Operations Manager

User Guide

21.Q2 May 2021

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Safety & FCC Statement

Safety Statement

Please take care to follow the safety precautions below when installing and operating the OPERATIONS MANAGER:

- Do not remove the metal covers. There are no operator serviceable components inside. Opening or removing the cover may expose you to dangerous voltage which may cause fire or electric shock. Refer all service to Opengear qualified personnel.
- To avoid electric shock the power cord protective grounding conductor must be connected through to ground.
- Always pull on the plug, not the cable, when disconnecting the power cord from the socket.

Do not connect or disconnect the appliance during an electrical storm. Also use a surge suppressor or UPS to protect the equipment from transients.

FCC Warning Statement

This device complies with Part 15 of the FCC rules. Operation of this device is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference that may cause undesired operation.

> Proper back-up systems and necessary safety devices should be utilized to protect against injury, death or property damage due to system failure. Such protection is the responsibility of the user.

This device is not approved for use as a life-support or medical system.

Any changes or modifications made to this device without the explicit approval or consent of Opengear will void Opengear of any liability or responsibility of injury or loss caused by any malfunction.

This equipment is for indoor use and all the communication wiring are limited to inside of the building.

About This User Guide

This user guide covers the Opengear Operation Manager products, including the OM2200 family of rack-mountable appliances (available with combinations of up to 48 serial ports and 24 Ethernet ports) and the OM1200 family of small form-factor appliances (available with combinations up to 8 serial and 8 Ethernet ports).

This manual is up to date for the 21.Q2 May 2021 firmware release. When using a minor release there may or may not be a specific version of the user guide for that release. The current Operations Manager user guide can always be found here.

Installation And Connection

This section describes how to install the appliance hardware and connect it to controlled devices.

Power Connection

OM2200 and some newer OM1200 have dual power inlets with auto failover built in. These power supplies each accept AC input voltage between 100 and 240 VAC with a frequency of 50 or 60 Hz. The OM2224-24E-10G-L draws a maximum of 48W, while non-24E are less than 30W.

Two IEC AC power sockets are located on the power side of the metal case, and these IEC power inlets use conventional IEC AC power cords.

> **Note:** Country specific IEC power cords are not included with OM2200s. OM1200s are shipped with a 12VDC to universal AC (multi-country clips) wall adapter.

See also "Dual AC Supply" on page 16 and "SNMP Alerts Power" on page 68.

Operations Manager Platform (OM1200) Environmental And Power	
Power Draw	< 25 Watts
Operating conditions	Temperature 0~50C, Rel Humidity 5~90%
Cooling	Passive
Environmental Sensors	Smart Controller with multi-zone temperature sensors.
	Auto-shutdown/re-boot on severe thermal events
Power Draw Sensors	Active multi-zone power draw monitoring

Operations Manager Platform (OM2200) Environmental And Power	
Power Supply	Dual AC or dual DC
Power Draw	48 Watts for -24E, others <30W
Operating conditions	Temperature 0~50C, Rel Humidity 5~90%
Cooling	Passive
Environmental Sensors	Smart Controller with multi-zone temperature sensors
	Supervisory environmental controller with safety power down.
Power Draw Sensors	Active multi-zone power draw monitoring

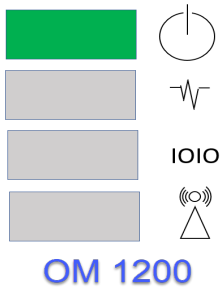
Dual AC Supply

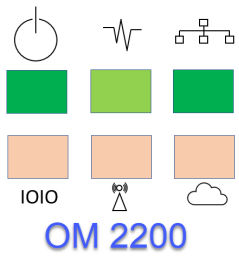
Dual AC Supply can provide power redundancy for devices, especially those that may operate in harsher environments. A secondary power supply provides redundancy for the device if one PSU is unplugged or in the event of a failure.

LED Power Status Indicator

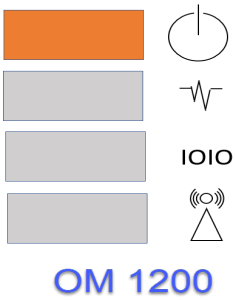
The power LED indicator requires no configuration and will display the dual power status on any Operations Manager device with a dual power supply.

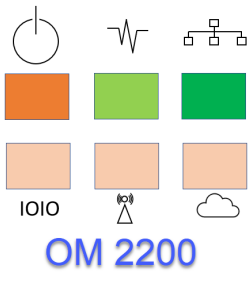
On a device with a **single** PSU (power supply unit) *or*, a **dual** PSU device has power connected to *two* PSUs, the LED power status indicator should be green at all times.





If a **dual** PSU device has power connected to *one* PSU (power supply unit), the LED power status indicator is colored amber indicating that the unit has no redundancy in the event of a power failure.





SNMP Alerts for Power-related Events

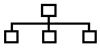
The System Voltage Range SNMP alert is triggered when there is a change in power status such as a system reboot or when the voltage on either power supply leaves or enters the configured range of the System Voltage alert.

SNMP Alert Configuration

The System Voltage Range SNMP alert is configured in the Configure > SNMP Alerts page, see "SNMP Alerts Power" on page 68.

Device Status LEDs

The LED states shown below are determined through infod status and config-server data. The config server holds a configurable threshold value for the Cell LED Amber / Green light, and modem enabled / disabled information.

Status LEDs					
LED Condition					
	LED Off	Amber Flashing	Amber Solid	Green Flashing	Green Solid
Power 	Device is off.		On a dual power supply system: Only one PSU is connected.		On a single power supply system: power is connected. On a dual power supply system: Redundant power is connected.
Heartbeat 	Device has halted.	Device is booting.		Normal operation.	Device is halted.
Network 	No active network connection	Device is failover starting.	Device is in failover.	Normal network connection is stopping or normal network is up and failover is stopping.	Network is connected.

Status LEDs (continued).					
LED Condition					
	LED Off	Amber Flashing	Amber Solid	Green Flashing	Green Solid
Cellular Interface 	Cellular is not in use.	Cell is starting and signal is below threshold. The LED signal threshold config is set to 50%.	Cell is connected and signal is below threshold. The LED signal threshold config is set to 50%.	Cell is starting and signal is above, or equal to the threshold.	Cell is connected and signal is above, or equal to the threshold.
IOIO 				Any serial activity is received, on either console/usb console or device serial ports.	
Cloud / Internet 	Not implemented.				

Note: The amber LED signal threshold config is set to 50%.of normal signal strength.

For information on the setting of network and power alert thresholds, see:

"SNMP Alerts Networking (Connection Status)" on page 70

"SNMP Alerts Power" on page 68

Connecting to the Network

All Operations Manager products have two network connections labeled NET1 and NET2. In the OM2200, there are options for copper wiring (on a standard RJ-45 connector) and fiber (through a standard SFP module).

The network connections on the OM2200 are located on the serial port side of the unit. Connect the provided shielded CAT5 cable to the NET1 to a computer or into your network for initial configuration. By default NET1 and NET2 are enabled.

You can use either 10/100/1000BaseT over Cat5 or fiber-optical transceiver (1Gbps) in the SFP slot for NET1 or NET2 on OM2200 (non-10G) and OM1208-8E.

Serial Connection

The serial connections feature RS-232 with software selectable pin outs (Cisco straight –X2 or Cisco reversed –X1). Connect serial devices with the appropriate STP cables.

Cellular Connectivity

The Operations Manager products offer an optional global cellular LTE interface (models with -L suffix). The cellular interface is certified for global deployments with most carriers and provides a CAT12 LTE interface supporting most frequencies in use. To activate the cellular interface, you should contact your local cellular carrier and activate a data plan associated to the SIM installed.

For -L models, attach the 4G cellular antennas to the unit's SMA antenna sockets on the power face (or to the extension RF cables) before powering on. Insert the 2FF SIM card on the power face with the contact facing up. Use the left SIM socket first.

Installing A New SIM Card

Before installing a new SIM card, the OM device must first be powered down. This can be done by switching off the power supply and waiting until the device has shut-down. Install the new SIM card into its slot, then restart the device

> **Note:** The device will not recognize the new SIM card unless a shut-down and restart is performed. The new SIM card will be read during start-up.

Reset and Erase

CONFIGURE > System > Reboot

The OPERATIONS MANAGER reboots with all settings (e.g. the assigned network IP address) preserved.

To reboot the unit:

Select **CONFIGURE > System > Reboot**.

To erase the unit:

Push the Erase button on the port-side panel twice with a bent paper clip while the unit is powered on.

This resets the appliance to its factory default settings. Any modified configuration information is erased. You will be prompted to log in and must enter the default administration username and administration password (Username: root Password: default). You will be required to change this password during the first log in.

Initial Settings

This section provides step-by-step instructions for the initial settings on your OPERATIONS MANAGER.

By default, all interfaces are enabled. The unit can be managed via Web GUI or by command line interface (CLI).

Tip: There is also a Quick Start Guide to assist with easy setup of the Operations Manager. The QSG is available at: http://ftp.opengear.com/download/quickstart/om2200/OMQSG.pdf

Default Settings

Tip: See also the Quick Start Guide at: http://ft-p.opengear.com/download/quickstart/om2200/OMQSG.pdf

The OPERATIONS MANAGER comes configured with a default static IP Address of 192.168.0.1 Subnet Mask 255.255.255.0.

Serial Port Settings

The default settings for the serial ports on a new device are:

“Console server” mode, 9600, 8N1, X2 (Cisco straight) pinout; the escape character is “~” .

Browser Web GUI

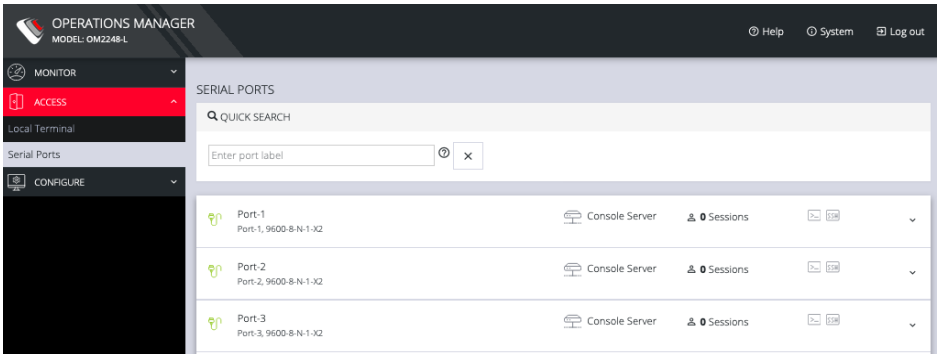
The OM offers a Web GUI via web browser that supports HTML5.

1. Type https://192.168.0.1 in the address bar. HTTPS is enabled by default.
2. Enter the default username and password

   Username: root

   Password: default
3. After the first successful log-in you are required to change the root password.
4. After log-in the Web GUI is available. Check system details in the top right-hand side of the Web GUI.
5. In the Navigation Bar on the left side, navigate to the **ACCESS > Serial Ports** page. The Serial Ports page displays a list of all the serial devices, including

the links to a Web Terminal or SSH connection for each.



Using the Web GUI

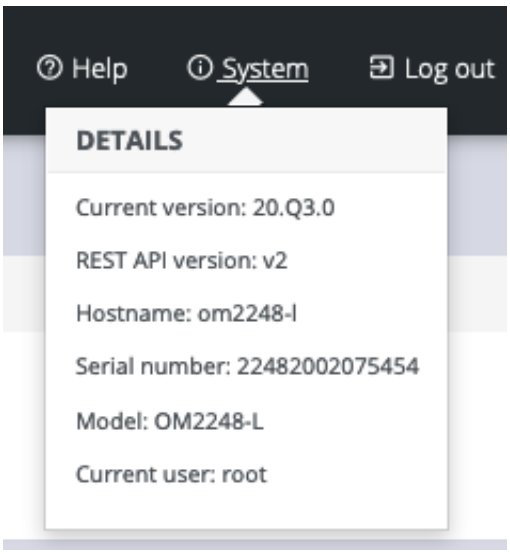
The Web GUI can switched between **Light** or **Dark** mode by adjusting the toggle on the bottom left.

Light mode changes the user interface to display mostly light colors. This is the default UI setting. Dark mode changes the user interface to display mostly dark colors, reducing the light emitted by device screens.

The Web GUI has three menu options on the upper right: **Help**, **System**, and **Log out**.

The **Help** menu contains a link to generate a **Technical Support Report** that can be used by Opengear Support for troubleshooting. It also contains a link to the latest Operations Manager User Manual.

The System menu presents the **Current version**, **REST API version**, **Hostname, Serial Number, Model**, and **Current user**.


