value
  (config network qos 2 policy 0 rule 0)>
  ```

  where value uses the format ***IPv4_address***[**/*netmask***], or **any** to match any IPv4 address.
- **address6**: Only traffic from the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

  ```
  (config network qos 2 policy 0 rule 0)> src address6 value
  (config network qos 2 policy 0 rule 0)>
  ```

  where value uses the format ***IPv6_address***[**/*prefix_length***], or **any** to match any IPv6 address.
- **mac**: Only traffic from the MAC address typed in **MAC address** will be matched. Set the MAC address to be matched:

  ```
  (config network qos 2 policy 0 rule 0)> src mac MAC_address
  (config network qos 2 policy 0 rule 0)>
  ```

ix. Set the destination address type:

```
(config network qos 2 policy 0 rule 0)> dst type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any**: Traffic destined for anywhere will be matched.

  See Firewall configuration for more information about firewall zones.
- **interface**: Only traffic destined for the selected **Interface** will be matched. Set the interface:

    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

    ```
    (config network qos 2 policy 0 rule 0)> dst interface
    /network/interface/eth1
    (config network qos 2 policy 0 rule 0)>
    ```

- **address**: Only traffic destined for the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv4_address***[***/netmask***], or **any** to match any IPv4 address.

- **address6**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address6 value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv6_address***[***/prefix_length***], or **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

8. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

System administration

This chapter contains the following topics:

Review device status

You can review the system of your device from either the **Status** page of the Web interface, or from the command line:

WebUI

To display system information:

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **Status**.

   A secondary menu appears, along with a status panel.
3. On the secondary menu, click to display the details panel for the status you want to view.

Command line

To display system information, use the show system command.

- Show basic system information:
  1. Log into the Connect EZ command line as a user with Admin access.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. Enter **show system** at the prompt:

```
> show system

  Model                     : Digi Connect EZ
  Serial Number             : Connect EZ-000065
  SKU                       : Connect EZ
  Hostname                  : Connect EZ
  MAC Address               : DF:DD:E2:AE:21:18

  Hardware Version          : 50001947-01 1P
  Firmware Version          : 22.2.9.85
  Alt. Firmware Version     : 22.2.9.85
  Alt. Firmware Build Date : Thurs, 03 March 2022 10:16:23
  Bootloader Version        : 19.7.23.0-15f936e0ed

  Current Time              : Thurs, 03 March 2022 10:16:23 +0000
  CPU                       : 1.4%
  Uptime                    : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Temperature               : 40C

>
```

- Show more detailed system information:
  1. Log into the Connect EZ command line as a user with Admin access.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. Enter **show system verbose** at the prompt:

```
> show system verbose

  Model                    : Digi Connect EZ
  Serial Number            : Connect EZ-000065
  SKU                      : Connect EZ
  Hostname                 : Connect EZ
  MAC Address              : DF:DD:E2:AE:21:18

  Hardware Version         : 50001947-01 1P
  Firmware Version         : 22.2.9.85
  Alt. Firmware Version    : 22.2.9.85
  Alt. Firmware Build Date : Thurs, 03 March 2022 10:16:23
  Bootloader Version       : 19.7.23.0-15f936e0ed
  Schema Version           : 715

  Timezone                 : UTC
  Current Time             : Thurs, 03 March 2022 10:16:23 +0000
  CPU                      : 1.4%
  Uptime                   : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Load Average             : 0.01, 0.03, 0.02
  RAM Usage                : 119.554MB/1878.984MB(6%)
  Temperature              : 40C
  Disk
  ----
  Load Average             : 0.09, 0.10, 0.08
  RAM Usage                : 127.843MB/1880.421MB(6%)
  Disk /etc/config Usage   : 18.421MB/4546.371MB(0%)
  Disk /opt Usage          : -4523.-46MB/549.304MB(-822%)
  Disk /overlay Usage      : MB/MB(%)
  Disk /tmp Usage          : 0.007MB/256.0MB(0%)
  Disk /var Usage          : 1.765MB/256.0MB(1%)

>
```

Configure system information

You can configure information related to your Connect EZ device, such as providing a name and location for the device.

Configuration items

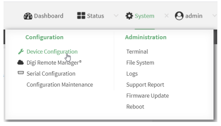
- A name for the device.
- The name of a contact for the device.

- The location of the device.
- A description of the device.
- A banner that will be displayed when users access terminal services on the device.

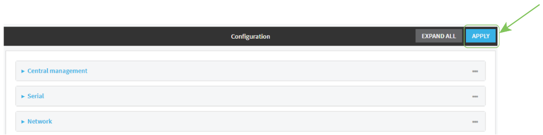
To enter system information:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System**.
4. For **Name**, type a name for the device. This name will appear in log messages and at the command prompt.
5. For **Contact**, type the name of a contact for the device.
6. For **Location**, type the location of the device.
7. For **Banner**, type a banner message that will be displayed when users log into terminal services on the device.
8. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Set a name for the device. This name will appear in log messages and at the command prompt.

   ```
   (config)> system name 192.168.3.1
   192.168.3.1(config)>
   ```

4. Set the contact for the device:

```
192.168.3.1(config)> system contact "Jane User"
192.168.3.1(config)>
```

5. Set the location for the device:

```
192.168.3.1(config)> system location "9350 Excelsior Blvd., Suite 700,
Hopkins, MN"
192.168.3.1(config)>
```

6. Set the banner for the device. This is displayed when users access terminal services on the device.

```
192.168.3.1(config)> system banner "Welcome to the Digi Connect EZ."
192.168.3.1(config)>
```

7. Save the configuration and apply the change:

```
192.168.3.1(config)> save
Configuration saved.
192.168.3.1>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Update system firmware

The Connect EZ operating system firmware images consist of a single file with the following naming convention:

***platform-version*.bin**

For example, **Connect EZ-22.2.9.85.bin**.

Manage firmware updates using Digi Remote Manager

If you have a network of many devices, you can use Digi Remote Manager **Profiles** to manage firmware updates. Profiles ensure all your devices are running the correct firmware version and that all newly installed devices are updated to that same version. For more information, see the **Profiles** section of the *Digi Remote Manager User Guide*.

Certificate management for firmware images

The system firmware files are signed to ensure that only Digi-approved firmware load onto the device. The Connect EZ device validates the system firmware image as part of the update process and only successfully updates if the system firmware image can be authenticated.

Downgrading

Downgrading to an earlier release of the firmware may result in the device configuration being erased.

Downgrading from firmware version 22.2.9.x

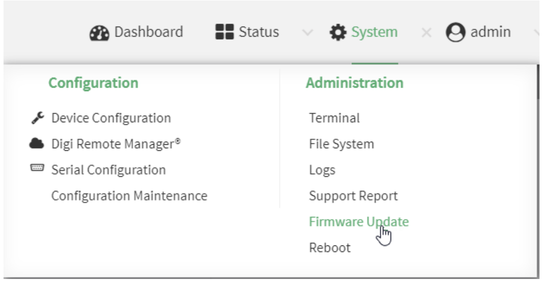
Beginning with firmware version 22.2.9.x, the Connect EZ device uses certificate-based communication for enhanced security when connecting to Digi Remote Manager. If you downgrade your firmware from version 22.2.9.x to version 21.11.x or previous, your device will no longer be able to communicate with Remote Manager.

To remedy this issue, select the device in Remote Manager and select **Actions** > **Reset Device Certificate**.

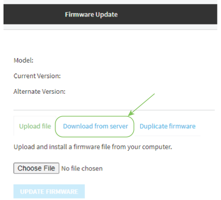
Update firmware over the air (OTA) from the Digi firmware server

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.



3. Click **Download from server**.



Upload and install a firmware file from your computer.

4. For **Version:**, select the appropriate version of the device firmware.
5. Click **Update Firmware**.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. >Use the **system firmware ota check** command to determine if new modem firmware is available on the Digi firmware repository.

```
> system firmware ota check
Current firmware version is 21.11.60.63
Checking for latest Connect EZ firmware...
Newest firmware version available to download is '22.2.9.85'
```

```
Device firmware update from '21.11.60.63' to '22.2.9.85' is needed
>
```

3. Use the **modem firmware ota list** command to list available firmware on the Digi firmware repository.

   ```
   > system firmware ota list
   21.11.60.63
   22.2.9.85
   >
   ```

4. Perform an OTA firmware update:
   - To perform an OTA firmware update by using the most recent available firmware from the Digi firmware repository:
     a. Update the firmware:

        ```
        > system firmware ota update
        Downloading firmware version '22.2.9.85'...
        Downloaded firmware /tmp/cli_firmware.bin remaining
        Applying firmware version '22.2.9.85'...
        41388K
        netflash: got "/tmp/cli_firmware.bin", length=42381373
        netflash: authentication successful
        netflash: vendor and product names are verified.
        netflash: programming FLASH device /dev/flash/image1
        41408K 100%
        Firmware update completed, reboot device
        >
        ```

     b. Reboot the device:

        ```
        > reboot
        >
        ```

   - To perform an OTA firmware update by using a specific version from the Digi firmware repository, use the **version** parameter to identify the appropriate firmware version as determined by using **system firmware ota list** command. For example:
     a. Update the firmware:

        ```
        > system firmware ota update version 22.2.9.85
        Downloading firmware version '22.2.9.85'...
        Downloaded firmware /tmp/cli_firmware.bin remaining
        Applying firmware version '22.2.9.85'...
        41388K
        netflash: got "/tmp/cli_firmware.bin", length=42381373
        netflash: authentication successful
        netflash: vendor and product names are verified.
        netflash: programming FLASH device /dev/flash/image1
        41408K 100%
        Firmware update completed, reboot device
        >
        ```

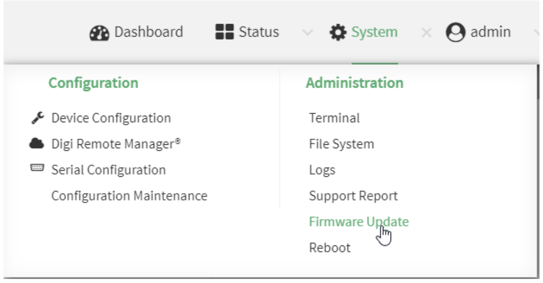
b. Reboot the device:

```
> reboot
>
```

Update firmware from a local file

WebUI

1. Download the Connect EZ operating system firmware from the Digi Support FTP site to your local machine.
2. Log into the Connect EZ WebUI as a user with Admin access.
3. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.



4. Click **Choose file**.
5. Browse to the location of the firmware on your local file system and select the file.
6. Click **Update Firmware**.

Command line

1. Download the Connect EZ operating system firmware from the Digi Support FTP site to your local machine.
2. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
3. Load the firmware image onto the device:

   ```
   > scp host hostname-or-ip user username remote remote-path local local-
   path to local
   ```

   where:

   - *hostname-or-ip* is the hostname or ip address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
   - *local-path* is the location on the Connect EZ device where the copied file will be placed.

   For example:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ-
22.2.9.85.bin local /etc/config/ to local
admin@192.168.4.1's password: adminpwd
Connect EZ-22.2.9.85.bin                       100%    36MB    11.1MB/s        00:03
>
```

4. Verify that the firmware file has been successfully uploaded to the device:

```
> ls /etc/config/scripts
-rw-r--r--    1 root     root      37511229 May 16 20:10 Connect EZ-
22.2.9.85.bin
-rw-r--r--    1 root     root          2580 May 16 16:44 accns.json
...
>
```

5. Update the firmware by entering the system firmware update command, specifying the firmware file name:

```
> system firmware update file Connect EZ-22.2.9.85.bin
36632K
netflash: got "/etc/config/Connect EZ-22.2.9.85.bin", length=37511229
netflash: authentication successful
netflash: programming FLASH device /dev/flash/image
36633K 100%
Firmware update completed, reboot device
>
```

6. Reboot the device to run the new firmware image using the reboot command.

```
> reboot
Rebooting system
>
```

7. Once the device has rebooted, log into the Connect EZ's command line as a user with Admin access and verify the running firmware version by entering the show system command.

```
> show system

 Hostname                 : Connect EZ
 FW Version               : 22.2.9.85
 MAC                      : 0040FF800120
 Model                    : Digi Connect EZ
 Current Time             : Thurs, 03 March 2022 10:16:23 +0000
 Uptime                   : 42 seconds (42s)

>
```

Dual boot behavior

By default, the Connect EZ device stores two copies of firmware in two flash memory banks:

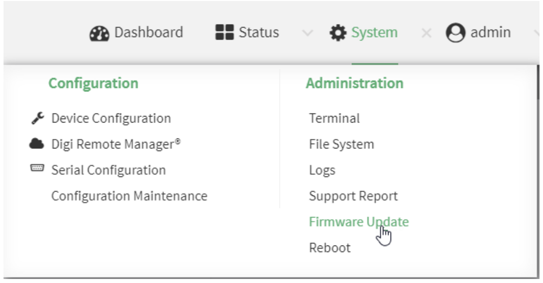
- The current firmware version that is used to boot the device.
- A copy of the firmware that was in use prior to your most recent firmware update.

When the device reboots, it will attempt to use the current firmware version. If the current firmware version fails to load after three consecutive attempts, it is marked as invalid and the device will use the previous firmware version stored in the alternate memory bank.

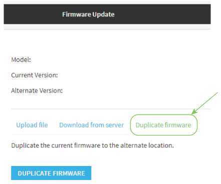
If the device consistently looses power during the boot process, this may result in the current firmware being marked as invalid and the device downgrading to a previous version of the firmware. As a result of this behavior, you can use the following procedure to guarantee that the same firmware is stored in both memory banks:

☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.



3. Click **Duplicate firmware**.



Duplicate the current firmware to the alternate location.

4. Click **Duplicate Firmware**.

⌨ Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Duplicate the firmware:

```
> system duplicate-firmware
>
```

Reboot your Connect EZ device

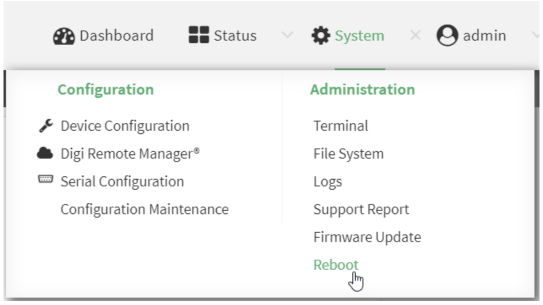
You can reboot the Connect EZ device immediately or schedule a reboot for a specific time every day.

Note You may want to save your configuration settings to a file before rebooting. See Save configuration to a file.

Reboot your device immediately

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. From the main menu, click **System**.
3. Click **Reboot**.



4. Click **Reboot** to confirm that you want to reboot the device.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

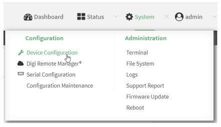
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the prompt, type:

```
> reboot
```

Schedule reboots of your device

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Select **System** > **Scheduled tasks**.
4. For **Reboot time**, enter the time of the day that the device should reboot, using the format *HH*:*MM*. The device will reboot at this time every day.

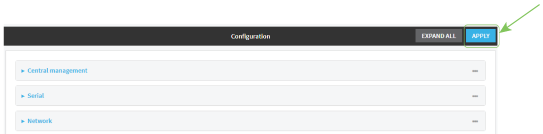
If **Reboot time** is set, but the device is unable to synchronize its time with an NTP server, the device will reboot after it has been up for 24 hours. See System time for information about configuring NTP servers. If **Reboot window** is set, the reboot will occur during a random time within the reboot window.

5. For **Reboot window**, enter the maximum random delay that will be added to **Reboot Time**.

   Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h**|**m**|**s**}.

   For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.
   The default is **10m**, and the maximum allowed time is **24h**.

6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the reboot time:

```
(config>> system schedule reboot_time time
(config)>
```

   where *time* is the time of the day that the device should reboot, using the format *HH*:*MM*. For example, the set the device to reboot at two in the morning every day:

```
(config>> system schedule reboot_time 02:00
(config)>
```

   If **reboot_time** is set, but the device is unable to synchronize its time with an NTP server, the device will reboot after it has been up for 24 hours. See System time for information about configuring NTP servers. If **reboot_window** is set, the reboot will occur during a random time within the reboot window.

4. Set the maximum random delay that will be added to **reboot_time**:

```
(config>> system schedule reboot_window value
(config)>
```

   where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

   For example, to set **reboot_window** to ten minutes, enter either **10m** or **600s**:

```
(config)> system schedule reboot_window 600s
(config)>
```

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Erase device configuration and reset to factory defaults

You can erase the device configuration in the WebUI, at the command line, or by using the **RESET** button on the device. Erasing the device configuration performs the following actions:

- Clears all configuration settings. When the device restarts, it uses the factory default configuration.
- Deletes all user files including Python scripts.
- Clears event and system log files.

Additionally, if the **RESET** button is used to erase the configuration, pressing the **RESET** button a second time immediately after the device has rebooted:

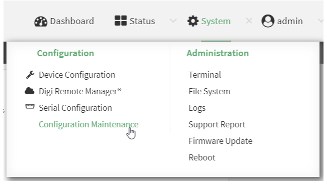
- Erases all automatically generated certificates and keys.
- With firmware release 22.2.9.x and newer, erases the client-side certificate used for communication with Digi Remote Manager.

  If you are using Digi Remote Manager with firmware release 22.2.9.x and newer, by default the device uses a client-side certificate for communication with Remote Manager. If the client-side certificate is erased, you must use the Remote Manager interface to reset the certificate.

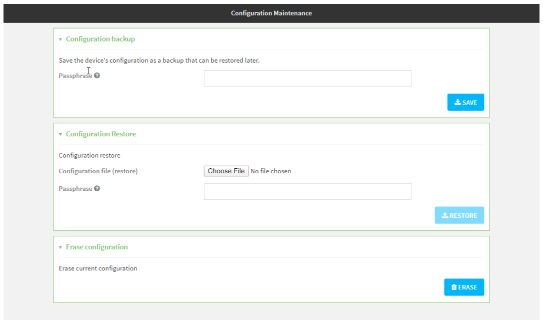
You can also reset the device to the default configuration without removing scripts, keys, and logfiles by using the **revert** command.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.



The **Configuration Maintenance** windows is displayed.



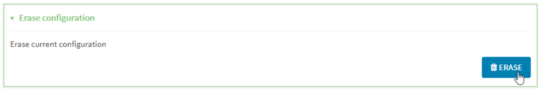
Save the device's configuration as a backup that can be restored later.

Configuration restore

No file chosen

Erase current configuration

3. In the **Erase configuration** section, click **ERASE**.



Erase current configuration

4. Click **CONFIRM**.
5. After resetting the device:
   a. Connect to the Connect EZ by using the serial port or by using an Ethernet cable to connect the Connect EZ **ETH2** port to your PC.
   b. Log into the Connect EZ:

      User name: Use the default user name: **admin**.

      Password: Use the unique password printed on the bottom label of the device (or the printed label included in the package).
   c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the following:

```
> system factory-erase
```

3. After resetting the device:
   a. Connect to the Connect EZ by using the serial port or by using an Ethernet cable to connect the Connect EZ **ETH2** port to your PC.
   b. Log into the Connect EZ:

      User name: Use the default user name: **admin**.

      Password: Use the unique password printed on the bottom label of the device (or the printed label included in the package).
   c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

Reset the device by using the RESET button.

1. Locate the **RESET** button on your device.
2. Press the **RESET** button perform a device reset. The **RESET** button has the following modes:
   - **Configuration reset**:
     - Press and release the **RESET** button .
     - The device reboots automatically and resets to factory defaults. This does not remove any automatically generated certificates and keys.
   - **Full device reset**:
     - After the device reboots from the first button press, immediately press and releasethe **RESET** button again.
     - The device reboots again and resets to factory defaults, as well as also removing generated certificates and keys.
3. After resetting the device:
   a. Connect to the Connect EZ by using the serial port or by using an Ethernet cable to connect the Connect EZ **ETH2** port to your PC.

   b. Log into the Connect EZ:

      User name: Use the default user name: **admin**.

      Password: Use the unique password printed on the bottom label of the device (or the printed label included in the package).

   c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

Reset the device with the revert command

You can reset the device to the default configuration without removing scripts, keys, and logfiles by using the **revert** command:

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. At the config prompt, enter **revert**:

   ```
   (config)> revert
   (config)>
   ```
4. Set the password for the admin user prior to saving the changes:

   ```
   (config)> auth user admin password pwd
   (config)>
   ```
5. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure the Connect EZ device to use custom factory default settings

You can configure your Connect EZ device to use custom factory default settings. This way, when you erase the device's configuration, the device will reset to your custom configuration rather than to the original factory defaults.

Note To clear the custom default configuration, press the RESET button, wait for the device to reboot, then press the RESET button again.

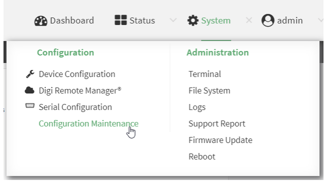
Required configuration items

- Custom factory default file

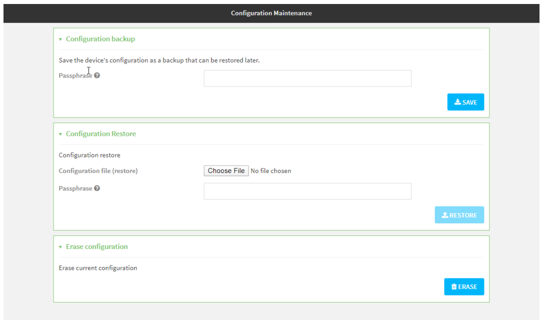
WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. Configure your Connect EZ device to match the desired custom factory default configuration.

   For example, you may want to configure the device to use a custom APN or a particular network configuration, so that when you reset the device to factory defaults, it will automatically have your required network configuration.
3. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.

   The **Configuration Maintenance** windows is displayed.

   
   Configuration Maintenance

   ▾ Configuration backup

   Save the device's configuration as a backup that can be restored later.

   Passphrase

   ▾ Configuration Restore

   Configuration restore

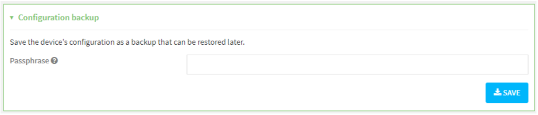
   Configuration file (restore) Choose File No file chosen

   Passphrase

   ▾ Erase configuration

   Erase current configuration

4. In the **Configuration backup** section, click **SAVE**.



▾ Configuration backup

Save the device's configuration as a backup that can be restored later.

Passphrase ?

Do not set a **Passphrase** for the configuration backup. The file will be downloaded using your browser's standard download process.

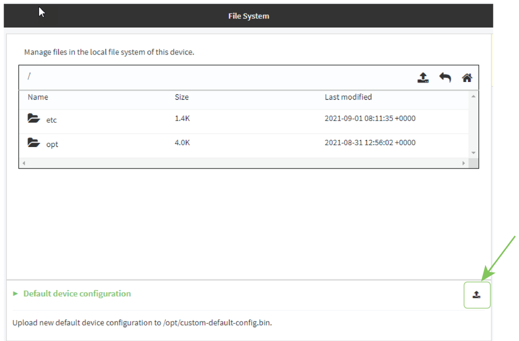
5. After the configuration backup file has been downloaded, rename the file to:

custom-default-config.bin

6. Upload the file to the device:

a. From the main menu, select **System** > **Filesystem**.

b. Under **Default device configuration**, click ⬆.



File System

Manage files in the local file system of this device.

/

Name	Size	Last modified
etc	1.4K	2021-09-01 08:11:35 +0000
opt	4.0K	2021-08-31 12:56:02 +0000

▸ Default device configuration

Upload new default device configuration to /opt/custom-default-config.bin.

c. Select the file from your local file system.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Enter the following:

```
> system backup / type custom-defaults
Backup saved as /opt/custom-default-config.bin
>
```

3. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Locate the device by using the Find Me feature

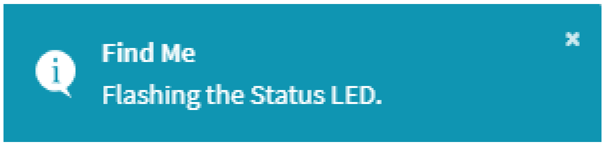
Use the **Find Me** feature to cause LEDs on the device to blink, which can help you to identify the specific device. For the Connect EZ, the Power LED blinks when the Find Me feature is in use.

To use this feature:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **Find Me**.

   A notification message appears, noting that the LED is flashing on the device. Click the **x** in the message to close it.

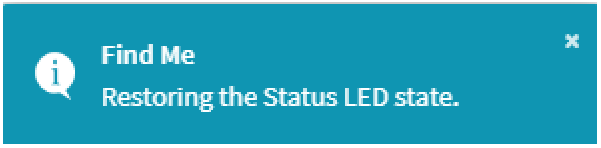
   

   Find Me

   Flashing the Status LED.

3. On the menu, click **System** again. Ablue circle next to **Find Me** is blinking, indicating that the **Find Me** feature is active.
4. To deactivate the **Find Me** feature, click **System** and click **Find Me** again.

