Digi 6350-SR/6355-SR

LTE Router

User Guide

원문: Digi 6350-SR 사용설명서(영문) · 제조사 원문 자료입니다. 사양은 제조사 사정에 따라 변경될 수 있습니다.

Revision history 90002315

Revision	Date	Decription
A	January 2019	Initial release of Digi-branded version of the *Digi 6350-SR/6355-SR LTE Router User Guide*.
B	April 2020	Update based on firmware version 20.2 release: ■ With firmware release 20.2, Active Recovery has been renamed to Digi SureLink™. ■ After upgrading to firmware release 20.2, if a configuration erase is performed, the Digi 6350-SR/6355-SR will default to Digi Remote Manager rather than to aView. See Important information about upgrading to firmware version 20.2.x for further information.

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Customer support

Gather support information: Before contacting Digi technical support for help, gather the following information:

- Product name and model
- Product serial number (s)
- Firmware version
- Operating system/browser (if applicable)

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- Logs (from time of reported issue)
- Trace (if possible)
- Description of issue
- Steps to reproduce

Contact Digi technical support: Digi offers multiple technical support plans and service packages. Contact us at +1 952.912.3444 or visit us at www.digi.com/support.

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Include the document title and part number (Digi 6350-SR/6355-SR LTE Router User Guide, 90002315 A) in the subject line of your email.

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Package contents

Item	Description
	Digi 6350-SR/6355-SR unit
	Digi 1002-CM unit
	Cellular antennas (2x) Wi-Fi antennas (2x)—Digi 6350-SR only
	Power supply
	Interchangeable power plug tips
Note One plate covers the plug-in slot completely; the other has holes that allow the antennas to protrude from the CM modem.	**Plastic face plates (2x)**

Exchanging power tips

The Digi 6350-SR/6355-SR may include four interchangeable plug tips that allow the Power Supply Unit (PSU) to operate in most countries. The PSU comes with the United States style plug installed.

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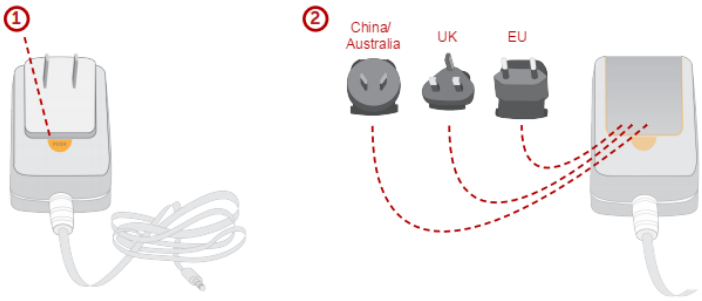
To change the plug tip:

1. While holding down the **PUSH** button, slide the current plug tip forward.
2. Pull off the attached plug tip.
3. Slide the new tip down into place until it clicks.



Note For more information regarding power-tip compatibility with global deployments, visit www.worldstandards.eu/electricity/plugs-and-sockets/.

Ports and connectors

Note WiFi Antennas are NOT included with Digi 6355-SRs.

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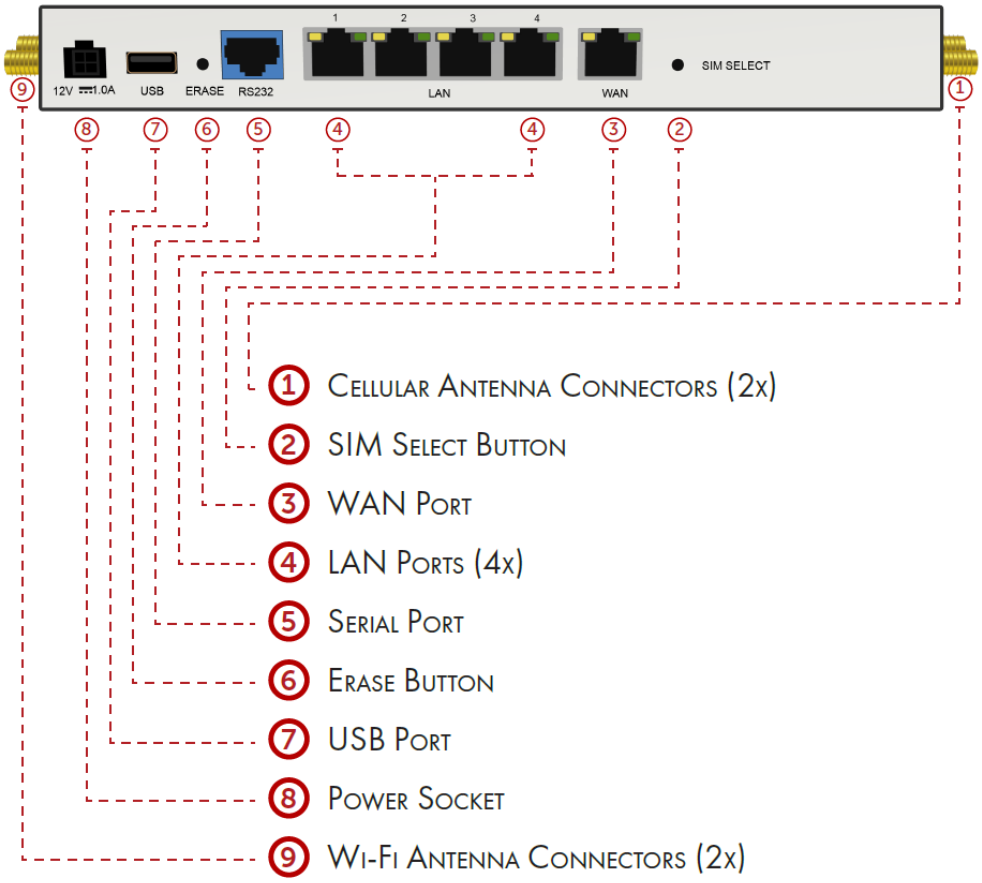

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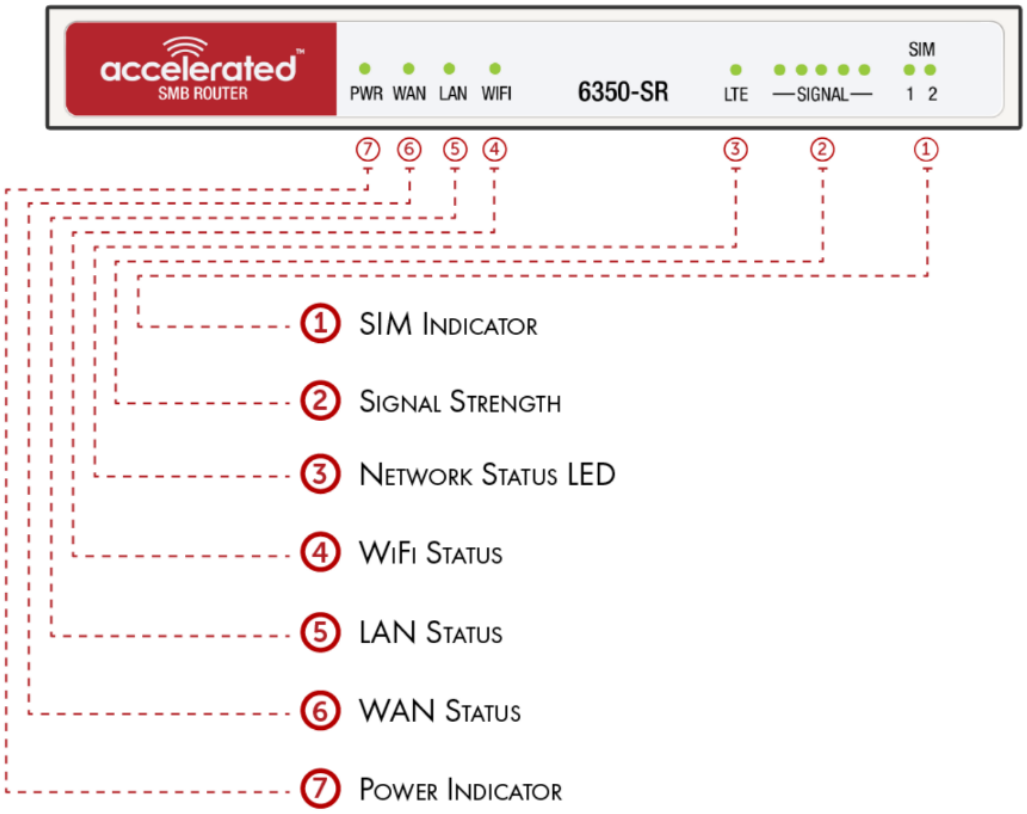
Device LEDs



Important information about upgrading to firmware version 20.2.*x*

Device defaults to Digi Remote Manager after configuration erase

With firmware version 20.2.*x*, the default cloud-based management service for the Digi 6350-SR/6355-SR device is Digi Remote Manager.

Digi 6350-SR/6355-SR devices upgraded from a firmware version prior to 20.2.*x* to firmware version 20.2.*x* or greater will retain their central management configuration. Therefore, if the device was previously configured to use aView for central management, it will continue to use aView after upgrading to 20.2.*x* or greater.

However, if you erase the configuration of a device that was upgraded from a firmware version prior to 20.2.*x*, it will default to using Digi Remote Manager for cloud-based central device management. You must reset the cloud configuration to use aView after a configuration erase.

Reset the cloud-based management service to aView

To the cloud-based management service to aView:

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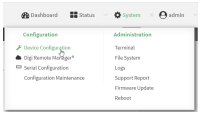
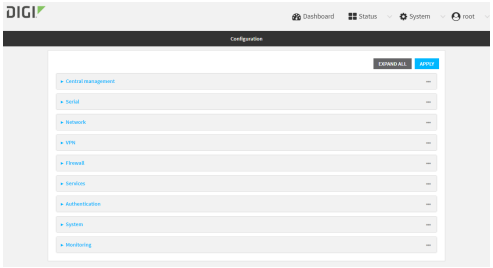
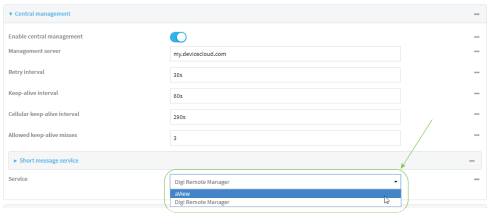
1. Log into the Digi 6350-SR/6355-SR WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



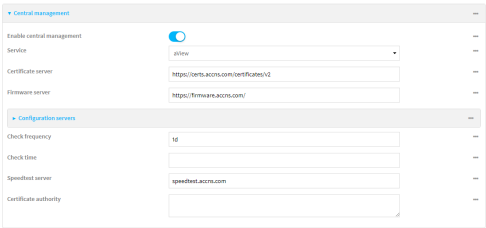
The **Configuration** window is displayed.



3. Click **Central Management**.
4. Click **Enable central management**, if it central management is not already enabled.
5. For **Service**, select **aView**.



The Central management pane refreshes with the default aView configuration.



Review the default configuration. Generally, the default configuration should not be changed.

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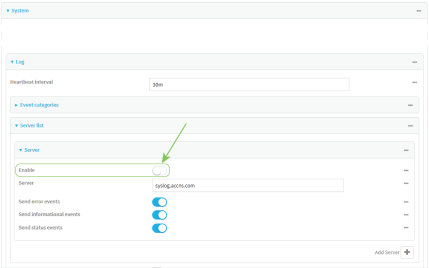
6. Enable the syslog server.

   If the syslog server is not enabled and set to syslog.accns.com, the device will be able to connect to aView and receive configuration updates, but unless the aView configuration updates set the syslog server, the device will not be able to send any metrics or logs to aView.

   a. Click **System** > **Log** > **Server list** > **Server**.

   b. Click **Enable**.



   c. Verify that **Server** is set to **syslog.accns.com**.

   d. (Optional) Select the event types to be sent to aView.

7. 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.

Default SureLink configuration

With firmware version 20.2.*x*, Active Recovery has been renamed to SureLink. After upgrading from a firmware version prior to 20.2.*x* to firmware version 20.2.*x* or greater, your existing Active Recovery configuration will remain in place. The only change will be that the feature is renamed from Active Recovery to SureLink.

However, if you erase the configuration of a device that was upgraded from a firmware version prior to 20.2.*x*, it will use the default SureLink settings. The default SureLink settings are:

Interface	Status	Action
Default wireless WANs (Modem)		
IPv4	Enabled	Restart interface
IPv6	Disabled	
Default WANs		
IPv4	Enabled	Restart interface
IPv6	Disabled	

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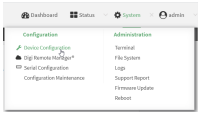
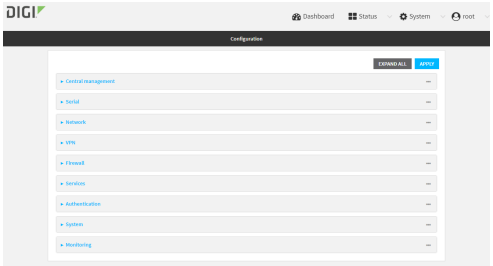
If the device is configured to synch with aView, it should get the correct SureLink configuration from aView. If not, you can configure SureLink by using the local WebUI:

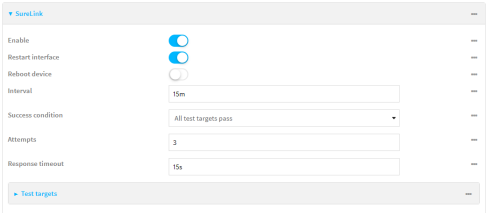
1. Log into the Digi 6350-SR/6355-SR WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.



3. Click **Network** > **Interfaces**.
4. Click to expand a WAN or WWAN (Modem).
5. After creating or selecting the WAN or WWAN, click **IPv4** (or **IPv6**) > **SureLink**.