Help
System
Log out
DETAILS
Current version: 20.Q3.0
REST API version: v2
Hostname: om2248-l
Serial number: 22482002075454
Model: OM2248-L
Current user: root

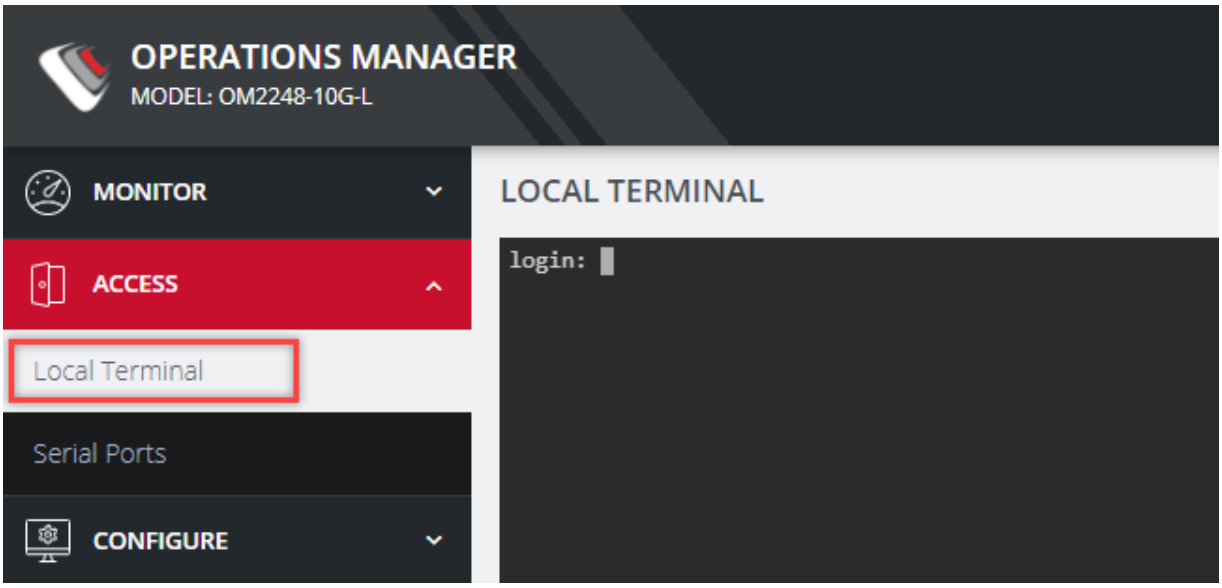
Management Console Connection via CLI

The Command Line Interface (CLI) is accessible using your preferred application to establish an SSH session. Open a CLI terminal on your desktop, then:

1. Input the default IP Address of 192.168.0.1. SSH port 22 is enabled by default.
2. When prompted, enter the log in and password in the CLI.
3. After a successful log in, you'll see a command prompt.

Accessing the Web GUI CLI Terminal

An alternative CLI terminal is provided within the Web GUI. To access this terminal, in the left-hand side **Navigation Bar**, navigate to the **ACCESS > Local Terminal** page. You will be required to submit your log-in credentials.



Change the Root Password

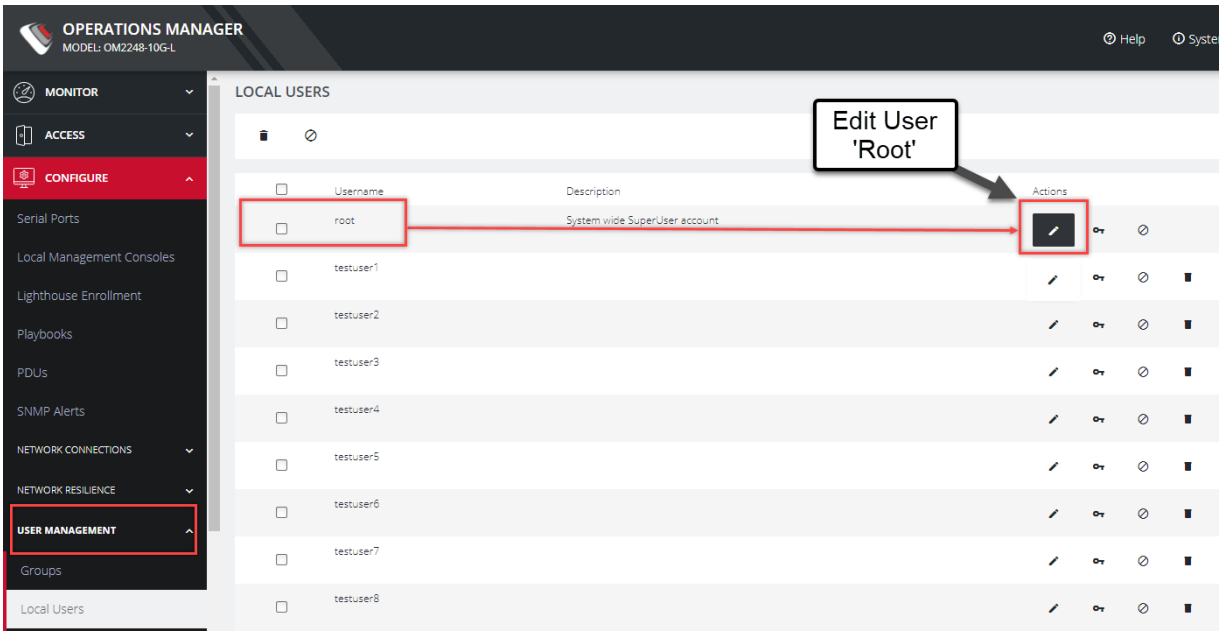
CONFIGURE > User Management > Local Users > Edit User

For security reasons, only the root user can initially log in to the appliance. Upon initial login the default password must be changed.

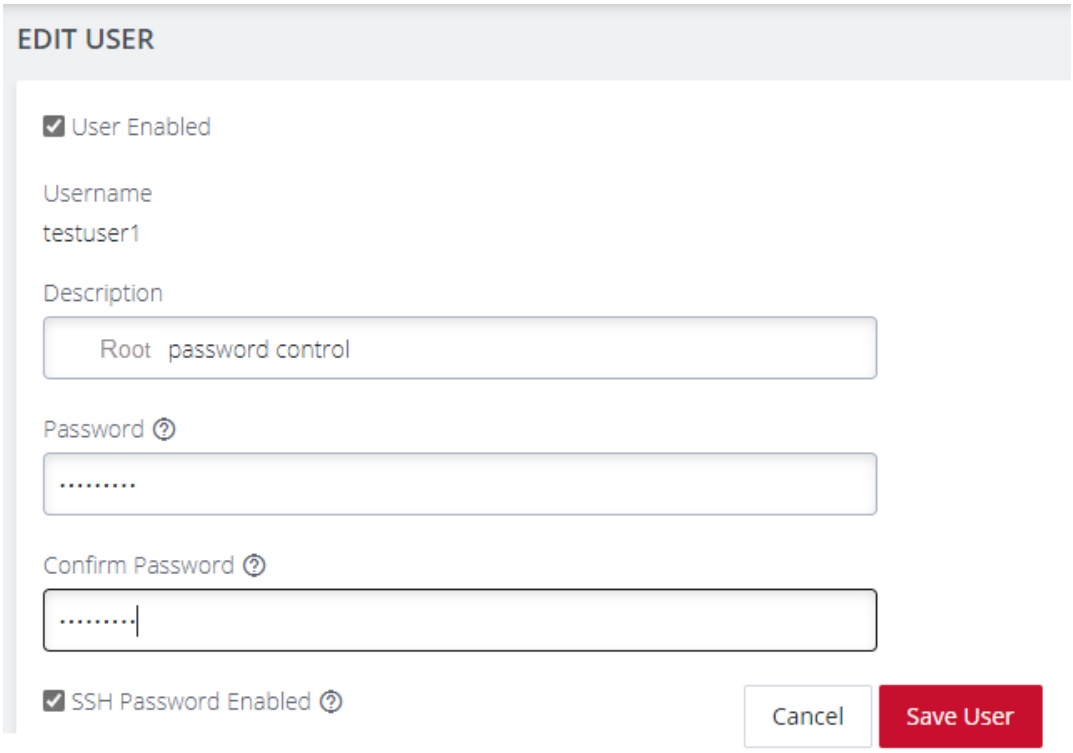
> **Tip:** Other Users' passwords may be changed using the same procedure by selecting the User's account name under the **Username** heading.

To change the password at any time:

1. Navigate to **CONFIGURE > User Management > Local Users**
2. Click the Root user's **Edit User** icon below the **Actions** heading.



3. In the **Edit User** page, if required, enter an optional description in the **Description** field. Enter a new password in the **Password** field and re-enter the password in the **Confirm Password** field.



4. Click **Save User**. A green banner confirms the password change has been saved.

Disable a Root User

CONFIGURE > User management > Local Users

To disable a root user:

> **Note:** Before proceeding, make sure that another user exists that has the Administrator role or is in a group with the Administrator role. For information on creating, editing, and deleting users, see "Local Users" on page 111

1. Navigate to **CONFIGURE > User management > Local Users**
2. Click the **Disable User** button in the **Actions** section next to the root user.
3. Click **Yes** in the **Confirmation** dialog.

To enable root user, log in with another user that has the Administrator role and click the **Enable User** button in the **Actions** section next to the root user.

.

Change Network Settings

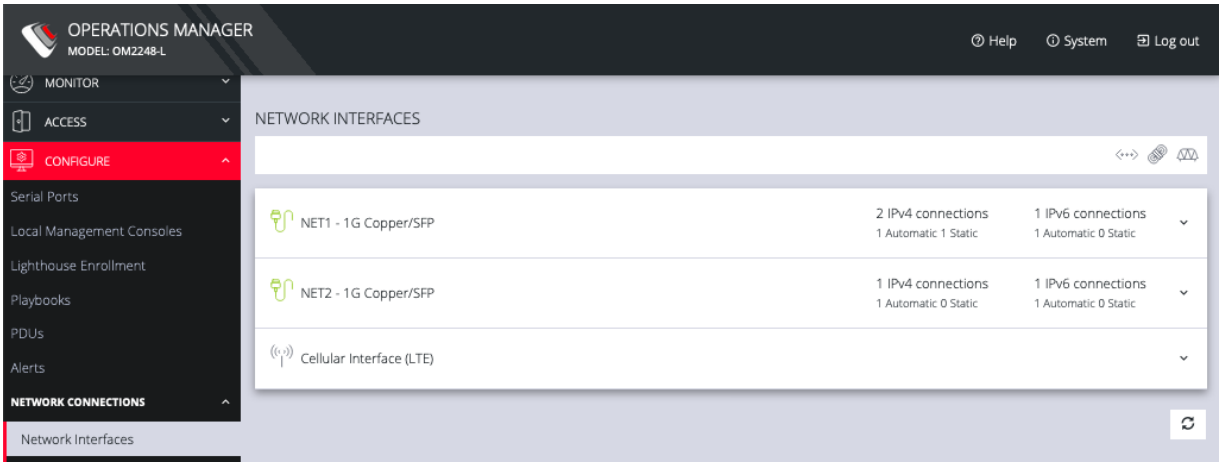
CONFIGURE > Network Connections > Network Interfaces

The interface supports both IPv4 and IPv6 networks. The IP address of the unit can be setup for Static or DHCP. The following settings can be configured for network ports:

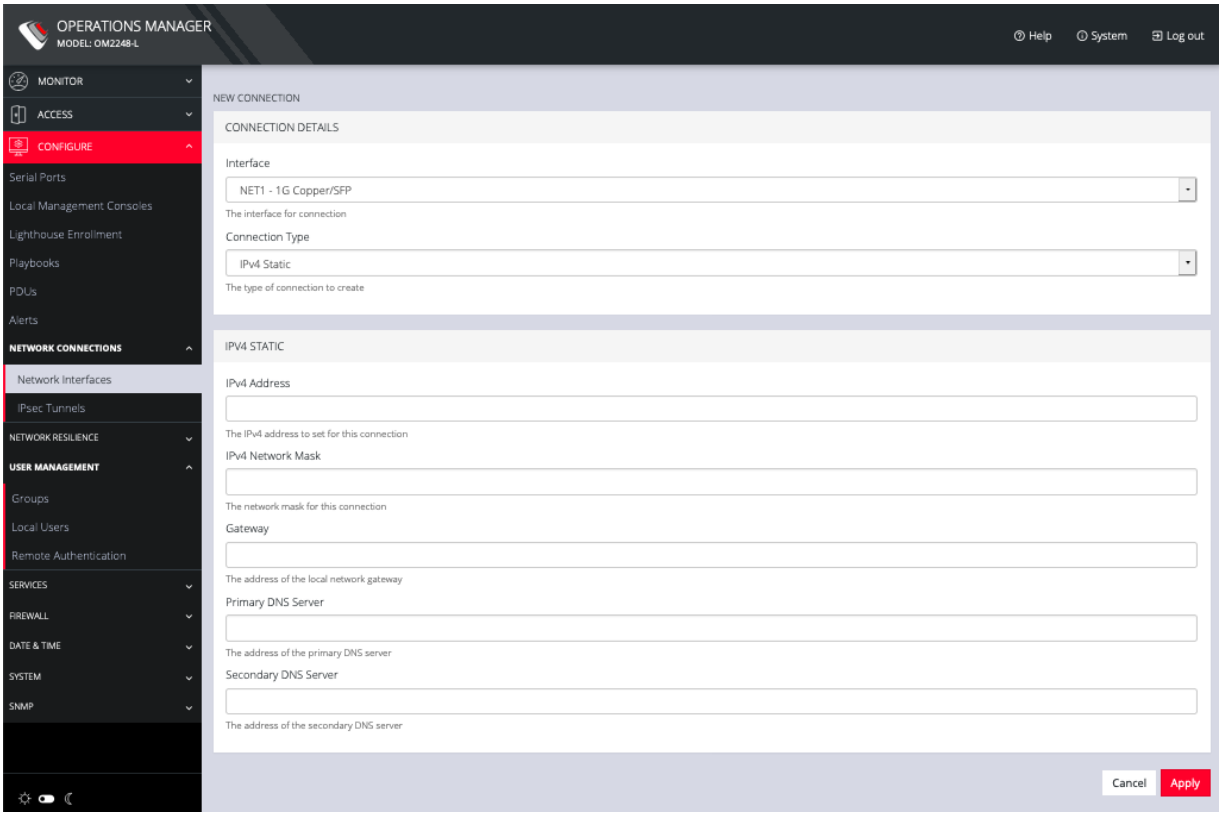
- IPv4, IPv6
- Static and/or DHCP
- Enabling or disabling network interfaces
- Ethernet Media types

To add a new connection:

1. Click **CONFIGURE > Network Connections > Network Interfaces**



2. Click the **expand arrow** to the right of the desired interface to view its details.
3. Click the **plus icon** to open the **New Connection** page.