   A notification message appears, noting that the LED is no longer flashing on the device. Click the **x** in the message to close it.

   Find Me

   Restoring the Status LED state.

⌨ Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To activate the **Find Me** feature, at the prompt, type the following at the command prompt:

```
> system find-me on
>
```

3. To deactivate the **Find Me** feature, type the following at the command prompt:

```
> system find-me off
>
```

4. To determine the status of the **Find Me** feature, type the following at the command prompt:

```
> system find-me status
off
>
```

Configuration files

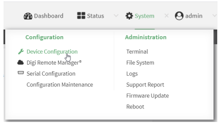
The Connect EZ configuration file, /etc/config/accns.json, contains all configuration changes that have been made to the device. It does not contain the complete device configuration; it only contains changes to the default configuration. Both the default configuration and the changes contained in the accns.json file are applied when the device reboots.

Save configuration changes

When you make changes to the Connect EZ configuration, the changes are not automatically saved. You must explicitly save configuration changes, which also applies the changes. If you do not save configuration changes, the system discards the changes.

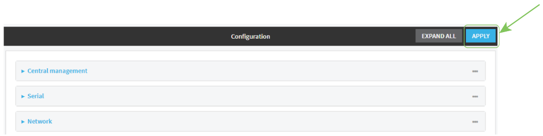
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Make any necessary configuration changes.
4. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Make any necessary configuration changes.
4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

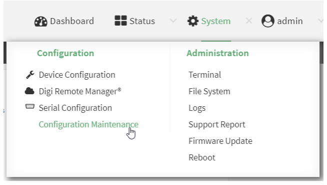
Save configuration to a file

You can save your Connect EZ device's configuration to a file and use this file to restore the configuration, either to the same device or to similar devices.

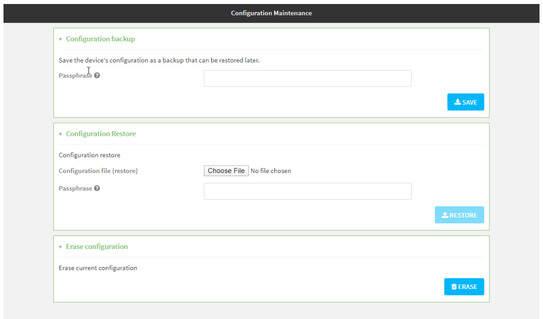
WebUI

This procedure creates a binary archive file containing the device's configuration, certificates and keys, and other information.

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.

   The **Configuration Maintenance** windows is displayed.

   Save the device's configuration as a backup that can be restored later.

   Configuration restore

   No file chosen

   Erase current configuration

3. In the **Configuration backup** section:
   a. (Optional) To encrypt the configuration using a passphrase, for **Passphrase (save/restore)**, enter the passphrase.
   b. Click **SAVE**.

   The file will be downloaded using your browser's standard download process.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the following:

```
> system backup path [passphrase passphrase] type type
```

where

- *path* is the location on the Connect EZ's filesystem where the configuration backup file should be saved.
- *passphrase* (optional) is a passphrase used to encrypt the configuration backup.
- *type* is the type of backup, either:
  - **archive**: Creates a binary archive file containing the device's configuration, certificates and keys, and other information.
  - **cli-config**: Creates a text file containing only the configuration changes.

For example:

```
> system backup /etc/config/scripts/ type archive
```

3. (Optional) Use **scp** to copy the file from your device to another host:

```
> scp host hostname-or-ip user username remote remote-path local local-
path to remote
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ device.

For example:

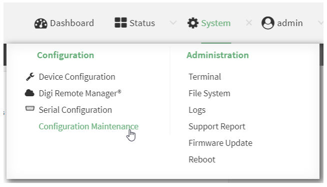
```
> scp host 192.168.4.1 user admin remote /home/admin/bin/ local
/etc/config/backup-archive-0040FF800120-19.05.17-19.01.17.bin to remote
```

Restore the device configuration

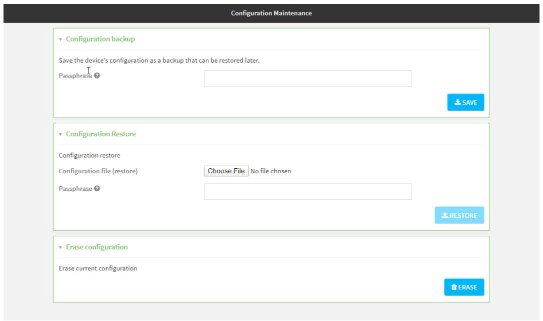
You can restore a configuration file to your Connect EZ device by using a backup from the device, or a backup from a similar device.

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.



The **Configuration Maintenance** windows is displayed.



Configuration Maintenance

Configuration backup

Save the device's configuration as a backup that can be restored later.

Passphrase

Configuration Restore

Configuration restore

Configuration file (restore) Choose File No file chosen

Passphrase

Erase configuration

Erase current configuration

3. In the **Configuration Restore** section:
   a. If a passphrase was used to create the configuration backup, for **Passphrase (save/restore)**, enter the passphrase.
   b. Under **Configuration Restore**, click **Choose File**.
   c. Browse to the system firmware file location on your local computer and select the file.
   d. Click **RESTORE**.
4. Click **CONFIRM**.

   The configuration will be restored and the device will be rebooted.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. If the configuration backup is on a remote host, use **scp** to copy the file from the host to your device:

```
> scp host hostname-or-ip user username remote remote-path local local-
path to local
```

   where:

   - *hostname-or-ip* is the hostname or ip address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
   - *local-path* is the location on the Connect EZ device where the copied file will be placed.

   For example:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/backup-archive-
0040FF800120-22.2.9.85-19.23.42.bin local /opt to local
```

3. Enter the following:

```
> system restore filepath [passphrase passphrase]
```

   where

- *filepath* is the the path and filename of the configuration backup file on the Connect EZ's filesystem (*local-path* in the previous step).
- *passphrase* (optional) is the passphrase to restore the configuration backup, if a passphrase was used when the backup was created.

For example:

```
> system restore /opt/backup-archive-0040FF800120-22.2.9.85-
19.23.42.bin
```

Schedule system maintenance tasks

You can configure tasks to be run during a specified maintenance window. When the device is within its maintenance window, firmware updates and Digi Remote Manager configuration checks will be performed.

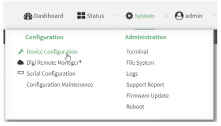
You can also schedule custom scripts to run during the maintenance window. See Configure scripts to run automatically for more information.

Required configuration items

- Events that trigger the maintenance window to begin.
- Whether all configured triggers, or only one of the triggers, must be met.
- The tasks to be performed. Options are:
  - Firmware updates.
  - Digi Remote Manager configuration check.
- Whether the device will check for updates to the device firmware.
- The frequency (daily, weekly, or monthly) that checks for firmware updates will run.

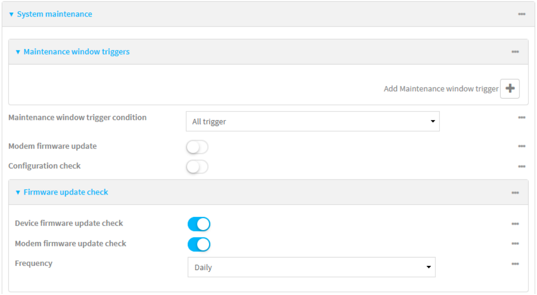
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks** > **System maintenance**.



▾ System maintenance

▾ Maintenance window triggers

Add Maintenance window trigger ✚

Maintenance window trigger condition: All trigger

Modem firmware update: ○

Configuration check: ○

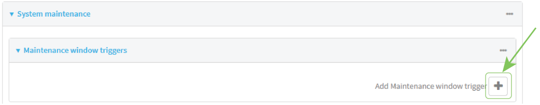
▾ Firmware update check

Device firmware update check: ●

Modem firmware update check: ●

Frequency: Daily

4. Click to expand **Maintenance window triggers**.
5. Click ✚ to add a maintenance window trigger.



6. For **Maintenance window trigger type**, select one of the following:
   - **Check if interface is up**, for **Test Interface**, select the interface.
   - **Time period for maintenance window**:
     a. Click to expand **Maintenance window**.
     b. For **Start time**, type the time of day that the maintenance window should start, using the syntax *HH*:*MM*. If **Start time** is not set, maintenance tasks are not scheduled and will not be run.

        The behavior of **Start time** varies depending on the setting of **Duration window**, which is configured in the next step.

        - If **Duration window** is set to **Immediately**, all scheduled tasks will begin at the exact time specified in **Start time**.
        - If **Duration window** is set to **24 hours**, **Start time** is effectively obsolete and the maintenance tasks will be scheduled to run at any time. Setting **Duration window** to **24 hours** can potentially overstress the device and should be used with caution.
        - If **Duration window** is set to any value other than to **Immediately** or **24 hours**, the maintenance tasks will run at a random time during the time allotted for the duration window.
        - If **Duration window** is set to one or more hours, the minutes field in **Start time** is ignored and the duration window will begin at the beginning of the specified hour.

     c. For **Duration window**, select the amount of time that the maintenance tasks will be run. If **Immediately** is selected, all scheduled tasks will begin at the exact time specified in **Start time**.
     d. For **Frequency**, select whether the maintenance window will be started every day, or once per week.
   - If **Check if Python Out-of-Service** is set, the maintenance window will only start if the Python Out-of-Service is set. See Use Python to set the maintenance window for further information.
7. (Optional) Click to enable **Device firmware update** to instruct the system to look for any updated device firmware during the maintenance window. If updated firmware is found, it will then be installed.

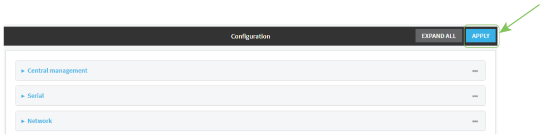
   Note If your device is managed by a Digi Remote Manager configuration, the configuration manages the device's firmware version. You should not enable this option.

8. The **Modem firmware update** option is not used with theConnect EZ.
9. (Optional) Click to enable **Configuration check** to allow for the configuration to be updated, including by custom scripts, during the maintenance window.
10. (Optional) Configure automated checking for device and modem firmware updates:
    a. Click to expand **Firmware update check**.
    b. **Device firmware update check** is enabled by default. This enables to automated checking for device firmware updates.
    c. **Modem firmware update check** is enabled by default. This enables to automated checking for modem firmware updates.

> **Note** The **Modem firmware update** option is not used with theConnect EZ. Any selection is ignored.

d. For Frequency, select how often automated checking for device and modem firmware should take place. Allowed values are **Daily**, **Weekly**, and **Monthly**. The default is **Daily**.

11. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure a system maintenance trigger:

   a. Add a trigger:

```
(config)> add system schedule maintenance trigger end
(config)>
```

   b. Set the type of trigger:

```
(config add system schedule maintenance trigger)> type value
(config)>
```

   where *value* is one of:

   - **interface_up**: If **interface_up** is set:

     i. Set the interface:

```
(config add system schedule maintenance trigger)> interface
value
(config)>
```

     ii. i. Use the **?** to determine available interfaces:

     ii. Set the interface. For example:

```
(config system schedule maintenance trigger 0)> interface
/network/interface/eth1
(config system schedule maintenance trigger 0)>
```

   - **out_of_service**: The maintenance window will only start if the Python Out-of-Service is set. See Use Python to set the maintenance window for further information.

- **time**: Configure a time period for the maintenance window:
    i. Configure the time of day that the maintenance window should start, using the syntax *HH*:*MM*. If the start time is not set, maintenance tasks are not scheduled and will not be run.

    ```
    (config system schedule maintenance trigger 0)> time from
    HH:MM
    (config system schedule maintenance trigger 0)>
    ```

    The behavior of the start time varies depending on the setting of the duration length, which is configured in the next step.

    - If the duration length is set to **0**, all scheduled tasks will begin at the exact time specified in the start time.
    - If the duration length is set to **24 hours**, the start time is effectively obsolete and the maintenance tasks will be scheduled to run at any time. Setting the duration length to **24 hours** can potentially overstress the device and should be used with caution.
    - If the duration length is set to any value other than to **0** or **24 hours**, the maintenance tasks will run at a random time during the time allotted for the duration window.
    - If the duration length is set to one or more hours, the minutes field in the start time is ignored and the duration window will begin at the beginning of the specified hour.

    ii. Configure the duration length (the amount of time that the maintenance tasks will be run). If **0** is used, all scheduled tasks will begin at the start time, defined in the previous step.

    ```
    (config system schedule maintenance trigger 0)> length num
    (config system schedule maintenance trigger 0)>
    ```

    where *num* is any whole number between **0** and **24**.

    iii. Configure the frequency that the maintenance tasks should be run:

    ```
    (config system schedule maintenance trigger 0)> frequency
    value
    (config system schedule maintenance trigger 0)>
    ```

    where *value* is either **daily** or **weekly**. **Daily** is the default.

4. (Optional)) Configure the device to look for any updated device firmware during the maintenance window. If updated firmware is found, it will then be installed. The device will look for updated firmware both on the local device and over the network, using a WAN connection.

    ```
    (config)> system schedule maintenance device_fw_update value
    (config)>
    ```

    where *value* is either **true** or **false**. **yes** or **no**, and **1** or **0** are also allowed.

Note If your device is managed by a Digi Remote Manager configuration, the configuration manages the device's firmware version. You should not enable this option.

5. (Optional) Configure automated checking for device and modem firmware updates:
   a. **Device firmware update check** is enabled by default. This enables to automated checking for device firmware updates. To disable:

   ```
   (config)> system schedule maintenance firmware_update_check device
   false
   (config)>
   ```

   b. **Modem firmware update check** is enabled by default. This enables to automated checking for modem firmware updates.

   ```
   (config)> system schedule maintenance firmware_update_check modem
   false
   (config)>
   ```

   c. Set how often automated checking for device and modem firmware should take place:

   ```
   (config)> system schedule maintenance frequency value
   (config)>
   ```

   where *value* is either **daily**, **weekly**, or **monthly**. **daily** is the default.
6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Disable device encryption

You can disable the cryptography on your Connect EZ device. This can be used to ship unused devices from overseas without needing export licenses from the country from which the device is being shipped.

When device encryption is disabled, the following occurs:

- The device is reset to the default configuration and rebooted.
- After the reboot:
  - Access to the device via the WebUI and SSH are disabled.
  - All internet connectivity is disabled, including WAN. Connectivity to central management software is also disabled.
  - All IP networks and addresses are disabled except for the default 192.168.210.1/24 network on the local LAN Ethernet port. DHCP server is also disabled.

The device can only be accessed by using telnet from a local machine connecting to the 192.168.210.1/24 network.

Disabling device encryption is not available in the WebUI. It can only be performed from the Admin CLI.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Disable encryption with the following command:

   ```
   > system disable-cryptography
   >
   ```
3. Type **exit** to exit the Admin CLI.

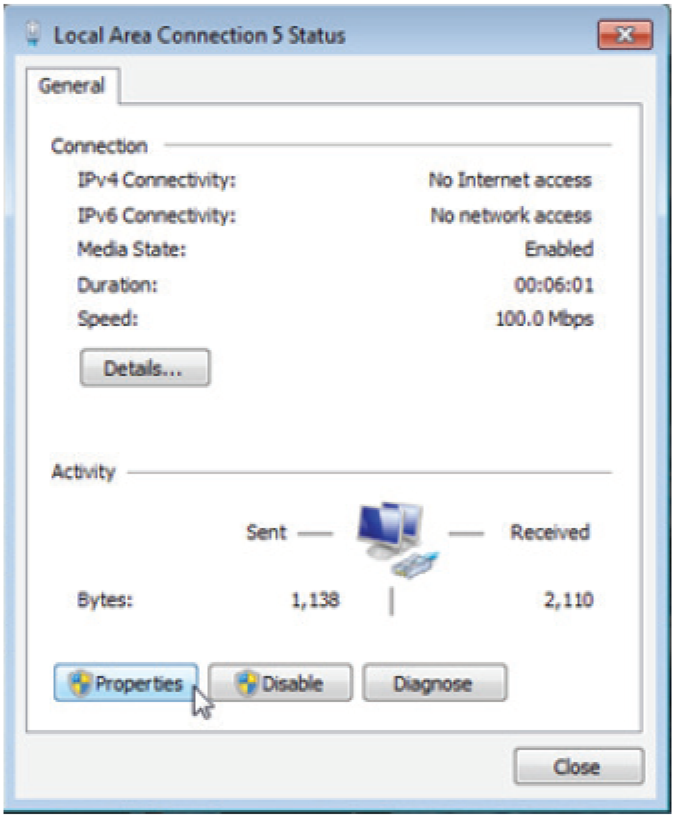
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Re-enable cryptography after it has been disabled.

To re-enable cryptography:

1. Configure your PC network to connect to the 192.168.210 subnet. For example, on a Windows PC:

a. Select the **Properties** of the relevant network connection on the Windows PC.



IPv4 Connectivity:	No Internet access
IPv6 Connectivity:	No network access
Media State:	Enabled
Duration:	00:06:01
Speed:	100.0 Mbps

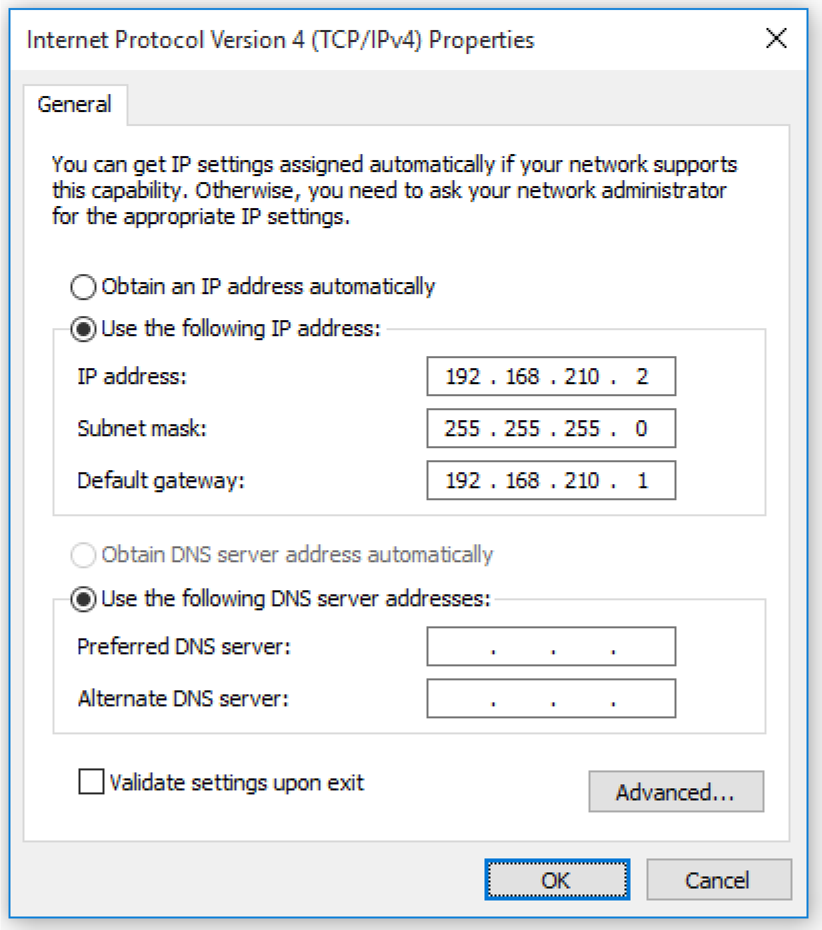
	Sent	Received
Bytes:	1,138	2,110

b. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.

c. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.

d. Configure with the following details:

- **IP address** for PC: 192.168.210.2
- **Subnet**: 255.255.255.0
- **Gateway**: 192.168.210.1



Internet Protocol Version 4 (TCP/IPv4) Properties

General

You can get IP settings assigned automatically if your network supports this capability. Otherwise, you need to ask your network administrator for the appropriate IP settings.

○ Obtain an IP address automatically

● Use the following IP address:

IP address: 192 . 168 . 210 . 2

Subnet mask: 255 . 255 . 255 . 0

Default gateway: 192 . 168 . 210 . 1

○ Obtain DNS server address automatically

● Use the following DNS server addresses:

Preferred DNS server: . . .

Alternate DNS server: . . .

□ Validate settings upon exit

2. Connect the PC's Ethernet port to the Ethernet port on your Connect EZ device.
3. Open a telnet session and connect to the Connect EZ device at the IP address of 192.168.210.1.
4. Log into the device:
   - Username: **admin**
   - Password: The default unique password for your device is printed on the device label.
5. At the shell prompt, type:

```
# rm /etc/config/.nocrypt
# flatfsd -i
```

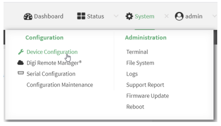
This will re-enable encryption and leave the device at its factory default setting.

Configure the speed of your Ethernet port

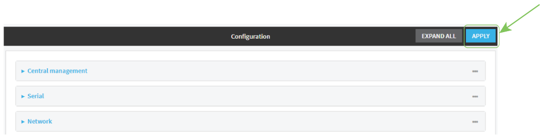
You can configure the speed of your Connect EZ device's Ethernet port.

☰ WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Device**.
4. For **Speed**, select the appropriate speed for the Ethernet port, or select **Auto** to automatically detect the speed. The default is **Auto**.
5. Click **Apply** to save the configuration and apply the change.