6. Make any necessary configuration changes.
7. 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.

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Location selection

Alongside existing infrastructure

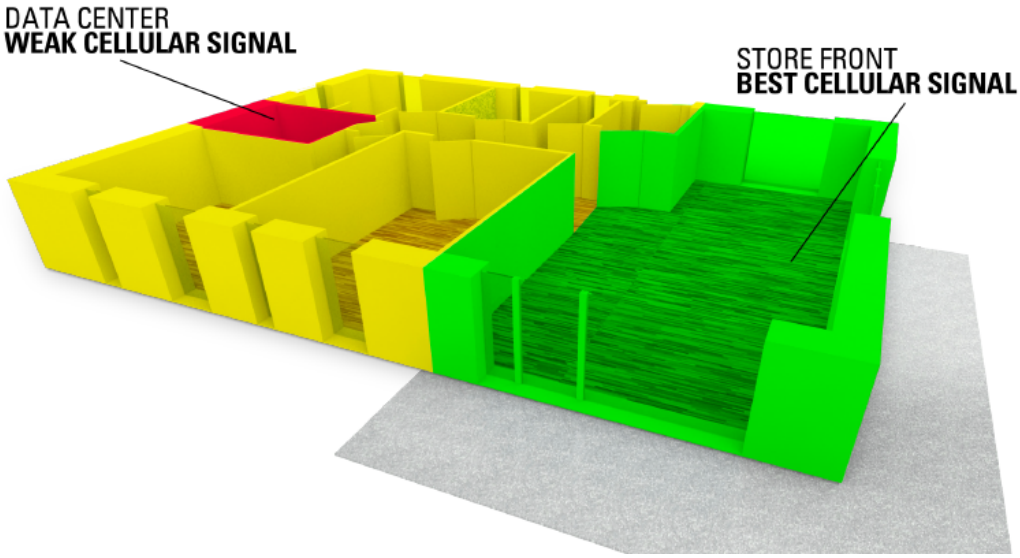
When deploying the Digi 6350-SR/6355-SR alongside existing network equipment, in a telco closet for instance, please consider the following (when possible):

- Avoid metal enclosures.
- Maximize distance from other equipment.
- Mount the device on the most exterior wall.
- Higher elevations are ideal.

New deployments

If there aren't any networking appliances currently installed at the deployment location, consider mounting the cellular router close to a window for optimal reception (in addition to the aforementioned list).

Note The Digi 6350-SR does not support Power over Ethernet (PoE). It MUST be located near an electrical outlet.



Physical setup

There is a label on the bottom of the Digi 6350-SR/6355-SR that indicates the plug-in modem's IMEI number.

(The modem is referred to as the Digi 1002-CM.)

Verify this IMEI number is an exact match to that on the plug-in modem itself, as well as the label on the router's packaging.

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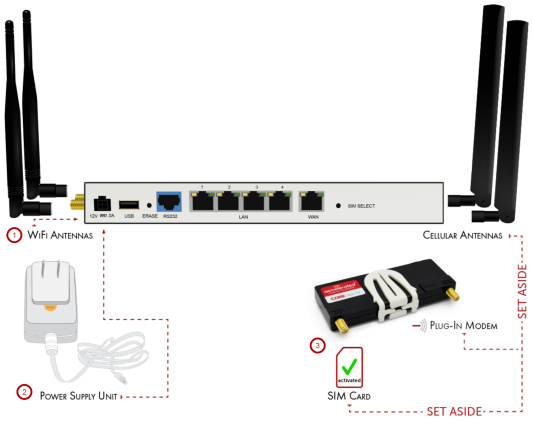
Note The plug-in modem must be installed before connecting the cellular antennas.

1. Affix the two WiFi antennas to the connectors situated closest to the power socket (Digi 6350-SR only).
2. Connect the power supply to the corresponding 12V socket on the device's back panel.
3. Gather the two cellular antennas, activated SIM card (2FF), and plug-in modem. These will be explained later.



Plug in LTE modem

1. Identify the SIM 1 and SIM 2 slots. If using only one SIM card, insert it into SIM 1. A second SIM may be inserted into slot SIM 2 for an alternate wireless carrier.
2. With the antenna SMA connectors pointing outward, slide the Digi 1002-CM modem into the router. A clicking sound will indicate it is properly inserted.

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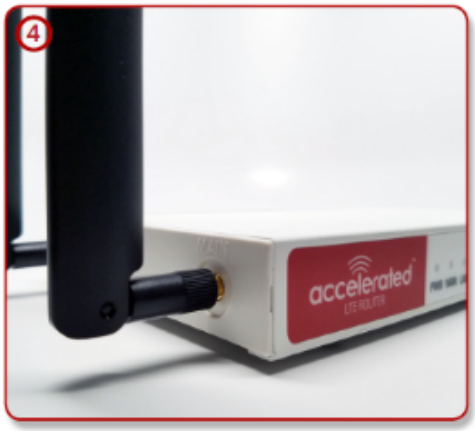
Initial setup *Plug in LTE modem*

3. Slide the white plastic plate over the antenna connectors to cover the plug-in modem as shown; it will clip into place.
4. Affix the cellular antennas to the two connectors protruding from the device.



Note Be sure to use the plate with the cut outs for the antenna connectors.

To remove the plug-in LTE modem, pinch the two vertical sides of the white clip (as shown above) and slide out the modem.

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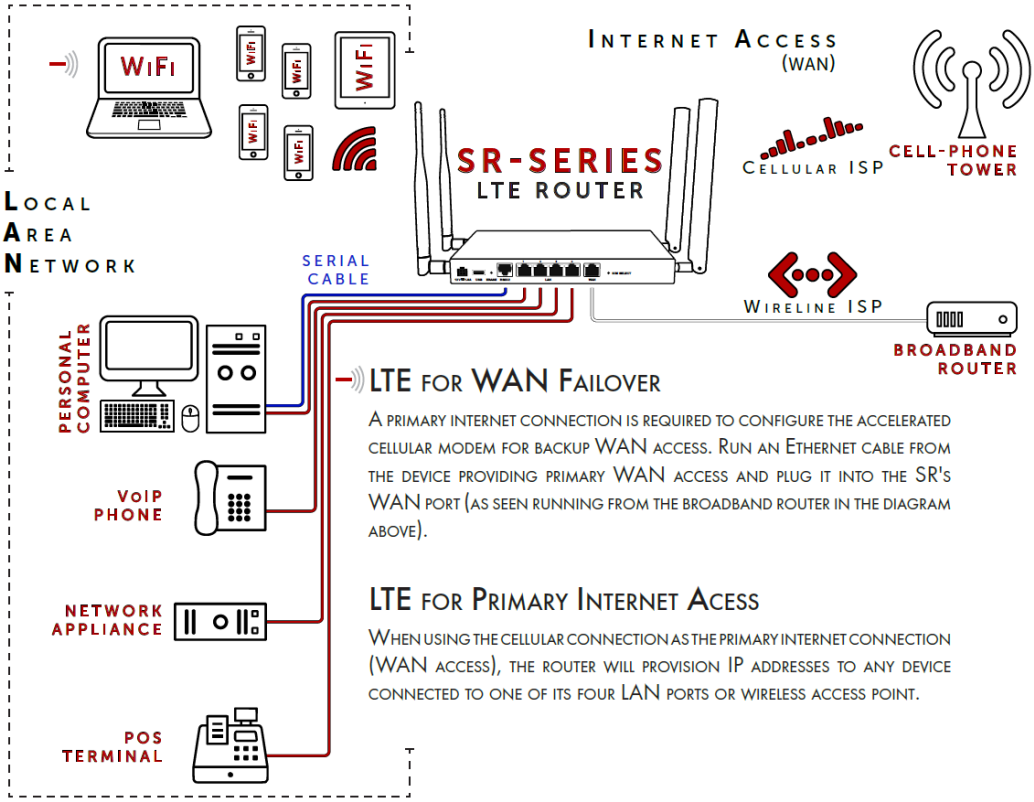
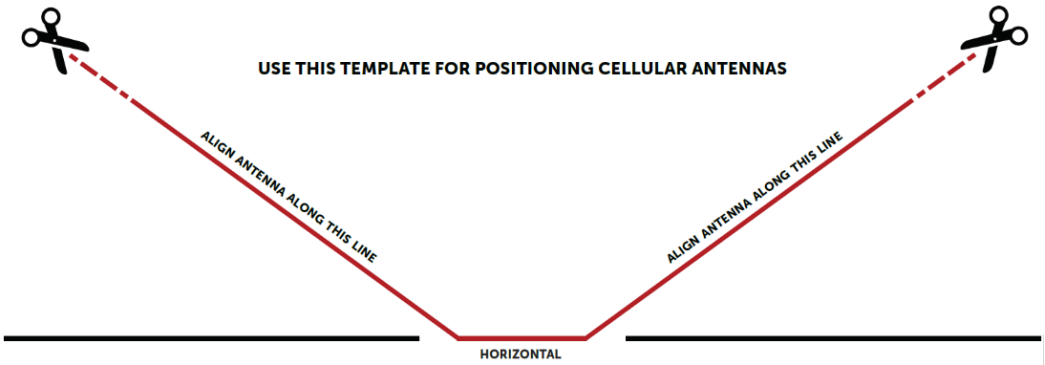
Network integration



Note The Digi 6350-SR is WiFi-Enabled; the Digi 6355-SR does not provide Wi-Fi capabilities. A second internet connection must be available for cellular failover.

Antenna positioning



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LTE signal status

Once powered on with its plug-in modem connected (including the activated SIM card), the Digi 6350-SR/6355-SR will boot up and attempt to join its cellular network. Initialization may take 30-60 seconds.

LEDs on the **Signal Strength Indicator** show the quality of cellular reception.

The **Network Status LED** displays the cellular network connection status (that is, whether it is on a 3G or 4G connection or unable to connect to either).

Refer to the following tables for more information:

Network Status LED

Solid Yellow Initializing or starting up.	**Solid Green** Connected to 2G or 3G and also has a device linked to a LAN port.
Flashing Yellow In the process of connecting to the cellular network and to any device on its LAN port(s).	**Flashing Blue** Connected to 4G LTE and in the process of connecting to a device on its LAN port(s).
Flashing White Established LAN connection(s) and is in the process of connecting to the cellular network.	**Solid Blue** Connected to 4G LTE and also has a LAN connection.
Flashing Green Connected to 2G or 3G and is in the process of connecting to any device on its LAN port(s), or nothing is connected to the port.	**Alternating Red/ Yellow** Upgrading firmware. **WARNING: DO NOT POWER OFF DURING FIRMWARE UPGRADE.**

Signal Strength LEDs

Signal Bars	Weighted dBm	Signal Strength %	Quality
	-113 to -99	0 - 23%	Bad
	-98 to -87	24 - 42%	Marginal
	-86 to -76	43 - 61%	OK
	-75 to -64	62 - 80%	Good
	-63 to -51	81 - 100%	Excellent

These measurements are negative numbers, meaning the smaller negative values denote a larger number. So, for example, a -85 is a better signal than -90.

Note For more information regarding how signal strength is calculated and subsequently displayed via the LED indicators, see Signal bars explained.

Signal bars explained

The LTE signal status bars are calculated using various algorithms based on the network type it is connected to. For 4G LTE, the RSRP, SNR, and RSSI values are all factored in to determine the reported signal strength bars. For 3G networks (including HSPA+) and 2G networks, the signal strength bars are determined by the RSSI value.

4G LTE algorithm

Determine RSRP, SNR, and RSSI values separately, using the following

```
RSRP > -85, rsrp_bars=5
-95 < RSRP <= -85, rsrp_bars=4
-105 < RSRP <= -95, rsrp_bars=3
-115 < RSRP <= -105, rsrp_bars=2
-199 < RSRP <= -115, if we're connected to the cellular network, rsrp_bars=1,
if not rsrp_bars=0
```

If RSRP <= -199, then use RSSI as the value and run it through the same algorithm described above.

```
SNR >= 13, snr_bars=5
4.5 <= SNR < 13, snr_bars=4
1 <= SNR < 4, snr_bars=3
-3 < SNR < 1, snr_bars=2
-99 < SNR <= -3, if we're connected to the cellular network, snr_bars=1, if not
snr_bars=0
```


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Once the snr_bars and rsrp_bars are determined, use the lesser of the two. That is the reported signal strength bars.

3G algorithm

Determine RSSI signal strength.

```
RSSI > -80, bars=5
-90 < RSSI <= -80, bars=4
-100 < RSSI <= -90, bars=3
-106 < RSSI <= -100, bars=2
RSSI <= -106, if we're connected to the cellular network, bars=1, if not bars=0
```

bars is then reported as the signal strength bars.

2G algorithm

Determine RSSI signal strength.

```
RSSI > -80, bars=5
-89 < RSSI <= -80, bars=4
-98 < RSSI <= -89, bars=3
-104 < RSSI <= -98, bars=2
RSSI <= -104, if we're connected to the cellular network, bars=1, if not bars=0
```

bars is then reported as the signal strength bars.

Default settings

Option	Default settings
Interface priorities	■ WAN set at a metric of 1 **Note** This metric sets the WAN port as the SR's primary network connection. ■ Modem (cellular) at a metric of 3
Modem configuration	■ SIM Failover after 5 attempts ■ Carrier Smart Select enabled
Network settings	■ LAN subnet of 192.168.2.1/24 ■ DHCP enabled ■ Source NAT enabled (outbound traffic)
Wi-Fi	■ SSID = Accelerated 6350-SR ■ Password = Accelerated! ■ Channel = Automatic
WAN failover conditions	■ Connectivity monitoring enabled for WAN ■ HTTP and Ping test: 4 attempts set at a 30s interval
Security policies	■ Packet Filtering set to block all inbound traffic ■ SSH, Web Admin, and Local GUI access enabled

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Custom settings

Option	Description
Network managed configuration	Digi 6350-SR/6355-SR routers will automatically synchronize with the aView cloud management platform so long as it is able to establish a network connection. This web-based configuration and monitoring portal provides: ■ Remote control and configuration updates ■ Email notifications for user-defined parameters (connection quality, data usage, and so on) ■ Out-of-Band SMS recovery Real-time monitoring for: • Signal strength and quality • Network connectivity details • Location-based services • Device performance Changes made within aView will be applied to the intended recipient(s) as soon as those devices check in with the web service for synchronization. This occurs once every 24 hours by default (though it can be rescheduled as necessary). **Note** This assumes the router being configured has been registered with aView. To apply all pending changes immediately, reboot the router or refer to the step-by-step guidance for issuing remote commands.
Local configuration	If your Digi 6350-SR/6355-SR is not provisioned in aView, it will use a default local configuration profile. Please refer to the Local Management section of this manual to change settings for an Digi 6350-SR/6355-SR router without accessing aView. **Note** Changes applied locally will be overridden should the device then sync with its config from aView.