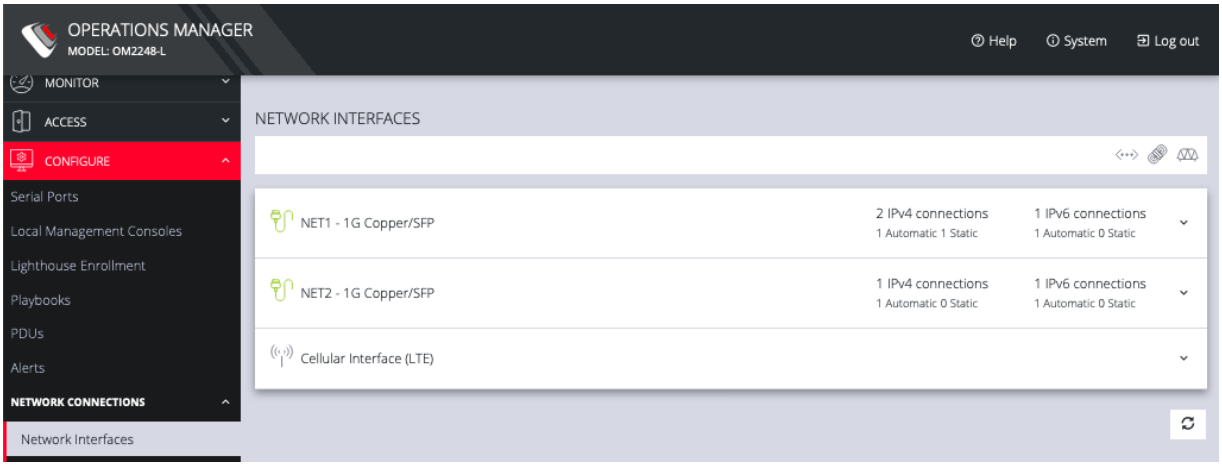
4. Select the **Interface** and **Connection Type** for your new connection.
5. The form on the bottom part of the page will change based on the **Connection Type** you choose. Enter the necessary information and click **Apply**.

   To disable or delete interfaces, use the controls on the expanded section on the **CONFIGURE > Network Connections > Network Interfaces** page.

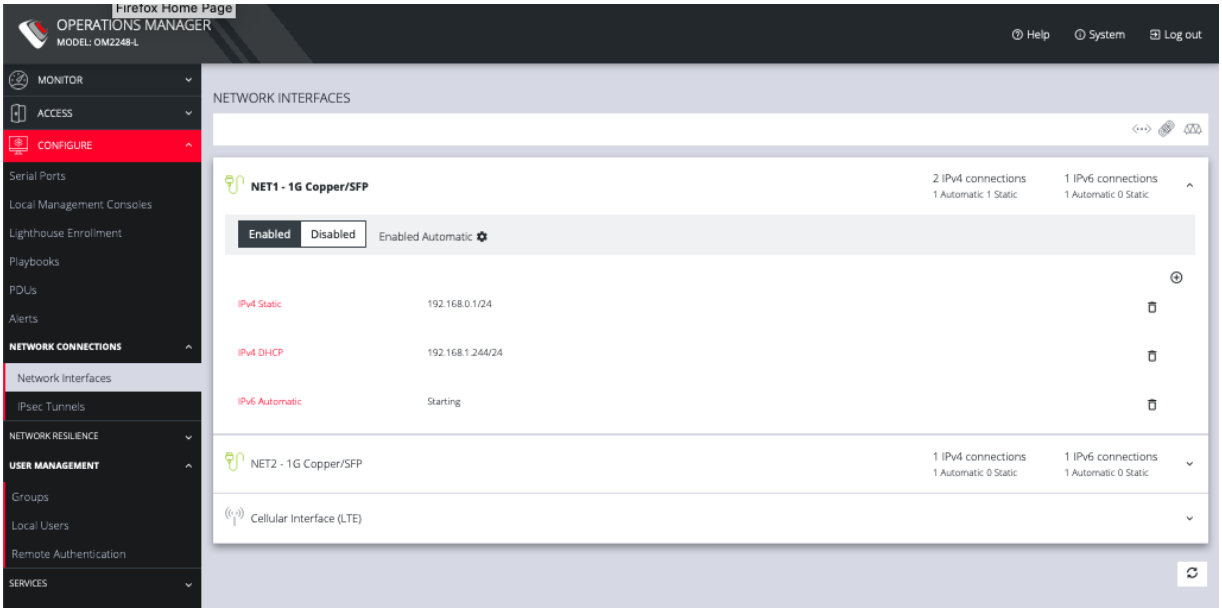
> **Note:** If you experience packet loss or poor network performance with the default auto-negotiation setting, try changing the Ethernet Media settings on the OPERATIONS MANAGER and the device it is connected to. In most cases, select 100 megabits, full duplex. Make sure both sides are set identically.

To change the Ethernet Media Type:

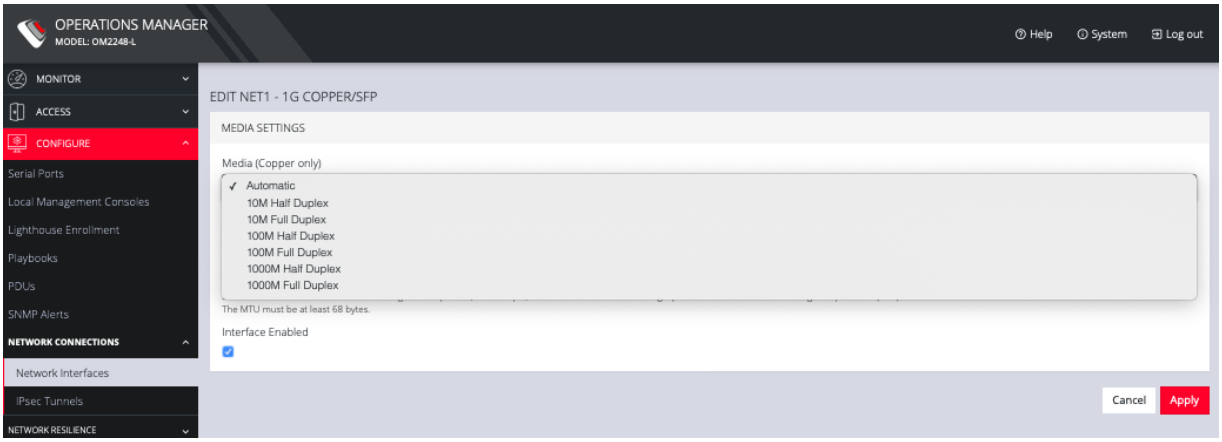
1. Click **CONFIGURE > Network Connections > Network Interfaces**



2. Click the expand arrow to the right of the interface you wish to modify.



3. Click **Enabled Automatic**.



4. Change the **Media Setting** as needed and click **Apply**.

MONITOR Menu

The MONITOR Menu is a relatively short section comprising only three topics.

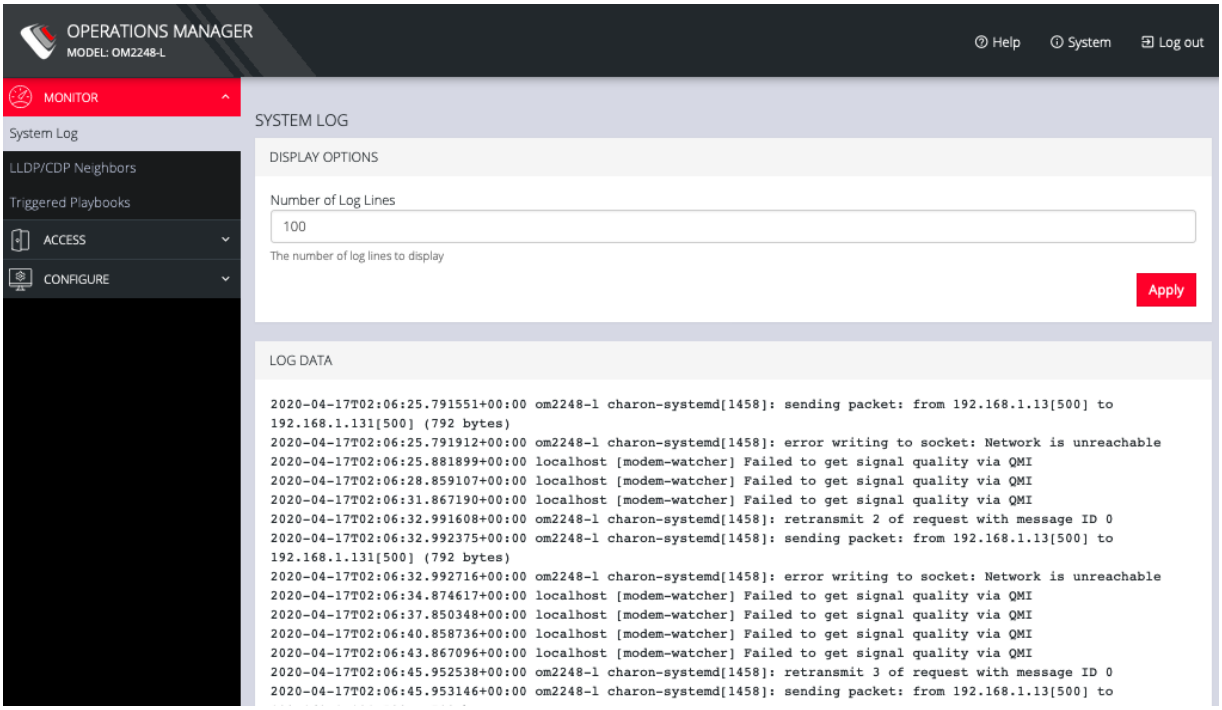
- System Log
    - Details of the system activity log, access and communications events with the server and with attached serial, network and power devices.
- LLDP/CDP Neighbors
    - Details of the LLDP/CDP Neighbors that are displayed when enabled for a connection.
- Triggered Playbooks
    - Monitoring current **Playbooks**, and applying filters to view any Playbooks that have been triggered.

System Log

MONITOR > System Log

The OPERATIONS MANAGER maintains a log of system activity, access and communications events with the server and with attached serial, network and power devices.

To view the System Log, click **MONITOR > System Log**.

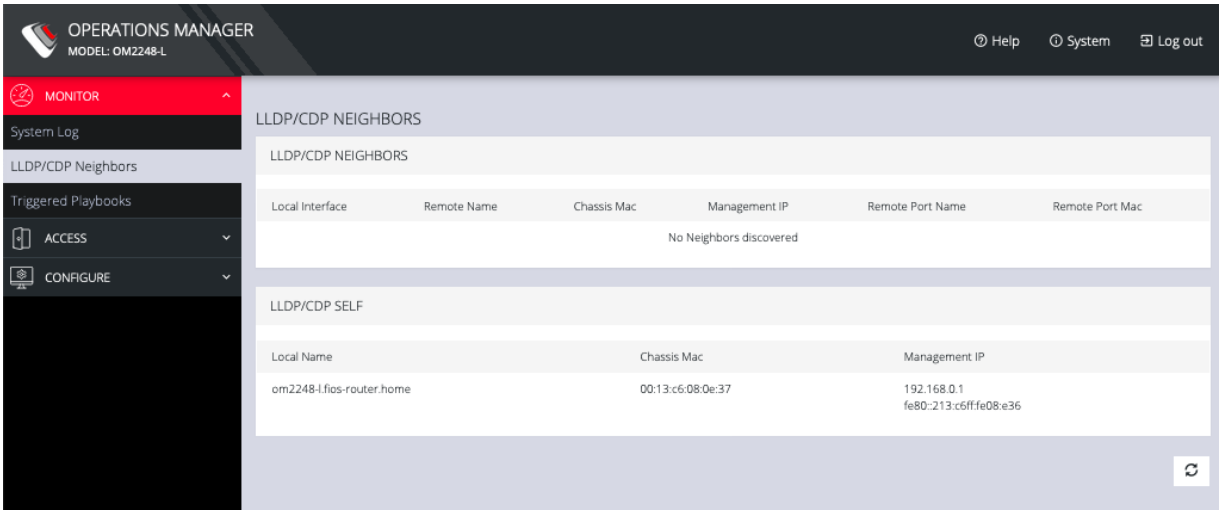


The System Log page lets you change the Number of Log Lines displayed on the screen. The newest items appear on the bottom of the list. Click the Refresh button on the bottom right to see the latest entries.

LLDP CDP Neighbors

MONITOR > LLDP/CDP Neighbors

The OPERATIONS MANAGER displays LLDP/CDP Neighbors when enabled for a connection. See **CONFIGURE > SERVICES > Network Discovery Protocols** to enable/disable.

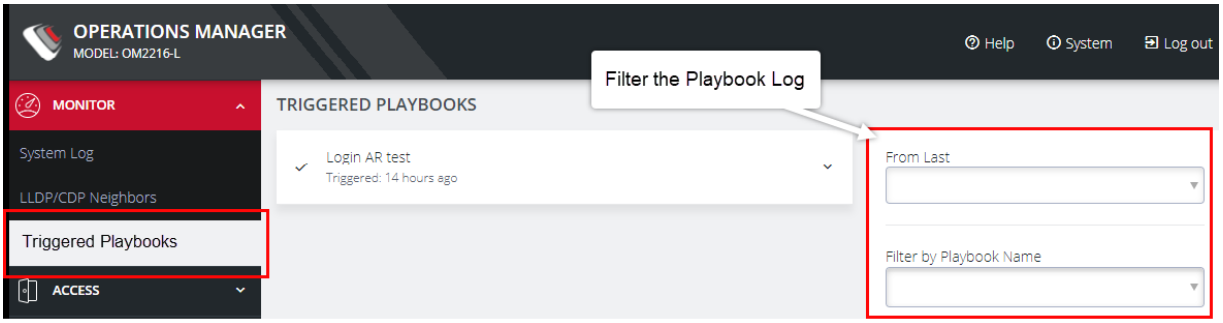


Triggered Playbooks

MONITOR > Triggered Playbooks

For information on creating **Playbooks**, see the Playbooks topic in this User Guide.

To monitor current **Playbooks**, click on **Monitor > Triggered Playbooks**. Choose the time period if desired, and filter by **Name** of **Playlist** to view any that have been triggered.