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network device eth_port value
```

   where:

   - *eth_port* is the name of the Ethernet port (for example, **eth**)
   - *value* is one of:
     - **10**—Sets the speed to 10 Mbps.
     - **100**—Sets the speed to 100 Mbps.
     - **1000**—Sets the speed to 1 Gbps. Available only for devices with Gigabit Ethernet ports.

       auto—Configures the device to automatically determine the best speed for the Ethernet port.

   The default is **auto**.
4. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Monitoring

This chapter contains the following topics:

intelliFlow

intelliFlow monitors system information, network data usage, and traffic information, and displays the information in a series of charts available in the local WebUI. To use intelliFlow, the Connect EZ must be powered on and you must have access to the local WebUI. Once you enable intelliFlow, the **Status** > **intelliFlow** option is available in the main menu. By default, intelliFlow is disabled.

intelliFlow provides charts on the following information:

- System utilisation
- Top data usage by host
- Top data usage by server
- Top data usage by service
- Host data usage over time

intelliFlow charts are dymanic; at any point, you can click inside the chart to drill down to view more granular information, and menu options allow you to change various aspects of the information being displayed.

Note When intelliFlow is enabled and the device is connected to Digi aView, it adds an estimated 50MB of data usage for the device by reporting the metrics to aView. intelliflow does not currently work with Digi Remote Manager.

Enable intelliFlow

Required configuration items

- Enable intelliFlow.

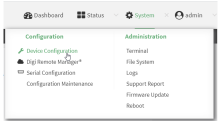
Additional configuration items

- The firewall zone for internal clients being monitored by intelliFlow.

To enable intelliFlow:

WebUI

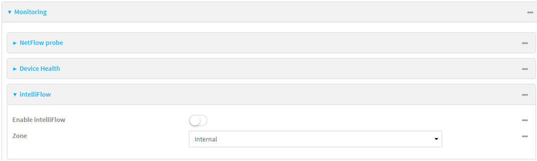
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

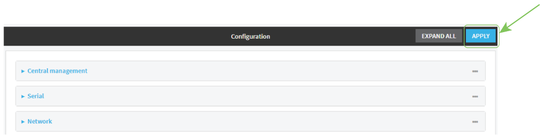
3. Click **Monitoring** > **intelliFlow**.

The intelliFlow configuration window is displayed.



Zone Internal

4. Click **Enable intelliFlow**.
5. For **Zone**, select the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone.
6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Enable IntelliFlow:

   ```
   (config)> monitoring intelliflow enable true
   ```
4. Set the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone:
   a. Determine available zones:

      ```
      (config)> monitoring intelliflow zone ?

      Zone: The firewall zone which is assigned to the network interface(s)
      that
      intelliFlow will see as internal clients.  intelliFlow relies on an
      internal to
      external relationship, where the internal clients are present on the
      zone specified.
      Format:
        any
        dynamic_routes
        edge
        external
        internal
        ipsec
        loopback
      ```

```
  setup
Default value: internal
Current value: internal

(config)>
```

b. Set the zone to be used by IntelliFlow:

```
(config)> monitoring intelliflow zone my_zone
```

5. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Use intelliFlow to display average CPU and RAM usage

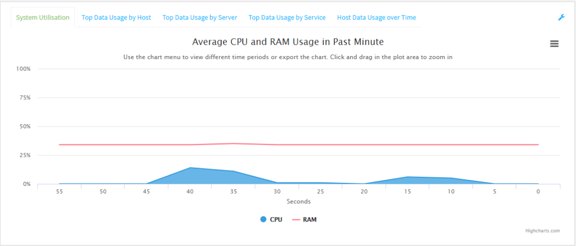
This procedure is only available from the WebUI.

To display display average CPU and RAM usage:

WebUI

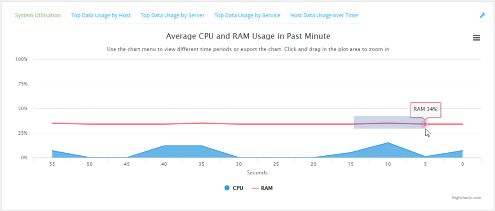
1. Log into the Connect EZ WebUI as a user with Admin access.
2. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
3. From the menu, click **Status** > **intelliFlow**.

The System Utilisation chart is displayed:


Average CPU and RAM Usage in Past Minute

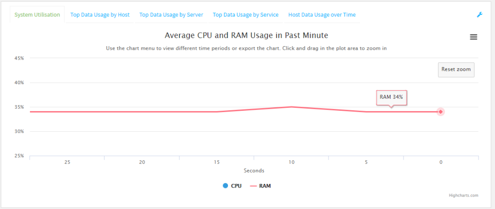
Use the chart menu to view different time periods or export the chart. Click and drag in the plot area to zoom in

- Display more granular information:
    1. Click and drag over an area in the chart to zoom into that area and provide more granular information.


Average CPU and RAM Usage in Past Minute

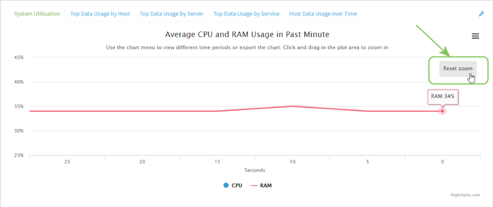
Use the chart menu to view different time periods or export the chart. Click and drag in the plot area to zoom in

    2. Release to display the selected portion of the chart:


Average CPU and RAM Usage in Past Minute

Use the chart menu to view different time periods or export the chart. Click and drag in the plot area to zoom in

3. Click **Reset zoom** to return to the original display:



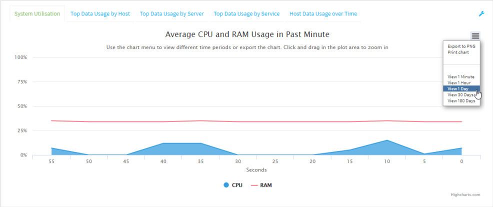
Use the chart menu to view different time periods or export the chart. Click and drag in the plot area to zoom in

- Change the time period displayed by the chart.

  By default, the **System utilisation** chart displays the average CPU and RAM usage over the last minute. You can change this to display the average CPU and RAM usage:

  - Over the last hour.
  - Over the last day.
  - Over the last 30 days.
  - Over the last 180 days.

  1. Click the menu icon (☰).
  2. Select the time period to be displayed.



Use the chart menu to view different time periods or export the chart. Click and drag in the plot area to zoom in

- Save or print the chart.

  1. Click the menu icon (☰).
  2. To save the chart to your local filesystem, select **Export to PNG**.
  3. To print the chart, select **Print chart**.

Use intelliFlow to display top data usage information

With intelliFlow, you can display top data usage information based on the following:

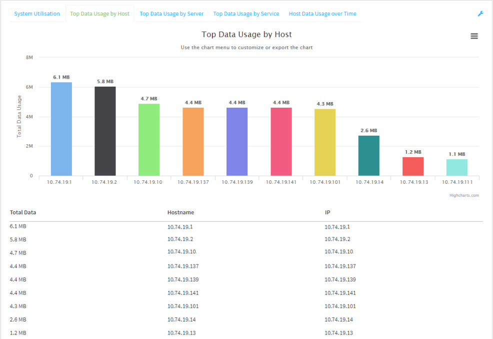
- Top data usage by host
- Top data usage by server
- Top data usage by service

To generate a top data usage chart:

☰ WebUI

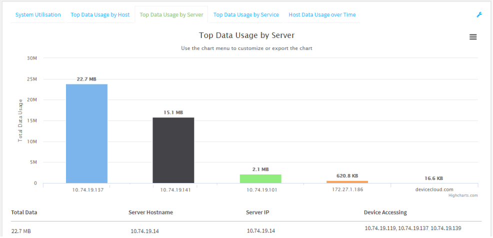
1. Log into the Connect EZ WebUI as a user with Admin access.
2. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
3. From the menu, click **Status** > **intelliFlow**.

4. Display a data usage chart:
   - To display the **Top Data Usage by Host** chart, click **Top Data Usage by Host**.



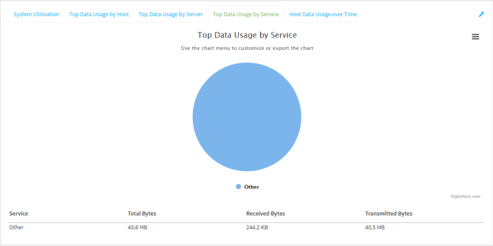
Total Data	Hostname	IP
6.1 MB	10.74.19.1	10.74.19.1
5.8 MB	10.74.19.2	10.74.19.2
4.7 MB	10.74.19.10.	10.74.19.10.
4.4 MB	10.74.19.137	10.74.19.137
4.4 MB	10.74.19.139	10.74.19.139
4.4 MB	10.74.19.141	10.74.19.141
4.3 MB	10.74.19.101	10.74.19.101
2.6 MB	10.74.19.14	10.74.19.14
1.2 MB	10.74.19.13	10.74.19.13

   - To display the **Top Data Usage by Server** chart, click **Top Data Usage by Server**.



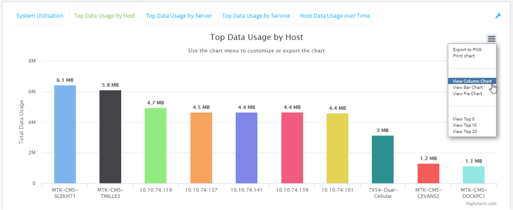
Total Data	Server Hostname	Server IP	Device Accessing
22.7 MB	10.74.19.14	10.74.19.14	10.74.19.119, 10.74.19.137, 10.74.19.139

   - To display the **Top Data Usage by Service** chart, click **Top Data Usage by Service**.


System Utilisation
Top Data Usage by Host
Top Data Usage by Server
Top Data Usage by Service
Host Data Usage over Time
Top Data Usage by Service
Use the chart menu to customize or export the chart
Other
Highcharts.com

Service	Total Bytes	Received Bytes	Transmitted Bytes
Other	40.8 MB	244.2 KB	40.5 MB

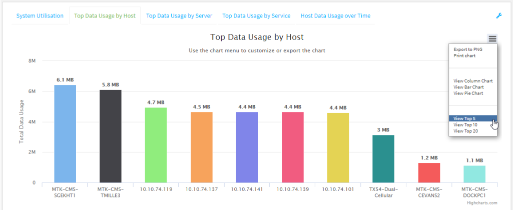
5. Change the type of chart that is used to display the data:
   a. Click the menu icon (☰).
   b. Select the type of chart.



6. Change the number of top users displayed.

   You can display the top five, top ten, or top twenty data users.

   a. Click the menu icon (☰).
   b. Select the number of top users to displayed.



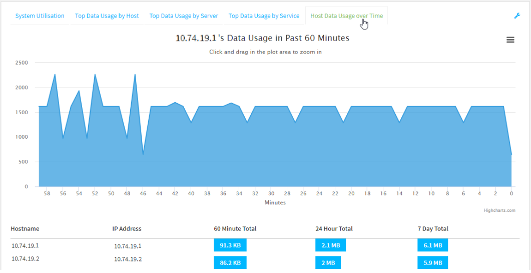
7. Save or print the chart.
   a. Click the menu icon (☰).
   b. To save the chart to your local filesystem, select **Export to PNG**.
   c. To print the chart, select **Print chart**.

Use intelliFlow to display data usage by host over time

To generate a chart displaying a host's data usage over time:

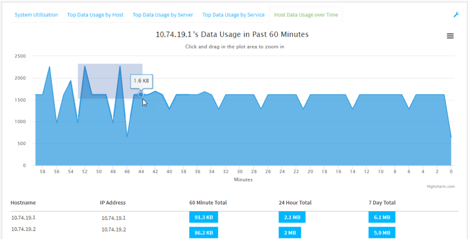
☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
3. From the menu, click **Status** > **intelliFlow**.
4. Click **Host Data Usage Over Time**.



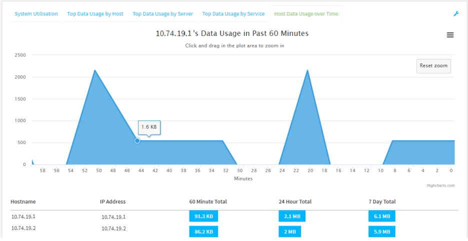
Hostname	IP Address	60 Minute Total	24 Hour Total	7 Day Total
10.74.19.1	10.74.19.1	91.3 KB	2.1 MB	6.1 MB
10.74.19.2	10.74.19.2	86.2 KB	2 MB	5.9 MB

- Display more granular information:
   a. Click and drag over an area in the chart to zoom into that area and provide more granular information.



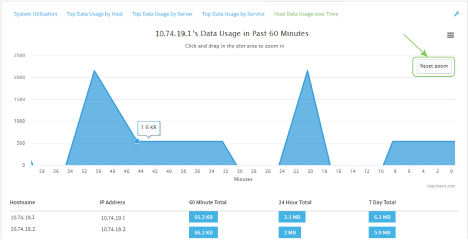
Hostname	IP Address	60 Minute Total	24 Hour Total	7 Day Total
10.74.19.1	10.74.19.1	91.3 KB	2.1 MB	6.1 MB
10.74.19.2	10.74.19.2	86.2 KB	2 MB	5.9 MB

b. Release to display the selected portion of the chart:



Hostname	IP Address	60 Minute Total	24 Hour Total	7 Day Total
10.74.19.1	10.74.19.1	91.3 KB	2.1 MB	6.1 MB
10.74.19.2	10.74.19.2	86.2 KB	2 MB	5.9 MB

c. Click **Reset zoom** to return to the original display:



Hostname	IP Address	60 Minute Total	24 Hour Total	7 Day Total
10.74.19.1	10.74.19.1	91.3 KB	2.1 MB	6.1 MB
10.74.19.2	10.74.19.2	86.2 KB	2 MB	5.9 MB

- Save or print the chart.
  a. Click the menu icon (☰).
  b. To save the chart to your local filesystem, select **Export to PNG**.
  c. To print the chart, select **Print chart**.

Configure NetFlow Probe

NetFlow probe is used to probe network traffic on the Connect EZ device and export statistics to NetFlow collectors.

Required configuration items

- Enable NetFlow.
- The IP address of a NetFlow collector.

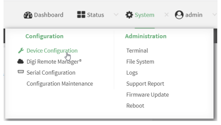
Additional configuration items

- The NetFlow version.
- Enable flow sampling and select the flow sampling technique.
- The number of flows from which the flow sampler can sample.
- The number of seconds that a flow is inactive before it is exported to the NetFlow collectors.
- The number of seconds that a flow is active before it is exported to the NetFlow collectors.
- The maximum number of simultaneous flows.
- A label for the NetFlow collector.
- The port of the NetFlow collector.
- Additional NetFlow collectors.

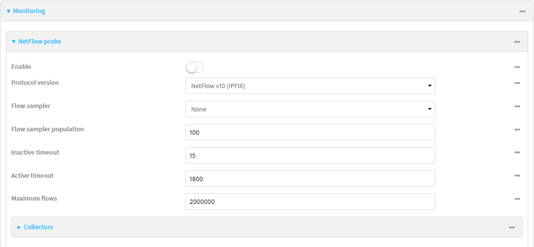
To probe network traffic and export statistics to NetFlow collectors:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Monitoring** > **NetFlow probe**.



▾ Monitoring

▾ NetFlow probe

Enable

Protocol version: NetFlow v10 (IPFIX)

Flow sampler: None

Flow sampler population: 100

Inactive timeout: 15

Active timeout: 1800

Maximum flows: 2000000

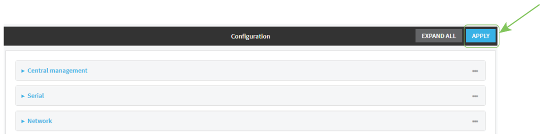
▸ Collectors

4. **Enable** NetFlow probe.
5. **Protocol version:** Select the **Protocol version**. Available options are:
   - **NetFlow v5**—Supports IPv4 only.
   - **NetFlow v9**—Supports IPv4 and IPv6.
   - **NetFlow v10 (IPFIX)**—Supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

   The default is **NetFlow v10 (IPFIX)**.
6. Enable **Flow sampler** by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows. Available options are:
   - **None**—No flow sampling method is used. Each flow is accounted.
   - **Deterministic**—Selects every *n*th flow, where *n* is the value of **Flow sampler population**.
   - **Random**—Randomly selects one out of every *n* flows, where *n* is the value of **Flow sampler population**.
   - **Hash**—Randomly selects one out of every *n* flows using the hash of the flow key, where *n* is the value of **Flow sampler population**.
7. For **Flow sampler population**, if you selected a flow sampler, enter the number of flows for the sampler. Allowed value is any number between **2** and **16383**. The default is **100**.
8. For **Inactive timeout**, type the the number of seconds that a flow can be inactive before sent to a collector. Allowed value is any number between **1** and **15**. The default is **15**.
9. For **Active timeout**, type the number of seconds that a flow can be active before sent to a collector. Allowed value is any number between **1** and **1800**. The default is **1800**.
10. For **Maximum flows**, type the maximum number of flows to probe simultaneously. Allowed value is any number between **0** and **2000000**. The default is **2000000**.

11. Add collectors:
    a. Click to expand **Collectors**.
    b. For **Add Collector**, click ✚.
    c. (Optional) Type a **Label** for the collector.
    d. For **Address**, type the IP address of the collector.
    e. (Optional) For **Port**, enter the port number used by the collector. The default is 2055.

    Repeat to add additional collectors.
12. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable NetFlow:

```
(config)> monitoring netflow enable true
(config)>
```

4. Set the protocol version:

```
(config)> monitoring netflow protocol version
                                                      (config)>
```

   where *version* is one of:
   - **v5**—NetFlow v5 supports IPv4 only.
   - **v9**—NetFlow v9 supports IPv4 and IPv6.
   - **v10**—NetFlow v10 (IPFIX) supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

   The default is **v10**.
1. Enable flow sampling by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows.

```
(config)> monitoring netflow sampler type
(config)>
```

where *type* is one of:

- **none**—No flow sampling method is used. Each flow is accounted.
- **deterministic**—Selects every *n*th flow, where *n* is the value of the flow sample population.
- **random**—Randomly selects one out of every *n* flows, where *n* is the value of the flow sample population.
- **hash**—Randomly selects one out of every *n* flows using the hash of the flow key, where *n* is the value of the flow sample population.

5. If you are using a flow sampler, set the number of flows for the sampler:

```
(config)> monitoring netflow sampler_population value
(config)>
```

where *value* is any number between **2** and **16383**. The default is **100**.

6. Set the number of seconds that a flow can be inactive before sent to a collector:

```
(config)> monitoring netflow inactive_timeout value
(config)>
```

where *value* is any is any number between **1** and **15**. The default is **15**.

7. Set the number of seconds that a flow can be active before sent to a collector:

```
(config)> monitoring netflow active_timeout value
(config)>
```

where *value* is any is any number between **1** and **1800**. The default is **1800**.

8. Set the maximum number of flows to probe simultaneously:

```
(config)> monitoring netflow max_flows value
(config)>
```

where *value* is any is any number between **0** and **2000000**. The default is **2000000**.

9. Add collectors:

   a. Add a collector:

   ```
   (config)> add monitoring netflow collector end
   (config monitoring netflow collector 0)>
   ```

   b. Set the IP address of the collector:

   ```
   (config monitoring netflow collector 0)> address ip_address
   (config monitoring netflow collector 0)>
   ```

   c. (Optional) Set the port used by the collector:

   ```
   (config monitoring netflow collector 0)> port port
   (config monitoring netflow collector 0)>
   ```

d. (Optional) Set a label for the collector:

```
(config monitoring netflow collector 0)> label "This is a collector."
(config monitoring netflow collector 0)>
```

Repeat to add additional collectors.

10. Save the configuration and apply the change:

```
(config monitoring netflow collector 0)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Central management

This chapter contains the following topics:

Digi Remote Manager support

Digi Remote Manager is a hosted remote configuration and management system that allows you to remotely manage a large number of devices. Remote Manager includes a web-based interface that you can use to perform device operations, such as viewing and changing device configurations and performing firmware updates. Remote Manager servers also provide a data storage facility. The Digi Remote Manager is the default cloud-based management system, and is enabled by default. You can also select to use Digi aView as the cloud-based management system. See *Digi aView User Guide* for information about aView.

To use Remote Manager, you must set up a Remote Manager account. To set up a Remote Manager account and learn more about Digi Remote Manager, go to www.digi.com/products/cloud/digi-remote-manager.

To learn more about Remote Manager features and functions, see the *Digi Remote Manager User Guide*.

Certificate-based enhanced security

Beginning with firmware version 22.2.9.x, the default URL for the device's Remote Manager connection is edp12.devicecloud.com. This URL is required to utilize the client-side certificate support. Prior to release 22.2.9.x, the default URL was my.devicecloud.com.

- If your Digi device is configured to use a non-default URL to connect to Remote Manager, updating the firmware will not change your configuration. However, if you erase the device's configuration, the Remote Manager URL will change to the default of edp12.devicecloud.com.
- If you perform a factory reset by pressing the **RESET** twice, the client-side certificate will be erased and you must use the Remote Manager interface to reset the certificate. Select the device in Remote Manager and select **Actions** > **Reset Device Certificate**.

The new URL of edp12.devicecloud.com is for device communication only. Use my.devicecloud.com for user interaction with remote manager.

Firewall issues

To utilize the certificate-based security, you may need to open a port through your firewall for egress connectivity to edp12.devicecloud.com. TCP port 3199 is used for communication with Remote Manager.

Configure Digi Remote Manager

By default, your Connect EZ device is configured to use central management using Digi Remote Manager.

Additional configuration options

These additional configuration settings are not typically configured, but you can set them as needed:

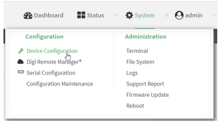
- Disable the Digi Remote Manager connection if it is not required. You can also configure an alternate cloud-based central management application.
- Change the reconnection timer.
- The non-cellular keepalive timeout.
- The keepalive count before the Remote Manager connection is dropped.

- SMS support.
- HTTP proxy server support.

To configure Digi Remote Manager:

WebUI

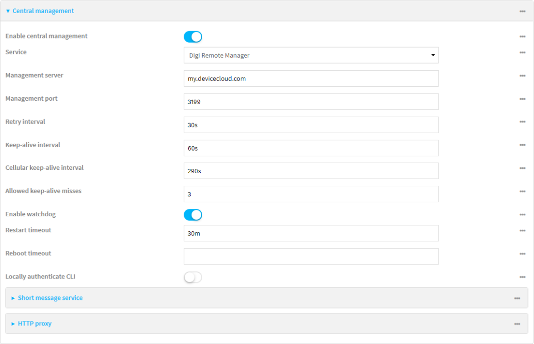
1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

3. Click **Central management**.

   The Central management configuration window is displayed.

   Enable central management ●
   Service: Digi Remote Manager
   Management server: my.devicecloud.com
   Management port: 3199
   Retry interval: 30s
   Keep-alive interval: 60s
   Cellular keep-alive interval: 290s
   Allowed keep-alive misses: 3
   Enable watchdog ●
   Restart timeout: 30m
   Reboot timeout:
   Locally authenticate CLI ○

   Digi Remote Manager support is enabled by default. To disable, click **Enable central management**.

4. (Optional) For **Service**, select either **Digi Remote Manager** or **Digi aView**. The default is **Digi Remote Manager**.
5. (Optional) For **Management server**, type the URL for the central management server.

   The default varies depending on firmware versions:

   - Firmware version 22.2.9.x and newer, the default is the edp12.devicecloud.com. This server is for device-connectivity only, and uses enhanced security through certificate-based communication. See Digi Remote Manager support for further infomation.
   - Firmware prior to version 22.2.9.x, the default is the Digi Remote Manager server, my.devicecloud.com.

6. (Optional) For **Management port**, type the destination port for the remote cloud services connection. The default is **3199**.
7. (Optional) For **Retry interval**, type the amount of time that the Connect EZ device should wait before reattempting to connect to remote cloud services after being disconnected. The default is 30 seconds.

   Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h**|**m**|**s**}.

   For example, to set **Retry interval** to ten minutes, enter **10m** or **600s**.

8. (Optional) For **Keep-alive interval**, type the amount of time that the Connect EZ device should wait between sending keep-alive messages to remote cloud services when using a non-cellular interface. The default is 60 seconds.

   Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h**|**m**|**s**}.

   For example, to set **Keep-alive interval** to ten minutes, enter **10m** or **600s**.

   Note The **Cellular keep-alive interval** is not used by the Connect EZ. Any entry is ignored.

9. (Optional) For **Allowed keep-alive misses**, type the number of allowed keep-alive misses. The default is **3**.

10. **Enable watchdog** is used to monitor the connection to remote cloud services. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default.
11. If **Enable watchdog** is enabled:
    a. (Optional) For **Restart Timeout**, type the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.

       Allowed values are any number of hours, minutes, or seconds, and take the format ***number***{**h**|**m**|**s**}.

       For example, to set **Restart Timeout** to ten minutes, enter **10m** or **600s**.

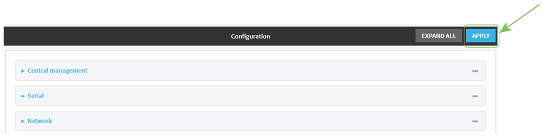
       The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.

    b. (Optional) For **Reboot Timeout**, type the amount of time to wait before rebooting the device, once the connection to the remote cloud servicesis down. By default, this option is not set, which means that the option is disabled.

       Allowed values are any number of hours, minutes, or seconds, and take the format ***number***{**h**|**m**|**s**}.

       For example, to set **Reboot Timeout** to ten minutes, enter **10m** or **600s**.

       The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.
12. (Optional) Enable **Locally authenticate CLI** to require a login and password to authenticate the user from the remote cloud services CLI. If disabled, no login prompt will be presented and the user will be logged in as **admin**. The default is disabled.
13. (Optional) Configure the Connect EZ device to communicate with remote cloud services by using SMS:
    a. Click to expand **Short message service**.
    b. **Enable** SMS messaging.
    c. For **Destination phone number**, type the phone number for the remote cloud services.
    d. (Optional) Type the **Service identifier**.
14. (Optional) Configure the Connect EZ device to communicate with remote cloud services by using an HTTP proxy server:
    a. Click to expand **HTTP Proxy**.
    b. **Enable** the use of an HTTP proxy server.
    c. For **Server**, type the hostname of the HTTP proxy server.
    d. For **Port**, type or select the port number on the HTTP proxy server that the device should connect to. The default is **2138**.
15. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. Digi Remote Manager support is enabled by default. To disable Digi Remote Manager support:

   ```
   (config)> cloud enable false
   (config)>
   ```

4. (Optional) Set the service:

   ```
   (config)> cloud service value
   (config)>
   ```

   where *value* is either:

   - **drm**: Digi Remote Manager
   - **aview**: Digi aView

   The default is Digi Remote Manager.

5. (Optional) Set the URL for the central management server. The default is the Digi Remote Manager server, my.devicecloud.com.

   ```
   (config)> cloud drm drm_url url
   (config)>
   ```

6. (Optional) Set the amount of time that the Connect EZ device should wait before reattempting to connect to the remote cloud services after being disconnected. The minimum value is ten seconds. The default is 30 seconds.

   ```
   (config)> cloud drm retry_interval value
   ```

   where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

   For example, to set **the retry interval** to ten minutes, enter either **10m** or **600s**:

   ```
   (config)> cloud drm retry_interval 600s
   (config)>
   ```

7. (Optional) Set the amount of time that the Connect EZ device should wait between sending keep-alive messages to the Digi Remote Manager when using a non-cellular interface. Allowed values are from 30 seconds to two hours. The default is 60 seconds.