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Getting started with aView

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About aView

The following actions are typically performed by your network administrator.

Changes can be made either at the device or group level. Select override from any given menu item to edit its inherited value, or navigate to the SR's corresponding group configuration page to update the config profile shared between all devices belonging to this group.

It is recommended that aView centrally manages the Digi 6350-SR/6355-SR devices; only resort to local management as necessary. For any questions regarding how to access aView, please contact Digi support or your purchasing partner.

Viewing and editing group configurations

To bring up a device in the configuration portal:

1. Use the search bar to filter devices by **MAC address**.

   Note The device MAC address is on its bottom label.

2. Select the MAC address of your Digi 6350-SR/6355-SR device and bring up its **Details** page.
3. Navigate to the **Configuration** tab of the left-side menu.
4. Follow the **Edit Group Configuration** link.
5. Adjust the necessary settings, clicking the Update button to apply any changes.

Devices will automatically apply configuration updates after the next daily sync (1am UTC by default). Refer to Using remote commands for details on how to apply changes sooner.

Upgrading firmware

WARNING! When the Digi 6350-SR/6355-SR is updating firmware, its LEDs will flash red and yellow. Do NOT remove power from the device during this process.

To view or select new firmware:

1. Navigate to the **Configuration** tab of the left-side menu.
2. Follow the **Edit Group Configuration** link.
3. Locate the **Firmware** pull-down menu.
4. Select on the intended version and wait for the settings to finish loading.
5. Click on the **Update** button at the bottom of the page to confirm firmware selection.

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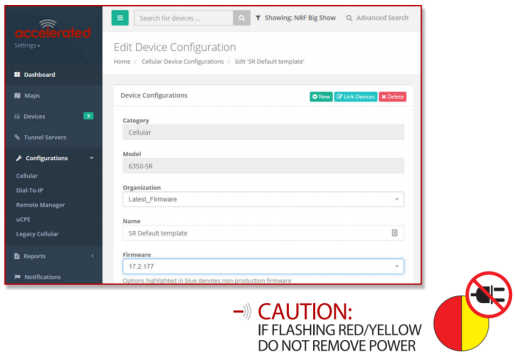


Using remote commands

The aView management portal maintains a connection to all online client devices registered with the service. Using this tunnel, network administrators can send a specific set of remote commands that will be received immediately as opposed to waiting to check in and apply any changes propagated from the cloud. The following remote commands are available:

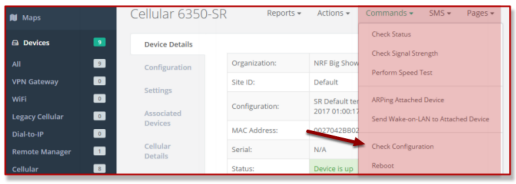
- Check Status
- Check Signal Strength
- Perform Speed Test
- ARPing Attached Device
- Send Wake-on-LAN to Attached Device
- Check Configuration
- Reboot

Remote commands must be sent to each device separately.

1. Log into the aView management portal and use the search bar to filter devices by **MAC address**.

   Note The device MAC address is on its bottom label.

2. Click the MAC address of your Digi 6350-SR/6355-SR device to bring up its **Details** page.
3. Select the **Commands** drop-down list at the top-right of the page.



Note Select the **Check Configuration** menu option to update a device immediately.

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Learning more

Details on using aView can be found in the aView User Guide.

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Interface configuration

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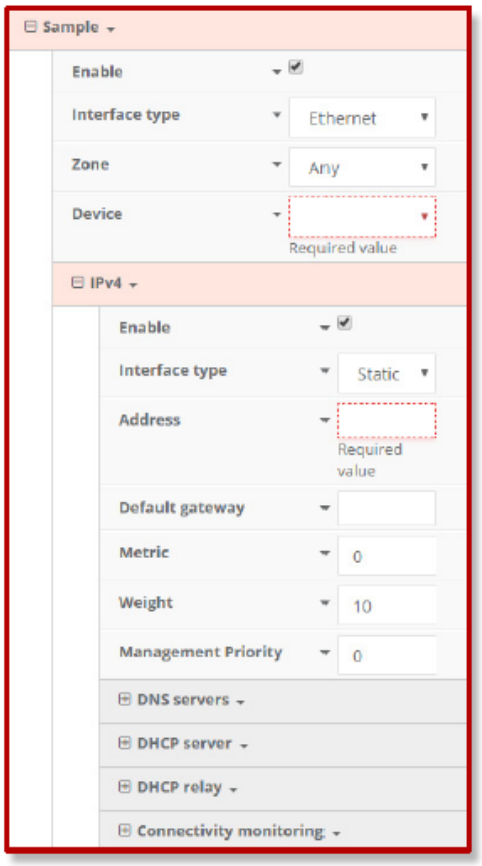
Changing the LAN subnet

The default subnet—192.168.2.*x*—is set in the IPv4 Address field of the LAN interface, and can be adjusted to any range of private IPs by completing the following steps:

1. Expand the configuration page to **Network > Interfaces**.
2. Select the **LAN** interface that needs to be adjusted and expand its IPv4 entry.
3. The **Address** field contains the range of IPs available for assignment.

Note The subnet mask must also be specified.

Changes made to the IPv4 Address must also be updated in the DHCP server entry to preserve functionality.



Creating new interfaces

Additional interfaces may be configured to further differentiate port functionality:

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1. Expand the configuration page to **Network > Interfaces**.
2. Name the new **Interface** using the text field at the bottom of the list, clicking the **Add** button to continue.
3. Ensure the appropriate settings are entered into the new collapsible section generated for the interface:
   - The **Enable** checkbox must remain selected.
   - **Interface Type** will stay **Ethernet**.
   - The default **Zone**, "Any," suffices unless security policies necessitate a different selection.
   - **Device** establishes which port(s) are assigned to the new interface.
   - Expand the **IPv4** category to specify the Interface type and the desired address range.
   - Additional settings for **DNS** and **DHCP** configuration can be adjusted as necessary.
   - Refer to Failover for information on **Connectivity Monitoring**.

Note This assumes a static (private) IP is desired for the interface.

VLAN management

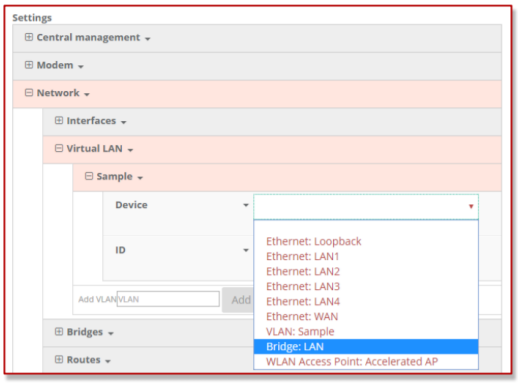
Before creating a Virtual LAN route for the Digi 6350-SR/6355-SR, be sure that its corresponding **LAN** interface has been configured (see Creating new interfaces).

The interface's **Device** must be set to only include the port(s) that will be utilizing the VLAN designation. Use the pull-down menu to specify an individual Ethernet LAN port, or choose the "**Bridge: LAN**" option to assign all four ports.

Once the interface is created, it will be selectable as a Device in the VLAN's pulldown menu.

Separate VLANs by assigning each a unique **ID** number.

Note For guidance on how to create bridges with less than four ports, see Configure LAN port as (VLAN).



Configure LAN port as (VLAN)

Goal

To set up a VLAN to separate network traffic on one LAN port from all other LAN interfaces.

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Setup

This example assumes the LAN ports are operating with default settings that provide DHCP connectivity to devices connected to the Digi 6350-SR/6355-SR LAN ports.

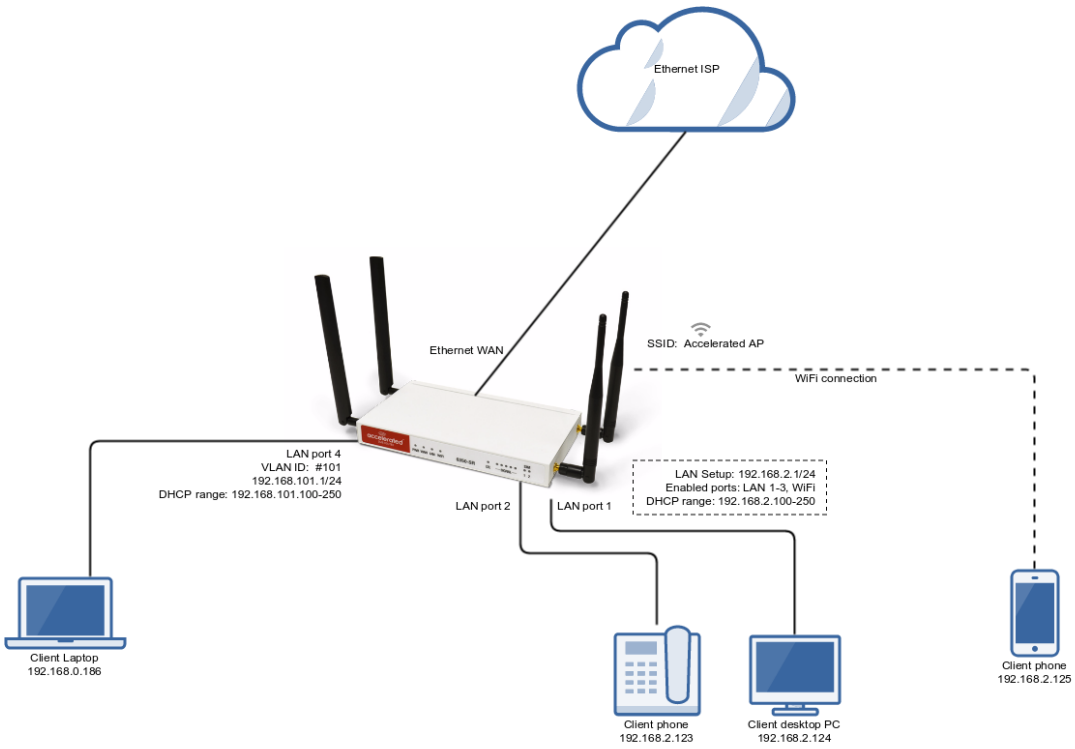
To set up the VLAN, you need the following:

- IP address range for the VLAN subnet.
- LAN Ethernet port or SSID you want to separate onto the VLAN interface.

Sample

The following diagram shows a sample setup of a 6350-SR with LAN port 4 separated from the other LAN ports and placed in a VLAN with ID #101.

VLAN 101 is configured to hand out IP addresses within the 192.168.101.100 - 192.168.101.250 range, with a gateway IP of 192.168.101.1/24.



Sample configuration

Open the configuration profile for the 6350-SR and make the following changes.

Under **Network -> Virtual LAN**:

1. Create a new entry named **test**.
2. Select the desired LAN interface under the **Device** drop-down.
3. Type in the desired VLAN ID number in the **ID** field.

Under **Network -> Interfaces**:

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1. Create a new entry named **vlan##**, where **##** is the number of the VLAN ID.
2. Select **VLAN: test** in the **Device** drop-down.
3. Type in the desired IP address and subnet in the **Address** field.
4. Under **DHCP server** , ensure the **Enabled** option is checked and the DHCP lease range start and end values match the desired DHCP range.

Under **Network -> Bridges -> LAN -> Devices**:

- Remove **Ethernet: LAN4** from the LAN bridge.

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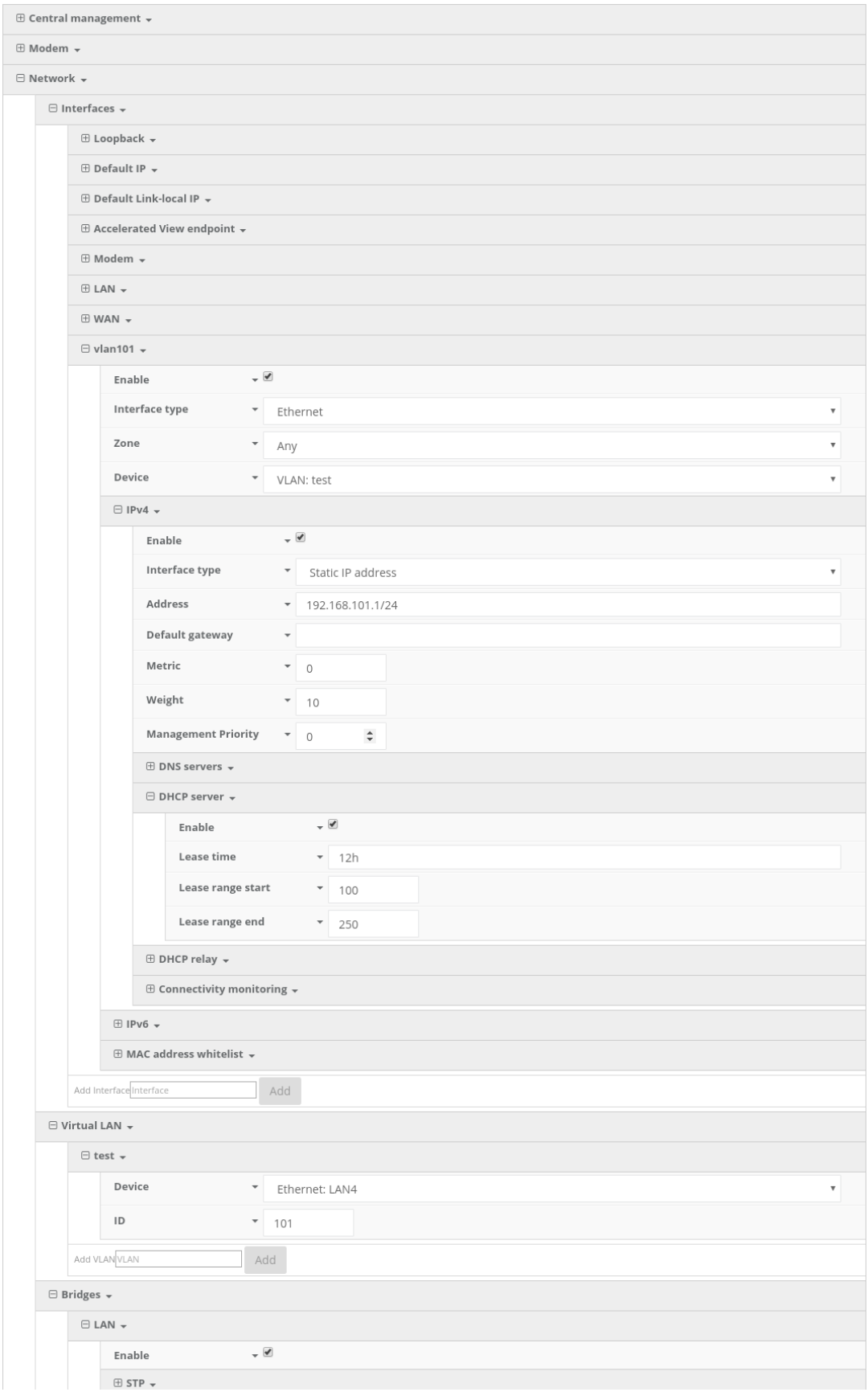
Interface configuration *Configure LAN port as (VLAN)*



Digi 635

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Wi-Fi options

IMPORTANT: The Digi 6355-SR does not have WiFi capabilities. The following information applies to the Digi 6350-SR only.