ACCESS Menu

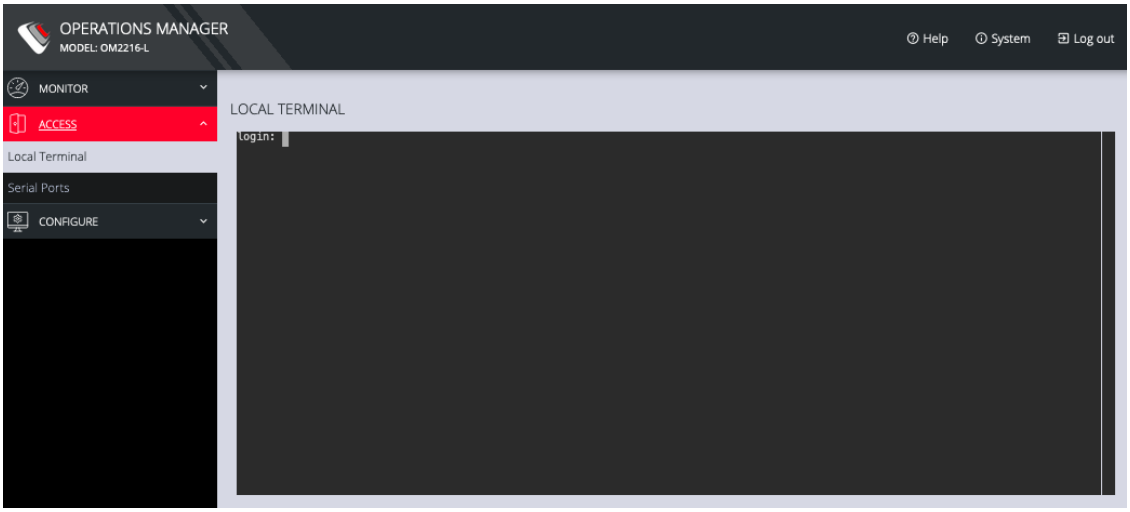
The ACCESS menu lets you access the OPERATIONS MANAGER via a built-in Web Terminal. It also provides SSH and Web Terminal access to specific ports.

Local Terminal

ACCESS > Local Terminal

The OPERATIONS MANAGER includes a web-based terminal. To access this bash shell instance:

1. Select **ACCESS > Local Terminal**



2. At the login prompt, enter a username and password.
3. A bash shell prompt appears.

This shell supports most standard bash commands and also supports copy-and-paste to and from the terminal.

To close a terminal session, close the tab, or type exit in the Web Terminal window. The session will timeout after 60 seconds.

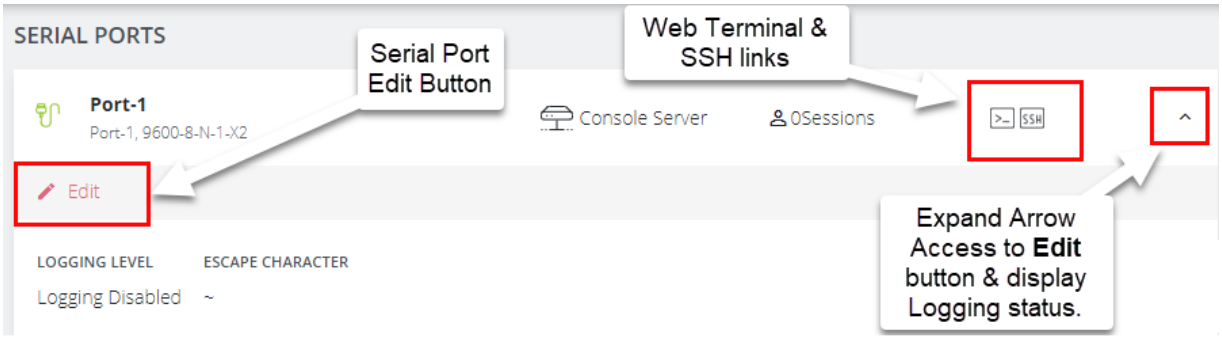
> **Tip:** The default for the CLI session timeout is “never” (value of 0), however, the Web session timeout defaults to 20min. The web session time-out will kill the CLI session even though the CLI session itself is set to “never”.

Access Serial Ports

ACCESS > Serial Ports

> **Tip:** Ensure you are on the **ACCESS > Serial Ports** page and not the similar **CONFIGURE > Serial Ports** page.

The **ACCESS > Serial Ports** page allows you to quickly locate and access specific ports via Web Terminal or SSH link shown in the image below.



Click the **Expand arrow** to the right of the port to see the Port Logging status or access the port **Edit** button, which is a link to the **CONFIGURE > Serial Ports** page.

Quick Search

To find a specific port by its port label, use the **Quick Search** form at the top-right of the **ACCESS > Serial Ports page**.

Ports have default numbered labels. You can edit the port label for a given serial port under **CONFIGURE > Serial Ports**. Click the **Edit** button to open the **EDIT SERIAL PORT** page.

Access Using Web Terminal or SSH

To access the console port via the Web Terminal or SSH:

1. Locate the particular port on the **ACCESS > Serial Ports** page and click the expand arrow.
2. Click the **Web Terminal** or SSH link for the particular port.

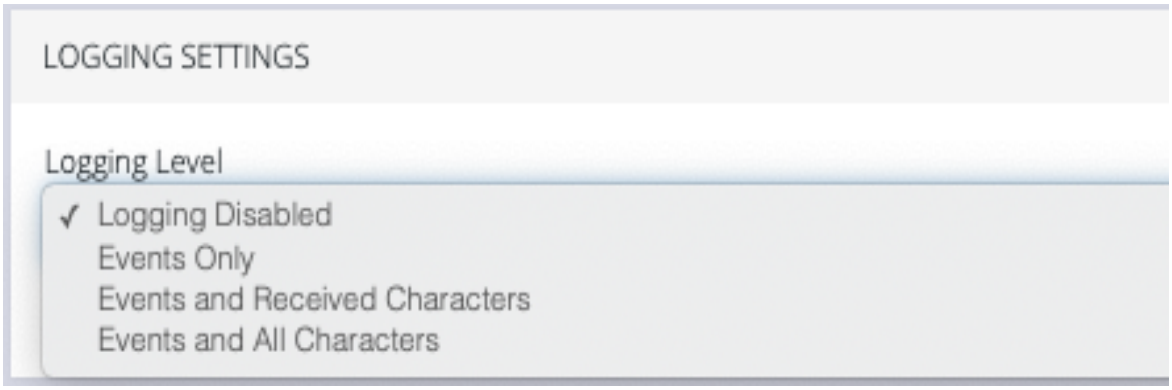
- Choosing **Web Terminal** opens a new browser tab with the terminal.
- Choosing **SSH** opens an application you have previously associated with SSH connections from your browser.

Serial Port Logging

The port logging facility and severity associated with the serial port logs is controlled and set at the **Configure > Services > Syslog > Global Serial Port Settings** page.

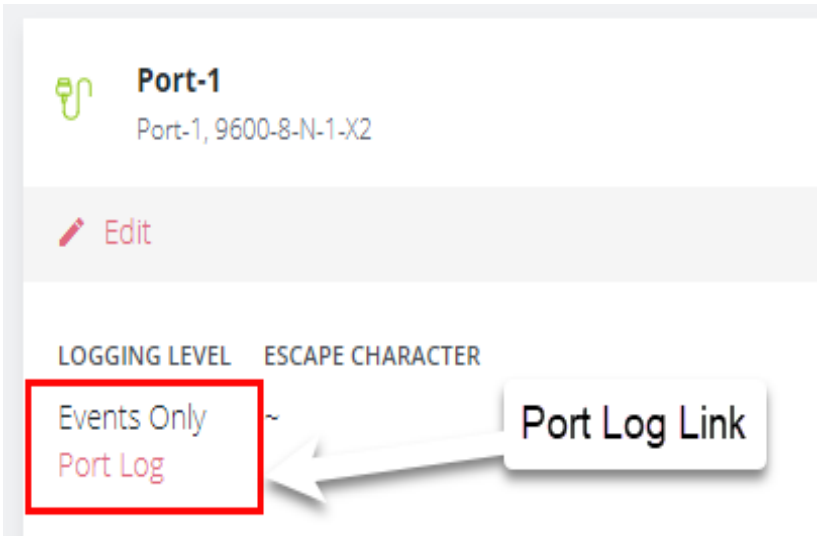
There is a separate setting to enable sending of serial port logs to remote side.

> **Note:** Serial port logging is disabled by default. The logging level for each serial port is set at Logging Settings in **Configure > Serial Ports > Edit** .



Display Port Logs

Tip: The log is accessed by clicking the **Port Log** link on the **ACCESS > Serial Ports** page. The link is only available when port logging is enabled.



CONFIGURE Menu

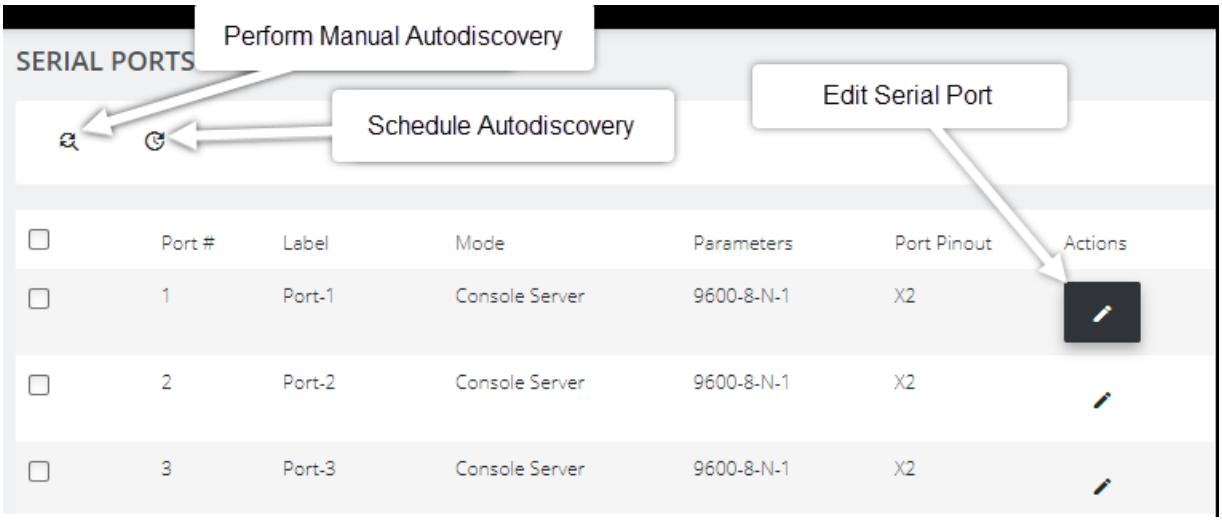
This section provides step-by-step instructions for the menu items under the CONFIGURE menu.

Configure Serial Ports

CONFIGURE > Serial Ports

> **Tip:** Ensure you are on the **CONFIGURE > Serial Ports** page and not the similar **ACCESS > Serial Ports** page.

Navigate to **CONFIGURE > Serial Ports**; a list of serial ports is displayed. On this page you can configure and edit specific ports. Click the **Edit** button (pencil icon) to the right of the port to display the port editing page.



Edit Serial Ports

From the **Configure > Serial Ports** page, click the **Edit Serial Port** button under **Actions** next to the Serial Port you wish to configure. The **Edit Serial Port** page is displayed.

Edit Serial Port Properties		
Field	Options	Definition
Label	Default or Custom	The serial port unique identifier. This can be used to locate this port using the **Quick Search** form on the **ACCESS > Serial Ports** page.
Mode	Disabled Console Server Local Console	**Console Server** mode allows access to a downstream device via its serial port. **Local Console** mode allows access to the NGCS device's console through a serial port.
Port Pinout	Cisco Rolled Cisco Straight	Select pin-out type depending on the type of device or host to be connected via the port.
Baud Rate	Baud rate	Select the Baud rate expected for this port. From 50 to 230,400 bps.
Data Bits	Integer	The data bit length for character.
Parity	None, Odd, Even, Mark, Space.	The parity type for character.
Stop Bits	1, 1.5, 2	The Stop bit length used in character.
Escape Character	~	The character used for sending OOB Shell commands.

LOGGING SETTINGS		
Logging Level	Disabled Events Only Events & Received Characters Events & All Characters	Specify the level of detail you require in the logs. Logs may also be sent to a Syslog server. Other settings to consider are: GLOBAL SERIAL PORT SETTINGS" under Services > "Remote Syslog" on page 147 "Send Serial Port Logs" under Services > Syslog >Edit Syslog Server
PORT IP ALIASES		
IP Address	Alias IP Address and interface type.	Allocate an IP address for dedicated access to a specific serial port.

Assigning unique IP addresses for each console port

Note: For further information about assigning unique IP addresses for each console port see the Zendesk article Assigning Unique IP Addresses For Each Console Port .

Autodiscovery

The Autodiscovery feature attempts to discover the host name of connected devices, this uses the hostname to set it as the port label of each serial port. This can save the need to manually provide hotnames during device setup.

Autodiscovery has been enhanced to discover baud rate and pinout (X1 / X2). The UI has been updated to indicate if ports are scheduled for discovery.

The **Serial Ports** page also allows you perform an Autodiscovery on selected ports. Autodiscovery of console ports attempts to set the port label by setting the baud rate to various rates (in the following order): 9600, 115200, 38400, 19200, and 57600.

> **Tip:** Autodiscovery on other Baud rates may be done by manually running the port_discovery script from the Web Terminal.