   ```
   (config)> cloud drm keep_alive value
   (config)>
   ```

   where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

   For example, to set **the keep-alive interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm keep_alive 600s
(config)>
```

Note The **Cellular keep-alive interval** is not used by the Connect EZ. Any entry is ignored.

8. Set the number of allowed keep-alive misses. Allowed values are any integer between **2** and **64**. The default is **3**.

   ```
   (config)> cloud drm keep_alive_misses integer
   (config)>
   ```

9. The **watchdog** is used to monitor the connection to remote cloud services. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default. To disable:

   ```
   (config)> cloud drm watchdog false
   (config)>
   ```

10. If **watchdog** is enabled:

    a. (Optional) Set the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.

       where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

       For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

       ```
       (config)> cloud drm restart_timeout 600s
       (config)>
       ```

       The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.

    b. (Optional) Set the amount of time to wait before rebooting the device, once the connection to the remote cloud servicesis down. By default, this option is not set, which means that the option is disabled.

       where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h**|**m**|**s**}.

       For example, to set **reboot_timeout** to ten minutes, enter either **10m** or **600s**:

       ```
       (config)> cloud drm reboot_timeout 600s
       (config)>
       ```

       The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.

11. (Optional) Determine whether to require a login and password to authenticate the user from the remote cloud services CLI:

    ```
    (config)> cloud drm cli_local_auth true
    (config)>
    ```

    If set to **false**, no login prompt will be presented and the user will be logged in as **admin**. The default is **false**.

12. (Optional) Configure the Connect EZ device to communicate with remote cloud services by using SMS:

    a. **Enable** SMS messaging:

    ```
    (config)> cloud drm sms enable true
    (config)>
    ```

    b. Set the phone number for Digi Remote Manager:

    ```
    (config)> cloud drm sms destination drm_phone_number
    (config)>
    ```

    c. (Optional) Set the service identifier:

    ```
    (config)> cloud drm sms sercice_id id
    (config)>
    ```

1. (Optional) Configure the Connect EZ device to communicate with remote cloud services by using an HTTP proxy server:

    a. **Enable** the use of an HTTP proxy server:

    ```
    (config)> cloud drm proxy enable true
    (config)>
    ```

    b. Set the hostname of the proxy server:

    ```
    (config)> cloud drm proxy host hostname
    (config)>
    ```

    c. (Optional) Set the port number on the proxy server that the device should connect to. The default is 2138.

    ```
    (config)> cloud drm proxy port integer
    (config)>
    ```

13. Save the configuration and apply the change:

    ```
    (config)> save
    Configuration saved.
    >
    ```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Collect device health data and set the sample interval

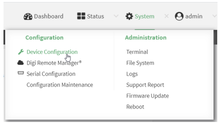
You can enable or disable the collection of device health data to upload to Digi Remote Manager, and configure the interval between health sample uploads. By default, device health data upload is enabled, and the health sample interval is set to 60 minutes.

To avoid a situation where several devices are uploading health metrics information to Remote Manager at the same time, the Connect EZ device includes a preconfigured randomization of two minutes for uploading metrics. For example, if **Health sample interval** is set to five minutes, the metrics will be uploaded to Remote Manager at a random time between five and seven minutes.

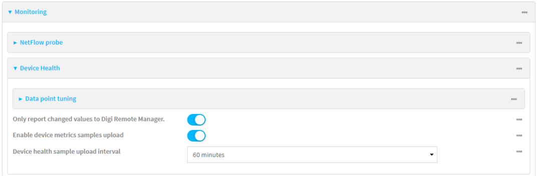
To disable the collection of device health data or enable it if it has been disabled, or to change the health sample interval:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Monitoring** > **Device Health**.



Only report changed values to Digi Remote Manager. ●
Enable device metrics samples upload ●
Device health sample upload interval 60 minutes

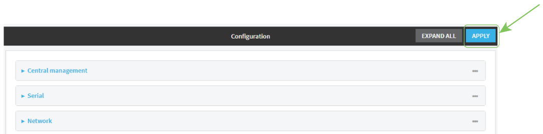
4. (Optional) Click to expand **Data point tuning**.

   Data point tuning options allow to you configure what data are uploaded to the Digi Remote Manager. All options are enabled by default.
5. **Only report changed values to Digi Remote Manager** is enabled by default.

   When enabled:

   - The device only reports device health metrics that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics.
   - All metrics are uploaded once every hour.

   When disabled, all metrics are uploaded every **Health sample interval**.
6. Device health data upload is enabled by default. To disable, click to toggle off **Enable Device Health samples upload**.
7. For **Health sample interval**, select the interval between health sample uploads.
8. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Device health data upload is enabled by default. To enable or disable:

   - To enable:

   ```
   (config)> monitoring devicehealth enable true
   (config)>
   ```

   - To disable:

   ```
   (config)> monitoring devicehealth enable false
   (config)>
   ```

4. The interval between health sample uploads is set to 60 minutes by default. To change:

```
(config)> monitoring devicehealth interval value
(config)>
```

   where *value* is one of **1**, **5**, **15**, **30**, or **60**, and represents the number of minutes between uploads of health sample data.

5. By default, the device will only report health metrics values to Digi Remote Manager that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics. This is useful to reduce the bandwidth used to report health metrics. Even if enabled, all metrics are uploaded once every hour.

   To disable:

```
(config)> monitoring devicehealth only_send_deltas false
(config)>
```

   When disabled, all metrics are uploaded every **Health sample interval**.

6. (Optional) Tuning parameters allow to you configure what data are uploaded to the Digi Remote Manager. By default, all tuning parameters are enabled.

   To view a list of all available tuning parameters, use the **show** command:

```
(config)> show monitoring devicehealth tuning
all

       eth
               rx
                       bytes
                               enable true
               tx
                       bytes
                               enable true
       serial
               rx
                       bytes
                               enable true
```

```
                              tx
                                              bytes
                                                              enable true
...
                                                                                          (config)>
```

To disable a tuning parameter, set its value to false. For example, to turn off all reporting for the serial port:

```
(config)> monitoring devicehealth tuning all serial rx bytes enabled
false
(config)> monitoring devicehealth tuning all serial tx bytes enabled
false
(config)>
```

7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

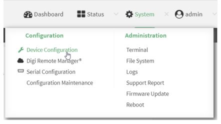
Enable event log upload to Digi Remote Manager

You can configure your device to upload the event log to Digi Remote Manager, and configure the interval between event log uploads.

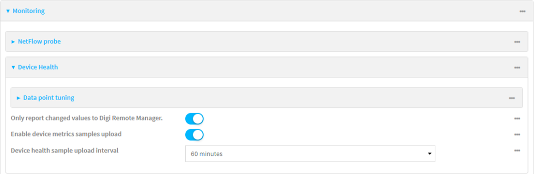
To enable the event log upload, or disable it if it has been disabled, and to change the upload interval:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Monitoring** > **Device event logs**.

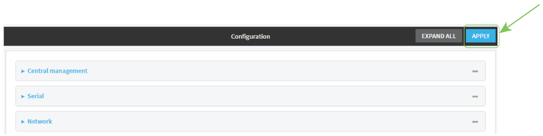


Only report changed values to Digi Remote Manager. ●

Enable device metrics samples upload ●

Device health sample upload interval: 60 minutes

4. Click **Enable event log uploads**.
5. For **Device event log upload interval**, select the interval between health sample uploads.
6. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```
3. Device health data upload is enabled by default. To enable or disable:
   - To enable:

     ```
     (config)> monitoring events enable true
     (config)>
     ```
   - To disable:

     ```
     (config)> monitoring events enable false
     (config)>
     ```
4. The interval between event log uploads is set to 60 minutes by default. To change:

   ```
   (config)> monitoring events interval value
   (config)>
   ```

   where *value* is one of **1**, **5**, **15**, **30**, or **60**, and represents the number of minutes between uploads of health sample data.
5. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```
6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Log into Digi Remote Manager

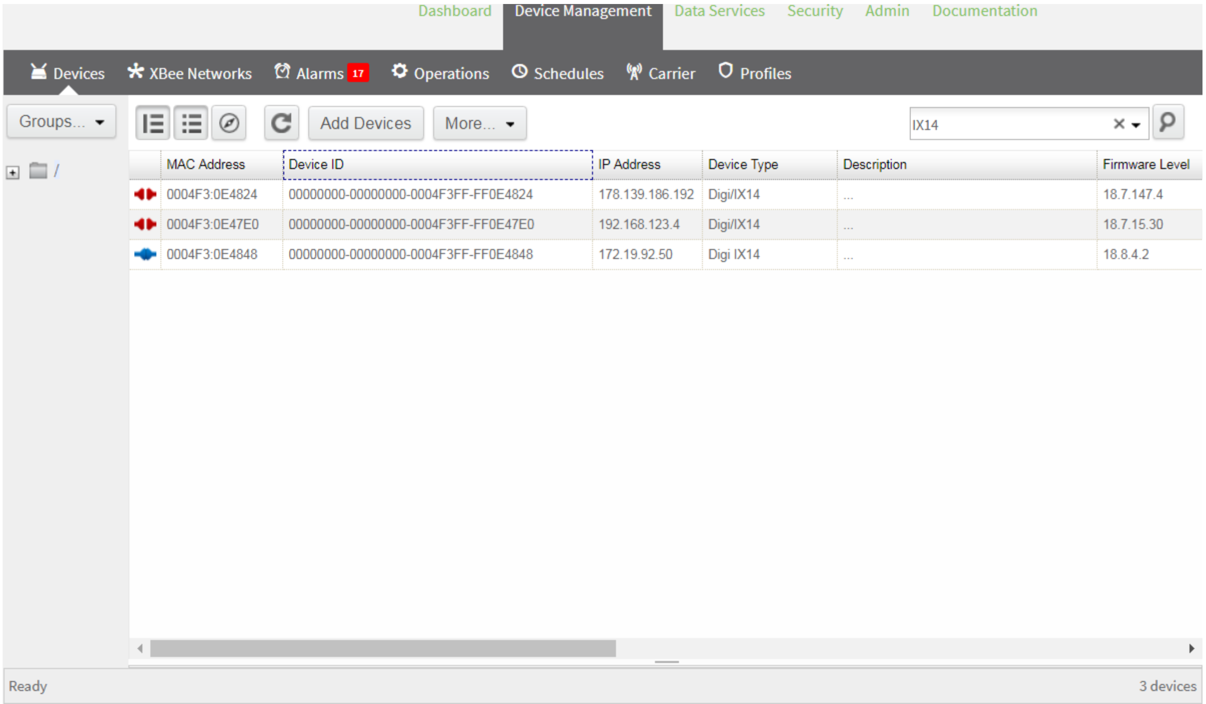
To start Digi Remote Manager

1. If you have not already done so, click here to sign up for a Digi Remote Manager account.
2. Check your email for Digi Remote Manager login instructions.
3. Go to remotemanager.digi.com.
4. Log into your Digi Remote Manager account.

Use Digi Remote Manager to view and manage your device

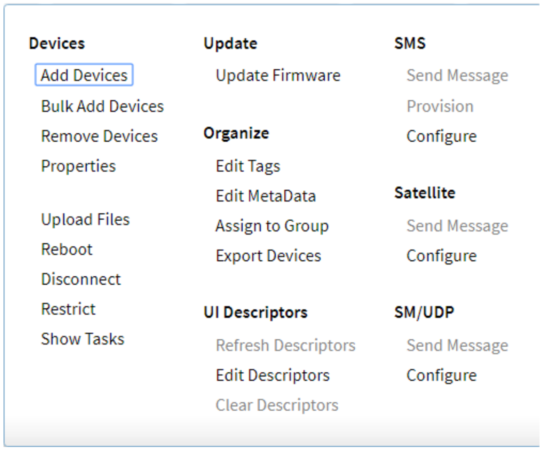
To view and manage your device:

1. If you have not already done so, connect to your Digi Remote Manager account.
2. Click **Device Management** to display a list of your devices.
3. Use the Search bar to locate the device you want to manage.



	MAC Address	Device ID	IP Address	Device Type	Description	Firmware Level
	0004F3:0E4824	00000000-00000000-0004F3FF-FF0E4824	178.139.186.192	Digi/IX14	...	18.7.147.4
	0004F3:0E47E0	00000000-00000000-0004F3FF-FF0E47E0	192.168.123.4	Digi/IX14	...	18.7.15.30
	0004F3:0E4848	00000000-00000000-0004F3FF-FF0E4848	172.19.92.50	Digi IX14	...	18.8.4.2

4. Select the device and click **Properties** to view general information for the device.
5. Click the **More** menu to perform a task.



Add a device to Digi Remote Manager

1. If you have not already done so, connect to your Digi Remote Manager account.
2. Click **Device Management** to display a list of your devices.
3. Click **Add Devices**.
4. Select **MAC Address** and enter the Ethernet MAC address for your device.
5. For **Install Code**, enter the default password on the printed label packaged with your device. The same default password is also shown on the label affixed to the bottom of the device.
6. Click **Add**.
7. Click **OK**.

Digi Remote Manager adds your Connect EZ device to your account and it appears in the **Device Management** view.

View Digi Remote Manager connection status

To view the current Digi Remote Manager configuration:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. The dashboard includes a Digi Remote Manager status pane:

Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. View the central management configuration:

```
(config)> show cloud
drm
       cellular_keep_alive 290s
       drm_url my.devicecloud.com
       keep_alive 60s
       keep_alive_misses 3
       retry_interval 30s
enable true
(config)>
```

1. Type **cancel** to exit configuration mode:

```
(config)> cancel
>
```

2. Type exit to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To view the status of your device's connection to Remote Manager, use the show cloudcommand at the command line:

Command line

```
> show cloud

 Device Cloud Status
 -------------------

 Status    : Connected
 Server    : my.devicecloud.com
 Device ID : 00000000-00000000-0040FFFF-FF0F4594
>
```

The **Device ID** is the unique identifier for the device, as used by the Remote Manager.

Configure multiple devices using profiles

Digi recommends you take advantage of Digi Remote Manager profiles to manage multiple Connect EZ routers. Typically, if you want to provision multiple Connect EZ routers:

1. Using the Connect EZ local WebUI, configure one Connect EZ router to use as the model configuration for all subsequent Connect EZs you need to manage.
2. Register the configured Connect EZ device in your Digi Remote Manager account.
3. In Digi Remote Manager, create a profile based on the configured Connect EZ.
4. Apply the profile to the Connect EZ devices you need to configure.

Digi Remote Manager provides multiple methods for applying profiles to registered devices. You can also include site-specific settings with a profile to override settings on a device-by-device basis.

Learn more

- For information on using Digi Remote Manager to configure and manage Connect EZ routers, see the *Digi Remote Manager User Guide*.
- For information on using Digi Remote Manager APIs to develop custom applications, see the *Digi Remote Manager Programmer Guide*.

File system

This chapter contains the following topics:

The Connect EZ local file system

The Connect EZ local file system has approximately 150 MB of space available for storing files, such as Python programs, alternative configuration files and firmware versions, and release files. The writable directories within the filesystem are:

- /tmp
- /opt
- /etc/config

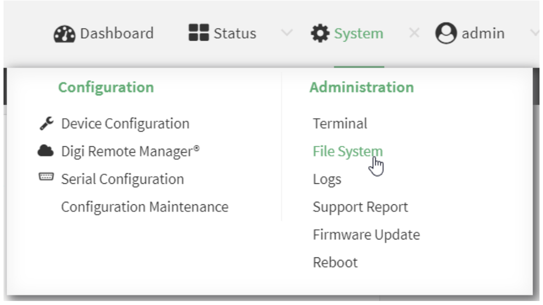
Files stored in the /tmp directory do not persist across reboots. Therefore, /tmp is a good location to upload temporary files, such as files used for firmware updates. Files stored in /opt and /etc/config do persist across reboots, but are deleted if a factory reset of the system is performed. See Erase device configuration and reset to factory defaults for more information.

Display directory contents

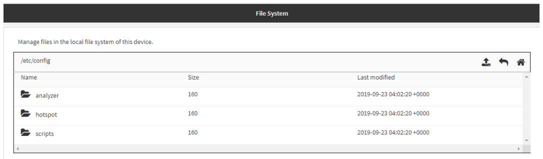
To display directory contents by using the WebUI or the Admin CLI:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



File System

Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight a directory and click ↪ to open the directory and view the files in the directory.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **ls *path/dir_name***. For example, to display the contents of the **/etc/config** directory:

```
> ls /etc/config
-rw-r--r--    1 root     root           856 Nov 20 20:12 accns.json
drw-------    2 root     root           160 Sep 23 04:02 analyzer
drwxr-xr-x    3 root     root           224 Sep 23 04:02 cc_acl
-rw-r--r--    1 root     root            47 Sep 23 04:02 dhcp.leases
...
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Create a directory

Command line

This procedure is not available through the WebUI. To make a new directory, use the mkdir command, specifying the name of the directory.

For example:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **mkdir *****/path/dir_name***. For example, to create a directory named **temp** in **/etc/config**:

```
> mkdir /etc/config/temp
>
```

3. Verify that the directory was created:

```
> ls /etc/config
...
-rw-r--r--    1 root     root          1436 Aug 12 21:36 ssl.crt
-rw-------    1 root     root          3895 Aug 12 21:36 ssl.pem
-rw-r--r--    1 root     root            10 Aug  5 06:41 start
drwxr-xr-x    2 root     root           160 Aug 25 17:49 temp
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Display file contents

This procedure is not available through the WebUI. To display the contents of a file by using the Admin CLI, , use the more command, specifying the name of the directory.

For example:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **more** ***/path/filename***. For example, to view the contenct of the file **accns.json** in **/etc/config**:

```
> more /etc/config/accns.json
{
    "auth":
        "user": {
            "admin": {
                "password":
"$2a$05$W1sls1oxsadf/n4J0XT.Rgr6ewr1yerHtXQdbafsatGswKg0YUm"
            }
        }
    },
    "schema": {
        "version": "461"
    }
}
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Copy a file or directory

This procedure is not available through the WebUI. To copy a file or directory by using the Admin CLI, use the cp command, specifying the existing path and filename followed by the path and filename of the new file, or specifying the existing path and directory name followed by the path and directory name of the new directory.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **cp** ***/path/filename*|*dir_name* */path*[*filename*]|*dir_name***. For example:

- To copy the file **/etc/config/accns.json** to a file named **backup_cfg.json** in a directory named **/etc/config/test**, enter the following:

  ```
  > cp /etc/config/accns.json /etc/config/test/backup_cfg.json
  >
  ```

- To copy a directory named **/etc/config/test** to **/opt**:

  ```
  > cp /etc/config/test/ /opt/
  >
  ```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Move or rename a file or directory

This procedure is not available through the WebUI. To move or rename a file or directory by using the Admin CLI, use the mv command.

Command line

To rename a file named **test.py** in **/etc/config/scripts** to **final.py**:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

   ```
   > mv /etc/config/scripts/test.py /etc/config/scripts/final.py
   >
   ```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To move **test.py** from **/etc/config/scripts** to **/opt**:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

   ```
   > mv /etc/config/scripts/test.py /opt/
   >
   ```

3. Type **exit** to exit the Admin CLI.

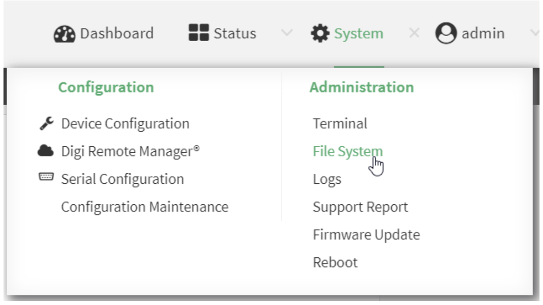
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Delete a file or directory

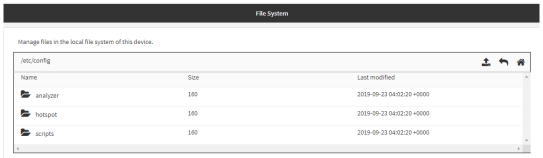
To delete a file or directory by using the WebUI or the Admin CLI:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



File System

Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight the directory containing the file to be deleted and click ↪ to open the directory.
4. Highlight the file to be deleted and click 🗑.
5. Click **OK** to confirm.

Command line

To delete a file named **test.py** in **/etc/config/scripts**:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> rm /etc/config/scripts/test.py
rm: remove '/etc/config/scripts/test.py'? yes
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To delete a directory named **temp** from **/opt**:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type:

```
> rm /opt/temp/
rm: descend into directory '/opt/temp'? yes
rm: remove directory '/opt/temp'? yes
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

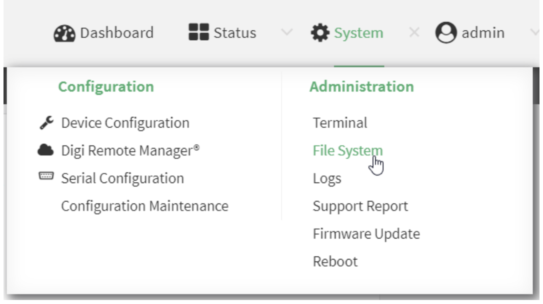
Upload and download files

You can download and upload files by using the WebUI or from the command line by using the scp Secure Copy command, or by using a utility such as SSH File Transfer Protocol (SFTP) or an SFTP application like FileZilla.

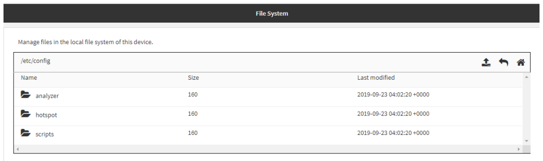
Upload and download files by using the WebUI

Upload files

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



   The **File System** page appears.



File System

Manage files in the local file system of this device.

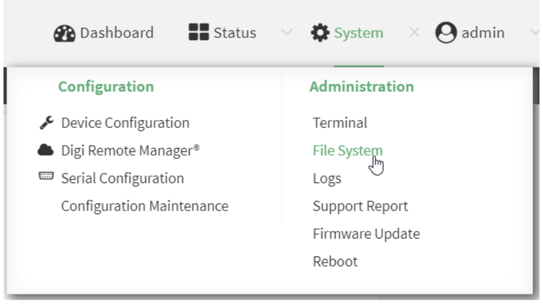
/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

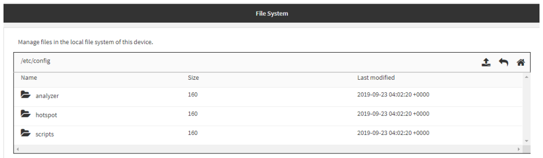
3. Highlight the directory to which the file will be uploaded and click ↩ to open the directory.
4. Click ⭱ (upload).
5. Browse to the location of the file on your local machine. Select the file and click **Open** to upload the file.

Download files

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



File System

Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight the directory to which the file will be uploaded and click ↪ to open the directory.
4. Highlight the appropriate file and click ⤓ (download).

Upload and download files by using the Secure Copy command

Copy a file from a remote host to the Connect EZ device

To copy a file from a remote host to the Connect EZ device, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
local
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
- *local-path* is the location on the Connect EZ device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the Connect EZ device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ-
22.2.9.85.bin local /etc/config/scripts to local
admin@192.168.4.1's password: adminpwd
Connect EZ-22.2.9.85.bin                        100%    36MB    11.1MB/s        00:03
>
```

Transfer a file from the Connect EZ device to a remote host

To copy a file from the Connect EZ device to a remote host, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
remote
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ device.