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Wi-Fi

Per the default configuration profile, there will be one available SSID.

Wi-Fi-enabled SRs can broadcast up to a total of 8 WLAN SSIDs simultaneously. To create additional SSIDs or to change the configuration of existing ones:

1. Navigate to the device's (or group) **Configuration** page.
2. Expand **Network > WiFi**.
3. Verify that **Enabled** is selected and adjust the **Channel** and **Beacon Interval** if necessary.
4. Expand the **Access Points** menu to view existing SSIDs or create new ones.
5. Each WLAN AP is listed as its own collapsible menu featuring:
   - Enabled status box
   - SSID
   - SSID Broadcast
   - Encryption type
   - Pre-shared key
6. To create a new AP, specify its name in the corresponding text field and click the **Add** button.

Client mode

In addition to serving as an independent WLAN Access Point, the Digi 6350-SR Wi-Fi can broadcast in **Client Mode** to serve as a supplemental AP to relay Wi-Fi originating from another Wi-Fi-enabled router by entering that network's **SSID** and **Pre-shared key**.

Wi-Fi as WAN

Client Mode can also be used to leverage the Digi 6350-SR Wi-Fi to relay Internet access (WAN) provided by another router's wireless AP.

Before configuring the Digi6350-SR for Wi-Fi-as-WAN (WaW) Client Mode, identify the SSID that the Digi 6350-SR should connect to, including its broadcasting channel, authentication details for the SSID, and interface prioritization for the WaW connection (that is, should it take precedence over the WAN Ethernet port).

1. Under **Network > WiFi > Client mode connections**, create a new entry named **testclient**. The name can be different if desired.
2. Enter the **Channel** and **authentication credentials** for the SSID of the secondary wireless router.
3. Under **Network > Interfaces**, create a new entry named **WiFiasWAN**.

   Note For details on how to create new interfaces, see Creating new interfaces.

1. Set the **Zone** for the new interface to **External**.
2. Set the **Device** for the new interface to WLAN Client: testclient
3. Under **IPv4**, set the Interface type to **DHCP** address.

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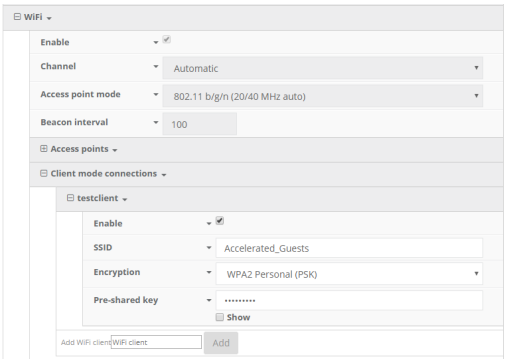
Note This will trigger the Digi 6350-SR to obtain a DHCP connection to the secondary wireless router's SSID network.

4. Click **Save**.



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Firewall settings

The Digi 6350-SR/6355-SR can function as a stateful firewall. Firewall configuration options leverage two key security measures:

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Packet filtering 37

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Port forwarding

Remote computers can access applications or services hosted on a local network with the Digi 6350-SR/6355-SR by setting up port forwarding. It provides mapping instructions that direct incomming traffic to the proper device on a LAN.

To configure port forwarding:

1. Under **Firewall > Port Forwarding**, click the **Add** button.
2. Select the relevant **LAN Interface**.

   Note Select **LAN** unless custom interfaces were configured.

3. The **IP version** and **Protocol** can be left at their default values unless changes are required by the request being serviced by this port-forwarding configuration.
4. Specify the public-facing **Port** for remote access.
5. In the **To** fields, specify the **port** and **IP address** associated with the intended destination device.
6. If necessary, expand the **Access Control List** to create a white list that determines which devices are authorized to leverage this particular forwarding route.

   Note Both individual IP addresses and entire zones may be white listed.

Packet filtering

Enabled by default, packet filtering will monitor traffic going to and from the Digi 6350-SR/6355-SR. The predefined settings are intended to block unauthorized inbound traffic while providing an unrestricted flow of data from LAN to WAN.

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Dual WAN configurations

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About dual WAN configuration

The Digi 6350-SR/6355-SR is a Dual-WAN device, meaning it has two interfaces capable of providing Internet access by default -- its WAN Ethernet port and the plug-in cellular modem -- though additional LAN ports may even be reconfigured for supplemental Internet access. Active WAN connections can provide both failover and load balancing per user-defined parameters.

Failover

By default, this allows the plug-in modem to serve as a secondary (backup) WAN that becomes the active connection once the Ethernet WAN port is detected as offline. The Digi 6350-SR/6355-SR then monitors the offline connection to see when it comes back online, which prompts the backup interface to once again become inactive.

Each interface has a **Metric** value associated with its IPv4 configuration. The example on the left of this page is associated with the WAN interface, which will take priority over all other interfaces by default (as seen by its Metric value of **1**).

Connectivity monitoring

Note Both tests are set via the default group config in aView—it is not built into the firmware.

Devices that have not synced with aView will not have these tests enabled by default.

To properly trigger a failover (or failback) scenario, test parameters must be defined to monitor the primary connection. Both a Ping and HTTP test come built into the Digi 6350-SR/6355-SR WAN port configuration by default. After 4 failed attempts, the secondary connection will take over Internet access for the Digi 6350-SR/6355-SR. Similarly, the monitoring tests trigger the restoration of the primary WAN connection when they detect that the interface with a higher metric has come back up.

Note Best practices dictate that redundant tests (with divergent failure conditions) will be the best way to ensure proper connectivity monitoring and active recovery. With only a single test type, false positives could be reported. Two different tests are recommended to prevent false positives.

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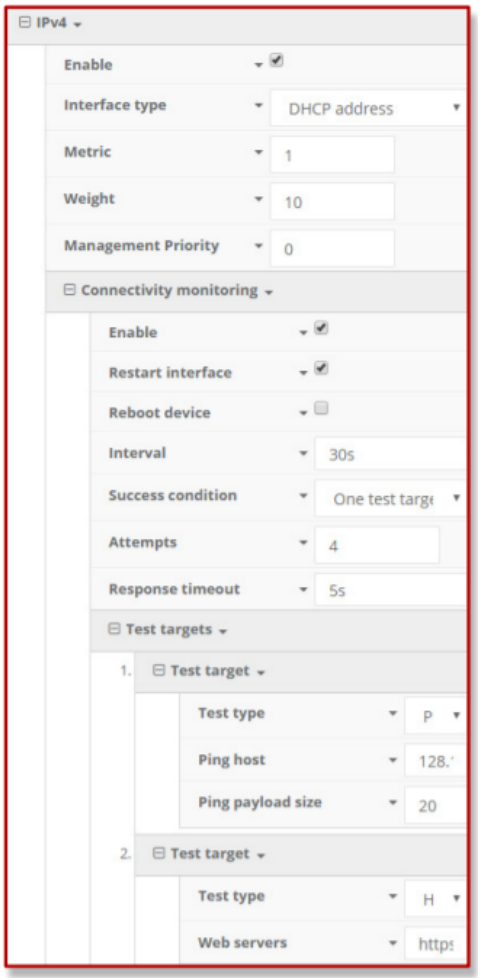

Carrier Smart Select

Note If one of the SIM cards requires a custom or unique APN, you will need to add this APN into the Digi 6350-SR/6355-SR config under the **Modem > APN** option.

By default, the Digi 6350-SR/6355-SR plug-in modem is set up for automatic SIM selection. That is, if the Digi 6350-SR/6355-SR is unable to connect with the SIM in slot 1, after a specified number of failures (5 by default) the Digi 6350-SR/6355-SR will automatically switch to use the SIM in slot 2. For this setup, you will need two SIM cards enabled, provisioned, and installed in the plug-in modem's SIM slots. The two cards can be from the same carrier or from different carriers.

Load balancing

Traffic can be balanced between the Ethernet and Cellular WAN interfaces. This feature, often referred to as load balancing, uses an interface's **Weight** value -- this is defined under the IPv4 expandable menu. The interfaces being balanced must share the same **Metric** value.

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It is important to note that the two SIM slots cannot be leveraged simultaneously for load balancing; the load must be shared between the cellular modem and the wireless internet connection. The **Weight** of an interface establishes its proportional contribution relative to the weight of its complimentary interface.

For example, setting the Ethernet WAN to a weight of **20** and the Cellular WAN to a weight of **5** establishes a **4:1** ratio—the Ethernet interface will handle 4 times the amount of data with this configuration.

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Virtual Router Redundancy Protocol (VRRP)

About VRRP 43
Configuring VRRP 43

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About VRRP

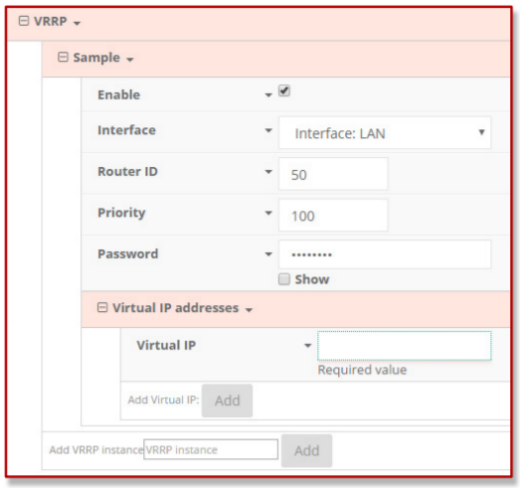
Virtual Router Redundancy Protocol (VRRP) is a networking protocol used to configure devices as a hot standby for a primary router, where a backup device will only start routing traffic after the network detects that the primary device is offline (using parameters set by VRRP).

Configuring VRRP

To link multiple devices together, each must be configured with the same Router ID within aView. Refer to the following step-by-step guidance for more information:

1. Expand **Network > VRRP**.
2. In the **Add VRRP Instance** text field, enter a name for the entry.
3. **Enable** the instance.
4. Specify an **Interface**—this will typically be set to **LAN**, meaning all four LAN ports.
5. Set the **Router ID** to match the number designated for this instance.
6. **Priority** establishes the order in which backup devices step in for offline routers.
7. The **Password** is a shared string of characters that must be entered for each device to authorize its integration into the VRRP instance.

Note A higher number establishes higher priority. Refer to the Creating new interfaces for more info on custom interfaces.



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Resetting your device

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

To reset the device to factory default settings, press and release the **ERASE** button when the device is switched on. This will erase all device-specific settings (excluding any automatically generated keys/certificates) to their original state, and it will automatically reboot.

Out-of-band SMS commands

Note This feature is only available via aView.

A set of emergency remote commands can be sent via SMS to the device to provide Out-Of Band (OOB) recovery for the device. These SMS commands allow you to perform actions such as factory resets, reboot the device, and restore to the backup firmware partition, all without requiring the device to have an active IP (WAN) connection. Similar to the standard remote commands, these can be used to provide control over the device without any on-site interaction. To utilize this feature, SMS must be enabled for the SIM card used by the device. The complete list of SMS commands is defined in the aView User Manual.

Support report

Often times, it is beneficial to download a support report from the device to provide to technical support. This report is a zipfile that contains all of the current details for the device's state and a full record of the system logs from the device.

To obtain a support report from the device, login to the device's local web UI. To access the local web UI, the user must have a PC/laptop connected to one of the LAN Ethernet ports of the Digi 6350-SR/6355-SR. They should receive an IP address via DHCP from the Digi 6350-SR/6355-SR in the 192.168.2.100-250 range. If they do not receive a DHCP address, they can configure a static IP on the PC/laptop of 192.168.210.2/24 with a gateway of 192.168.210.1. Once the PC/laptop has an IP address, open the following URL in a browser on the PC:

https://192.168.210.1

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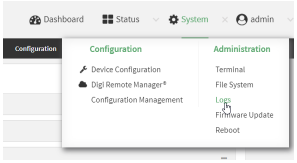
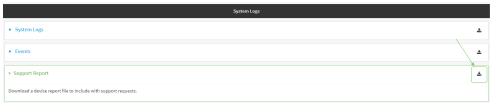
For firmware version 19.11.x or newer:

1. On the main menu, click **System** > **Logs**.

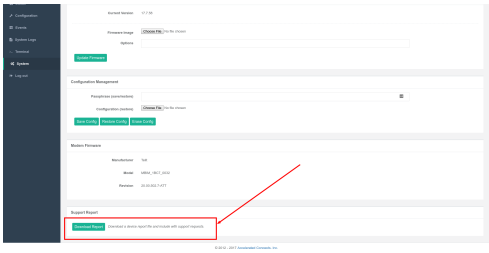


2. Collapse the system log viewer by click ▾ **System Logs**, or scroll down to **Support Report**.
3. Click to expand ▸ **Support Report**.
4. Click to generate and download the support report.



For firmware version 19.8.x or older:

1. On the main menu, click **System**.
2. In the **Support Report** section at the bottom of the page, click **Download Report**.



You may need to scroll down to locate the **Support Report** section .

Persistent system logs

As of December 6th, 2017, the default behavior for all Digi 6350-SR/6355-SRs is to have persistent system logs disabled. Information logged on the device will be erased when the Digi 6350-SR/6355-SR is powered off or rebooted.