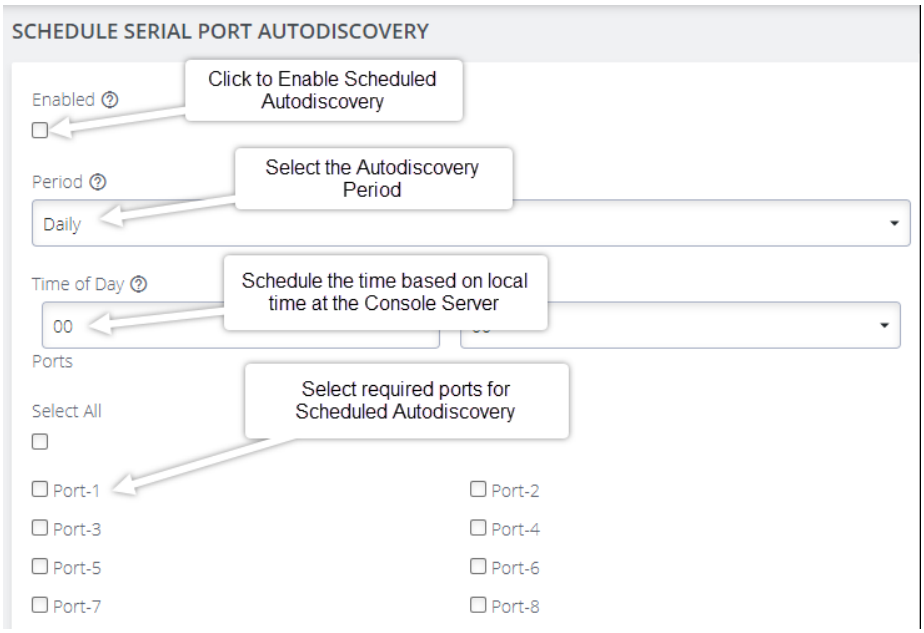
Autodiscovery may be done manually by clicking the **Perform Autodiscovery** button.

Schedule Autodiscovery

Autodiscovery can be scheduled periodically as required by clicking the **Schedule Autodiscovery** button.

The **Schedule Autodiscovery** page allows you to select the ports and specify a time and period for port detection to run.

The Serial Port Autodiscovery Page:



Local Management Consoles

Note: Applies to OM2200 Devices only. Not applicable to OM1200.

CONFIGURE > Local Management Consoles

This feature allows administrators to log in and configure the OM via the RJ-45 or USB ports on the device. You can edit settings or disable the local RJ45 serial console (Cisco straight -X2 pinout) and the USB serial console (needs user supplied micro-USB to USB-A cable).

To edit the settings of a local management console:

1. Navigate to **CONFIGURE > Local Management Consoles**. Here you'll see a list of consoles.
2. Locate the console you want to manage, then, click on the **Edit Management Console Port** button (pencil icon) under **Actions**.
3. On the **Edit Local Management Console** page you can set the parameters for:
    - **Baud Rate**
    - **Data Bits**
    - **Parity**
    - **Stop Bits**
    - **Terminal Emulation**
    - Enable or disable **Kernel Debug Messages**
    - Enable or disable the selected **Management Console**

Note: Enabling **Kernel Debug Messages** can only be applied to a single serial management console.

To disable a local management console:

1. Click **CONFIGURE > Local Management Consoles**.
2. Click on the **Disable Management Console Port** button under **Actions** next to the console you wish to disable.

Lighthouse Enrollment

CONFIGURE > Lighthouse Enrollment

Opengear appliances can be enrolled into a Lighthouse instance, providing centralized access to console ports, NetOps Automation, and central configuration of Opengear devices.

Lighthouse central management uses a persistent, public key authenticated SSH tunnels to maintain connectivity to managed console servers.

All network communications between Lighthouse and each console server (e.g. access to the web UI), and the console server's managed devices (e.g. the serial consoles of network equipment), is tunneled through this SSH management tunnel.

The below Zendesk articles and user guide contain further information about Lighthouse Enrollment:

Manual enrollment using UI or CLI

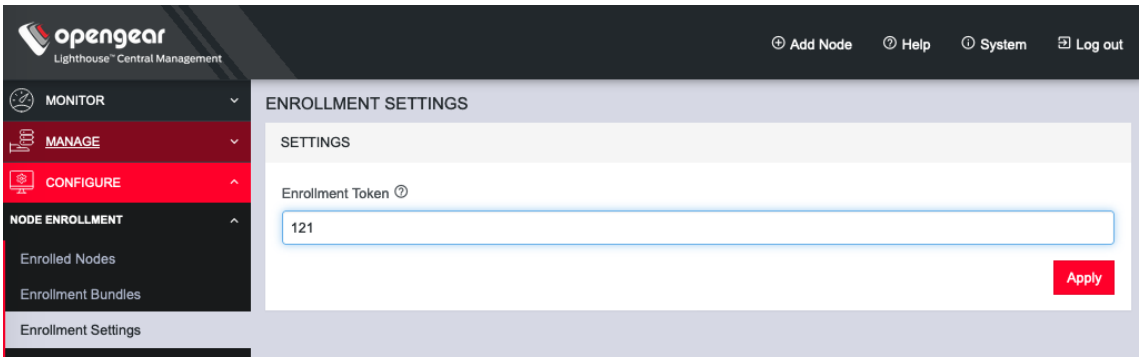
How do I add Nodes to Lighthouse

Lighthouse User Guide

Manual Enrollment Using UI

> **Note:** To enroll your OPERATIONS MANAGER to a Lighthouse instance, you must have Lighthouse installed and have an enrollment token set in Lighthouse.

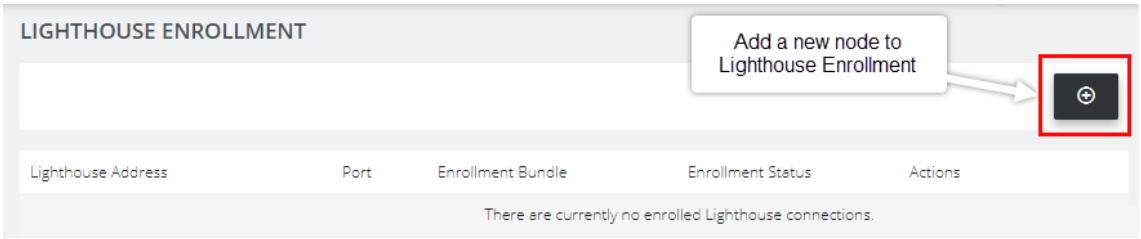
1. In Lighthouse. Set an OM enrollment token, click on **CONFIGURE > NODE ENROLLMENT > Enrollment Settings** page, and enter an **Enrollment Token**.



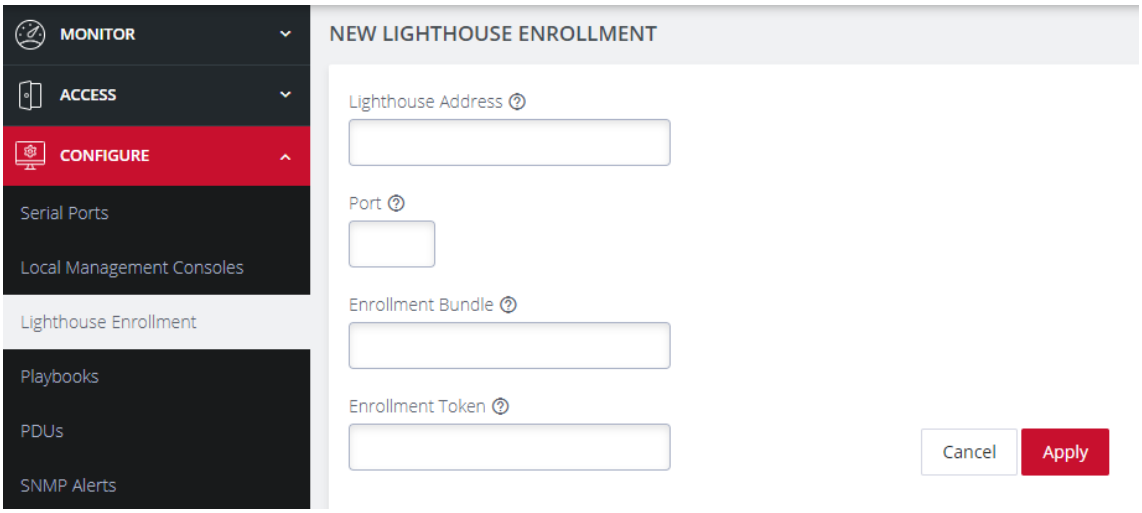
> **Tip:** The same token will be entered in the NEW LIGHTHOUSE ENROLLMENT page of the OM.

2. Enroll your OPERATIONS MANAGER in this Lighthouse instance:
   Click **CONFIGURE > Lighthouse Enrollment**

2. Click on the **Add Lighthouse Enrollment** button on the top-right of the page. The **New Lighthouse Enrollment** page opens.



3. Enter the IP address or fully qualified domain name of the Lighthouse instance and the **Enrollment Token** you created in Lighthouse. Optionally enter a **Port** and an **Enrollment Bundle** (see the Lighthouse User Guide for more information about Bundling).



4. Click the **Apply** button. A flag will confirm the enrollement.

> **Note:** Enrollment can also be done directly via Lighthouse using the Add Node function. See the Lighthouse User Guide for more instructions on enrolling Opengear devices into Lighthouse.

Manual Enrollment Using the CLI

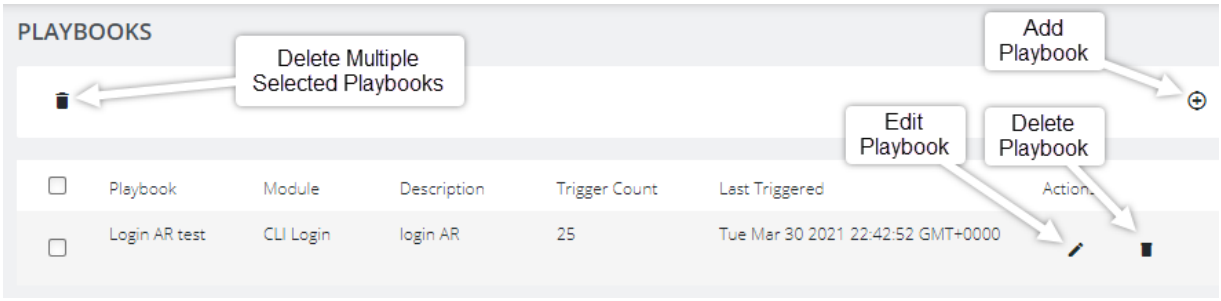
For complete instructions on Lighthouse Enrollment vias the CLI please refer to this link: Manual enrollment using UI or CLI .

Playbooks

CONFIGURE > Playbooks

Playbooks are configurable systems that periodically check if a user-defined **Trigger** condition has been met. Playbooks can be configured to perform one or more specified **Reactions** when a specific trigger event occurs.

The Playbook Landing Page:



Create Or Edit a Playbook

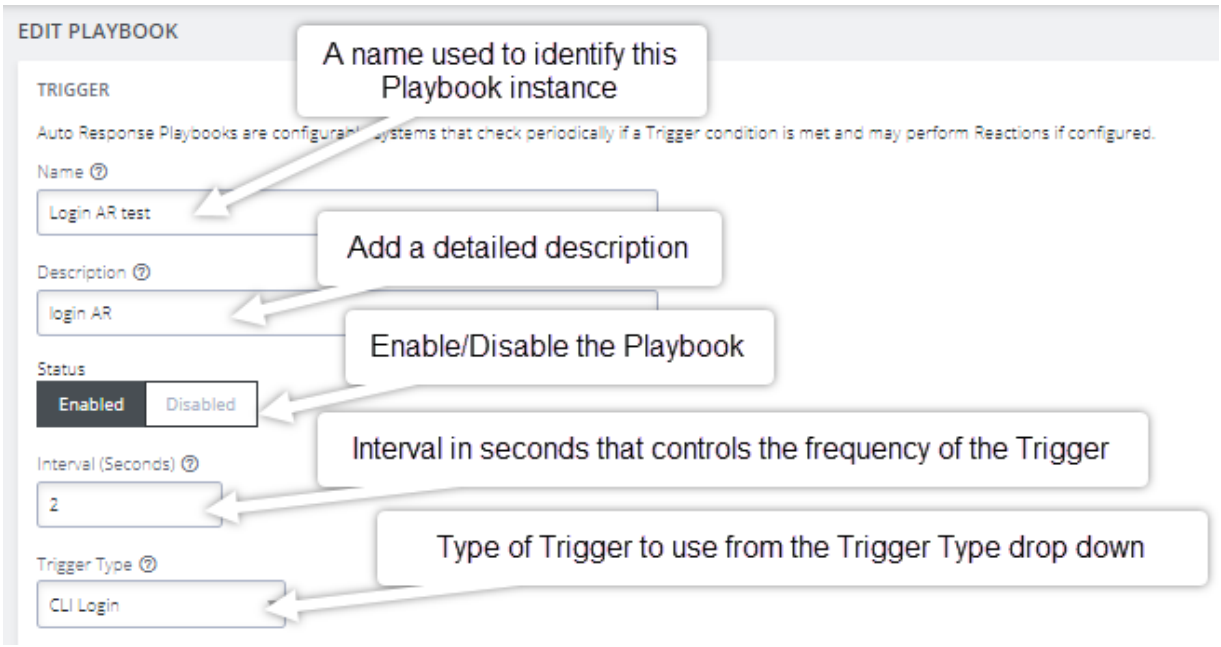
CONFIGURE > Playbooks > Add Playbook

To create a new Playbook:

Navigate to the **Configure > Playbooks** page.

Click the **Add Playbook** button (top-right) to create a new **Playbook**. The **Edit Playbook** page is displayed. Complete the required Playbook setup information as detailed in the following procedures.

TRIGGER Section:



1. Enter a unique **Name** for the **Playbook** that reflects its purpose.
2. Add a detailed **Description** that will help others to understand what it does.
3. Select **Enabled** to activate the **Playbook** after you have created it.
4. Enter an **Interval** in seconds to control the frequency that the **Trigger** will be checked.
5. Choose the type of **Trigger** to use from the **Trigger Type** drop down.

Tip: See the Trigger Type table on the following page for additional trigger type information.