For example:

To copy a support report from the Connect EZ device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

```
> system support-report /var/log/
Saving support report to /var/log/support-report-0040D0133536-22-03-03-
10:16:23.bin
Support report saved.
>
```

2. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local
/var/log/support-report-00:40:D0:13:35:36-22-03-03-10:16:23.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-22-03-03-10:16:23.bin
>
```

Upload and download files using SFTP

Transfer a file from a remote host to the Connect EZ device

This example uploads firmware from a remote host to the Connect EZ device with an IP address of **192.168.2.1**, using the username **ahmed**:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> put Connect EZ-22.2.9.85
Uploading Connect EZ-22.2.9.85 to Connect EZ-22.2.9.85
Connect EZ-22.2.9.85
          100%  24M  830.4KB/s   00:00
sftp> exit
$
```

Transfer a file from the Connect EZ device to a remote host

This example downloads a file named **test.py** from the Connect EZ device at the IP address of **192.168.2.1** with a username of **ahmed** to the local directory on the remote host:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> get test.py
Fetching test.py to test.py
test.py
    100%  254    0.3KB/s   00:00
sftp> exit
$
```

Diagnostics

This chapter contains the following topics:

Perform a speedtest

To perform a speedtest:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **speedtest** command to generate the report:

   ```
   > speedtest host
   ```

   where *host* is the hostname or IP address of a speedtest host. For example:

   ```
   > speedtest speedtest.accns.com
   Tx (upload) average: 50.1110 Mbps
   Tx latency: 31.45 ms
   Rx (download) average: 44.7588 Mbps
   Rx latency: 30.05 ms
   >
   ```
3. To output the result in json format, use the **output** parameter:

   ```
   > speedtest host output json
   {"tx_avg": "51.8510", "tx_avg_units": "Mbps", "tx_latency": "31.07",
   "tx_latency_units": "ms", "rx_avg": "39.5770", "rx_avg_units": "Mbps",
   "rx_latency": "34.19", "rx_latency_units": "ms" }
   >
   ```
4. To change the size of the speedtest packet, use the **size** parameter:

   ```
   > speedtest host size int
   ```
5. By default, the speedtest uses nuttcp for the mode. You can change this to iperf with the **mode** parameter:

   ```
   > speedtest host mode iperf
   ```
6. Type **exit** to exit the Admin CLI.

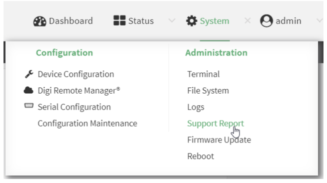
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Generate a support report

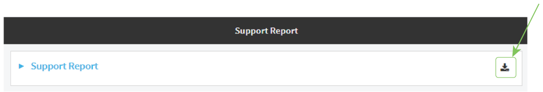
To generate and download a support report:

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System**. Under **Administration**, click **Support Report**.



3. Click ⬇ to generate and download the support report.



Attach the support report to any support requests.

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **system support-report** command to generate the report:

```
> system support-report /var/log/
Saving support report to /var/log/support-report-0040D0133536-22-03-03-
10:16:23.bin
Support report saved.
>
```

3. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local
/var/log/support-report-00:40:D0:13:35:36-22-03-03-10:16:23.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-22-03-03-10:16:23.bin
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

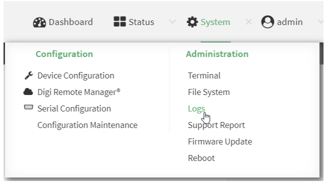
View system and event logs

See Configure options for the event and system logs for information about configuring the information displayed in event and system logs.

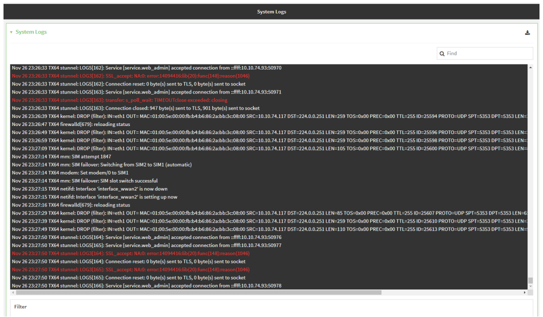
View System Logs

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System** > **Logs**.

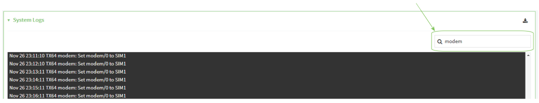


The system log displays:



```
Nov 26 23:26:33 TX64 stunnel: LOG5[162]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:50970
Nov 26 23:26:33 TX64 stunnel: LOG3[162]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:26:33 TX64 stunnel: LOG5[162]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:26:33 TX64 stunnel: LOG5[163]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:50971
Nov 26 23:26:33 TX64 stunnel: LOG3[163]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:26:33 TX64 stunnel: LOG5[163]: Connection closed: 947 byte(s) sent to TLS, 901 byte(s) sent to socket
Nov 26 23:26:39 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=259 TOS=0x00 PREC=0x00 TTL=255 ID=25594 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:26:47 TX64 firewalld[679]: reloading status
Nov 26 23:26:49 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=259 TOS=0x00 PREC=0x00 TTL=255 ID=25596 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:26:59 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=259 TOS=0x00 PREC=0x00 TTL=255 ID=25598 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:27:09 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=105 TOS=0x00 PREC=0x00 TTL=255 ID=25600 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:27:14 TX64 mm: SIM attempt 1847
Nov 26 23:27:14 TX64 mm: SIM failover: Switching from SIM2 to SIM1 (automatic)
Nov 26 23:27:14 TX64 modem: Set modem/0 to SIM1
Nov 26 23:27:14 TX64 mm: SIM failover: SIM slot switch successful
Nov 26 23:27:15 TX64 netifd: Interface 'interface_wwan2' is now down
Nov 26 23:27:15 TX64 netifd: Interface 'interface_wwan2' is setting up now
Nov 26 23:27:16 TX64 firewalld[679]: reloading status
Nov 26 23:27:29 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=85 TOS=0x00 PREC=0x00 TTL=255 ID=25607 PROTO=UDP SPT=5353 DPT=5353 LEN=6
Nov 26 23:27:39 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=259 TOS=0x00 PREC=0x00 TTL=255 ID=25610 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:27:49 TX64 kernel: DROP (filter): IN=eth1 OUT= MAC=01:00:5e:00:00:fb:b4:b6:86:2a:bb:3c:08:00 SRC=10.10.74.117 DST=224.0.0.251 LEN=110 TOS=0x00 PREC=0x00 TTL=255 ID=25613 PROTO=UDP SPT=5353 DPT=5353 LEN=
Nov 26 23:27:50 TX64 stunnel: LOG5[164]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:50976
Nov 26 23:27:50 TX64 stunnel: LOG5[165]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:50977
Nov 26 23:27:50 TX64 stunnel: LOG3[164]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:27:50 TX64 stunnel: LOG5[164]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:27:50 TX64 stunnel: LOG3[165]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:27:50 TX64 stunnel: LOG5[165]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:27:50 TX64 stunnel: LOG5[166]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:50978
```

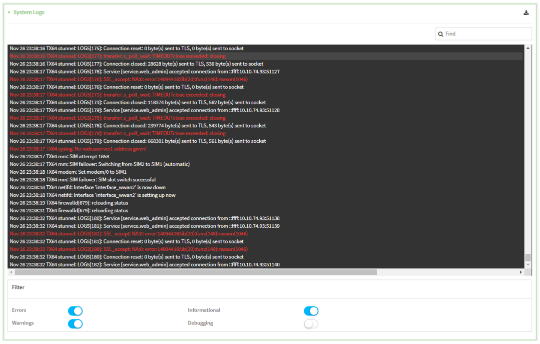
3. Limit the display in the system log by using the **Find** search tool.



modem

```
Nov 26 23:11:10 TX64 modem: Set modem/0 to SIM1
Nov 26 23:12:10 TX64 modem: Set modem/0 to SIM1
Nov 26 23:13:11 TX64 modem: Set modem/0 to SIM1
Nov 26 23:14:11 TX64 modem: Set modem/0 to SIM1
Nov 26 23:15:11 TX64 modem: Set modem/0 to SIM1
Nov 26 23:16:11 TX64 modem: Set modem/0 to SIM1
```

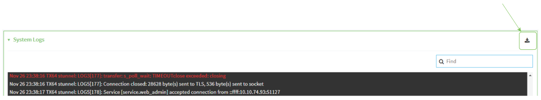
4. Use filters to configure the types of information displayed in the system logs.



```
Nov 26 23:38:16 TX64 stunnel: LOG5[175]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:38:16 TX64 stunnel: LOG3[177]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:38:16 TX64 stunnel: LOG5[177]: Connection closed: 28628 byte(s) sent to TLS, 536 byte(s) sent to socket
Nov 26 23:38:17 TX64 stunnel: LOG5[178]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51127
Nov 26 23:38:17 TX64 stunnel: LOG3[176]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:38:17 TX64 stunnel: LOG5[176]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:38:17 TX64 stunnel: LOG3[173]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:38:17 TX64 stunnel: LOG5[173]: Connection closed: 118374 byte(s) sent to TLS, 562 byte(s) sent to socket
Nov 26 23:38:17 TX64 stunnel: LOG5[179]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51128
Nov 26 23:38:17 TX64 stunnel: LOG3[178]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:38:17 TX64 stunnel: LOG5[178]: Connection closed: 239774 byte(s) sent to TLS, 543 byte(s) sent to socket
Nov 26 23:38:17 TX64 stunnel: LOG3[179]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:38:17 TX64 stunnel: LOG5[179]: Connection closed: 668301 byte(s) sent to TLS, 561 byte(s) sent to socket
Nov 26 23:38:17 TX64 syslog: No radiusserver1 address given!
Nov 26 23:38:17 TX64 mm: SIM attempt 1858
Nov 26 23:38:17 TX64 mm: SIM failover: Switching from SIM2 to SIM1 (automatic)
Nov 26 23:38:18 TX64 modem: Set modem/0 to SIM1
Nov 26 23:38:18 TX64 mm: SIM failover: SIM slot switch successful
Nov 26 23:38:18 TX64 netifd: Interface 'interface_wwan2' is now down
Nov 26 23:38:18 TX64 netifd: Interface 'interface_wwan2' is setting up now
Nov 26 23:38:19 TX64 firewalld[679]: reloading status
Nov 26 23:38:31 TX64 firewalld[679]: reloading status
Nov 26 23:38:32 TX64 stunnel: LOG5[180]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51138
Nov 26 23:38:32 TX64 stunnel: LOG5[181]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51139
Nov 26 23:38:32 TX64 stunnel: LOG3[181]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:38:32 TX64 stunnel: LOG5[181]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:38:32 TX64 stunnel: LOG3[180]: SSL_accept: NA:0: error:14094416:lib(20):func(148):reason(1046)
Nov 26 23:38:32 TX64 stunnel: LOG5[180]: Connection reset: 0 byte(s) sent to TLS, 0 byte(s) sent to socket
Nov 26 23:38:32 TX64 stunnel: LOG5[182]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51140
```

Errors	●	Informational	●
Warnings	●	Debugging	○

5. Click ⬇ to download the system log.



```
Nov 26 23:38:16 TX64 stunnel: LOG3[177]: transfer: s_poll_wait: TIMEOUTclose exceeded: closing
Nov 26 23:38:16 TX64 stunnel: LOG5[177]: Connection closed: 28628 byte(s) sent to TLS, 536 byte(s) sent to socket
Nov 26 23:38:17 TX64 stunnel: LOG5[178]: Service [service.web_admin] accepted connection from ::ffff:10.10.74.93:51127
```

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show log command at the Admin CLI prompt:

```
> show log

Timestamp         Message
--------------  ---------------------------------------------------------
----
Nov 26 21:54:34  Connect EZ netifd: Interface 'interface_wan' is setting
up now
Nov 26 21:54:35  Connect EZ firewalld[621]: reloading status
...
>
```

3. (Optional) Use the **show log number *num*** command to limit the number of lines that are displayed. For example, to limit the log to the most recent ten lines:

```
> show log number 10

Timestamp         Message
--------------  ---------------------------------------------------------
----
Nov 26 21:54:34  Connect EZ netifd: Interface 'interface_wan' is setting
up now
Nov 26 21:54:35  Connect EZ firewalld[621]: reloading status
...
>
```

4. (Optional) Use the **show log filter *value*** command to limit the number of lines that are displayed. Allowed values are **critical**, **warning**, **info**, and **debug**. For example, to limit the event list to only info messages:

```
> show log filter info

Timestamp         Type     Category  Message
---------------- -------- --------- --------------------------------------
-----
Nov 26 22:01:26  info     user
name=admin~service=cli~state=opened~remote=192.168.1.2
Nov 26 22:01:25  info     user
name=admin~service=cli~state=closed~remote=192.168.1.2
```

```
. . .
>
```

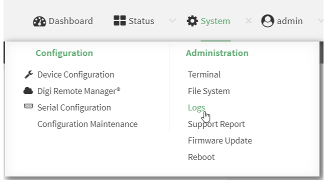
5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

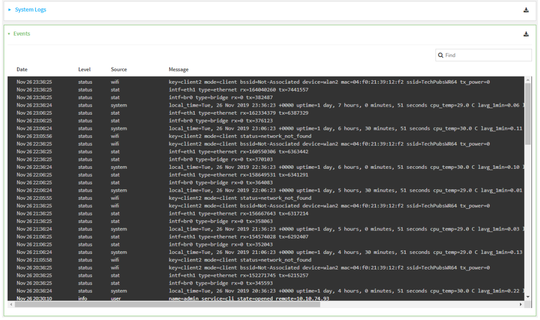
View Event Logs

WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the main menu, click **System** > **Logs**.

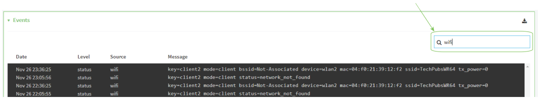


3. Click ▾ **System Logs** to collapse the system logs viewer, or scroll down to **Events**.
4. Click ▸ **Events** to expand the event viewer.



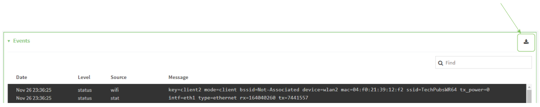
```
Date            Level   Source  Message
Nov 26 23:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 23:36:25 status  stat    intf=eth1 type=ethernet rx=164040260 tx=7441557
Nov 26 23:36:25 status  stat    intf=br0 type=bridge rx=0 tx=382487
Nov 26 23:36:24 status  system  local_time=Tue, 26 Nov 2019 23:36:23 +0000 uptime=1 day, 7 hours, 0 minutes, 51 seconds cpu_temp=29.0 C lavg_1min=0.06
Nov 26 23:06:25 status  stat    intf=eth1 type=ethernet rx=162334379 tx=6387329
Nov 26 23:06:25 status  stat    intf=br0 type=bridge rx=0 tx=376123
Nov 26 23:06:24 status  system  local_time=Tue, 26 Nov 2019 23:06:23 +0000 uptime=1 day, 6 hours, 30 minutes, 51 seconds cpu_temp=30.0 C lavg_1min=0.11
Nov 26 23:05:56 status  wifi    key=client2 mode=client status=network_not_found
Nov 26 22:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 22:36:25 status  stat    intf=eth1 type=ethernet rx=160550306 tx=6363442
Nov 26 22:36:25 status  stat    intf=br0 type=bridge rx=0 tx=370103
Nov 26 22:36:24 status  system  local_time=Tue, 26 Nov 2019 22:36:23 +0000 uptime=1 day, 6 hours, 0 minutes, 51 seconds cpu_temp=30.0 C lavg_1min=0.10
Nov 26 22:06:25 status  stat    intf=eth1 type=ethernet rx=158649531 tx=6341291
Nov 26 22:06:25 status  stat    intf=br0 type=bridge rx=0 tx=364083
Nov 26 22:06:24 status  system  local_time=Tue, 26 Nov 2019 22:06:23 +0000 uptime=1 day, 5 hours, 30 minutes, 51 seconds cpu_temp=29.0 C lavg_1min=0.01
Nov 26 22:05:55 status  wifi    key=client2 mode=client status=network_not_found
Nov 26 21:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 21:36:25 status  stat    intf=eth1 type=ethernet rx=156667643 tx=6317214
Nov 26 21:36:25 status  stat    intf=br0 type=bridge rx=0 tx=358063
Nov 26 21:36:24 status  system  local_time=Tue, 26 Nov 2019 21:36:23 +0000 uptime=1 day, 5 hours, 0 minutes, 51 seconds cpu_temp=29.0 C lavg_1min=0.03
Nov 26 21:06:25 status  stat    intf=eth1 type=ethernet rx=154574028 tx=6292407
Nov 26 21:06:25 status  stat    intf=br0 type=bridge rx=0 tx=352043
Nov 26 21:06:24 status  system  local_time=Tue, 26 Nov 2019 21:06:23 +0000 uptime=1 day, 4 hours, 30 minutes, 51 seconds cpu_temp=29.0 C lavg_1min=0.13
Nov 26 21:05:58 status  wifi    key=client2 mode=client status=network_not_found
Nov 26 20:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 20:36:25 status  stat    intf=eth1 type=ethernet rx=152271745 tx=6215257
Nov 26 20:36:25 status  stat    intf=br0 type=bridge rx=0 tx=345593
Nov 26 20:36:24 status  system  local_time=Tue, 26 Nov 2019 20:36:23 +0000 uptime=1 day, 4 hours, 0 minutes, 51 seconds cpu_temp=30.0 C lavg_1min=0.22
Nov 26 20:30:10 info    user    name=admin service=cli state=opened remote=10.10.74.93
```

5. Limit the display in the event log by using the **Find** search tool.



```
Date            Level   Source  Message
Nov 26 23:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 23:05:56 status  wifi    key=client2 mode=client status=network_not_found
Nov 26 22:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 22:05:55 status  wifi    key=client2 mode=client status=network_not_found
```

6. Click to download the event log.



```
Date            Level   Source  Message
Nov 26 23:36:25 status  wifi    key=client2 mode=client bssid=Not-Associated device=wlan2 mac=04:f0:21:39:12:f2 ssid=TechPubsWR64 tx_power=0
Nov 26 23:36:25 status  stat    intf=eth1 type=ethernet rx=164040260 tx=7441557
```

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show event command at the Admin CLI prompt:

```
> show event

Timestamp        Type    Category  Message
---------------- ------- --------- --------------------------------------
-----
Nov 26 21:42:37  status  stat
intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35  status  system    local_time=Thu, 08 Aug 2019 21:42:35
+0000~uptime=3 hours, 0 minutes, 48 seconds
...
>
```

3. (Optional) Use the **show event number *num*** command to limit the number of lines that are displayed. For example, to limit the event list to the most recent ten lines:

```
> show event number 10

Timestamp        Type    Category  Message
---------------- ------- --------- --------------------------------------
-----
Nov 26 21:42:37  status  stat
intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35  status  system    local_time=Thu, 08 Aug 2019 21:42:35
+0000~uptime=3 hours, 0 minutes, 48 seconds
...
>
```

4. (Optional) Use the **show event table *value*** command to limit the number of lines that are displayed. Allowed values are **error**, **info**, and **status**. For example, to limit the event list to only info messages:

```
> show event table info

Timestamp        Type    Category  Message
---------------- ------- --------- --------------------------------------
-----
Nov 26 22:01:26  info    user
name=admin~service=cli~state=opened~remote=192.168.1.2
Nov 26 22:01:25  info    user
name=admin~service=cli~state=closed~remote=192.168.1.2
...
>
```

5. Type **exit** to exit the Admin CLI.

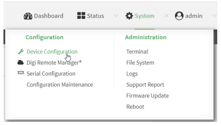
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure syslog servers

You can configure remote syslog servers for storing event and system logs.

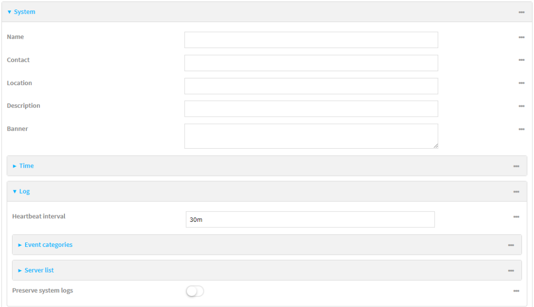
WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



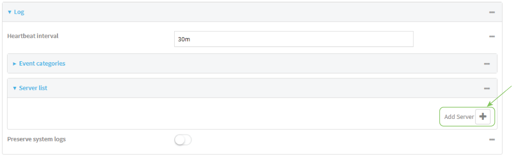
The **Configuration** window is displayed.

3. Click **System** > **Log**.



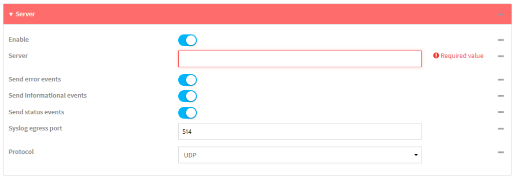
Heartbeat interval 30m

4. Add and configure a remote syslog server:
   a. Click to expand **Server list**.
   b. For **Add Server**, click ✚.



Heartbeat interval 30m

The log server configuration window is displayed.



Syslog egress port 514

Protocol UDP

Log servers are enabled by default. To disable, click to toggle off **Enable**.

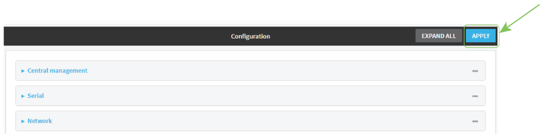
   c. Type the host name or IP address of the **Server**.

   d. Select the event categories that will be sent to the server. By default, all event categories are enabled. You can disable logging for error, informational, and status event categories by clicking to toggle off the category.

   e. For **Syslog egress port**, type the port number to use for the syslog server. The default is **514**.

   f. For **Protocol**, select the IP protocol to use for communication with the syslog server. Available options are **TCP** and **UPD**. The default is **UPD**.

5. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To configure remote syslog servers:

   a. Add a remote server:

```
(config)> add system log remote end
(config system log remote 0)>
```

   b. Enable the server:

```
(config system log remote 0)> enable true
(config system log remote 0)>
```

   c. Set the host name or IP address of the server:

```
(config system log remote 0)> server hostname
(config system log remote 0)>
```

   d. The event categories that will be sent to the server are automatically enabled when the server is enabled.

      - To disable informational event messages:

```
(config system log remote 0)> info false
(config system log remote 0)>
```

- To disable status event messages:

  ```
  (config system log remote 0)> status false
  (config system log remote 0)>
  ```

- To disable informational event messages:

  ```
  (config system log remote 0)> error false
  (config system log remote 0)>
  ```

4. Set the port number to use for the syslog server:

   ```
   (config system log remote 0)> port value
   (config system log remote 0)>
   ```

   where *value* is any integer between **1** and **65535**. The default is **514**.

5. Set the IP protocol to use for communication with the syslog server:

   ```
   (config system log remote 0)> protocol value
   (config system log remote 0)>
   ```

   where *value* is either **tcp** or **udp**. The default is **udp**.

6. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Configure options for the event and system logs

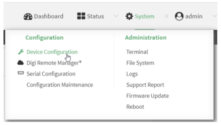
The default configuration for event and system logging is:

- The heartbeat interval, which determines the amount of time to wait before sending a heartbeat event if no other events have been sent, is set to 30 minutes.
- All event categories are enabled.

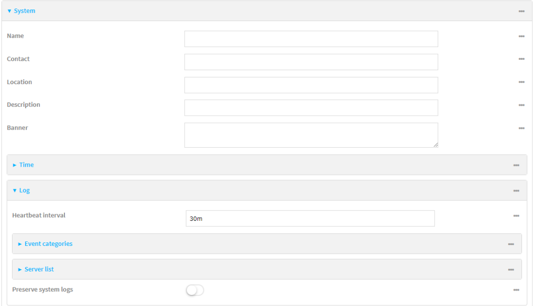
To change or disable the heartbeat interval, or to disable event categories, and to perform other log configuration:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Log**.

   Heartbeat interval 30m

4. (Optional) To change the **Heartbeat interval** from the default of 30 minutes, type a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

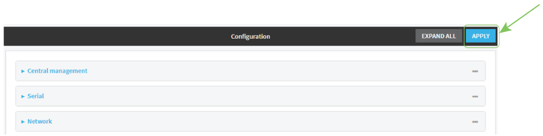
   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **Heartbeat interval** to ten minutes, enter **10m** or **600s**.

   To disable the **Heartbeat interval**, enter **0s**.
5. (Optional) To disable event categories, or to enable them if they have been disabled:
   a. Click to expand **Event Categories**.
   b. Click an event category to expand.
   c. Depending on the event category, you can enable or disable informational events, status events, and error events. Some categories also allow you to set the **Status interval**, which is the time interval between periodic status events.
6. (Optional) See Configure syslog servers for information about configuring remote syslog servers to which log messages will be sent.
7. Enable **Preserve system logs** to save the current session's system log after a reboot.

   By default, the Connect EZ device erases system logs each time the device is powered off or rebooted.

   Note You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.
8. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To change the heartbeat interval from the default of 30 minutes, set a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

```
(config)> system log heartbeat_interval value
(config)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **the heartbeat interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log heartbeat_interval 600s
(config)>
```

   To disable the heartbeat interval, set the value to **0s**
4. Enable preserve system logs functionality to save the current session's system log after a reboot. By default, the Connect EZ device erases system logs each time the device is powered off or rebooted.

   Note You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.

```
(config)> system log persistent true
(config)>
```

5. (Optional) To disable event categories, or to enable them if they have been disabled:
   a. Use the question mark (**?**) to determine available event categories:

```
(config)> system log event ?

Event categories: Settings to enable individual event categories.

 Additional Configuration
 -----------------------------------------------------------------------
----------
 arping                     ARP ping
 config                     Configuration
 dhcpserver                 DHCP server
 firmware                   Firmware
 location                   Location
 netmon                     Active recovery
 network                    Network interfaces
 openvpn                    OpenVPN
 portal                     Captive portal
 remote                     Remote control
 restart                    Restart
 serial                     Serial
 sms                        SMS commands
 speed                      Speed
 stat                       Network statistics
 user                       User
 wol                        Wake-On-LAN

(config)> system log event
```

b. Depending on the event category, you can enable or disable informational events, status events, and error events. Some categories also allow you to set the status interval, which is the time interval between periodic status events. For example, to configure DHCP server logging:

   i. Use the question mark (**?**) to determine what events are available for DHCP server logging configuration:

```
(config)> system log event dhcpserver ?
...
DHCP server: Settings for DHCP server events. Informational events
are generated
when a lease is obtained or released. Status events report the
current list of
leases.