Logging can be configured to persist between power cycles by enabling the **Preserve System Logs** checkbox nested under the **System > Log** menu option.

Note Logging across reboots should be enabled only to debug issues and then disabled ASAP to avoid unnecessary wear to the flash memory.

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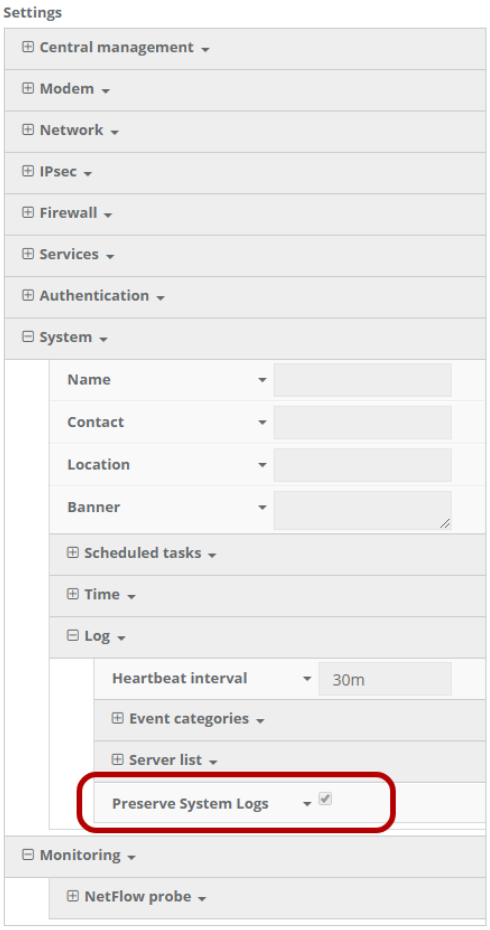
Troubleshooting *Persistent system logs*



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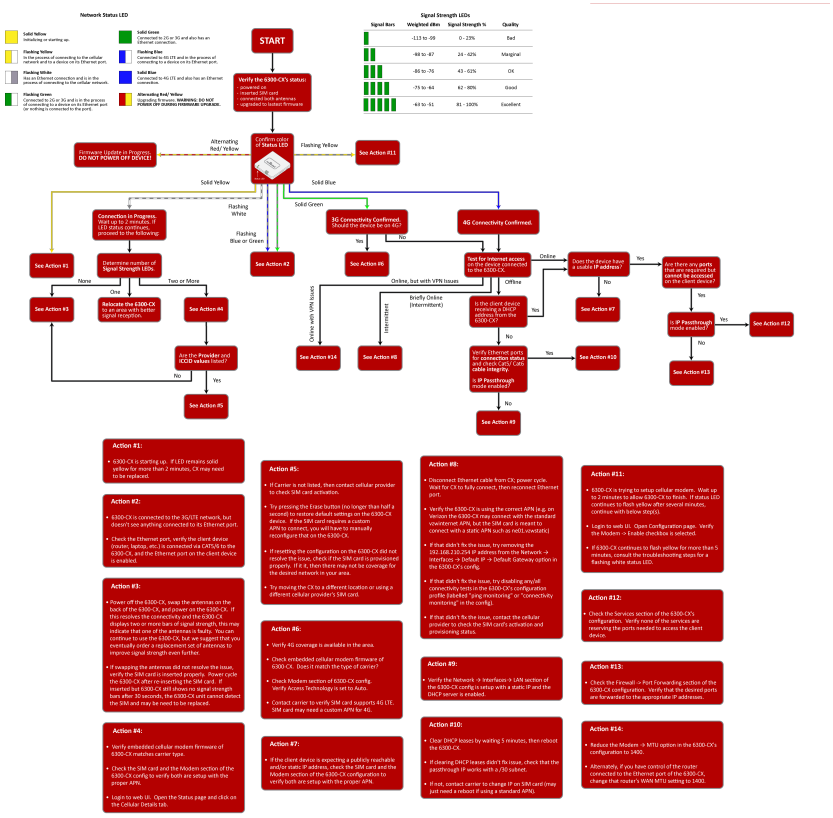
LTE troubleshooting tree



Network Status LED

- **Solid Yellow** — Initializing or starting up.
- **Flashing Yellow** — In the process of connecting to the cellular network and to any device on its LAN port(s).
- **Flashing White** — Established LAN connection(s) and is in the process of connecting to the cellular network.
- **Flashing Green** — Connected to 2G or 3G and is in the process of connecting to any device on its LAN port(s), or nothing is connected to the port.
- **Solid Green** — Connected to 2G or 3G and also has a device linked to a LAN port.
- **Flashing Blue** — Connected to 4G LTE and in the process of connecting to a device on its LAN port(s).
- **Solid Blue** — Connected to 4G LTE and also has a LAN connection.
- **Alternating Red/ Yellow** — Upgrading firmware. **WARNING: DO NOT POWER OFF DURING FIRMWARE UPGRADE.**

Signal Strength LEDs

Signal Bars	Weighted dBm	Signal Strength %	Quality
	-113 to -99	0 - 23%	Bad
	-98 to -87	24 - 42%	Marginal
	-86 to -76	43 - 61%	OK
	-75 to -64	62 - 80%	Good
	-63 to -51	81 - 100%	Excellent

Alternating Red/Yellow

Firmware Update in Progress: **DO NOT POWER OFF DEVICE!**

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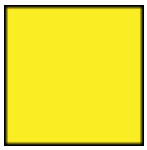
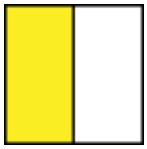


Solid Yellow

Digi 6350-SR/6355-SR is starting up.



Flashing Yellow

Digi 6350-SR/6355-SR is trying to setup cellular modem. Wait up to 2 minutes to allow the process to finish. If status LED continues to flash yellow after several minutes, continue with below step(s):

1. Login to web UI. Open Configuration page. Verify the **Modem -> Enable** check box is selected.
2. If the Digi 6350-SR/6355-SR continues to flash yellow for more than 5 minutes, consult the troubleshooting steps for a flashing white status LED.

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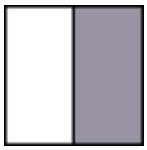

Flashing White

Ethernet link detected, connection is in progress.
Wait up to 2 minutes. If LED status continues, determine the number of Signal Strength LEDs:
None

- Power off the Digi 6350-SR/6355-SR, swap the antennas on the back of the Digi 6350-SR/6355-SR, and power on the Digi 6350-SR/6355-SR. If this resolves the connectivity and there are two or more bars of signal strength, this may indicate that one of the antennas is faulty. You can continue to use the Digi 6350-SR/6355-SR, but we suggest that you eventually order a replacement set of antennas to improve signal strength even further.
- If swapping the antennas did not resolve the issue, verify the SIM card is inserted properly. Power cycle the Digi 6350-SR/6355-SR after re-insterting the SIM card. Wait 30 to 60 seconds. If the problem persists, the unit cannot detect the SIM and the Digi 6350-SR/6355-SR may need to be replaced.

One
Relocate the Digi 6350-SR/6355-SR to an area with better signal reception.
Two or more
Verify that the embedded cellular modem firmware matches the carrier type.
Check the SIM card and the Modem section of the config to verify both are set up with the proper APN.
Login to the web UI. Open the Status page and click on the Cellular Details Tab. Are the **Provider** and **ICCID** values listed?
No

- If the proper Carrier is not listed, contact the cellular provider to verify SIM card activation.
- Try pressing the **Erase** button (no longer than half a second) to restore default settings. If the SIM card requires a custom APN to connect, you will have to manually reconfigure that on the Digi 6350-SR/6355-SR
- If resetting the configuration did not resolve the issue, check if the SIM card is provisioned properly. If it is, then there may not be coverage for the desired network in your area.
- Try moving the Digi 6350-SR/6355-SR to a different location or try using a different cellular provider's SIM card.

Yes

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- Power off the Digi 6350-SR/6355-SR, swap the antennas on the back of the Digi 6350-SR/6355-SR, and power on the Digi 6350-SR/6355-SR. If this resolves the connectivity and there are two or more bars of signal strength, this may indicate that one of the antennas is faulty. You can continue to use the Digi 6350-SR/6355-SR, but we suggest that you eventually order a replacement set of antennas to improve signal strength even further.
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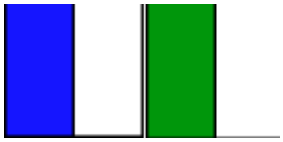

Flashing Blue or Green

Digi 6350-SR/6355-SR is connected to the 3G/LTE network, but doesn't see anything connected to its Ethernet port. Check the Ethernet port, verify the client device (router, laptop, etc.) is connected via CAT5/6 to the Digi 6350-SR/6355-SR, and the Ethernet port on the client device is enabled

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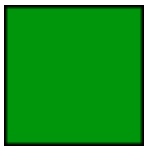

Solid Green

3G connectivity confirmed Should the device be on 4G?
Yes

- Verify 4G coverage is available in the area.
- Check embedded cellular modem firmware. Does it match the type of carrier?
- Check Modem section of Digi 6350-SR/6355-SR config. Verify Access Technology is set to Auto.
- Contact carrier to verify SIM card supports 4G LTE. SIM card may need a custom APN for 4G.

No
Test for Internet access on the device connected to the Digi 6350-SR/6355-SR.
Online
Does the device has a usable IP Address?

- **If no**, see if the client device is expecting a publicly reachable and/or static IP address, check the SIM card and the Modem section of the Digi 6350-SR/6355-SR configuration to verify both are set up with the proper APN.

Are there any ports that are required but cannot be accessed on the client device? Also check if the IP Passthrough has been enabled.

- **If yes**, check the Services section of the configuration. Verify none of the services are reserving the ports needed to access the client device.
- **If no**, check the **Firewall -> Port Forwarding** section of the configuration. Verify that the desired ports are forwarded to the appropriate IP addresses.

Offline
Is the client device receiving a DHCP address from the Digi 6350-SR/6355-SR?

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- **If yes**, check if the IP Passthrough has been enabled.
  - If yes, are there any ports that are required but cannot be accessed on the client device? Also check if the IP Passthrough has been enabled.
    - If yes, check the Services section of the configuration. Verify none of the services are reserving the ports needed to access the client device.
    - If no, check the **Firewall -> Port Forwarding** section of the configuration. Verify that the desired ports are forwarded to the appropriate IP addresses.
  - If no, see if the client device is expecting a publicly reachable and/or static IP address, check the SIM card and the **Modem** section of the configuration to verify both are set up with the proper APN.
- **If no**, verify Ethernet ports for connection status and check Cat5/ Cat6 cable integrity. Is IP Passthrough mode enabled?
  - If yes, clear DHCP leases by waiting 5 minutes, then reboot the Digi 6350-SR/6355-SR. If clearing DHCP leases didn't fix issue, check that the passthrough IP works with a /30 subnet. If not, contact carrier to change IP on SIM card (may just need a reboot if using a standard APN).
  - If no, verify the **Network > Interfaces > LAN** section of the config is setup with a static IP and the DHCP server is enabled.

Online, but with VPN issues
Reduce the **Modem > MTU** option in the configuration to 1400. Alternately, if you have control of the router connected to the Ethernet port of the Digi 6350-SR/6355-SR, change that router's WAN MTU seting to 1400.
Briefly online

1. Disconnect Ethernet cable from the Digi 6350-SR/6355-SR; power cycle. Wait for the Digi 6350-SR/6355-SR to fully connect, then reconnect Ethernet port.
2. Verify the Digi 6350-SR/6355-SR is using the correct APN (e.g. on Verizon you can connect with the standard vzwinternet APN, but the SIM card is meant to connect with a static APN such as ne01.vzwstatic)
3. If that didn't fix the issue, try removing the 192.168.210.254 IP address from the **Network > Interfaces > Default IP > Default Gateway** option in the config.
4. If that didn't fix the issue, try disabling any/all connectivity tests in the configuration profile (labelled "ping monitoring" or "connectivity monitoring" in the config).
5. If that didn't fix the issue, contact the cellular provider to check the SIM card's activation and provisioning status.

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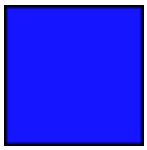

Solid Blue

4G connectivity confirmed
Test for Internet access on the device connected to the Digi 6350-SR/6355-SR.
Online
Does the device has a usable IP Address?

- **If no**, see if the client device is expecting a publicly reachable and/or static IP address, check the SIM card and the Modem section of the configuration to verify both are set up with the proper APN.

Are there any ports that are required but cannot be accessed on the client device? Also check if the IP Passthrough has been enabled.

- **If yes**, check the Services section of the configuration. Verify none of the services are reserving the ports needed to access the client device.
- **If no**, check the **Firewall -> Port Forwarding** section of the configuration. Verify that the desired ports are forwarded to the appropriate IP addresses.

Offline
Is the client device receiving a DHCP address from the Digi 6350-SR/6355-SR?

- **If yes**, check if the IP Passthrough has been enabled.
  - **If yes,** are there any ports that are required but cannot be accessed on the client device? Also check if the IP Passthrough has been enabled.
    - If yes, check the **Services** section of the configuration. Verify none of the services are reserving the ports needed to access the client device.
    - If no, check the **Firewall -> Port Forwarding** section of the configuration. Verify that the desired ports are forwarded to the appropriate IP addresses.
  - **If no**, see if the client device is expecting a publicly reachable and/or static IP address, check the SIM card and the Modem section of the configuration to verify both are set up with the proper APN.

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- **If no**, verify Ethernet ports for connection status and check Cat5/ Cat6 cable integrity. Is IP Passthrough mode enabled?
  - **If yes**, clear DHCP leases by waiting 5 minutes, then reboot the unit. If clearing DHCP leases didn't fix issue, check that the passthrough IP works with a /30 subnet. If not, contact carrier to change IP on SIM card (may just need a reboot if using a standard APN).
  - **If no**, verify the Network → Interfaces→ LAN section of the config is set up with a static IP and the DHCP server is enabled.

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5. If that didn't fix the issue, contact the cellular provider to check the SIM card's activation and provisioning status.