Trigger Types:

Trigger	Reaction Description
CLI Login	Triggers upon Login or Logout events. Select either or both.
CLI Login Failure	Monitor the terminal and trigger on failed user login attempts.
Cell Connection	Triggered whenever the cellular connection state changes. This Trigger type is only compatible with cellular units.
Cell Message	Triggered when an SMS message that matches the user-defined message pattern. Cellular units only.
Cell Signal Strength	Triggered if the cellular signal strength moves below a user-defined percentage.
Curl	Periodically attempts to perform a HTTP request using curl and triggers the Playbook reaction based on the results.
Custom Command	Periodically runs a custom Shell command and triggers the Playbook reaction upon failure.
Load	Monitors the system load average and triggers the Playbook if it breaches the user-defined acceptable range.
Memory Usage	Triggered if the system memory usage exceeds the user-defined percentage threshold.
Network Settings	Monitors network interfaces for specific attributes and triggers a user-defined reponse when they change.
Ping	Periodically pings an address and triggers a user-defined reponse upon failure.

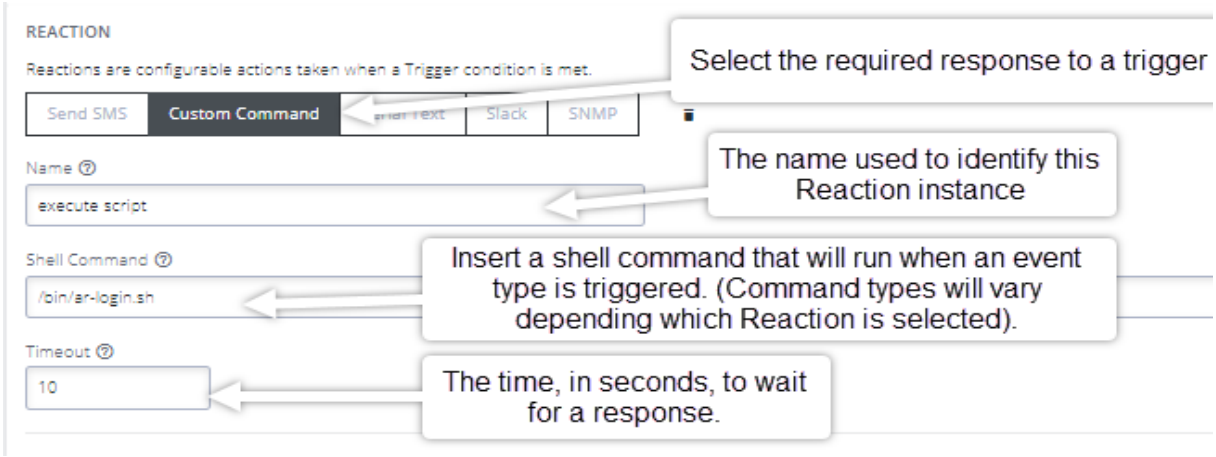
Continued...

Trigger	Description
Serial Login	Monitors selected serial ports and triggers a user-defined reaction upon user login and logout events.
Serial Pattern	Monitors serial ports and triggers a reaction when data matching a pattern is received on specific ports.
Serial Signal	Monitors selected serial ports and triggers when signals are changed.

REACTION Section:

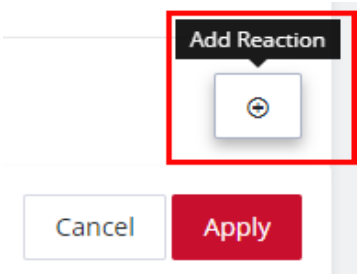
In this section you customise the response to the Trigger that you created.

1. Clicking on each **Reaction** opens a custom screen to provide necessary information.

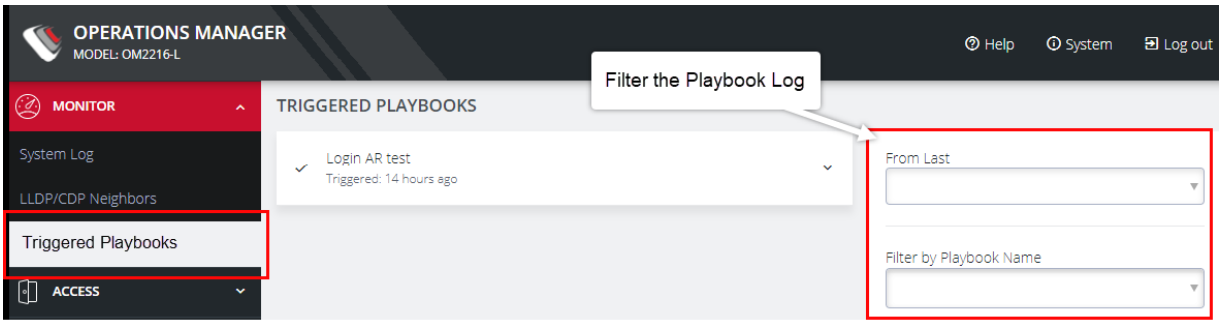


Continued...

2. To create additional Reactions, click the **Add Reaction** button.



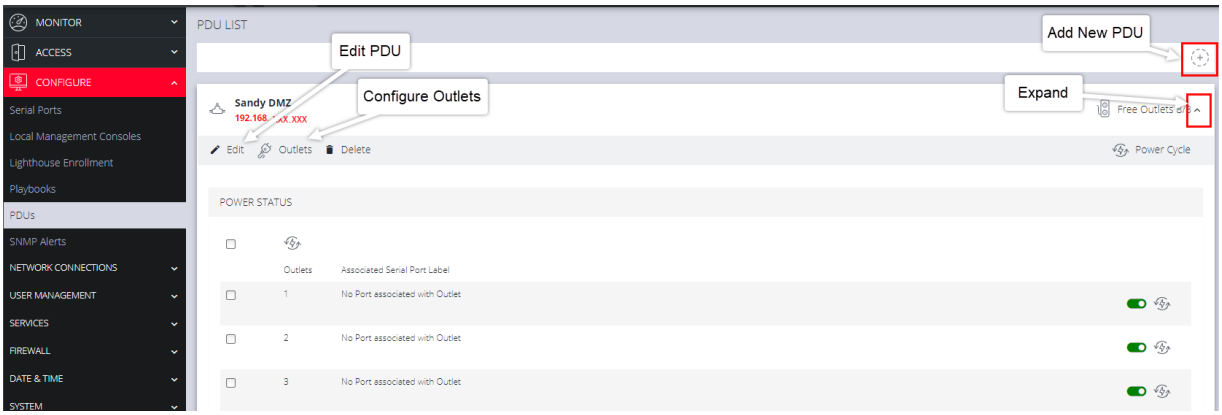
3. When you are finished, click **Apply**. A banner confirms that the Playbook settings are saved, if the Playbook is **Enabled** it is activated.
4. To monitor current **Playbooks**, click on the **Monitor > Triggered Playbooks** menu (shown below). Select the time period if desired and filter by **Name** of **Playlist** to view any that have been triggered.



PDUs

CONFIGURE > PDUs

One or more Power Distribution Units **(PDUs)**, both **Local** and **Remote** can be monitored. To add information for a **PDU**, select **Configure > PDUs**.



Add and Configure a PDU

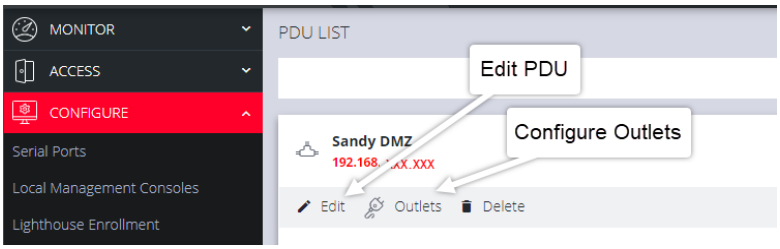
PDU configuration definitions are provided in the on the"PDU Settings Table" on the next page.

1. In the PDU List page, click the **Add New PDU** button. The **Edit** page opens.
2. Enter a meaningful **Label** that will easily identify this **PDU**.
3. Select the **Monitor** checkbox.
4. Select **Local** or **Remote**.

> **Note:** Note that **Local** or **Remote** have different settings forms.

5. Complete the **Local** or **Remote** settings in accordance with the "PDU Settings Table" on the next page.

6. Click on the **Configure Outlets** link, assign a port for each of the PDUs' ports and enter a meaningful name for each outlet.



7. When you are finished, click **Apply**. A green banner confirms your settings.

PDU Settings Table

PDU Settings	
Label	Enter a meaningful label that will easily identify the individual **PDU**.
Monitor	Click to check this box to monitor the outlet's status.
Mode	Note that (**Local** or **Remote** have different settings forms).
Driver	Select the appropriate driver compatible with this PDU.
Local Mode Only	
Port	The serial port that the PDU is connected to.
Username	Enter the Username to use when connecting.
Password	User password to use when connecting to the device.

The table is continued on the following page...

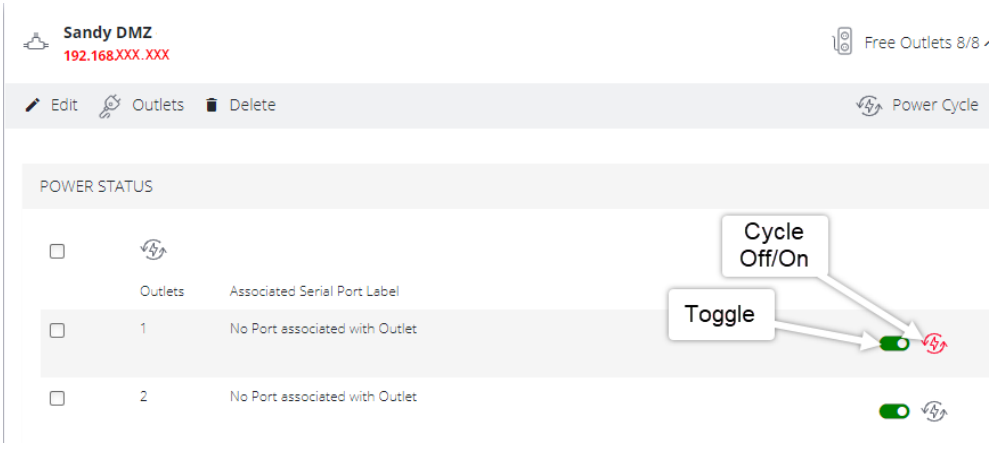
Continued...

Remote Mode Only	
Address	The remote address of the PDU.
SNMP Protocol	Click the drop-down arrow and select the correct transport protocol used to communicate with the PDU. The default value is UDP.
Version	The version of SNMP to use, V1, V2c and V3 are supported. The default value is V1.
Community	Enter a group name authorized to communicate with the device for SNMP versions 1 and 2c.

After you have created **PDUs**, you can **Edit** or **Delete** them from the **Configure > PDUs** page.

PDU Operation

After the PDU has been created and configured, PDU operation is simple. For any PDU that has Monitoring set to **Enabled**, the **Toggle** on/off switch will power-on or power-off the PDU, and the **Cycle** button cycles the PDU through a power-down and power-up cycle.



SNMP Alerts

CONFIGURE > SNMP Alerts > System/Power/Networking

Tip: For more detailed information about configuring SNMP Alerts see the individual topic pages that follow.

On the **CONFIGURE > SNMP Alerts** page; SNMP Alert Managers can be added or deleted under SNMP > SNMP Alert Managers, for the following:

- **System**: Covers notification for the following causes.
  - **Authentication**: Notifies when a user attempts to log in via SSH, REST API, Web GUI, or the device's serial ports. An alert is sent regardless of whether the log in has succeeded or failed.
  - **Configuration**: For changes that occur to the system configuration.
  - **System Temperature**: When temperature SNMP alerts are enabled, network operators are immediately notified should the system begin operating outside user-defined tolerances.
- **Power**: When voltage SNMP alerts are enabled, network operators are immediately notified should the PSU begin operating outside design tolerances. See "SNMP Alerts Power" on page 68 for further information.
- **Networking (Cell Signal Strength)**: Be notified when cell signal strength leaves or re-enters the selected range, or when the network link state changes. A slider adjusts the upper and lower signal strength.

Tip: Manage the SNMP settings on the **CONFIGURE > SNMP > SNMP Alert Managers** page.

SNMP Alerts System - Temperature, Authentication, Configuration

Temperature

CONFIGURE > SNMP Alerts > System > System Temperature

It is essential to ensure that the system is operating within its design temperature as premature aging of the component can occur if the device is excessively hot during operation. This can lead to component failure and ultimately result in RMA.

When temperature SNMP alerts are enabled (Alerting), network operators are immediately notified (subject to network connectivity and latency) should the PSU begin operating outside user-defined temperature tolerances.

System generated SNMP Alerts send SNMP traps to a remote SNMP manager which alerts the user of temperature events.

> **Tip:** The OM device can send network, power and system events to the remote SNMP manager.

Configure SNMP System Temperature Alerts

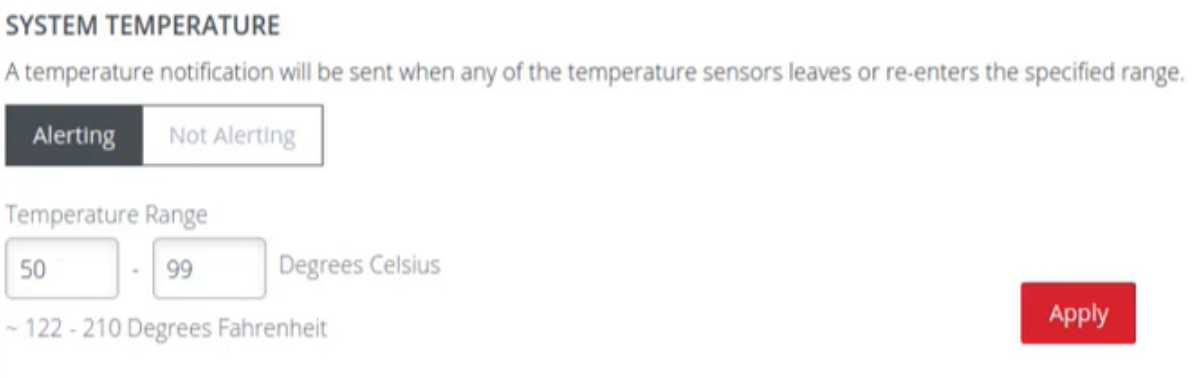
Configure > SNMP Alerts > System > System Temperature

The System Temperature Range alert reports the system temperature (measured at **System Temperature 1** and **System Temperature 2** sensors) and sends an alert when the system temperature leaves or enters the user-configured temperature range.