 Parameters                 Current Value
 -------------------------------------------------------------------
--------------
 info                       true          Enable informational
events
 status                     true          Enable status events
 status_interval            30m           Status interval

(config)> system log event dhcpserver
```

ii. To disable informational messages for the DHCP server:

```
(config)> system log event dhcpserver info false
(config)>
```

iii. To change the status interval:

```
(config)> system log event dhcpserver status_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **the status interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log event dhcpserver status_interval 600s
(config)>
```

6. (Optional) See Configure syslog servers for information about configuring remote syslog servers to which log messages will be sent.
7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Analyze network traffic

The Connect EZ device includes a network analyzer tool that captures data traffic on any interface and decodes the captured data traffic for diagnostics. You can capture data traffic on multiple interfaces at the same time and define capture filters to reduce the captured data. You can capture up to 10 MB of data traffic in two 5 MB files per interface.

To perform a more detailed analysis, you can download the captured data traffic from the device and view it using a third-party application.

Note Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See Save captured data traffic to a file.

This section contains the following topics:

Configure packet capture for the network analyzer

To use the network analyzer, you must create one or more packet capture configuration.

Required configuration items

- The interface used by this packet capture configuration.

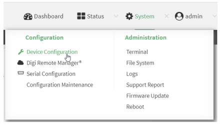
Additional configuration items

- The filter expression for this packet capture configuration.
- Schedule the analyzer to run based on a specified event or at a particular time:
  - The events or time that will trigger the analyzer to run, using this capture configuration.
  - The amount of time that the analyzer session will run.
  - The frequency with which captured events will be saved.

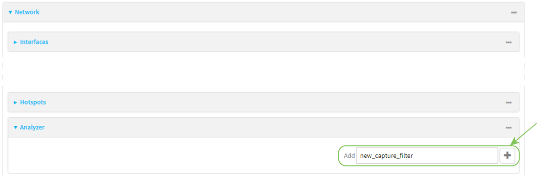
To configure a packet capture configuration:

WebUI

1. Log into the Connect EZ WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

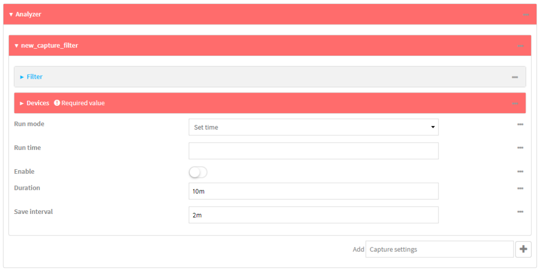


   The **Configuration** window is displayed.
3. Click **Network** > **Analyzer**.
4. For **Add Capture settings**, type a name for the capture filter and click ✚.



Add new_capture_filter ✚

   The new capture filter configuration is displayed.



Run mode: Set time

Run time:

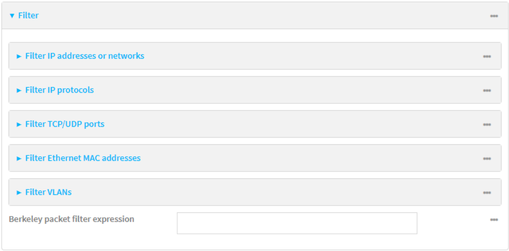
Enable: ○

Duration: 10m

Save interval: 2m

Add Capture settings ✚

5. (Optional) Add a filter type:
   a. Click to expand **Filter**.



▾ Filter

▸ Filter IP addresses or networks

▸ Filter IP protocols

▸ Filter TCP/UDP ports

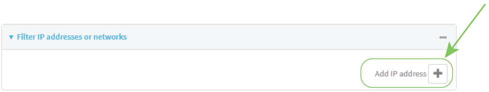
▸ Filter Ethernet MAC addresses

▸ Filter VLANs

Berkeley packet filter expression

   You can select from preconfigured filters to determine which types of packets to capture or ignore, or you can create your own Berkeley packet filter expression.

   b. To create a filter that either captures or ignores packets from a particular IP address or network:
      i. Click to expand **Filter IP addresses or networks**.
      ii. Click ✚ to add an IP address/network.



▾ Filter IP addresses or networks

Add IP address ✚

      iii. For **IP address or network**, type the IPv4 or IPv6 address (and optional netmask).
      iv. For **Source or destination IP address**, select whether the filter should apply to packets when the IP address/network is the source, the destination, or both.
      v. Click **Ignore this IP address or network** if the filter should ignore packets from this IP address/network. By default, is option is disabled, which means that the filter will capture packets from this IP address/network.
      vi. Click ✚ to add additional IP address/network filters.

   c. To create a filter that either captures or ignores packets that use a particular IP protocol:
      i. Click to expand **Filter IP protocols**.
      ii. Click ✚ to add an IP protocol.
      iii. For **IP protocol to capture or ignore**, select the protocol. If **Other protocol** is selected, type the number of the protocol.
      iv. Click **Ignore this protocol** if the filter should ignore packets that use this protocol. By default, is option is disabled, which means that the filter will capture packets that use this protocol.
      v. Click ✚ to add additional IP protocols filters.

   d. To create a filter that either captures or ignores packets from a particular port:
      i. Click to expand **Filter TCP/UDP port**.
      ii. Click ✚ to add a TCP /UDP port.
      iii. For **IP TCP/UDP port to capture or ignore**, type the number of the port to be captured or ingored.
      iv. For **TCP or UDP port**, select the type of transport protocol.

v. For **Source or destination TCP/UDP port**, select whether the filter should apply to packets when the port is the source, the destination, or both.

vi. Click **Ignore this TCP/UDP port** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.

vii. Click ✚ to add additional port filters.

e. To create a filter that either captures or ignores packets from one or more specified MAC addresses:

i. Click to expand **Filter Ethernet MAC addresses**.

ii. Click ✚ to add a MAC address.

iii. For **Ethernet MAC address**, type the MAC address to be captured or ingored.

iv. For **Source or destination Ethernet MAC address**, select whether the filter should apply to packets when the Ethernet MAC address is the source, the destination, or both.

v. Click **Ignore this MAC address** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.

vi. Click ✚ to add additional MAC address filters.

f. To create a filter that either captures or ignores packets from one or more VLANs:

i. Click to expand **Filter VLANs**.

ii. Click ✚ to add a VLAN.

iii. For **The VLAN to capture or ignore**, type the number of the VLAN.

iv. Click **Ignore this VLAN** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.

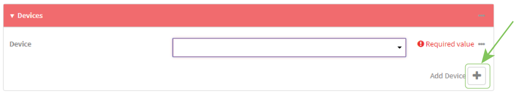
v. Click ✚ to add additional VLAN filters.

g. For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See Example filters for capturing data traffic for examples of filters using BPF syntax.

6. Add one or more interface to the capture filter:

a. Click to expand **Device**.

b. Click ✚ to add an interface to the capture setting instance.



c. For **Device**, select an interface.

d. Repeat to add additional interfaces to the capture filter.

7. (Optional) For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See Example filters for capturing data traffic for examples of filters using BPF syntax.

8. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:

a. For **Run mode**, select the mode that will be used to run the capture filter. Available options are:
   - **On boot**: The capture filter will run once each time the device boots.
   - **Interval**: The capture filter will start running at the specified interval, within 30 seconds after the configuration change is saved.
     - If **Interval** is selected, in **Interval**, type the interval.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

       For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
   - **Set time**: Runs the capture filter at a specified time of the day.
     - If **Set Time** is selected, specify the time that the capture filter should run in **Run time**, using the format *HH*:*MM*.
   - **During system maintenance**: The capture filter will run during the system maintenance time window.

b. **Enable** the capture filter schedule.

c. For **Duration**, type the amount of time that the scheduled analyzer session will run.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

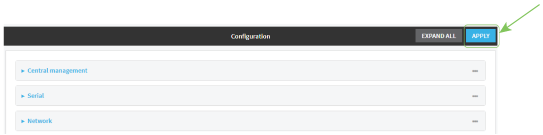
   For example, to set **Duration** to ten minutes, enter **10m** or **600s**.

d. For **Save interval**, type the frequency with which captured events will be saved.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w**|**d**|**h**|**m**|**s**}.

   For example, to set **Save interval** to ten minutes, enter **10m** or **600s**.

9. Click **Apply** to save the configuration and apply the change.



Command line

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new capture filter:

```
(config)> add network analyzer name
(config network analyzer name)>
```

4. Add an interface to the capture filter:

   ```
   (config network analyzer name)> add device end device
   (config network analyzer name)>
   ```

   Determine available devices and the proper syntax.

   To determine available devices and proper syntax, use the space bar autocomplete feature:

   ```
   (config network analyzer name)> add device end <space>
   (config network analyzer name)> add interface end /network/
   ```

   Repeat to add additional interfaces.

5. (Optional) Set a filter for the capture filter:

   a. To create a filter that either captures or ignores packets from a particular IP address or network:

      i. Add a new IP address/network filter:

      ```
      (config network analyzer name)> add filter address end
      (config network analyzer name filter address 0)>
      ```

      ii. Set the IPv4 or IPv6 address (and optional netmask):

      ```
      (config network analyzer name filter address 0)> address ip_
      address[/netmask]
      (config network analyzer name filter address 0)>
      ```

      iii. Set whether the filter should apply to packets when the IP address/network is the source, the destination, or both:

      ```
      (config network analyzer name filter address 0)> match value
      (config network analyzer name filter address 0)>
      ```

      where *value* is one of:

      - **source**: The filter will apply to packets when the IP address/network is the source.
      - **destination**: The filter will apply to packets when the IP address/network is the destination.
      - **either**: The filter will apply to packets when the IP address/network is either the source or the destination.

      iv. (Optional) Set the filter should ignore packets from this IP address/network:

      ```
      (config network analyzer name filter address 0)> ignore true
      (config network analyzer name filter address 0)>
      ```

      By default, is option is set to **false**, which means that the filter will capture packets from this IP address/network.

      v. Repeat these steps to add additional IP address filters.

   b. To create a filter that either captures or ignores packets that use a particular IP protocol:

i. Add a new IP protocol filter:

```
(config network analyzer name)> add filter protocol end
(config network analyzer name filter protocol 0)>
```

ii. Use the **?** to determine available protocols and the appropriate format:

```
(config network analyzer name filter protocol 0)> protocol ?

IP protocol to capture or ignore: IP protocol to capture or
ignore.
Format:
  ah
  esp
  gre
  icmp
  icmpv6
  igmp
  ospf
  other
  tcp
  udp
  vrrp
Current value:

(config network analyzer name filter protocol 0)>
```

iii. Set the protocol:

```
(config network analyzer name filter protocol 0)> protocol value
(config network analyzer name filter protocol 0)>
```

iv. If other is set for the protocol, set the number of the protocol:

```
(config network analyzer name filter protocol 0)> protocol_other
value
(config network analyzer name filter protocol 0)>
```

where *value* is an integer between 1 and 255 and represents the the number of the protocol.

v. (Optional) Set the filter should ignore packets from this protocol:

```
(config network analyzer name filter protocol 0)> ignore true
(config network analyzer name filter protocol 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this protocol.

vi. Repeat these steps to add additional protocol filters.

c. To create a filter that either captures or ignores packets from a particular port:

i. Add a new port filter:

```
(config network analyzer name)> add filter port end
(config network analyzer name filter port 0)>
```

ii. Set the transport protocol that should be filtered for the port:

```
(config network analyzer name filter port 0)> protocol value
(config network analyzer name filter port 0)>
```

where *value* is one of **tcp**, **udp**, or **either**. The default is either.

iii. Set whether the filter should apply to packets when the port is the source, the destination, or both:

```
(config network analyzer name filter port 0)> match value
(config network analyzer name filter port 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the port is the source.
- **destination**: The filter will apply to packets when the port is the destination.
- **either**: The filter will apply to packets when the port is either the source or the destination.

iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter port 0)> ignore true
(config network analyzer name filter port 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this port.

v. Repeat these steps to add additional port filters.

d. To create a filter that either captures or ignores packets from one or more specified MAC addresses:

i. Add a new MAC address filter:

```
(config network analyzer name)> add filter mac_address end
(config network analyzer name filter mac_address 0)>
```

ii. Set the MAC address that should be be captured or ignored:

```
(config network analyzer name filter mac_address 0)> address value
(config network analyzer name filter mac_address 0)>
```

where *value* is the MAC address to be filtered, using colon-hexadecimal notation with lower case, for example, **00:aa:11:bb:22:cc**.

iii. Set whether the filter should apply to packets when the MAC address is the source, the destination, or both:

```
(config network analyzer name filter mac_address 0)> match value
(config network analyzer name filter mac_address 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the MAC address is the source.
- **destination**: The filter will apply to packets when the MAC address is the destination.
- **either**: The filter will apply to packets when the MAC address is either the source or the destination.

iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter mac_address 0)> ignore true
(config network analyzer name filter mac_address 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this MAC address.

v. Repeat these steps to add additional MAC addresses.

e. To create a filter that either captures or ignores packets from one or more specified VLANs:

i. Add a new VLAN filter:

```
(config network analyzer name)> add filter vlan end
(config network analyzer name filter vlan 0)>
```

ii. Set the VLAN that should be be captured or ignored:

```
(config network analyzer name filter vlan 0)> vlan value
(config network analyzer name filter vlan 0)>
```

where *value* is number o the VLAN.

iii. (Optional) Set the filter should ignore packets from this VLAN:

```
(config network analyzer name filter vlan 0)> ignore true
(config network analyzer name filter vlan  0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this MAC address.

iv. Repeat these steps to add additional VLANs.

f. To create a filter using Berkeley Packet Filter (BPF) syntax:

```
(config network analyzer name)> filter custom value
(config network analyzer name)>
```

where *value* is a filter using Berkeley Packet Filter (BPF) syntax. Values that contain spaces must be enclosed in double quotes (**"**).

See Example filters for capturing data traffic for examples of filters using BPF syntax.

6. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:

a. Enable scheduling for this capture filter:

```
(config network analyzer name)> schedule enable true
(config network analyzer name)>
```

b. Set the mode that will be used to run the capture filter:

```
(config network analyzer name)> when mode
(config network analyzer name)>
```

where *mode* is one of the following:

- **boot**: The script will run once each time the device boots.
- **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected, set the interval:

  ```
  (config add network analyzer name)> on_interval value
  (config add network analyzer name)>
  ```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

  For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

  ```
  (config network analyzer name)> on_interval  600s
  (config network analyzer name)>
  ```

- **set_time**: Runs the script at a specified time of the day. If **set_time** is set, set the time that the script should run, using the format *HH*:*MM*:

  ```
  (config network analyzer name)> run_time HH:MM
  (config network analyzer name)>
  ```

- **maintenance_time**: The script will run during the system maintenance time window.

c. Set the amount of time that the scheduled analyzer session will run:

```
(config network analyzer name)> duration value
(config network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

d. Set the frequency with which captured events will be saved:

```
(config network analyzer name)> save_interval value
(config network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **save_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

7. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Example filters for capturing data traffic

The following are examples of filters using Berkeley Packet Filter (BPF) syntax for capturing several types of network data. See https://biot.com/capstats/bpf.html for detailed information about BPF syntax.

Example IPv4 capture filters

- Capture traffic to and from IP host 192.168.1.1:

```
ip host 192.168.1.1
```

- Capture traffic from IP host 192.168.1.1:

```
ip src host 192.168.1.1
```

- Capture traffic to IP host 192.168.1.1:

```
ip dst host 192.168.1.1
```

- Capture traffic for a particular IP protocol:

```
ip proto protocol
```

  where *protocol* is a number in the range of **1** to **255** or one of the following keywords: **icmp**, **icmp6**, **igmp**, **pim**, **ah**, **esp**, **vrrp**, **udp**, or **tcp**.

- Capture traffic to and from a TCP port 80:

```
ip proto tcp and port 80
```

- Capture traffic to UDP port 53:

```
ip proto udp and dst port 53
```

- Capture traffic from UDP port 53:

```
ip proto udp and src port 53
```

- Capture to and from IP host 10.0.0.1 but filter out ports 22 and 80:

```
ip host 10.0.0.1 and not (port 22 or port 80)
```

Example Ethernet capture filters

- Capture Ethernet packets to and from a host with a MAC address of 00:40:D0:13:35:36:

```
ether host 00:40:D0:13:35:36
```

- Capture Ethernet packets from host 00:40:D0:13:35:36:

```
ether src 00:40:D0:13:35:36:
```

- Capture Ethernet packets to host 00:40:D0:13:35:36:

```
ether dst 00:40:D0:13:35:36
```

Capture packets from the command line

You can start packet capture at the command line with the analyzer start command. Alternatively, you can schedule the network analyzer to run based on a specified event or at a particular time. See Configure packet capture for the network analyzer for information about scheduling packet capturing.

Additional analyzer commands allow you to:

- Stop capturing packets.
- Save captured data traffic to a file.
- Clear captured data.

Required configuration items

- A configured packet capture. See Configure packet capture for the network analyzer for packet capture configuration information.

To start packet capture from the command line:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

   ```
   > analyzer start name capture_filter
   >
   ```

   where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

   To determine available packet capture configurations, use the **?**:

   ```
   > analyzer start name ?

   name: Name of the capture filter to use.
   Format:
     test_capture
   ```

```
  capture_ping

> analyzer start name
```

You can capture up to 10 MB of data traffic in two 5 MB files per interface.

Note Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See Save captured data traffic to a file.

Stop capturing packets

You can stop packet capture at the command line with the analyzer stop command.

To stop packet capture from the command line:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type the following at the Admin CLI prompt:

   ```
   > analyzer stop name capture_filter
   >
   ```

   where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

   To determine available packet capture configurations, use the **?**:

   ```
   > analyzer stop name ?

   name: Name of the capture filter to use.
   Format:
     test_capture
     capture_ping

   > analyzer stop name
   ```

Show captured traffic data

To view captured data traffic, use the show analyzer command. The command output show the following information for each packet:

- The packet number.
- The timestamp for when the packet was captured.
- The length of the packet and the amount of data captured.
- Whether the packet was sent or received by the device.
- The interface on which the packet was sent or received.

- A hexadecimal dump of the packet of up to 256 bytes.
- Decoded information of the packet.

To show captured data traffic:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> show analyzer name capture_filter

Packet 1 : Mar-03-2022 10:16:23.287682, Length 60 bytes (Captured Length
60 bytes)

Received on interface eth1

      00 40 ff 80 01 20 b4 b6  86 21 b5 73 08 00 45 00   .@... ..
.!.s..E.
      00 28 3d 36 40 00 80 06  14 bc 0a 0a 4a 82 0a 0a   .(=6@... ....J..
      4a 48 cd ae 00 16 a4 4b  ff 5f ee 1f d8 23 50 10   JH.....K
._...#P.
      08 02 c7 40 00 00 00 00  00 00 00 00                ...@.... ....

    Ethernet Header
      Destination MAC Addr : 00:40:D0:13:35:36
      Source MAC Addr      : fb:03:53:05:11:2f
      Ethernet Type        : IP (0x0800)
    IP Header
      IP Version           : 4
      Header Length        : 20 bytes
      ToS                  : 0x00
      Total Length         : 40 bytes
      ID                   : 15670 (0x3d36)
      Flags                : Do not fragment
      Fragment Offset      : 0 (0x0000)
      TTL                  : 128 (0x80)
      Protocol             : TCP (6)
      Checksum             : 0x14bc
      Source IP Address    : 10.10.74.130
      Dest. IP Address     : 10.10.74.72
    TCP Header
      Source Port          : 52654
      Destination Port     : 22
      Sequence Number      : 2756443999
      Ack Number           : 3995064355
      Data Offset          : 5
      Flags                : ACK
      Window               : 2050
      Checksum                 : 0xc740
      Urgent Pointer           : 0
    TCP Data
      00 00 00 00 00 00                                         ......

>
```

where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

To determine available packet capture configurations, use the **?**:

```
> show anaylzer name ?

name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> show anaylzer name
```

Save captured data traffic to a file

Data traffic is captured to RAM and when the device reboots, the data is lost. To retain the captured data, first save the data to a file and then upload the file to a PC.

To save captured traffic data to a file, use the analyzer save command:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type the following at the Admin CLI prompt:

```
> analyzer save filename filename name capture_filter
>
```

where:

- *filename* is the name of the file that the captured data will be saved to.

  Determine filenames already in use:

  Use the tab autocomplete feature to determine filenames that are currently in use:

```
> analyzer save name <tab>
test1_analyzer_capture     test2_analyzer_capture
> analyzer save name
```

- *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

  To determine available packet capture configurations, use the **?**:

```
> analyzer save name ?

name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> analyzer save name
```

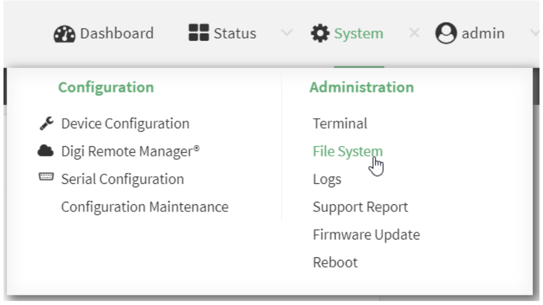
The file is stored in the **/etc/config/analyzer** directory. To transfer the file to your PC, see Download captured data to your PC.

Download captured data to your PC

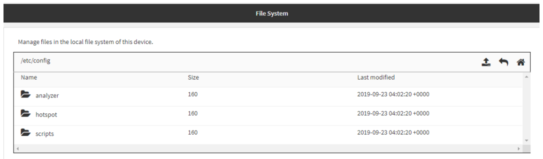
After saving captured data to a file (see Save captured data traffic to a file), you can download the file from the WebUI or from the command line by using the scp (secure copy file) command.

☰ WebUI

1. Log into the Connect EZ WebUI as a user with Admin access.
2. On the menu, click **System**. Under **Administration**, click **File System**.



The **File System** page appears.



File System

Manage files in the local file system of this device.

/etc/config

Name	Size	Last modified
analyzer	160	2019-09-23 04:02:20 +0000
hotspot	160	2019-09-23 04:02:20 +0000
scripts	160	2019-09-23 04:02:20 +0000

3. Highlight the **analyzer** directory and click ➦ to open the directory.
4. Select the saved analyzer report you want to download and click ⤓ (download).

⌨ Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type **scp** to use the Secure Copy program to copy the file to your PC:

```
> scp host hostname-or-ip user username remote remote-path local local-
path to remote
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ device.

For example:

To download the traffic saved in the file **/etc/config/analyzer/eth0.pcpng** to a PC with the IP **192.168.210.2**, for a user named **maria**, to the **/home/maria** directory:

```
> scp host 192.168.210.2 user maria remote /home/maria local
/etc/config/analyzer/eth0.pcpng to remote

maria@192.168.210.2's password:
eth0.pcpng                                   100%   11KB 851.3KB/s
00:00
```

Clear captured data

To clear captured data traffic in RAM, use the analyzer clear command:

Command line

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> analyzer clear name capture_filter
>
```

where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

To determine available packet capture configurations, use the **?**:

```
> anaylzer clear name ?

name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> anaylzer clear name
```

Note You can remove data traffic saved to a file using the rm command.

Use the ping command to troubleshoot network connections

Use the ping command troubleshoot connectivity problems.