AT command access

To gain AT command access through the Digi 6350-SR/6355-SR, the tester must have a PC/laptop connected to one of the LAN Ethernet ports of the Digi 6350-SR/6355-SR. They should receive an IP address via DHCP from the Digi 6350-SR/6355-SR in the 192.168.0.100-250 range. If they do not receive a DHCP address, they can configure a static IP on the PC/laptop of 192.168.0.2/24 with a gateway of 192.168.0.1

1. Open a SSH session to the Digi 6350-SR/6355-SR.
2. Log into the device console as a user with admin access.

   Depending on the device configuration, you may be presented with an additional menu. Type **a** for the Admin CLI.

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3. Type **atcmd** and press **Enter**. Type **n** if you want exclusive access. This allows you to send AT commands to the device while still allowing the device to connect, disconnect, and/or reconnect to the Sprint network.

Example AT command access below:

```
$ ssh admin@192.168.0.1
Password:

Access selection menu:

a: Admin CLI
s: Shell
q: Quit

Select access or quit [admin] : a

Connecting now, 'exit' to disconnect from Admin CLI ...

> atcmd

Do you want exclusive access to the modem? (y/n) [y]: n
Starting terminal access to modem AT commands.
Note that the modem is still in operation.

To quit enter '~.' ('~~.' if using an ssh client) and press ENTER

Connected
ati
Manufacturer: Sierra Wireless, Incorporated
Model: MC7455
Revision: SWI9X30C_02.24.03.00 r6978 CARMD-EV-FRMWR2 2017/03/02 13:36:45
MEID: 35907206045169
IMEI: 359072060451693
IMEI SV: 9
FSN: LQ650551070110
+GCAP: +CGSM
OK
```

Terminal on unit

Goal

To access the console of the Digi 6350-SR/6355-SR using the **Terminal on Unit** link presented in aView for the device.

Note **Terminal on Unit** leverages the management tunnel established between the Digi 6350-SR/6355-SR and aView. For details on the monthly data usage for this access, see Data usage estimates.

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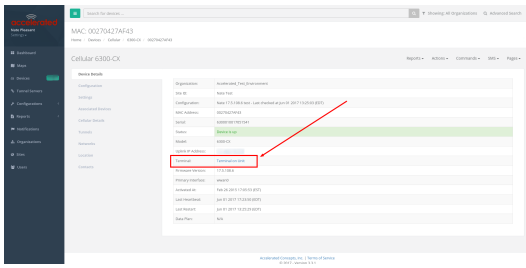


Setup

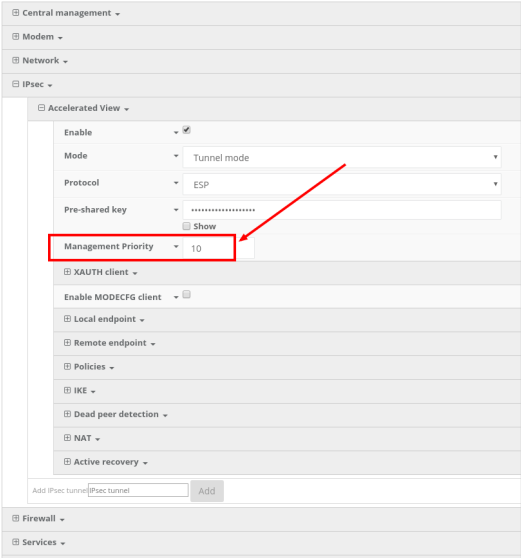
For this setup, you need access to aView and a Digi 6350-SR/6355-SR online and syncing with aView. If you see the Digi 6350-SR/6355-SR listed as up (green status) in aView, you are good to go.

Details

Note aView uses the IPSec tunnel the Digi 6350-SR/6355-SR establishes to **remote.accns.com** to provide terminal access to the console of the Digi 6350-SR/6355-SR. For details on the monthly data usage for this access, see Data usage estimates.

The following configuration sets up the Digi 6350-SR/6355-SR to report its IPSec tunnel local IP address as the management IP that aView can then use to access its console.

Open the configuration profile for the Digi 6350-SR/6355-SR. Under **IPSec -> aView**, set the **Management priority** to **10**. This gives the aView IPSec tunnel the highest priority management interface, which it then reports to aView as the IP that can be used to access its console.



Once you apply the new configuration to the Digi 6350-SR/6355-SR, reboot the device so it rebuilds the IPSec tunnel and reports the new IPSec local IP address to aView. You can verify that aView is using the IPSec local IP as the management IP by looking at the **Uplink IP address** on the **Device Details** tab. This value should be set to a **172.x.x.x** IP address.

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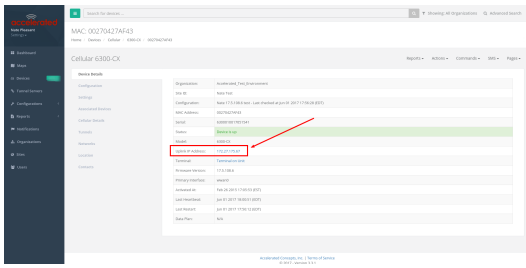
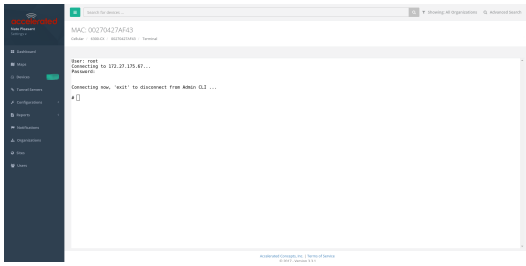


Using Terminal on Unit link

Once the correct management IP is reported from the Digi 6350-SR/6355-SR to aView, click the **Terminal on Unit** to open a page on aView that provides access to the Digi 6350-SR/6355-SR console. Log in as a user that has admin access.



Note There is a known issue where the predictive/auto-correct feature of the Google keyboard renders it incompatible with the Terminal page. If you access the above Terminal with an Android phone or tablet, you will need to use a keyboard other than the native Google keyboard.

Data usage estimates

The Digi 6350-SR/6355-SR is sensitive to the data usage on a customer's wireless data plan. Careful consideration was applied to add reporting, alerting, and remote control features through the best-of-breed aView cloud management system. Please note that even though the service was designed with standard reporting/ control intervals these values can be adjusted downward to obtain near-zero data utilization or, conversely, remote services can be tuned up for more aggressive monitoring at the expense of additional data utilization. The current aView architecture requires that all devices have a minimum of 1 publicly reachable IP address to access cloud-based features (see below).

Note These values are estimates to be used for planning purposes—the actual carrier data measurement may vary.

Data Consumption for aView Services

Service/function	Status/interval	Usage	Notes
Cloud-based Reporting/ Configuration	Standard (every 30 min)	3MB (per month)	Includes one startup sequence

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Service/function	Status/interval	Usage	Notes
Remote Control (IPSec tunnel)	Central management is enabled by default	25MB (per month)	Minimum keep-alive traffic

Note For deployments with heightened sensitivity toward data usage, the IPSec remote control tunnel can be disabled. Cloud-based reporting and configuration can still be accomplished via SMS commands that are not subject usage metering on mobile data plans. Please consult with support for more information before leveraging this approach, "Option 2" in the table below.

Note Charges for SMS messages may apply. Please consult your cellular carrier for billing details.

Service/function	Status/interval	Usage	Notes
Option 2 (Contact Digi for help)	IPSec disabled	2MB	Uses SMS on demand

Itemized Breakdown of Services via aView

Service/function	Status/interval	Usage	Notes	Protocol/port used
Syslog check-in	Every 30 minutes	1KB	Used for reporting and alerts	UDP 514 (syslog)
Configuration check-in	Once nightly -- 1am (UTC)	12KB	Recommended for remote management	TCP 443 (HTTPS)
Boot-up sequence	Each device reboot	24KB	Used for reporting and remote management	UDP 123 (NTP) UDP 514 (syslog)
Device firmware upgrade	As needed (~8 releases per year)	10MB	Updates device firmware upon new release	TCP 443 (HTTPS)
Modem firmware upgrade	As needed (less frequent than device firmware updates)	60MB	Updates firmware on the embedded cellular modem	TCP 443 (HTTPS)
Remote control tunnel	Always-on, if enabled	25MB per month	Minimum keep-alive traffic	UDP 500 and 4500 (IPSec)

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Local device management

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Enabling local management and logging in to web UI

Note Digi recommends you manage the Digi 6350-SR/6355-SR centrally using aView.

If you are not using the aView portal, you must manage and configure your device via the local interface.

Connect to the router using its Gateway IP address: **192.168.210.1** by default.

Username: **root**

Password: **default**

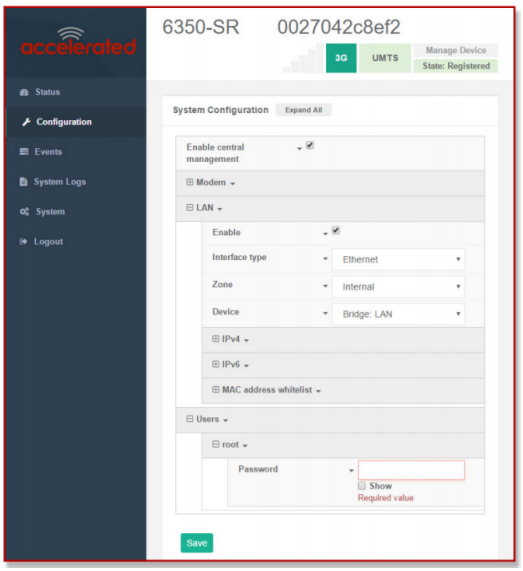
Once logged in via the local web interface, click on the **Configuration** link. You will initially be shown a limited set of configuration options. Start by enabling local management of the device.

1. Uncheck box next to **Enable central management**
2. (optional) If this is the first time the device has been configured, you will also need to update the default user's password, under **Users -> admin -> Password** or **Users -> root -> Password**.
3. Click **Save**.

After saving the profile, the device will no longer attempt to sync with aView and a full range of available configuration options will be visible. Clicking the down arrow next to the name of a configuration option will display a pop-up providing help details about that option, including any default values.

The local management portal offers the same configuration options as aView, although changes made here will not sync with the cloud.

Note Passwords are case sensitive. (The default credentials are all lower case.)



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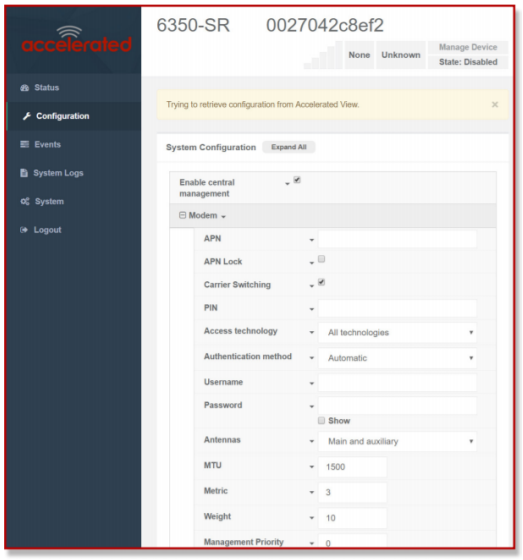
Define a custom APN

If your device is unable to sync with aView because the device cannot establish a cellular connection without a custom APN, it will need to be managed locally before remote configuration will be possible.

To do so:

1. Connect to the device's local UI by navigating to its default gateway address in a web browser.
2. From the **Configuration** tab, enter the name of the APN that should be associated with this device.
3. **Optional**: If the custom APN requires a specific **username** and **password**, please input those into the corresponding fields.
4. Click the **Save** button to finalize any changes.



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Connecting the serial ports

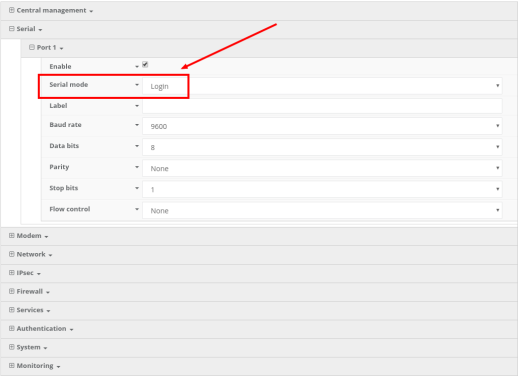
The RS232 serial port on the Digi 6350-SR/6355-SR provides two modes of functionality:

- **Login**—provides login access to device.
- **Remote access**—Remote OoB access to the console of another client device.

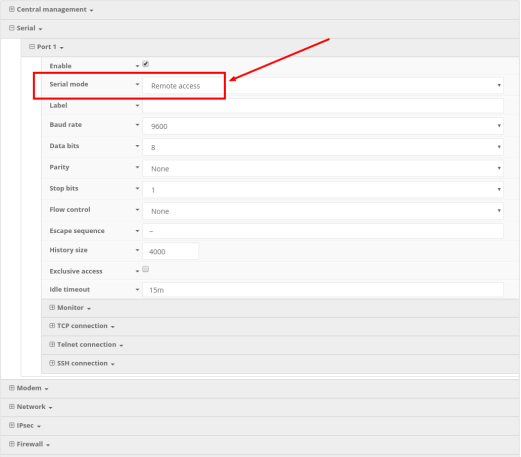
By default, the Digi 6350-SR/6355-SR serial port operates in the **Login** mode.

You must use a cable with an RJ45 connector to connect to the Digi 6350-SR/6355-SR with a RJ45, DB9F or DB9M connector, as determined by your device type, to terminate to your device. Consult the user guide for the device you are connecting to the Digi 6350-SR/6355-SR to determine the connector type, cable type, and pinout positions for your specific device.

The serial port is enabled by default.



If the Digi 6350-SR/6355-SR serial mode is set to **Remote access**, the network device connected to the Digi 6350-SR/6355-SR serial port may be accessed using the aView terminal window, the Digi 6350-SR/6355-SR local web GUI, 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. Connect the network devices to the Digi 6350-SR/6355-SR serial port using the pinout information below.



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Serial port pinout and use

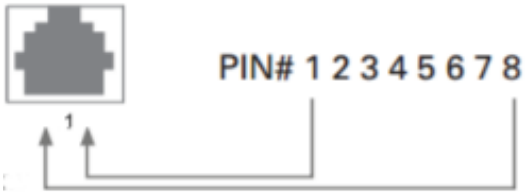
The RS232 standard requires support for baud rates up to 9600 baud on shielded multicore cable up to 50 feet (15 meters) long. For the 635x-SR, the use of standard CAT 5 cables enables serial communication at all baud rates up to 50 feet. CAT5 unshielded twisted pair cable lengths much longer than 50 feet have been verified at 9600 baud but are non-standard and are not guaranteed.