1. Navigate to Configure > SNMP Alerts > System > System Temperature.
2. Click on the **Alerting** button to activate the function, this also activates the user-defined range sliders.

   > **Note:** The **Not Alerting** button de-activates the function and temperature alerts will be stopped until activated again.

3. Click+Drag the temperature range limiters to the required upper and lower limits.
4. Click **Apply**. The **Details Saved** banner confirms your settings.



In this image, if any temperature sensor reports the system temperature (measured at **System Temperature 1** and **System Temperature 2** sensors) to be less than 50 degrees C or greater than 99 degrees C, an SNMP alert will be triggered.

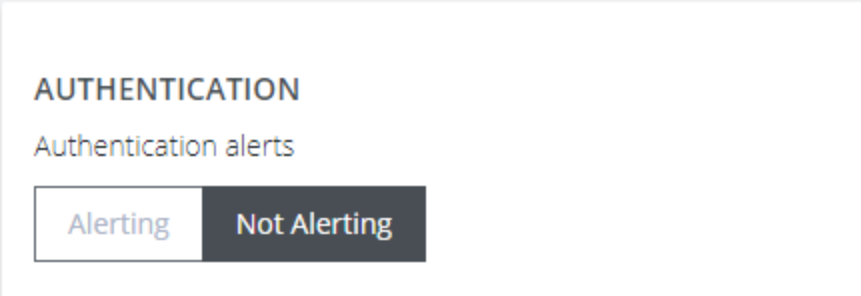
> **Tip:** The temperature display is automatically converted to Fahrenheit.

Authentication

CONFIGURE > SNMP Alerts > System > Authentication

Notifies when a user attempts to log in via SSH, REST API, or the device's serial ports. An alert is sent regardless of whether the log in has succeeded or failed.

1. Navigate to Configure > SNMP Alerts > System > Authentication.
2. Click on the **Alerting** button to activate the function.
3. Click **Apply**. The **Details Saved** banner confirms your settings.

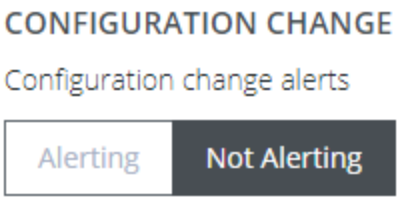


Configuration

CONFIGURE > SNMP Alerts > System > Configuration

Notifies of changes that occur to the system configuration.

1. Navigate to Configure > SNMP Alerts > System > Configuration.
2. Click on the **Alerting** button to activate the function.
3. Click **Apply**. The **Details Saved** banner confirms your settings.



SNMP Alerts Power

Configure > SNMP Alerts > Power > Voltage

The PSU is one of the most critical part of the OM device so it is essential to ensure that the PSU is operating within its design tolerances.

When voltage SNMP alerts are enabled, network operators are immediately notified of PSU failures (subject to network connectivity and latency). Should the PSU begin operating outside design tolerances, PSU-related SNMP Alerts will trigger an alert for the following conditions:

- Output DC voltage of both PSUs
  If the voltage drops too low, it risks the device going into brown-out state. If it gets too high, it can damage components.

System generated SNMP Alerts send SNMP traps to a remote SNMP manager which alerts the user of system events. The OM device can send network, power and system events to the remote SNMP manager.

Tip: The OM device can send network, power and system events to the remote SNMP manager.

Configure Power Alerts

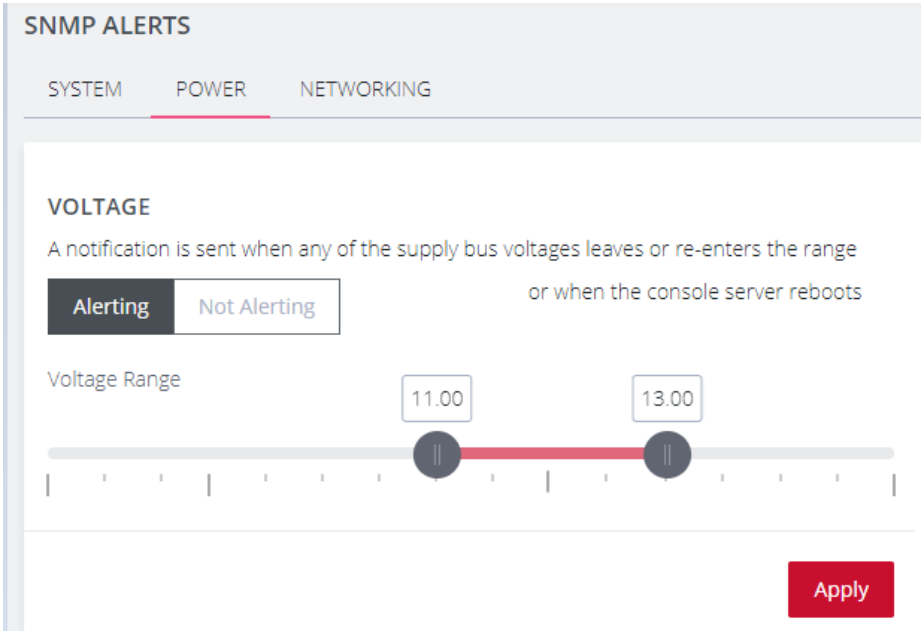
Configure > SNMP Alerts > Power > Voltage

The alert related to this functionality is the System Voltage Range alert which sends an alert when the system reboots or the voltage on either power supply leaves or enters the user-configured voltage range.

1. Navigate to Configure > SNMP Alerts > Power > Voltage.
2. Click on the **Alerting** button to activate the function, this also activates the user-defined range sliders.

   > **Note:** The **Not Alerting** button de-activates the function and power alerts will be stopped until activated again

3. Click+Drag the voltage range limiters to the required upper and lower limits.
4. Click **Apply**. The **Details Saved** banner confirms your settings.



In the above image, if any power supply fails, is disconnected or some other power anomaly occurs which causes the voltage to drop below 11V or above 13V, an SNMP alert will be triggered.

> **Warning:** The recommended safety settings are 11.4 ~ 12.6 volts.

When an event occurs that causes the voltage range on any power supply to re-enter the configured voltage range, it will cause an SNMP alert to be triggered.

SNMP Alerts Networking (Connection Status)

Configure > SNMP Alerts > Networking > Network Connection Status

The alert related to this functionality is the Network Connection Status which sends an alert when cell signal strength leaves or re-enters a user-defined range, or, when the network link state changes. A slider adjusts the upper and lower signal strength limits.

Configure Signal Strength Alerts

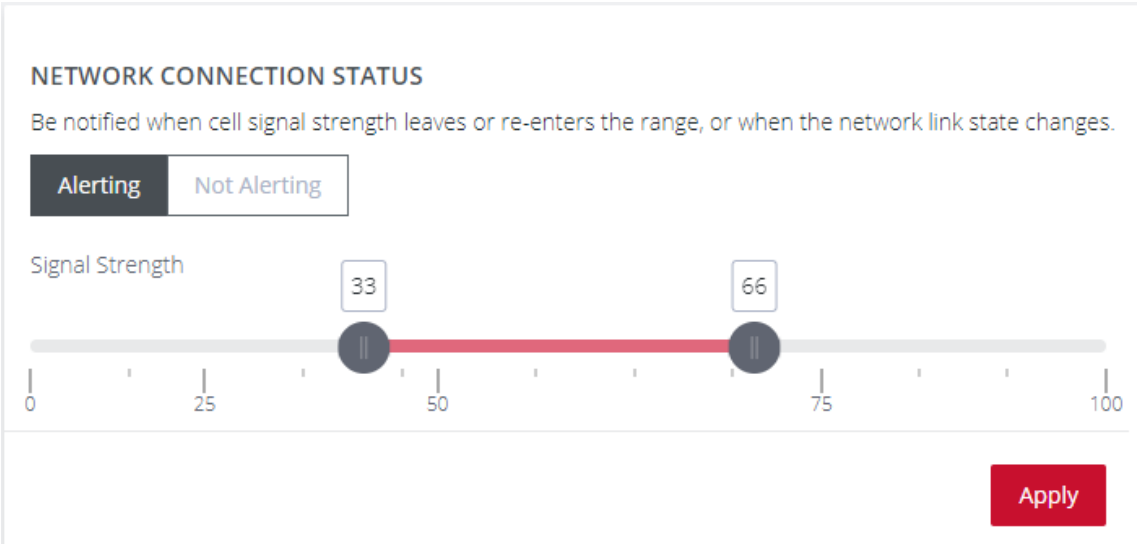
Configure > SNMP Alerts > Networking > Network Connection Status

To set the Network Connection Status signal strength boundaries:

1. Navigate to Configure > SNMP Alerts > Network Connection Status > Signal Strength page.
2. Click on the **Alerting** button to activate the function, this also activates the user-defined range sliders.
3. Click+Drag the signal strength range limiters to the required upper and lower limits.

> **Note:** The **Not Alerting** button de-activates the function and signal strength alerts will be stopped until activated again.

4. Click **Apply**. The **Details Saved** banner confirms your settings.



When an event occurs that causes the signal strength to re-enter the user-defined range, an SNMP alert will be triggered.

In the above image, if any anomaly occurs that causes the signal strength to drop below 33 or above 66, an SNMP alert will be triggered.

Network Connections

CONFIGURE > NETWORK CONNECTIONS

The **Network Connections** menu contains the **Network Interfaces** and **IPsec Tunnels** settings.

Network Interfaces

CONFIGURE > NETWORK CONNECTIONS > Network Interfaces

The interface supports both IPv4 and IPv6 networks. The IP address of the unit can be setup for Static or DHCP. The following settings can be configured for network ports:

- IPv4, IPv6
- Static and/or DHCP
- Enabling or disabling network interfaces
- Ethernet Media types

For detailed information about Network Interface configuration and adding a new connection, see "Change Network Settings" on page 32.

For information about VLAN interfaces, bridges and bonds, see "Network Aggregates - Bonds and Bridges" on page 86

Dual SIM

CONFIGURE > NETWORK CONNECTIONS> Network Interfaces > Cellular Interface (LTE)

Operations Manager has been available for some time with support for two SIM cards/slots, whereby, it is possible designate which SIM slot is the Active SIM that is normally used by the device for OOB communications (in Automatic failover mode this SIM is termed the Primary SIM). The secondary SIM is used as a failover SIM. This feature increases the reliability of the OOB solution by providing redundant Out-Of-Band access over a cellular connection.

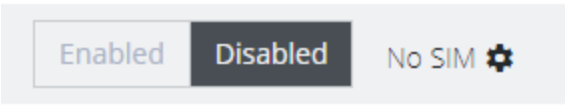
> **Note:** The terminology changes when SIM Failover policy is switched from **Manual** to **Automatic**. In Manual failover mode the active SIM is designated ACTIVE, whereas in Automatic failover mode the active SIM is designated PRIMARY.

With the Dual SIM feature activated, in the event of a failure of OOB communications through the Active SIM, it is possible to manually de-select the failed SIM and activate the secondary SIM by making *it* the Active SIM. This changeover allows OOB communications to resume through the newly designated Active SIM.

Display SIM Status and Signal Strength

> **Note:** For information about configuring the **Signal Strength Thresholds** see: "SNMP Alerts" on page 64

1. Navigate to Configure > Network Connections > Network Interfaces.
2. Click on the **Cellular Interface (LTE)** row.

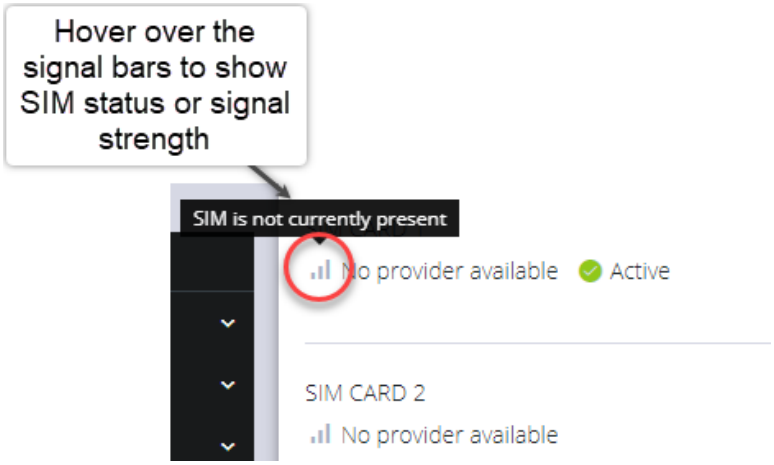
3. 

.

The information bar expands, and the page shows the current status of the active and inactive SIM cards.

> **Note:** If the unit does not have a cell modem (-L) then the cellular interface will not be visible.

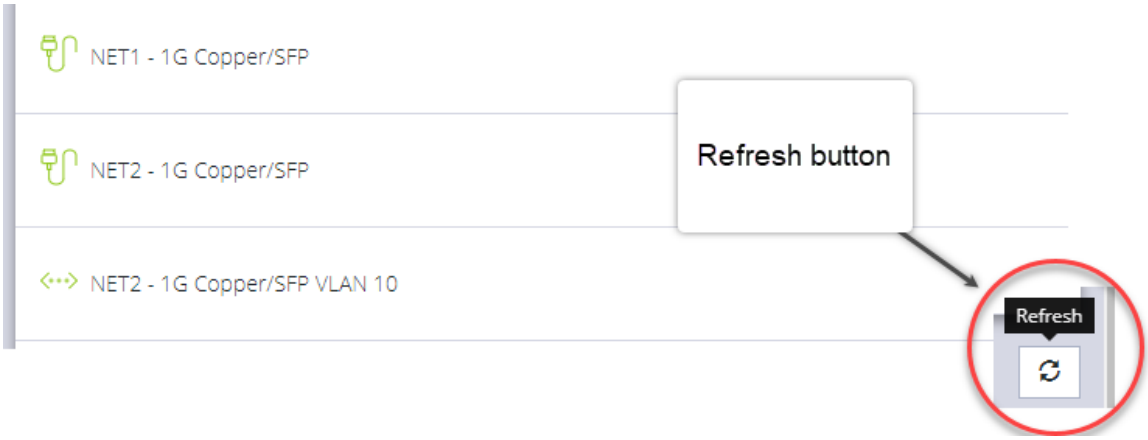
4. The active SIM indicates the color of the signal strength based upon the selected thresholds in **Configure** → **SNMP Alerts** under the **Networking Signal Strength Alert**.