Ping to check internet connection

To check your internet connection:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type the ping command followed by the host name or IP address of the server to be pinged:

```
> ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=11.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=10.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=54 time=10.7 ms
...
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Stop ping commands

To stop pings when the number of pings to send (the **count** parameter) has been set to a high value, enter **Ctrl+C**.

Use the traceroute command to diagnose IP routing problems

Use the **traceroute** command to diagnose IP routing problems. This command traces the route to a remote IP host and displays results. The **traceroute** command differs from ping in that traceroute shows where the route fails, while ping simply returns a single error on failure.

See the traceroute command description for command syntax and examples. The **traceroute** command has several parameters. Only **host** is required.

- **host**: The IP address of the destination host.
- **bypass**: Send directly to a host on an attached network.
- **debug**: Enable socket level debugging.
- **dontfragment**: Do not fragment probe packets.
- **first_ttl**: Specifies with what TTL to start. (Default: 1)
- **gateway**: Route the packet through a specified gateway.
- **icmp**: Use ICMP ECHO for probes.
- **interface**: Specifies the interface.

- **ipchecksums**: Calculate ip checksums.
- **max_ttl**: Specifies the maximum number of hops. (Default: 30)
- **nomap**: Do not map IP addresses to host names
- **nqueries**: Sets the number of probe packets per hop. (Default: 3)
- **packetlen**: Total size of the probing packet. (Default: -1)
- **pausemsecs**: Minimal time interval between probes (Default: 0)
- **port**: Specifies the destination port. (Default: -1)
- **src_addr**: Chooses an alternative source address.
- **tos**: Set Type of Service. (Default: -1)
- **verbose**: Verbose output.
- **waittime**: Max wait for a response to a probe. (Default: 5)

Example

This example shows using **traceroute** to verify that the Connect EZ device can route to host **8.8.8.8** (www.google.com) through the default gateway. The command output shows that **15** routing hops were required to reach the host:

1. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the **traceroute** command to view IP routing information:

```
> traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 52 byte packets
 1  192.168.8.1 (192.168.8.1)  0 ms  0 ms  0 ms
 2  10.10.10.10 (10.10.10.10)  0 ms  2 ms  2 ms
 3  * 10.10.8.23 (10.10.8.23)  1 ms  1 ms
 4  96.34.84.22 (96.34.84.22)  1 ms  1 ms  1 ms
 5  96.34.81.190 (96.34.81.190)  2 ms  2 ms  2 ms
 6  * * *
 7  96.34.2.12 (96.34.2.12)  11 ms  11 ms  11 ms
 8  * * *
 9  8.8.8.8 (8.8.8.8)  11 ms  11 ms  11 ms
>
```

By entering a **whois** command on a Unix device, the output shows that the route is as follows:

1. **192/8**: The local network of the Connect EZ device.
2. **192.168.8.1**: The local network gateway to the Internet.
3. **96/8**: Charter Communications, the network provider.
4. **216/8**: Google Inc.

Stop the traceroute process

To stop the traceroute process, enter **Ctrl-C**.

Digi Connect EZ regulatory and safety statements

RF exposure statement

In order to comply with RF exposure limits established in the ANSI C95.1 standards, the distance between the antenna or antennas and the user should not be less than **20 cm**.

Federal Communication (FCC) Part 15 Class A

These devices comply with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) These devices may not cause harmful interference, and (2) These devices must accept any interference received, including interference that may cause harmful operation.

European Community - CE Mark Declaration of Conformity (DoC)

Digi has issued Declarations of Conformity for the Connect EZ concerning emissions, EMC, and safety. For more information, see www.digi.com/resources/certifications.

Important note

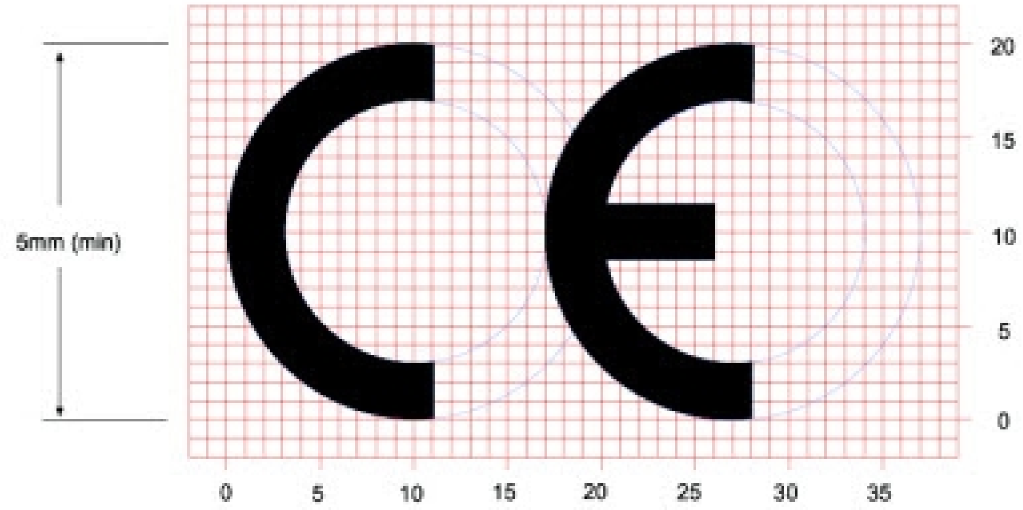
Digi customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market. Refer to the radio regulatory agency in the desired countries of operation for more information.

CE and UKCA OEM labeling requirements

The CE and UKCA markings must be clearly visible and legible when you affix it to the product. If this is not possible, you must attach these marks to the packaging (if any) or accompanying documents.

CE labeling requirements

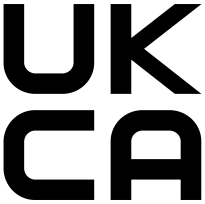
The “CE” marking must be affixed to a visible location on the OEM product. The following figure shows CE labeling requirements.



The CE mark shall consist of the initials “CE” taking the following form:

- If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
- The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

UK Conformity Assessed (UKCA) labeling requirements



See guidance/using-the-ukca-marking for further details.

You must make sure that:

- If you reduce or enlarge the size of your marking, the letters forming the UKCA marking must be in proportion to the version set out below.
- The UKCA marking is at least 5 mm in height – unless a different minimum dimension is specified in the relevant legislation.
- The UKCA marking is easily visible, legible (from 1 January 2023 it must be permanently attached).
- The UKCA marking can take different forms (for example, the color does not have to be solid), as long as it remains visible, legible and maintains the required proportions.

Innovation, Science, and Economic Development Canada (IC) certifications

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le present appareil numerique n’emet pas de bruits radioelectriques depassant les limites applicables aux appareils numeriques de la class B prescrites dans le Reglement sur le brouillage radioelectrique edicte par le ministere des Communications du Canada.

RoHS compliance statement

All Digi International Inc. products that are compliant with the RoHS Directive (EU Directive 2002/95/EC and subsequent amendments) are marked as **RoHS COMPLIANT**. RoHS COMPLIANT means that the substances restricted by the EU Directive 2002/95/EC and subsequent amendments of the European Parliament are not contained in a finished product above threshold limits mandated by EU Directive 2002/95/EC and subsequent amendments, unless the restrictive substance is subject of an exemption contained in the RoHS Directive. Digi International Inc., cannot guarantee that inventory held by distributors or other third parties is RoHS compliant.

Safety notices

- Read all instructions before installing and powering the router. You should keep these instructions in a safe place for future reference.
- If the power supply shows signs of damage or malfunction, stop using it immediately, turn off the power and disconnect the power supply before contacting your supplier for a repair or replacement.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user’s authority to operate the equipment. Use only the accessories, attachments, and power supplies provided by the manufacturer-connecting non-approved antennas or power supplies may damage the router, cause interference or create an electric shock hazard, and will void the warranty.
- Do not attempt to repair the product. The router contains no electronic components that can be serviced or replaced by the user. Any attempt to service or repair the router by the user will void the product warranty.
- Ports that are capable of connecting to other apparatus are defined as SELV ports. To ensure conformity with IEC60950 ensure that these ports are only connected to ports of the same type on other apparatus.

Cautionary statements for Connect EZ

Residential environment warnings

Note This equipment meets Class A requirements that may not offer adequate protection to broadcast services within a residential environment.

Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/ electronic products are recycled using the best available recovery techniques to minimize the impact on the environment.

This product contains high quality materials and components which can be recycled. At the end of its life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

Digi International Ltd WEEE Registration number: WEE/HF1515VU

Command line interface

This chapter contains the following topics:

Access the command line interface

You can access the Connect EZ command line interface using an SSH connection, a telnet connection, or a serial connection. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access. For further information about configuring access to these services, see:

- Serial: Serial port
- WebUI: Configure the web administration service
- SSH: Configure SSH access
- Telnet: Configure telnet access

Log in to the command line interface

Command line

1. Connect to the Connect EZ device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See Access the command line interface for more information.
   - For serial connections, the default configuration is:
     - **115200** baud rate
     - **8** data bits
     - **no** parity
     - **1** stop bit
     - **no** flow control
   - For SSH and telnet connections, the default IP address of the device is**192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

   ```
   login: admin
   Password: **********
   ```

   The default username is **admin**. The default unique password for your device is printed on the device label.
3. Depending on the device configuration, you may be presented with another menu, for example:

   ```
   Access selection menu:

          a: Admin CLI
          q: Quit

   Select access or quit [admin] :
   ```

Type **a** or **admin** to access the Connect EZ command line.

You will now be connected to the Admin CLI:

```
Connecting now...
 Press Tab to autocomplete commands
 Press '?' for a list of commands and details
 Type 'help' for details on navigating the CLI
 Type 'exit' to disconnect from the Admin CLI

>
```

See Command line interface for detailed instructions on using the command line interface.

Exit the command line interface

Command line

1. At the command prompt, type **exit**.

```
> exit
```

2. Depending on the device configuration, you may be presented with another menu, for example:

```
Access selection menu:

       a: Admin CLI
       q: Quit

Select access or quit [admin] :
```

Type **q** or **quit** to exit.

Execute a command from the web interface

1. Log into the Connect EZ WebUI as a user with Admin access.
2. At the main menu, click **Terminal**. The device console appears.

```
Connect EZ login:
```

3. Log into the Connect EZ command line as a user with Admin access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

   The Admin CLI prompt appears.

```
>
```

Display help for commands and parameters

The help command

When executed from the root command prompt, **help** displays information about autocomplete operations, how to move the cursor on the Connect EZ command line, and other keyboard shortcuts:

```
> help

 Commands
 ------------------------------------------------------------------------------
-
 ?             Show commands help
 <Tab>         Tab completion, displays all valid commands to complete command,
               if only one command is possible, it is used
 <Space>       Like tab except shortest prefix is used if command is valid
 <Enter>       Enter an input. If quoting then a new line is created instead. If
               the input is invalid then characters will be deleted until a
               prefix for a valid command is found.
 Ctrl + A      Move cursor to start of line
 Ctrl + E      Move cursor to end of line
 Ctrl + W      Delete word under cursor until start of line or [\',", ,\,/,.]
 Ctrl + R      If the current input is invalid then characters will be deleted
               until a prefix for a valid command is found.
 Ctrl + left   Jump cursor left until start of line or [\',", ,\,/,.]
 Ctrl + right  Jump cursor right until start of line or [\',", ,\,/,.]

>
```

The question mark (?) command

When executed from the root command prompt, **?** displays available commands:

```
> ?

 Commands
 ------------------------------------------------------------------------------
-
 config      View and modify the configuration
 exit        Exit the CLI
 analyzer    Analyzer commands.
 cp          Copy a file or directory.
 help        Show CLI editing and navigation commands.
 ls          List a directory.
 mkdir       Create a directory.

 more        View a file.
 mv          Move a file or directory.
 ping        Ping a host.
 reboot      Reboot the system.
 rm          Remove a file or directory.
 scp         Copy a file or directory over SSH.
 show        Show instance statistics.
 ssh          SSH login to a remote server
 system      System commands.
 telnet        Telnet login to a remote server
 traceroute  Print the route packets trace to network host.
 .

>
```

Display help for individual commands

When included with a command name, both **?** and **help** provide further information about the command. For example:

1. To display further information about the **show** command, type either **show ?** or **show help**:

```
> show ?

 Commands
 ------------------------------------------------------------------------
--
 analyzer     Show analyzer
 arp            Show ARP tables
 cloud          Show drm statistics
 config         Show config deltas.
 dhcp-lease     Show DHCP leases.
 dns            Show DNS servers.
 event          Show event list
 ipsec          Show IPsec statistics.
 location       Show loction information.
 log            Show syslog.
 manufacture    Show manufacturer information.
 modbus-gateway Show modbus gateway status & statistics.
 network        Show network interface statistics.
 ntp            Show NTP information.
 openvpn        Show OpenVPN statistics.
 route          Show IP routing information.
 serial         Show serial statistics.
 surelink       Show Surelink statistics.
 system         Show system statistics.
 version        Show firmware version.

 > show
```

Use the Tab key or the space bar to display abbreviated help

When executed from the root command prompt, pressing the **Tab** key or the space bar displays an abbreviated list of available commands:

Similar behavior is available with any command name:

```
> config network interface <space>
..               ...              defaultip        defaultlinklocal lan
loopback
> config network interface
```

Auto-complete commands and parameters

When entering a command and parameter, press the **Tab** key to cause the command line interface to auto-complete as much of the command and parameter as possible. Typing the space bar has similar behavior. If multiple commands are available that will match the entered text, auto-complete is not performed and the available commands are displayed instead.

Auto-complete applies to these command elements only :

- Command names. For example, typing **net<Tab>** auto-completes the command as **network**.
- Parameter names. For example:
  - **ping *hostname* int<Tab>** auto-completes the parameter as **interface**.
  - **system b<Tab>** auto-completes the parameter as **backup**.
- Parameter values, where the value is one of an enumeration or an on|off type; for example:

  ```
  (config)> serial port1 enable t<Tab>
  ```

  auto-completes to

  ```
  (config)> serial port1 enable true
  ```

Auto-complete does not function for:

- Parameter values that are string types.
- Integer values.
- File names.
- Select parameters passed to commands that perform an action.

Available commands

The following commands are available from the Admin CLI prompt:

Command	Description
config	Used to view and modify the configuration. See Device configuration using the command line interface for more information about using the **config** command.
exit	Exits the CLI.
cp	Copies a file or directory.
help	Displays: ■ CLI editing and navigation commands, when executed from the root of the Admin CLI prompt. ■ Available commands, syntax diagram, and parameter information, when executed in conjunction with another command. See Display help for commands and parameters for information about the **help** command.
ls	Lists the contents of a directory.
mkdir	Creates a directory.
more	Displays the contents of a file.
mv	Moves a file or directory.
ping	Pings a remote host using Internet Control Message Protocol (ICMP) Echo Request messages.
reboot	Reboots the Connect EZ device.
rm	Removes a file.
scp	Uses the secure copy protocol (SCP) to transfer files between the Connect EZ device and a remote host. See Use the scp command for information about using the **scp** command.
show	Displays information about the device and the device's configuration. See Display status and statistics using the show command for more information about the show command.
system	Issues commands related to system functionality.
traceroute	Sends and tracks route packets to a destination host.
update	Updates the device firmware.

Note For commands that operate on the Connect EZ's file system, such as the **cp**, **ls**, and **mkdir** commands, see File system for information about the file system, including how to copy, move and delete files and directories.

Use the scp command

The **scp** command uses Secure Copy Protocol (SCP) to transfer files between the Connect EZ device and a remote host.

Required configuration items

- The hostname or IP address of the remote host.
- The username and password of the user on the remote host.
- Whether the file is being copied to the Connect EZ device from a remote host, or to the remote host from the Connect EZ device.
    - If the file is being copied to the Connect EZ device from a remote host:
        - The path and filename of the file on the remote host that will be copied to the Connect EZ device.
        - The location on the Connect EZ device where the file will be copied.
    - If the file is being copied to a remote host from the Connect EZ device:
        - The path and filename of the file on the Connect EZ device that will be copied to the remote host.
        - The location on the remote host where the file will be copied.

Copy a file from a remote host to the Connect EZ device

To copy a file from a remote host to the Connect EZ device, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
local
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ device.
- *local-path* is the location on the Connect EZ device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the Connect EZ device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ-
22.2.9.85.bin local /etc/config/scripts to local
admin@192.168.4.1's password: adminpwd
Connect EZ-22.2.9.85.bin                        100%    36MB    11.1MB/s        00:03
>
```

Transfer a file from the Connect EZ device to a remote host

To copy a file from the Connect EZ device to a remote host, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
remote
```

where:

- *hostname-or-ip* is the hostname or ip address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ device.

For example:

To copy a support report from the Connect EZ device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

```
> system support-report /var/log/
Saving support report to /var/log/support-report-0040D0133536-22-03-03-
10:16:23.bin
Support report saved.
>
```

2. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local
/var/log/support-report-00:40:D0:13:35:36-22-03-03-10:16:23.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-22-03-03-10:16:23.bin
>
```

Display status and statistics using the show command

The Connect EZ **show** command display status and statistics for various features.

For example:

show config

The show config command displays all the configuration settings for the device that have been changed from the default settings. This is a particularly useful when troubleshooting the device.

```
> show config

auth tacacs+ service "login"
auth user admin password
"$2a$05$WlJQhquI7BgsytkpobKhaeLPtWraGANBcrlEaJX/wJv63JENW/HOu"
add auth user test
add auth user test group end "admin"
add auth user test group end "serial"
auth user test password
"$2a$05$RdGYz1sLKbWrqe6cZjlsd.otg03JZR6n9939XV6EYWUSP0tMAzO5W"
```

```
network interface lan ipv4 type "dhcp"
network interface lan zone "external"

schema version "445"

>
```

show system

The show system command displays system information and statistics for the device, including CPU usage.

```
> show system

  Model                     : Digi Connect EZ
  Serial Number             : Connect EZ-000065
  SKU                       : Connect EZ
  Hostname                  : Connect EZ
  MAC Address               : DF:DD:E2:AE:21:18

  Hardware Version          : 50001947-01 1P
  Firmware Version          : 22.2.9.85
  Alt. Firmware Version     : 22.2.9.85
  Alt. Firmware Build Date : Thurs, 03 March 2022 10:16:23
  Bootloader Version        : 19.7.23.0-15f936e0ed

  Current Time              : Thurs, 03 March 2022 10:16:23 +0000
  CPU                       : 1.4%
  Uptime                    : 6 days, 6 hours, 21 minutes, 57 seconds (541317s)
  Temperature               : 40C

>
```

show network

The show network command displays status and statistics for network interfaces.

```
> show network

 Interface          Proto  Status   Address
 ----------------   -----  -------  -------------------------------
 defaultip          IPv4   up       192.168.210.1/24
 defaultlinklocal   IPv4   up       169.254.100.100/16
 lan               IPv4   up       192.168.2.1
 lan               IPv6   up       0:0:0:0:0:ffff:c0a8:301
 loopback           IPv4   up       127.0.0.1/8
 wan               IPv4   up       192.168.3.1/24
 wan               IPv6   up       fd00:2704::240:ffff:fe80:120/64

>
```

Device configuration using the command line interface

The **config** command allows for device configuration from the command line. All configuration tasks that can be performed by using the WebUI can also be performed by using the **config** command.

There are two ways to invoke the **config** command from the CLI:

- Execute the **config** command and parameters at the root prompt. See Execute configuration commands at the root Admin CLI prompt for more information.
- Enter configuration mode by executing the **config** command without any parameters. See Configuration mode for more information.

Execute configuration commands at the root Admin CLI prompt

You can execute the **config** command at the root Admin CLI prompt with any appropriate parameters. When the **config** command is used in this way, changes to the device's configuration are automatically saved when the command is executed.

For example, to disable the SSH service from the root prompt, enter the following command:

```
> config service ssh enable false
>
```

The Connect EZ device's ssh service is now disabled.

Note When the **config** command is executed at the root prompt, certain configuration actions that are available in configuration mode cannot be performed. This includes validating configuration changes, canceling and reverting configuration changes, and performing actions on elements in lists. See Configuration mode for information about using configuration mode.

Display help for the config command from the root Admin CLI prompt

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character after the **config** command.

1. For example:

   ```
   > config ?
   ```

   Will display the following help information:

   ```
   > config ?

   Additional Configuration
   -------------------------------------------------------------------------
   -
   application               Custom scripts
   auth                      Authentication
   cloud                     Central management
   firewall                  Firewall
   monitoring                Monitoring
   network                   Network
   serial                    Serial
   service                   Services
   system                    System
   vpn                       VPN

   Run "config" with no arguments to enter the configuration editing mode.
   ```

```
> config
```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command:

```
> config service ?
Services

Additional Configuration
-------------------------------------------------------------------------
-
dns                       DNS
mdns                      Service Discovery (mDNS)
multicast                 Multicast
ntp                       NTP
remote_control            Remote control
snmp                      SNMP
ssh                       SSH
telnet                    Telnet
web_admin                 Web administration

> config service
```

3. Next, display help for the **config service ssh** command:

```
> config service ssh ?

SSH: An SSH server for managing the device.

Parameters                Current Value
-------------------------------------------------------------------------
-
enable                    true           Enable
key                       [private]      Private key
port                      22             Port

Additional Configuration
-------------------------------------------------------------------------
-
acl                       Access control list
mdns

> config service ssh
```

4. Lastly, display the allowed values and other information for the **enable** parameter:

```
> config service ssh enable ?

Enable: Enable the service.
Format: true, false, yes, no, 1, 0
Default value: true
```

```
Current value: true

> config service ssh enable
```

Configuration mode

Configuration mode allows you to perform multiple configuration tasks and validate the changes prior to saving them. You can cancel all changes without saving them at any time. Configuration changes do not take effect until the configuration is saved.

Enable configuration mode

To enable configuration mode, at the root prompt, enter the **config** command without any parameters:

```
> config
(config)>
```

When the command line is in configuration mode, the prompt will change to include **(config)**, to indicate that you are currently in configuration mode.

Enter configuration commands in configuration mode

There are two ways to enter configuration commands while in configuration mode:

- Enter the full command string from the config prompt.

  For example, to disable the ssh service by entering the full command string at the config prompt:

  ```
  (config)> service ssh enable false
  (config)>
  ```

- Execute commands by moving through the configuration schema.

  For example, to disable the ssh service by moving through the configuration and then executing the **enable false** command:

  1. At the **config** prompt, enter **service** to move to the **service** node:

     ```
     (config)> service
     (config service)>
     ```

  2. Enter **ssh** to move to the **ssh** node:

     ```
     (config service)> ssh
     (config service ssh)>
     ```

  3. Enter **enable false** to disable the **ssh** service:

     ```
     (config service ssh)> enable false
     (config service ssh)>
     ```

  See Move within the configuration schema for more information about moving within the configuration.

Save changes and exit configuration mode

To save changes that you have made to the configuration while in configuration mode, use **save**. The save command automatically validates the configuration changes; the configuration will not be saved if it is not valid. Note that you can also validate configuration changes at any time while in configuration mode by using the **validate** command.

```
(config)> save
Configuration saved.
>
```

After using **save** to save changes to the configuration, you will automatically exit configuration mode. To return to configuration mode, type **config** again.

Exit configuration mode without saving changes

You can discard any unsaved configuration changes and exit configuration mode by using the **cancel** command:

```
(config)> cancel
>
```

After using **cancel** to discard unsaved changes to the configuration, you will automatically exit configuration mode.

Configuration actions

In configuration mode, configuration actions are available to perform tasks related to saving or canceling the configuration changes, and to manage items and elements in lists. The commands can be listed by entering a question mark (**?**) at the **config** prompt.

The following actions are available:

Configuration actions	Description
cancel	Discards unsaved configuration changes and exits configuration mode.
save	Saves configuration changes and exits configuration mode.
validate	Validates configuration changes.
revert	Reverts the configuration to default settings. See The revert command for more information.
show	Displays configuration settings.
add	Adds a named element, or an element in a list. See Manage elements in lists for information about using the **add** command with lists.
del	Deletes a named element, or an element in a list. See Manage elements

Configuration actions	Description
	in lists for information about using the **del** command with lists.
move	Moves elements in a list. See Manage elements in lists for information about using the **move** command with lists.

Display command line help in configuration mode

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character at the **config** prompt. For example:

1. Enter **?** at the **config** prompt:

   ```
   (config)> ?
   ```

   This will display the following help information:

   ```
   (config)> ?

    Additional Configuration
    ------------------------------------------------------------------------
   --
    application                Custom scripts
    auth                       Authentication
    cloud                      Central management
    firewall                   Firewall
    monitoring                 Monitoring
    network                    Network
    serial                     Serial
    service                    Services
    system                     System
    vpn                        VPN

   (config)>
   ```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command, use one of the following methods:

   - At the **config** prompt, enter **service ?**:

     ```
     (config)> service ?
     ```

   - At the **config** prompt:

     a. Enter **service** to move to the **service** node:

     ```
     (config)> service
     (config service)>
     ```

     b. Enter **?** to display help for the **service** node:

     ```
     (config service)> ?
     ```

Either of these methods will display the following information:

```
config> service ?

Services

 Additional Configuration
 ------------------------------------------------------------------------
--
 dns                        DNS
 mdns                       Service Discovery (mDNS)
 multicast                  Multicast
 ntp                        NTP
 remote_control             Remote control
 snmp                       SNMP
 ssh                        SSH
 telnet                     Telnet
 web_admin                  Web administration

(config)> service
```

3. Next, to display help for the **service ssh** command, use one of the following methods:
   - At the **config** prompt, enter **service ssh ?**:

     ```
     (config)> service ssh ?
     ```

   - At the **config** prompt:
     a. Enter **service** to move to the **service** node:

        ```
        (config)> service
        (config service)>
        ```

     b. Enter **ssh** to move to the **ssh** node:

        ```
        (config service)> ssh
        (config service ssh)>
        ```

     c. Enter **?** to display help for the **ssh** node:

        ```
        (config service ssh)> ?
        ```

Either of these methods will display the following information:

```
(config)> service ssh ?

SSH: An SSH server for managing the device.

 Parameters                 Current Value
 ------------------------------------------------------------------------
--
 enable                     true           Enable
 key                        [private]      Private key
```

```
 port                      22               Port

 Additional Configuration
 ------------------------------------------------------------------------
--
 acl                       Access control list
 mdns

(config)> service ssh
```

4. Lastly, to display allowed values and other information for the **enable** parameter, use one of the following methods:
   - At the **config** prompt, enter **service ssh enable ?**:

     ```
     (config)> service ssh enable ?
     ```

   - At the **config** prompt:
     a. Enter **service** to move to the **service** node:

        ```
        (config)> service
        (config service)>
        ```

     b. Enter **ssh** to move to the **ssh** node:

        ```
        (config service)> ssh
        (config service ssh)>
        ```

     c. Enter **enable ?** to display help for the **enable** parameter:

        ```
        (config service ssh)> enable ?
        (config service ssh)>
        ```

   Either of these methods will display the following information:

   ```
   (config)> service ssh enable ?

    Enable: Enable the service.
    Format: true, false, yes, no, 1, 0
    Default value: true
    Current value: true

   (config)> service ssh enable
   ```

Move within the configuration schema

You can perform configuration tasks at the CLI by moving within the configuration.