The Digi 6350-SR/6355-SR RS232 serial port is DTE and has the following pin configuration.

Pin 1	CTS	Clear to send	Input to Digi 6350-SR/6355-SR
Pin 2	DTS	Data terminal ready	Input to Digi 6350-SR/6355-SR
Pin 3	TXD	Transmit data	Output from Digi 6350-SR/6355-SR
Pin 4/5	—	Ground	Signal ground
Pin 6	RXD	Receive data	Input to Digi 6350-SR/6355-SR
Pin 7	DCD	Data carrier detect	Outpu from Digi 6350-SR/6355-SR
Pin 8	RTS	Request to send	Outpu from Digi 6350-SR/6355-SR

Note Ring indicate (RI) and data set ready (DSR) are not implemented.

The serial ports use a female RJ45 jack to enable connection using UTP Ethernet cabling.



Wiring for remote access

The serial port of the Digi 6350-SR/6355-SR has the same pinout as most common router console ports. Therefore, it is recommended to use a rollover Ethernet cable if the Digi 6350-SR/6355-SR serial mode is set to **Remote access**, since the pins have to be reversed in order to provide remote access into a secondary router's console port.

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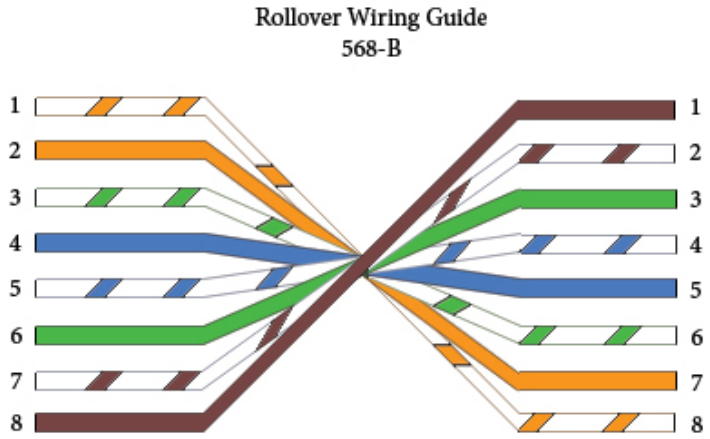

USB-to-serial access

In addition to the dedicated RS232 serial port, serial out-of-band (OOB) access can be leveraged over SSH using the USB port.

Note For assistance with enabling SSH, please refer to the following documentation:

- Enabling Shell Access: to enable full shell access to the device (as opposed to the admin CLI)
- Remote Access: to enable external SSH access
- Terminal on Unit: to enable SSH using the terminal available in aView.

This feature is currently supported by shell interactions in an SSH session. With shell access enabled, press 's' after authenticating to the device.

```
$ ssh admin@192.168.2.1
$ password
Access selection menu:

    a: Admin CLI
    s: Shell
    q: Quit

Select access or quit [admin] : s
Connecting now, 'exit' to disconnect from shell ...
#
```

Single USB-to-Serial cable

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Purchasing options are available through Digi. Refer to the following command to bring up a single serial connection over USB.

Usb-to-Serial Splitter

Purchasing options are available through Digi.

To conveniently access multiple serial connections over SSH using this adapter, enter the following script into router's **Custom Script** field, setting its **Run mode** to "**On boot**." This field is nested under **System > Scheduled Tasks > Custom Script**.

```
cat <<EOT > /opt/serial_port_selector
#!/bin/sh
bugout() {
  echo "\$@"
  exit
}
serials="\$(dmesg | grep "FTDI USB Serial Device converter now attached" | grep -
o "ttyUSB[0-9]" | sort -u)"
[ "\$serials" ] || bugout 'no serial-to-USB converters found'
serial_count=\$(echo "\$serials" | wc -l)
echo "Found \$serial_count USB-to-serial converters."
for i in \$serials; do
  echo "\$i"
done
echo "Type the number of the USB port you wish to open a console connection to"
echo "(e.g. for ttyUSB2, type '2'), followed by ENTER:"
```


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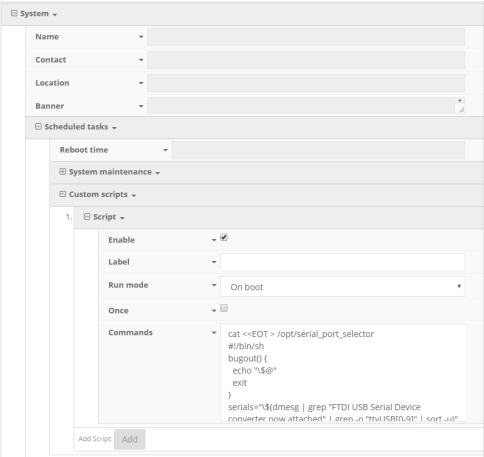
Serial port setup *USB-to-serial access*

```
read port_num
serial_port=\$(echo "\$serials" | grep "\$port_num")
[ "\$serial_port" ] || bugout "Port number \$port_num is not available, please
re-run and specify a differnt port."
echo "Opening connection to USB-to-serial port \$serial_port."
echo "Press '~.' followed by ENTER to close connection."
tip -l "\$serial_port" -c -s 9600
EOT
chmod +x /opt/serial_port_selector
```



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IntelliFlow dashboard

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About IntelliFlow

Minimum firmware: 18.1.29

The intelliFlow(TM) Dashboard, listed as the Dashboard in the local WebUI router management interface, is a graphical display of the device system resources (CPU and RAM usage), and data/port usage of the connected local clients and remote servers. This data is collected by various inbuilt, dedicated NetFlow collectors.

The key features of the intelliFlow(TM) Dashboard include:

- Line/area charts for System Resources data
- Bar/column/pie charts for data and port usage
- Charts can be exported in the PNG picture format
- Charts can be printed directly from the browser
- Charts allow interactive "drill down" of data/port usage
- Charts support interactive zooming/enlarging
- Adjustments of the history resolution can be made

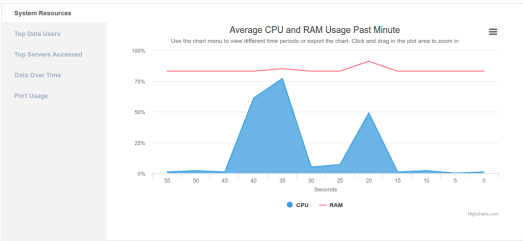
The following sections describes the features and interactions of each display tab.

System resources

The **System Resources** chart shows two pieces of information, CPU usage and RAM usage in percentage (%) over the past time range. The available ranges, which are switchable by accessing the three horizontal bars at the top-right of the chart, include:

- Past 1 minute
- Past 1 hour
- Past 1 day
- Past 30 days
- Past 180 days

Average CPU-and-RAM-usage



The main part of the column chart (which is the default chart type) includes:

- Title and subtitle: Description of the charts and helpful tip about how to interact with the chart
- X-axis: Past number of 'time' since the current epoch at Dashboard page load
- Y-axis: Percentage of usage
- Legend: Indicates the color of each item in the graph and what metric it correlates to

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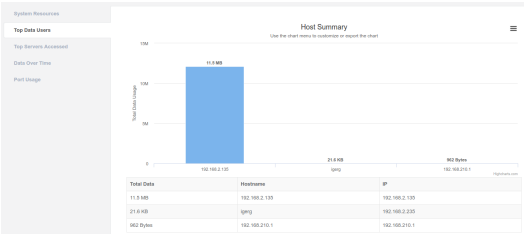
The mouse cursor can be hovered over the line (RAM) or shaded area (CPU) to show more precise usage details. Specific parts of the chart can be zoomed in by click and dragging onto that part of the chart.

Top data users

The **Top User Data** tab includes the Host Summary chart available as a column, a bar, or a pie chart, and a table showing the total data usage of each host, their hostname (IP address if the hostname has not been passed through the NetFlow collector), and the IP address of the host. A view filter of the top 5, 10, and 20 hosts in terms of data usage is also available.

These options can be accessed from the three-bar button menu at the top-right of the chart.

Host summary



The main part of the column chart (which is the default chart type) includes:

- Main and subtitle: Description of the charts and helpful tip about how to interact with the chart
- X-axis: The hostnames of the data's hosts
- Y-axis: Data usage (for each host)

The main charting area contains the relevant shaded areas (i.e. bars) to represent each host. These areas can be hovered over to show general details. Each bar is clickable. When clicked, they will drill down into the respective host to reveal greater details about their data usage history in a different chart.

A **Back to hosts** button is now visible near the top-right of the drilled-down chart, and it is used to navigate back to the main chart.

Host summary table

Directly under the Host Summary chart is the **Host Summary** table. This table contains three fields:

- Total Data: The total data usage of a host
- Hostname: The hostname of the host as passed through NetFlow, or the host's IP address is used if a hostname is not detected
- IP: The IP address of the host

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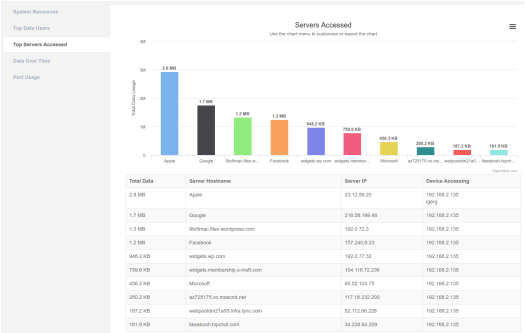
IntelliFlow dashboard *Top servers accessed*

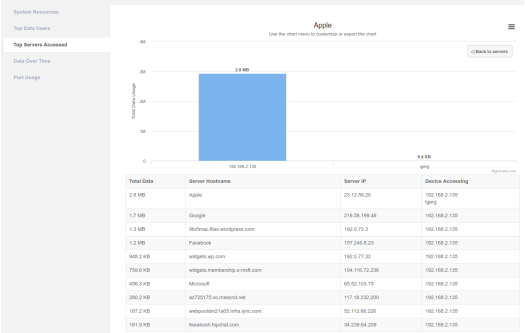
Top servers accessed

The **Top Servers Accessed** tab includes the total traffic sorted by the remote server as a column graph (default). It can also be viewed as a bar graph or a pie chart. A view filter of the top 5, 10, and 20 hosts in terms of traffic throughput is also available. Below the chart is the Services Accessed table, which shows the detailed statistics of data usage in relation to the servers and hosts.

These options can be accessed from the three-bar button menu at the top-right of the chart.



The **Server Drilldown** Information is accessible by clicking on any one of the columns (or bars/pie slices). This reveals all the devices that accessed this server, sorted by the device which had the most traffic to the server to the device which had the least.



To navigate back to the home chart, click on the Back to servers button on the top-right of the tab.

Data over time

The **Data Over Time** tab includes the combined total traffic of all the hosts plotted as an area line graph (default). Below the chart is the Data Usage table, which shows the host details and time period

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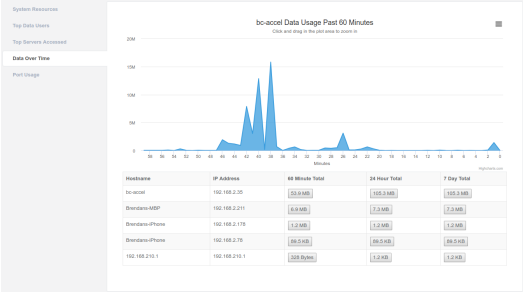
filters labelled by the data usage.

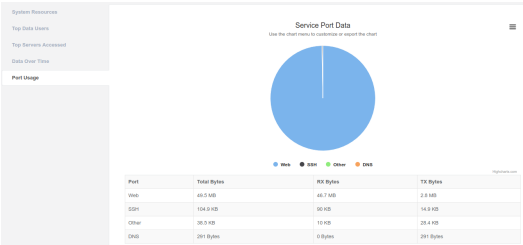


The buttons in the table at the bottom of this tab re-frames the display chart to show only the data usage in relation to that specific host within the specific time-frame. The title of the chart indicates the host and past time-frame that the chart is showing.

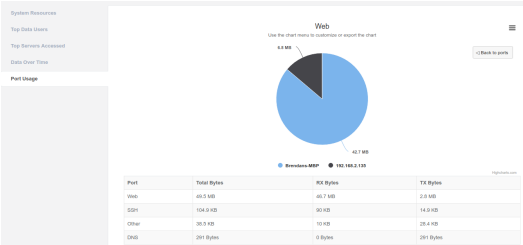
Port usage

The **Port Usage** tab includes the total traffic sorted by the routing port plotted as a pie graph (default). It can also be viewed as a column and a bar graph. A view filter of the top 5, 10, and 20 port in terms of traffic throughput is also available. Below the chart is the Service Port Data table, which shows the detailed statistics of the ports and their respective traffic throughput.

These options can be accessed from the three-bar button menu at the top-right of the chart.



The Port Drilldown Information is accessible by clicking on any of the pie slices. This reveals all the devices that had traffic through this port, broken down into in percentage. To navigate to the main chart, click on the Back to ports button at the top of top-right of the Port Usage chart.



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Quality of Service (QOS)

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About QOS

Minimum firmware: 18.4.54

Quality Of Service (QOS) is a feature within Digi routers to manage traffic performance of different services, such as Voice over IP (VoIP), cloud computing, traffic shaping, traffic prioritizing, bandwidth allocation etc.. The configuration for QOS is included in the Firewall section of the device configurations.

By default, QOS functionality is disabled, however there is a configuration designed for a typical VoIP site defined. The default configuration provides an example of matching packets as they are routed out from the device onto the LAN (labelled inbound) and out from the device on the WAN interface (labelled outbound). It is important to remember when configuring QOS that we can only control the egress packet queue on each interface, not what we receive on the interface (packet ingress).

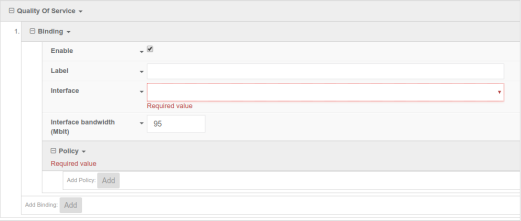
This article explains the configuration related to QOS on Digi devices. Further explanation of each configurable field can be accessed by hovering over the **Help** button in the small triangle tip next to the field-in-question.

QOS configuration

All bindings, policies, and rules are added and configured in **Firewall > Quality Of Service**. If custom QOS bindings are required, click on **Add** to add a new binding. The order of the bindings can be sorted by simply dragging on the binding and moving it.

QOS Binding

Each **Binding** should be uniquely bound to a network interface. A binding contains the policies and rules applicable packets exiting on that interface. Each binding includes the following configurable fields:



Field	Description
Enable	To enable or disable the binding of interest.
Label	Plain text used to name this binding.
Interface	The interface to queue egress packets on. The interface is fundamental and we can only match traffic that is being sent out on this interface.
Interface bandwidth (Mbit)	The maximum bandwidth of the interface with respect to the direction of traffic flow this binding is defining. It is recommended that a 95% of the maximum interface bandwidth is used in this field.
Policy	At least one policy for each binding is required. Each binding policy can contain up to 30 rules.

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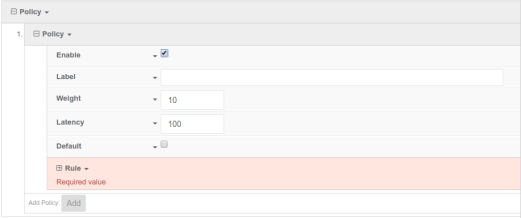
QOS Policy

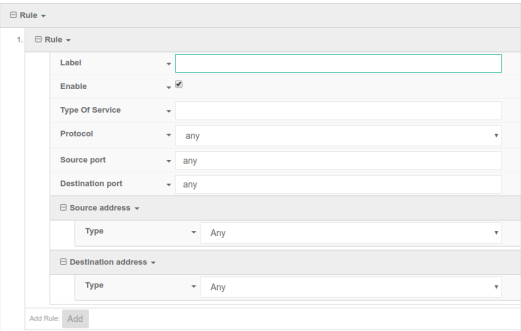
A **Policy** sets behavioural attributes of the traffic matched by a collection of rules. This is the defining part of the HFSC queue, which regulates packet sending by applying complex algorithms based on the latency and bandwidth available. The rules, or Policy Rules are also defined in the policy. These policies can be added by clicking on **Add** button next to **Add Policy**. Each policy includes the following configurable fields:



Field	Description
Enable	To enable or disable the policy.
Label	Plain text used to name the policy.
Weight	A portion of the combined policy weights of a binding. The larger the weight (with respect to the other policy weights), the larger portion of the maximum bandwidth is available. For example, if a binding contains three (3) policies, each policy contains a weight of 10. Therefore the traffic matching each policy will be 1/3 of the total interface bandwidth.
Latency	The maximum delay in the transmission of related packets. The lower the latency, the faster the packets will be scheduled for transmission.
Default	Specifies whether the policy is a fall-back policy, i.e. the policy used for traffic that is not matched by a policy rule. If unchecked, custom policy rules can be defined. It is critical to define a default, otherwise any packets that do not match a rule will be dropped.

QOS Rule

The **Rule** specifies the types of packets that will inherit the parent policy's attributes. Rules can be added by first unchecking **Default**, then click the **Add** button next to **Add Rule**. Each rule includes the following configurable fields:



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Field	Description
Enable	To enable or disable the rule.
Label	Plain text used to name the rule.
Type Of Service	A Type Of Service (TOS) value specified in a packet header. A list of common TOS values can be found in this link. If unspecified, this field is ignored.
Protocol	The IP protocol matching criteria. It can be TCP, UDP, or ANY other IP protocol.
Source port	Source port of the traffic to match.
Destination port	Destination port of the traffic to match.
Source address	A slide out tab with the option to choose a Type. Apart from Any, each of the options reveals a corresponding drop-down field: ■ **Any**: Traffic from anywhere will be matched ■ **Interface**: Traffic only from the specified interface will be matched ■ **IPv4/IPv6 address**: Traffic only from the specified IP address will be matched ■ **MAC address**: Traffic only from the specified MAC address will be matched
Destination address	A slide out tab with the option to choose a Type. Apart from Any, each of the options reveals a corresponding drop-down field: ■ **Any**: Traffic to anywhere will be matched ■ **Interface**: Traffic only to the specified interface will be matched ■ **IPv4/IPv6 address**: Traffic only to the specified IP address will be matched

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Accessing Admin CLI

Goal

To show how to access Admin CLI using Terminal on Unit or SSH.

Setup

For Terminal on Unit, you will need either:

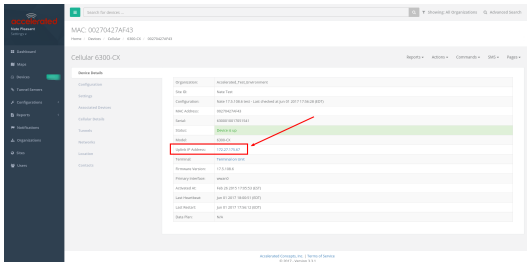
- Direct SSH access to the Digi 6350-SR/6355-SR device.
- Access to the aView management portal, and a Digi 6350-SR/6355-SR device online and syncing with aView. The device should be listed in aView as up (green status).

Details

aView uses the IPSec tunnel the Digi 6350-SR/6355-SR device establishes to ipsec.accns.com (or remote.accns.com) to provide terminal access to the console of the device.

Note For details on the monthly data usage for this access, refer to the following article: Data usage estimates.

If a new configuration is applied to a Digi 6350-SR/6355-SR device , reboot the device so that it rebuilds the IPSec tunnel and reports the new IPSec local IP address to aView. You can verify that aView is using the IPSec local IP as the management IP by looking at the **Uplink IP Address** on the **Device Details** tab. This value should be set to a 192.x.x.x IP address when using ipsec.accns.com, or 172.x.x.x fo r remote.accns.com.



Using the Terminal on a Unit link

1. Once the correct management IP is reported from the Digi 6350-SR/6355-SR device to aView, click **Terminal on Unit** to open a page on aView that provides access to the console of the device.

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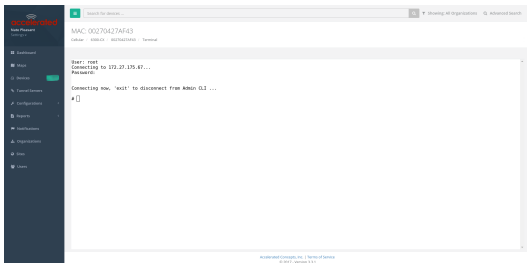
2. Log into the device console as a user with admin access.

   Depending on the device configuration, you may be presented with an additional menu. Type **a** for the Admin CLI.

3. At the Admin CLI prompt, press TAB to view available commands. The same is true for typing one of the commands followed by a space then hitting TAB. This will show the available options within that command. (See Command breakdown.)



Direct ssh access

SSH access can be gained through a local connection to the Digi 6350-SR/6355-SR device. You can access the Digi 6350-SR/6355-SR device on its LAN IP address (default 192.168.2.1) or its default 192.168.210.1 IP address. Below is an example SSH login process.

1. SSH to the ACL device at its LAN IP address (default 192.168.2.1) or its default 192.168.210.1 IP address.
2. Log into the device console as a user with admin access.

   Depending on the device configuration, you may be presented with an additional menu. Type **a** for the Admin CLI.

3. At the Admin CLI prompt, press TAB to view available commands. The same is true for typing one of the commands followed by a space then hitting TAB. This will show the available options within that command. (See Command breakdown.)

```
$ ssh admin@192.168.2.1
$ password
Access selection menu:

a: Admin CLI
s: Shell
q: Quit

Select access or quit [admin] : a

Connecting now, 'exit' to disconnect from Admin CLI ...
#
```

Command breakdown

- **atcmd**—Run AT commands to cellular modem in the device
- **config**—Make config changes on the device, one at a time
- **exit**—Exit from the Admin CLI console

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- **ping**—Ping an IP address or domain (Ctrl+c to stop)
- **reboot**—Reboot the device
- **show**—Display network or device version details
- **traceroute**—Perform traceroute to an IP address or domain

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Antenna notes and solutions

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Antenna terminology

Electronics require antennas to convert data into RF signals (and vice versa). They are coupled with radio transmitters and/or receivers to process the information that is carried over cellular bands. Antenna design and functionality has evolved over time:

- **Internal antennas**: An antenna can be concealed within the casing of a device, as seen with most smart phones. Internal antennas are potentially more prone to interference due to the close grouping of electrical components.
- **External antennas**: Situating antennas further away from the rest of the circuit board can help alleviate interference due to electrical components by maximizing a device's natural reach. Instead of sitting inside the device directly next to the modem or transceiver, they screw into place using SMA connectors and protrude from the equipment (think "rabbit ears").
- **MIMO**: Multiple-Input and Multiple-Output (MIMO) technology expands the throughput capacity of a transceiver by leveraging multiple antennas to simultaneously convert RF signals into data (or vice versa), providing faster transfer speeds as a result. Think of it (loosely) as Carrier Aggregation for antennas—once again combining individual lanes into a single, coordinated superhighway. Networks must leverage MIMO antenna transmission to be technically considered 4G.

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Physical specifications

Many Digi devoces use industry-standard, female SMA connectors to affix antennas to the internal cellular radio. External antennas improve clarity when compared to internal antennas, which are prone to electromagnetic interference.

An extension coaxial cable can also enhance the reach of a device; however, that cabling causes attenuation—or a degradation in signal quality—due to the distance the signal travels. Significant attenuation typically begins at 30 feet of cabling.

Certain Digi products, for example, the Digi 6300-CX and Digi 6330-MX, are designed to provide the ability to place the unit where reception is best (moving the radio is always preferred). This allows the device to capture optimal Radio Frequency (RF) before converting it to IP packets and transmit data via Ethernet cabling, an approach that yields increased performance and cost savings over coax cabling.

Digi can also provide a battery pack for site surveys, creative mounting options, and a (passive) Power-over-Ethernet (PoE) injector to provide an efficient, flexible deployment at the lowest possible cost. Most Digi clients will not require third-party antennas unless deploying without PoE. It is always preferred to mount a PoE unit on an external wall via Ethernet and use the shortest coax cable required to run the external antenna to the outside of a building.

CRITICAL NOTE: Test the signal strength outside of the building to ensure you have cellular coverage in the area prior to any cabling work. **Tip**: Use the site survey battery to do this.

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Antennas tested by Digi

Note Antenna information has been compiled by Digi to assist clients in finding and sourcing an antenna solution to best meet their application and business needs. The information on availability and pricing is for planning purposes only and may vary. Clients should test and validate their own applications prior to selecting an antenna for their project.

These antennas are omni-directional—that is, they offer the ability to send/receive signals from any direction. Directional antennas may improve RF sensitivity, but they will require an expert knowledge to find a specific cellular tower and maintain the ongoing fine-tuning that may be required to keep the antenna positioned properly. Due to the challenges of directional antennas, Digi typically focuses on MIMO omni-directional models.

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Extra-small IoT paddle antennas

Manufacturer: Taoglas Antennas Solutions
Product: TG.08.0113 and the Product Datasheet
MSRP: $12 per antenna ($24 for a pair)

Note Use two antennas for full MIMO Operation.

Deployment notes

This antenna is recommended for consideration when a project requires antennas with a small form factor (for example, digital signage, small enclosures, rack mounted, in-vehicle, and so on). The performance of these antennas is surprisingly good considering the size. Although testing has shown they may slightly under perform compared to the antennas included with your unit, these smaller antennas may provide the perfect balance between form factor and performance in your IoT application.

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Large external MIMO antenna (outdoor rated)

Manufacturer: EAD

Product: LMO7270 and the Product Datasheet

MSRP: $129 with dual 5M coax cabling

Deployment notes

This is a hardened antenna designed to be mounted outdoors. This is a MIMO antenna with two short pig tail connectors and the overall dimensions are 187 mm in height and 106 mm at the base. Digi typically provides this antenna with a kit including dual coax cables at 5M in length. If you are using this antenna with a Digi PoE (for example, the Digi 6300-CX) we typically recommend you mount the unit on the inside and run the 5M cables to the outside. In this way, you save costs and eliminate attenuation (signal loss) by running Ethernet as far as possible and minimize the coax cable length. Digi testing of this antenna reveals performance gain.

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Flat MIMO antenna #1

Manufacturer: Taoglas Antennas Solutions

Product: Gemini LMA100 and the Product Datasheet

MSRP: $99 with dual 5M cables

Deployment notes

This is an easy-to-use MIMO antenna. It offers a low-profile form factor that accommodates simple mounting. This model is manufactured by Taoglas and showed solid RF performance in our testing. The antenna has a square shape, sized at 164 mm x 164 mm x 36.5 mm. The antenna cabling is built into the antenna, and typically reaches only one meter, but it can be built (sized) to order (lead time can take up to 8 weeks). This antenna typically includes a stand that can be used instead of mounting. The pricing above is based on 5M cables (~15 feet) and the antenna is rated for indoor and outdoor use.

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Flat MIMO antenna #2

Manufacturer: Mobile Mark

Product: PNM2-LTE and the Product Datasheet

MSRP: PNM2-LTE-1C1C-WHT-180 (includes Cabling @ 15 feet) $176.40

Deployment notes

This is an additional easy-to-use MIMO antenna with a low-profile form factor and simple mounting. This model is manufactured by Mobile Mark and showed solid RF performance in our testing. With a square form factor of 146 mm x 146 mm x 18 mm, the antenna cabling is built into the antenna and can be sized to order (typically lead time from the manufacturer is 2 weeks).

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Paddle extender

Deployment notes

This unique product (termed *the paddle extender*) is designed to move the standard LTE antennas to a more optimal spot to obtain better RF connectivity. A typical use can may be where the unit is installed in a metal enclosure or rack (think of a data center or digital signage enclosure). The paddle antennas can be mounted to the top SMA connector, escaping the limitations of having to stay affixed to the device's chassis. Remote mounting is then simplified thanks to the paddle extender's magnetic base (diameter of 48mm [1.9 inches]). The length of the cable 50cm (19.7 inches).

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