- Move forward one node in the configuration by entering the name of an Additional Configuration option:

1. At the **config** prompt, type **service** to move to the **service** node:

   ```
   (config)> service
   (config service)>
   ```

2. Type **ssh** to move to the **ssh** node:

   ```
   (config service)> ssh
   (config service ssh)>
   ```

3. Type **acl** to move to the **acl** node:

   ```
   (config service ssh)> acl
   (config service ssh acl)>
   ```

4. Type **zone** to move to the **zone** node:

   ```
   (config service ssh acl)> zone
   (config service ssh acl zone)>
   ```

You can also enter multiple nodes at once to move multiple steps in the configuration:

```
(config)> service ssh acl zone
(config service ssh acl zone)>
```

- Move backward one node in the configuration by entering two periods (**..**):

  ```
  (config service ssh acl zone)> ..
  (config service ssh acl)>
  ```

  You can also move back multiples nodes in the configuration by typing multiple sets of two periods:

  ```
  (config service ssh acl zone)> .. .. ..
  (config service)>
  ```

- Move to the root of the config prompt from anywhere within the configuration by entering three periods (**...**):

  ```
  (config service ssh acl zone)> ...
  (config)>
  ```

Manage elements in lists

While in configuration mode, you can use the **add**, **del**, and **move** action commands to manage elements in a list. When working with lists, these actions require an index number to identify the list item that will be acted on.

Add elements to a list

When used with parameters that contains lists of elements, the **add** command is used to add an element to the list.

For example, to add an authentication method:

1. Display current authentication method by using the **show** command:

   ```
   (config)> show auth method
   0 local
   (config)>
   ```

2. Add an authentication method by using the **add *index_item*** command. For example:
   - To add the TACACS+ authentication method to the beginning of the list, use the index number **0**:

     ```
     (config)> add auth method 0 tacacs+
     (config)> show auth method
     0 tacacs+
     1 local
     (config)>
     ```

   - To add the TACACS+ authentication method to the end of the list, use the **end** keyword:

     ```
     (config)> add auth method end tacacs+
     (config)> show auth method
     0 local
     1 tacacs+
     (config)>
     ```

The end keyword

As demonstrated above, the **end** keyword is used to add an element to the end of a list. Additionally, the **end** keyword is used to add an element to a list that does not have any elements.

For example, to add an authentication group to a user that has just been created:

1. Use the **show** command to verify that the user is not currently a member of any groups:

   ```
   (config)> show auth user new-user group
   (config)>
   ```

2. Use the **end** keyword to add the admin group to the user's configuration:

   ```
   (config)> add auth user new-user group end admin
   (config)>
   ```

3. Use the **show** command again to verify that the admin group has been added to the user's configuration:

   ```
   (config)> show auth user new-user group
   0 admin
   (config)>
   ```

Delete elements from a list

When used with parameters that contains lists of elements, the **del** command is used to delete an element in the list.

For example, to delete an authentication method:

1. Use the **show** command to display current authentication method configuration:

   ```
   (config)> show auth method
   0 local
   1 tacacs+
   2 radius
   (config)>
   ```

2. Delete one of the authentication methods by using the **del *index_number*** command. For example:

   a. To delete the local authentication method, use the index number **0**:

      ```
      (config)> del auth method 0
      (config)>
      ```

   b. Use the **show** command to verify that the local authentication method was removed:

      ```
      (config)> show auth method
      0 tacacs+
      1 radius
      (config)>
      ```

Move elements within a list

Use the **move** command to reorder elements in a list.

For example, to reorder the authentication methods:

1. Use the **show** command to display current authentication method configuration:

   ```
   (config)> show auth method
   0 local
   1 tacacs+
   2 radius
   (config)>
   ```

2. To configure the device to use TACACS+ authentication first to authenticate a user, use the **move *index_number_1 index_number_2*** command:

   ```
   (config)> move auth method 1 0
   (config)>
   ```

3. Use the **show** command again to verify the change:

   ```
   (config)> show auth method
   0 tacacs+
   1 local
   2 radius
   (config)>
   ```

The revert command

The **revert** command is used to revert changes to the Connect EZ device's configuration and restore default configuration settings. The behavior of the revert command varies depending on where in the configuration hierarchy the command is executed, and whether the optional **path** parameter is used.

After executing the revert command, you must save the configuration changes by using the **save** command. You can also discard the configuration changes by using the **cancel** command.

CAUTION! The **revert** command reverts all changes to the default configuration, not only unsaved changes.

Revert all configuration changes to default settings

To discard all configuration changes and revert to default settings, use the **revert** command at the config prompt without the optional **path** parameter:

1. At the config prompt, enter **revert**:

   ```
   (config)> revert
   (config)>
   ```

2. Set the password for the admin user prior to saving the changes:

   ```
   (config)> auth user admin password pwd
   (config)>
   ```

3. Save the configuration and apply the change:

   ```
   (config)> save
   Configuration saved.
   >
   ```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Revert a subset of configuration changes to the default settings

There are two methods to revert a subset of configuration changes to the default settings.

- Enter the **revert** command with the **path** parameter. For example, to revert all changes to the authentication methods configuration:
  1. Enter the **revert** command with the **path** set to **auth method**:

     ```
     (config)> revert auth method
     (config)>
     ```

  2. Save the configuration and apply the change:

     ```
     (config)> save
     Configuration saved.
     >
     ```

  3. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

- Move to the location in the configuration and enter the **revert** command without the **path** parameter. For example:

  1. Change to the auth method node:

     ```
     (config)> auth method
     (config auth method)>
     ```

  2. Enter the **revert** command:

     ```
     (config auth method)> revert
     (config auth method)>
     ```

  3. Save the configuration and apply the change:

     ```
     (config auth method)> save
     Configuration saved.
     >
     ```

  4. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

- You can also use a combination of both of these methods:

  1. Change to the **auth** node:

     ```
     (config)> auth
     (config auth)>
     ```

  2. Enter the **revert** command with the **path** set to **method**:

     ```
     (config auth)> revert method
     (config auth)>
     ```

  3. Save the configuration and apply the change:

     ```
     (config auth)> save
     Configuration saved.
     >
     ```

  4. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Enter strings in configuration commands

For string parameters, if the string value contains a space, the value must be enclosed in quotation marks. For example, to assign a descriptive name for the device using the **system** command, enter:

```
(config)> system description "Digi Connect EZ"
```

Example: Create a new user by using the command line

In this example, you will use the Connect EZ command line to create a new user, provide a password for the user, and assign the user to authentication groups.

1. Log into the Connect EZ command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, create a new user with the username **user1**:

   - Method one: Create a user at the root of the config prompt:

     ```
     (config)> add auth user user1
     (config auth user user1)>
     ```

   - Method two: Create a user by moving through the configuration:

     a. At the config prompt, enter **auth** to move to the **auth** node:

     ```
     (config)> auth
     (config auth)>
     ```

     b. Enter **user** to move to the **user** node:

     ```
     (config auth)> user
     (config auth user)>
     ```

     c. Create a new user with the username **user1**:

     ```
     (config auth user)> add user1
     (config auth user user1)>
     ```

4. Configure a password for the user:

   ```
   (config auth user user1)> password pwd1
   (config auth user user1)>
   ```

5. List available authentication groups:

   ```
   (config auth user user1)> show .. .. group

   admin
       acl
           admin
               enable true
           nagios
               enable false
           openvpn
               enable false
               no tunnels
           portal
               enable false
               no portals
   ```

```
        serial
            enable false
            no ports
        shell
            enable false

serial
    acl
        admin
            enable true
        nagios
            enable false
        openvpn
            enable false
            no tunnels
        portal
            enable false
            no portals
        serial
            enable true
                ports
                    0 port1
        shell
            enable false
(config auth user user1)>
```

6. Add the user to the admin group:

```
(config auth user user1)> add group end admin
(config auth user user1)>
```

7. Save the configuration and apply the change:

```
(config auth user user1)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Command line reference

analyzer clear

Clears the traffic captured by the analyzer.

Syntax

```
analyzer clear <name>
```

Parameters

name: Name of the capture filter to use.

analyzer save

Saves the current captured traffic to a file.

Syntax

```
analyzer save <name> <filename>
```

Parameters

name: Name of the capture filter to use.

filename: The filename to save captured traffic to. The file will be saved to the device's /etc/config/analyzer directory.

analyzer start

Start a capture session of packets on this devices interfaces.

Syntax

```
analyzer start <name>
```

Parameters

name: Name of the capture filter to use.

analyzer stop

Stops the traffic capture session.

Syntax

```
analyzer stop <name>
```

Parameters

name: Name of the capture filter to use.

clear dhcp-lease ip-address

Clear the DHCP lease for the specified IP address.

Syntax

```
clear dhcp-lease ip-address ADDRESS
```

Parameters

address: An IPv4 or IPv6 address

clear dhcp-lease mac

Clear the DHCP lease for the specified MAC address.

Syntax

```
clear dhcp-lease mac ADDRESS
```

Parameters

address: 12-digit, colon-delimited MAC address [00:11:22:AA:BB:CC]

cp

Copy a file or directory.

Syntax

```
cp <source> <destination> [force]
```

Parameters

source: The source file or directory to copy.

destination: The destination path to copy the source file or directory to.

force: Do not ask to overwrite the destination file if it exists.

help

Show CLI editing and navigation commands.

Syntax

```
help
```

Parameters

None

ls

List a directory.

Syntax

```
ls <path> [show-hidden]
```

Parameters

path: List files and directories under this path.

show-hidden: Show hidden files and directories. Hidden filenames begin with '.'.

mkdir

Create a directory. Parent directories are created as needed.

Syntax

```
mkdir <path>
```

Parameters

path: The directory path to create.

modem at-interactive

Start an AT command session on the modem's AT serial port.

Syntax

```
modem at-interactive [name STRING] [imei STRING]
```

Parameters

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

modem puk unlock

Unlock the SIM with a PUK code from the SIM provider.

Syntax

```
modem puk unlock <puk> <new-pin> [name STRING] [imei STRING]
```

Parameters

puk: The SIM's PUK code.

new-pin: The PIN code to change to.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

modem sim-slot

Show or change the modem's active SIM slot. This applies only to modems with multiple SIM slots.

Syntax

```
modem sim-slot <slot> [name STRING] [imei STRING]
```

Parameters

slot: The SIM slot to change to.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

monitoring

Commands to clear the device's status or systems.

monitoring metrics

Device metrics commands.

uplaod

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

Parameters

None

monitoring metrics upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

Syntax

```
monitoring metrics upload
```

Parameters

None

more

View a file.

Syntax

```
more <path>
```

Parameters

path: The file to view.

mv

Move a file or directory.

Syntax

```
mv <source> <destination> [force]
```

Parameters

source: The source file or directory to move.

destination: The destination path to move the source file or directory to.

force: Do not ask to overwrite the destination file if it exists.

ping

Ping a host using ICMP echo.

Syntax

```
ping <host> [interface STRING] [source STRING] [ipv6] [size INTEGER] [count
INTEGER] [broadcast]
```

Parameters

host: The name or address of the remote host to send ICMP ping requests to. If broadcast is enabled, can be the broadcast address.

interface: The network interface to send ping packets from when the host is reachable over a default route. If not specified, the system's primary default route will be used.

source: The ping command will send a packet with the source address set to the IP address of this interface, rather than the address of the interface the packet is sent from.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

size: The number of bytes sent in the ICMP ping request. (Minimum: 0, Default: 56)

count: The number of ICMP ping requests to send before terminating. (Minimum: 1, Default: 100)

broadcast: Enable broadcast ping functionality.

reboot

Reboot the system.

Parameters

None

rm

Remove a file or directory.

Syntax

```
rm <path> [force]
```

Parameters

path: The path to remove.

force: Force the file to be removed without asking.

scp

Copy a file or directory over SSH.

Syntax

```
scp <local> <remote> <host> <user> <to> [port INTEGER]
```

Parameters

local: The path and name of the file on the local device to copy to or from.

remote: The path and name of the file on the remote host to copy to or from.

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

to: Determine whether to copy the file from the local device to the remote host, or from the remote host to the local device.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

show analyzer

Show packets from a specified analyzer capture.

Syntax

```
show analyzer <name>
```

Parameters

name: Name of the capture filter to use.

show arp

Show ARP tables. If no IP version is specified IPv4 & IPV6 will be displayed.

Syntax

```
show arp [ipv4] [ipv6] [verbose]
```

Parameters

ipv4: Display IPv4 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

ipv6: Display IPv6 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

verbose: Display more information (less concise, more detail).

show cloud

Show drm status & statistics.

Syntax

```
show cloud
```

Parameters

None

show config

Show a summary of changes made to the default configuration. The changes shown are not suitable for pasting into a CLI session.

Syntax

```
show config [cli_format]
```

Parameters

cli_format: Show the exact CLI commands required to configure the device from a default configuration. The changes shown are suitable for pasting into a CLI session, although individual output lines maybe context sensitive and unable to be entered in isolation.

show dhcp-lease

Show DHCP leases.

Syntax

```
show dhcp-lease [all] [verbose]
```

Parameters

all: Show all leases (active and inactive (not in etc/config/dhcp.*lease)).

verbose: Display more information (less concise, more detail).

show dns

Show DNS servers and associated domains.

Syntax

```
show dns
```

Parameters

None

show event

Show event list (high level).

Syntax

```
show event [table <status|error|info>] [number INTEGER]
```

Parameters

table: Type of event log to be displayed (status, error, info).

number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

show hotspot

Show hotspot statistics.

Syntax

```
show hotspot [name STRING] [ip STRING]
```

Parameters

name: The configured instance name of the hotspot.

ip: IP address of a specific client, to limit the status display to only this client.

show ipsec

Show IPsec status & statistics.

Syntax

```
show ipsec [tunnel STRING] [all] [verbose]
```

Parameters

tunnel: Display more details and config data for a specific IPsec tunnel.

all: Display all tunnels including disabled tunnels.

verbose: Display status of one or all tunnels in plain text.

show l2tp lac

Show L2TP access concentrator status & statistics.

Syntax

```
show l2tp lac [name STRING]
```

Parameters

name: Display more details for a specific L2TP access concentrator.

show l2tp lns

Show L2TP network server status & statistics.

Syntax

```
show l2tp lns [name STRING]
```

Parameters

name: Display more details for a specific L2TP network server.

show l2tpeth

Show L2TPv3 ethernet tunnel session status and statistics.

Syntax

```
show l2tpeth [name STRING]
```

Parameters

name: Display more details for a specific L2TPv3 ethernet tunnel session.

show location

Show location information.

Syntax

```
show location [geofence]
```

Parameters

geofence: Show geofence information.

show log

Show system log (low level).

Syntax

```
show log [number INTEGER] [filter <critical|warning|debug|info>]
```

Parameters

number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

filter: Filters for type of log message displayed (critical, warning, info, debug). Note, filters from the number of messages retrieved not the whole log (this can be very time consuming). If you require more messages of the filtered type, increase the number of messages retrieved using 'number'.

show manufacture

Show manufacturer information.

Syntax

```
show manufacture [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

show modbus-gateway

Show modbus gateway status & statistics.

Syntax

```
show modbus-gateway [verbose]
```

Parameters

verbose: Display more information (less concise, more detail).

show nemo

Show NEMO status and statistics.

Syntax

```
show nemo [name STRING]
```

Parameters

name: Display more details and configuration data for a specific NEMO instance.

show network

Show network interface status & statistics.

Syntax

```
show network [interface STRING] [all] [verbose]
```

Parameters

interface: Display more details and config data for a specific network interface.

all: Display all interfaces including disabled interfaces.

verbose: Display more information (less concise, more detail).

show ntp

Show NTP status & statistics.

Syntax

```
show ntp
```

Parameters

None

show openvpn client

Show OpenVPN client status & statistics.

Syntax

```
show openvpn client [name STRING] [all]
```

Parameters

name: Display more details and config data for a specific OpenVPN client.

all: Display all clients including disabled clients.

show openvpn server

Show OpenVPN server status & statistics.

Syntax

```
show openvpn server [name STRING] [all]
```

Parameters

name: Display more details and config data for a specific OpenVPN server.

all: Display all servers including disabled servers.

show route

Show IP routing information.

Syntax

```
show route [ipv4] [ipv6] [verbose]
```

Parameters

ipv4: Display IPv4 routes.

ipv6: Display IPv6 routes.

verbose: Display more information (less concise, more detail).

show serial

Show serial status & statistics.

Syntax

```
show serial [port STRING]
```

Parameters

port: Display more details and config data for a specific serial port.

show scripts

Show scheduled system scripts.

Syntax

```
show scripts
```

Parameters

None

show surelink interface

Show SureLink status & statistics for network interfaces.

Syntax

```
show surelink interface [name STRING] [all]
```

Parameters

name: The name of a specific network interface.

all: Show all network interfaces.

show surelink ipsec

Show SureLink status & statistics for IPsec tunnels.

Syntax

```
show surelink ipsec [tunnel STRING] [all]
```

Parameters

tunnel: The name of a specific IPsec tunnel.

all: Show all IPsec tunnels.

show surelink openvpn

Show SureLink status & statistics for OpenVPN clients.

Syntax

```
show surelink openvpn [client STRING] [all]
```

Parameters

client: The name of the OpenVPN client.

all: Show all OpenVPN clients.

show system

Show system status & statistics.

Syntax

```
show system [verbose]
```

Parameters

verbose: Display more information (disk usage, etc).

show usb

Show USB information.

Syntax

```
show usb
```

Parameters

None

show version

Show firmware version.

Syntax

```
show version [verbose]
```

Parameters

verbose: Display more information (build date).

show vrrp

Show VRRP status & statistics.

Syntax

```
show vrrp [name STRING] [all] [verbose]
```

Parameters

name: Display more details and config data for a specific VRRP instance.

all: Display all VRRP instances including disabled instances.

verbose: Display all VRRP status and statistics including disabled instances.

show web-filter

Show web filter status & statistics.

Syntax

```
show web-filter
```

Parameters

None

speedtest

Perform a speed test to a remote host using nuttcp or iPerf. The system's primary default route will be used. The speed test will take approximately 30 seconds to complete.

Syntax

```
speedtest <host> [size INTEGER] [mode <nuttcp|iperf>] [output <text|json>]
```

Parameters

host: The name or address of the remote speed test host/server.

size: The number of kilobytes sent in the speed test packets. (Minimum: 0, Default: 1000)

mode: The type of speed test protocol to run. (Default: nuttcp)

output: The format of output to display the speed test results as. (Default: text)

ssh

Use SSH protocol to log into a remote server.

Syntax

```
ssh <host> <user> [port INTEGER] [command STRING]
```

Parameters

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

command: The command that will be automatically executed once the SSH session to the remote host is established.

system backup

Save the device's configuration to a file. Archives are full backups including generated SSH keys and dynamic DHCP lease information. Command backups are a list of CLI commands required to build the device's configuration.

Syntax

```
system backup [type <custom-defaults|cli-config|archive>] [path STRING]
[passphrase STRING] [remove <custom-defaults>]
```

Parameters

type: The type of backup file to create. Archives are full backups including generated SSH keys and dynamic DHCP lease information. CLI configuration backups are a list of CLI commands used to build the device's configuration. (Default: archive)

path: The file path to save the backup to. (Default: /var/log/)

passphrase: Encrypt the archive with a passphrase.

remove: Remove a backup file.

system disable-cryptography

Erase the device's configuration and reboot into a limited mode with no cryptography available. The device's shell will be accessible over Telnet (port 23) at IP address 192.168.210.1. To return the device to normal operation, perform the configuration erase procedure with the device's ERASE button twice consecutively.

Syntax

```
system disable-cryptography
```

Parameters

None

system duplicate-firmware

Duplicate the running firmware to the alternate partition so that the device will always boot the same firmware version.

Syntax

```
system duplicate-firmware
```

Parameters

None

system factory-erase

Erase the device to restore to factory defaults. All configuration and automatically generated keys will be erased.

Syntax

```
system factory-erase
```

Parameters

None

system find-me

Find Me function to flash LEDs on this device to help users locate the unit.

Syntax

```
system find-me <state>
```

Parameters

state: Find Me control to flash cellular-related LEDs.

system firmware ota check

Query the Digi firmware server for the latest device firmware version.

Syntax

```
system firmware ota check
```

Parameters

None

system firmware ota list

Query the Digi firmware server for a list of device firmware versions.

Syntax

```
system firmware ota list
```

Parameters

None

system firmware ota update

Perform FOTA (firmware-over-the-air) update. The device will be updated to the latest firmware version unless the version argument is used to specify the firmware version.

Syntax

```
system firmware ota update [version STRING]
```

Parameters

version: Firmware version name.

system firmware update

Update the current firmware image. Upon reboot the new firmware will be run.

Syntax

```
system firmware update <file>
```

Parameters

file: Firmware filename and path.

system power ignition off_delay

Update the current ignition off delay without changing the configuration.

Syntax

```
system power ignition off_delay <off_delay>
```

Parameters

off_delay: Ignition power off delay. Format: number{h|m|s}, Max: 18h. (Minimum: 0s, Maximum: 18h)

system restore

Restore the device's configuration from a backup archive or CLI commands file.

Syntax

```
system restore <path> [passphrase STRING]
```

Parameters

path: The path to the backup file.

passphrase: Decrypt the archive with a passphrase.

system script start

Run a manual script. Scripts that are disabled, not a manual script, or already running can not be run.

Syntax

```
system script start <script>
```

Parameters

script: Script to start.

system script stop

Stop an active running script. Scripts scheduled to run again will still run again (disable a script to prevent it from running again).

Syntax

```
system script stop <script>
```

Parameters

script: Script to stop.

system serial clear

Clears the serial log.

Syntax

```
system serial clear <port>
```

Parameters

port: Serial port.

system serial save

Saves the current serial log to a file.

Syntax

```
system serial save <port> <filename>
```

Parameters

port: Serial port.

filename: The filename to save the serial log. The file will be saved to the device's /etc/config/serial directory.

system serial show

Displays the serial log on the screen.

Syntax

```
system serial show <port>
```

Parameters

port: Serial port.

system serial start

Start logging data on a serial port.

Syntax

```
system serial start <port> [size INTEGER]
```

Parameters

port: Serial port.

size: Maximum size of serial log. (Default: 65536)

system serial stop

Start logging data on a serial port.

Syntax

```
system serial stop <port>
```

Parameters

port: Serial port.

system support-report

Save a support report to a file and include with support requests.

Syntax

```
system support-report [path STRING]
```

Parameters

path: The file path to save the support report to. (Default: /var/log/)

system time set

Set the local date and time using the timezone set in the system.time.timezone config setting.

Syntax

```
system time set <datetime>
```

Parameters

datetime: The date in year-month-day hour:minute:second format (e.g "2021-09-26 12:24:48").

system time sync

Perform a NTP query to the configured server(s) and set the local time to the first server that responds.

Syntax

```
system time sync
```

Parameters

None

system time test

Test the configured NTP server(s) for connectivity. This test will not affect the device's current local date and time.

Syntax

```
system time test
```

Parameters

None

telnet

Use Telnet protocol to log into a remote server.

Syntax

```
telnet <host> [port INTEGER]
```

Parameters

host: The hostname or IP address of the remote host.

port: The telnet port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 23)

traceroute

Print the route packets trace to network host.

Syntax

```
traceroute <host> [ipv6] [gateway STRING] [interface STRING] [first_ttl
INTEGER] [max_ttl INTEGER] [port INTEGER] [nqueries INTEGER] [src_addr STRING]
[tos INTEGER] [waittime INTEGER] [pausemsecs INTEGER] [packetlen INTEGER]
[debug] [dontfragment] [icmp] [nomap] [bypass]
```

Parameters

host: The host that we wish to trace the route packets for.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

gateway: Tells traceroute to add an IP source routing option to the outgoing packet that tells the network to route the packet through the specified gateway.

interface: Specifies the interface through which traceroute should send packets. By default, the interface is selected according to the routing table.

first_ttl: Specifies with what TTL to start. (Minimum: 1, Default: 1) max_ttl: Specifies the maximum number of hops (max time-to-live value) traceroute will probe. (Minimum: 1, Default: 30)

port: Specifies the destination port base traceroute will use (the destination port number will be incremented by each probe). A value of -1 specifies that no specific port will be used. (Minimum: -1, Default: -1)

nqueries: Sets the number of probe packets per hop. A value of -1 indicated. (Minimum: 1, Default: 3)

src_addr: Chooses an alternative source address. Note that you must select the address of one of the interfaces. By default, the address of the outgoing interface is used.

tos: For IPv4, set the Type of Service (ToS) and Precedence value. Useful values are 16 (low delay) and 8 (high throughput). Note that in order to use some TOS precedence values, you have to be super user. For IPv6, set the Traffic Control value. A value of -1 specifies that no value will be used. (Minimum: -1, Default: -1)

waittime: Determines how long to wait for a response to a probe. (Minimum: 1, Default: 5)

pausemsecs: Minimal time interval between probes. (Minimum: 0, Default: 0)

packetlen: Total size of the probing packet. Default 60 bytes for IPv4 and 80 for Ipv6. A value of -1 specifies that the default value will be used. (Minimum: -1, Default: -1)

debug: Enable socket level debugging.

dontfragment: Do not fragment probe packets.

icmp: Use ICMP ECHO for probes.

nomap: Do not try to map IP addresses to host names when displaying them.

bypass: Bypass the normal routing tables and send directly to a host on an attached network.