The signal bar color (not the number of bars) indicates signal strength:

- **Green** if signal is above the higher threshold.
- **Amber**if signal is between lower and higher threshold.
- **Red** if signal is below the lower threshold,
- **Grey** for 0 or not active,

5. Click the **Refresh** button to display the current signal strength of the active SIM.



Note: When the **Refresh** button is clicked the signal strength is only updated for the active SIM. If you would like to know what the other SIM Signal Strength is, you need to activate it, let the modem come back online, which may take 3 minutes or more.

Installing A New SIM Card

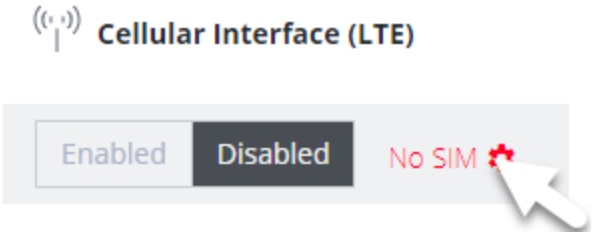
Before installing a new SIM card, the OM device must first be powered down. This can be done by switching off the power supply and waiting until the device has shut-down. Install the new SIM card into its slot, then restart the device

Note: The device will not recognize the new SIM card unless a shut-down and restart is performed. The new SIM card will be read during start-up.

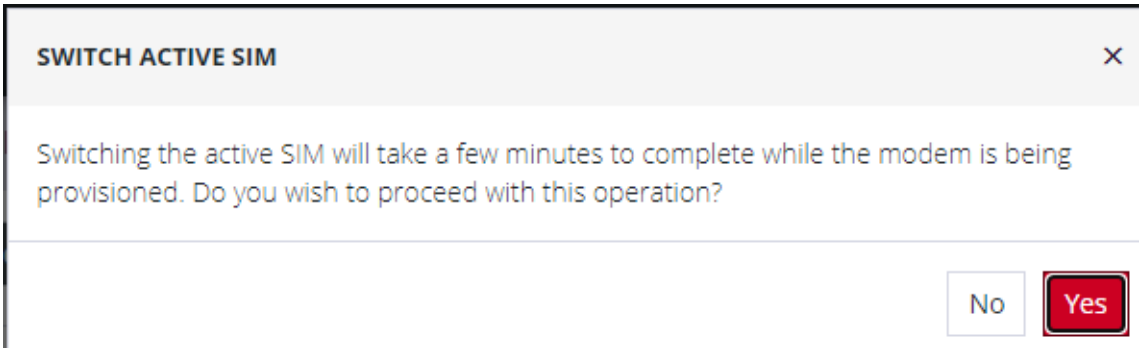
Select The Active SIM (Manual Failover Mode)

Switching the active SIM must be done manually. To switch the Active SIM:

1. Navigate to **CONFIGURE > NETWORK CONNECTIONS > Network Interfaces > Cellular Interface (LTE**.
2. Click the **Settings cog** , this will display the **MANAGE CELLULAR INTERFACE (LTE)** page and the current status of both SIM slots, including the current carrier name.



3. On the right, select the **Make Active** button of the new, active SIM and apply the change by selecting **Confirm**.
4. A pop-up alert states that this operation will take a few minutes to complete. Click **Yes** to confirm the change.



> **Note:** During the change-over the current IP address is hidden and then returned when the modem re-connects.

5. If you require, you can monitor the interface during the changeover via the CLI with the command:.

```
watch ip address show dev wwan0
```

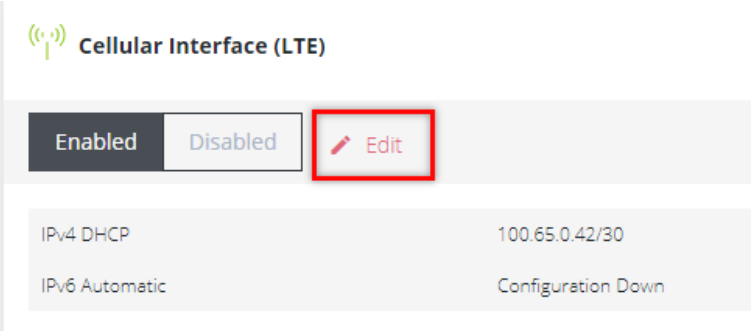
You can also set the SIM settings by expanding the menu for each SIM to set the APN.

If no SIM is inserted you can still select a SIM slot. If you insert a SIM it will not force it to become the active SIM.

Select The Primary SIM (Automatic Failover Mode)

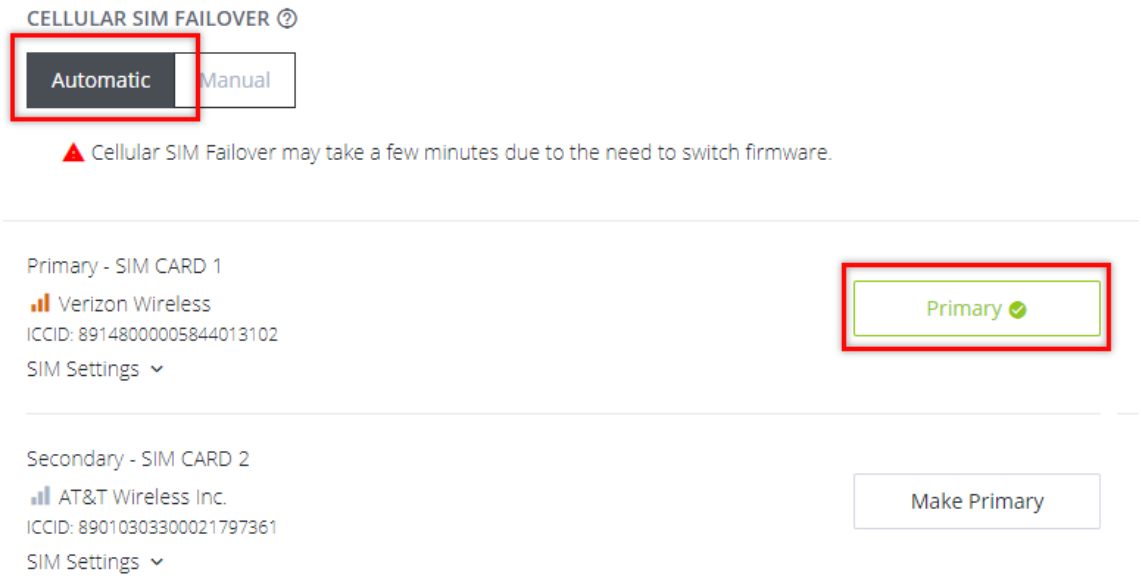
Switching the primary SIM must be done manually. To switch the Primary SIM:

1. Navigate to **CONFIGURE > NETWORK CONNECTIONS > Network Interfaces > Cellular Interface (LTE**.
2. Click the **Edit**icon, this will display the **MANAGE CELLULAR INTERFACE (LTE)** page and the current status of both SIM slots.



3. Ensure the cellular interface is enabled by clicking the **Enabled** button.

4. Under **Cellular SIM Failover** click the **Automatic** button, this will display the **Primary** selection buttons.



5. Click the **Primary** button of the SIM selected to be the primary SIM.
6. Click the **Confirm** button at the bottom of the page. A green banner will appear to confirm that the new settings have been saved.

Dual SIM Automatic Failover

CONFIGURE > NETWORK CONNECTIONS> Network Interfaces > Cellular Interface (LTE)

Devices that carry two SIM cards can be configured so that either SIM card slot may be activated. In Automatic failover mode, either of the two SIM cards may be designated as the Primary SIM. (see "Dual SIM" on page 74).

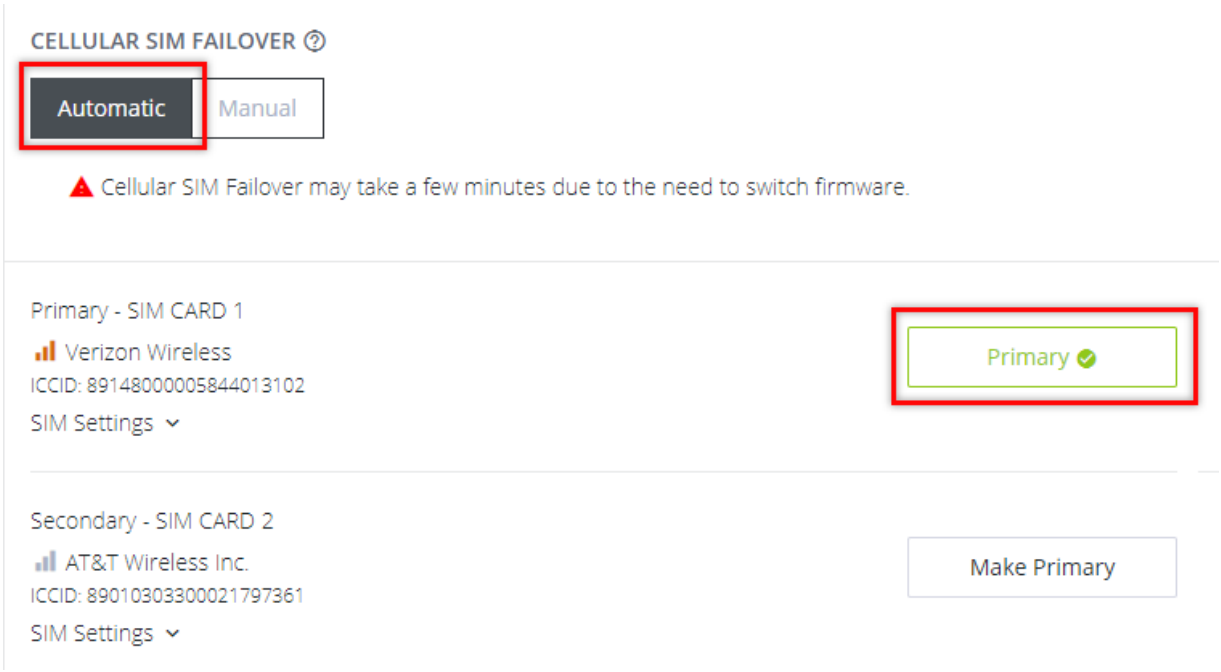
Dual SIM Automatic Failover works seamlessly with the existing failover solution to provide another layer of redundancy. This feature allows the software to detect a failure in OOB communications via the Primary SIM and will automatically failover to the Secondary SIM without the need for manual operator intervention.

Options within the configuration also allow you to configure the failback settings from Secondary SIM, back to the previous Primary SIM when OOB communications have been restored. See "Cellular Interface Policy Settings" on page 84.

> **Note:** The terminology changes when SIM Failover policy is switched from **Manual** to **Automatic**. In Manual mode the active SIM is designated ACTIVE, whereas in Automatic failover mode the active SIM is designated PRIMARY.

See the image on the following page for a depiction of Primary and Secondary SIM card slots.

Either of the SIM card slots can be designated as the Primary SIM. In the following image, SIM card 1 has been designated as the Primary SIM and is currently the active SIM, while SIM card 2 is designated as the Secondary SIM which, (in the scenario below), is only activated in the event of an automatic failover such as occurs during an OOB communications failure on the Primary SIM.



Failover Modes

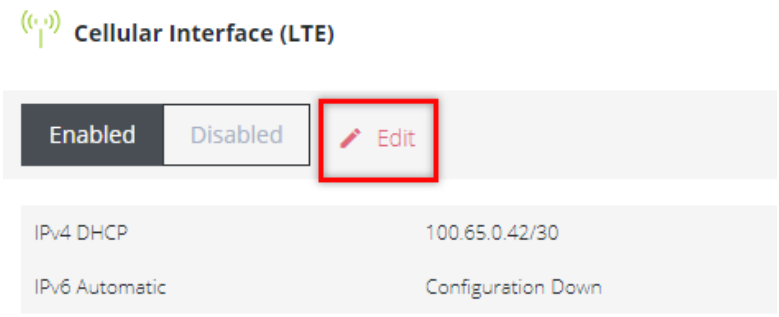
Features of Automatic Failover include:

- Select either **Manual** or **Automatic** SIM failover.
- Specify SIM failback policy (applicable when the Ethernet connection and primary SIM are both down):
  - **Upon disconnect** - See the table "Cellular Interface Policy Settings" on page 84 for an explanation of the policy.
  - **After a Delay** (specified in minutes) - The device switches back to primary after a pre-defined time has elapsed.
  - **Never** - The device never switches back to the Primary.
- SIM failover settings allow you to configure the parameters that affect cellular data usage, for example, quicker failover (consumes more data) vs less frequent tests (consumes less data). The configuration preferences include
  - Ping test for failover from Primary to Secondary and failback from Secondary to Primary.
  - Failover settings are per SIM slot and consist of a failover and failback ping test.
- Automatic Failover functions in both dormant and non-dormant mode.

Activate or Configure Automatic Failover

CONFIGURE > NETWORK CONNECTIONS> Network Interfaces > Cellular Interface (LTE) > Manage Cellular Interface (LTE)

1. Navigate to the Cellular Interface page at: CONFIGURE > NETWORK CONNECTIONS> Network Interfaces > Cellular Interface (LTE).
2. Click the **Edit** link next to the Cellular Interface Enabled/Disabled switch.



3. In the Manage Cellular Interface page, select the **Automatic** failover option.
4. Ensure the correct SIM card is selected as the Primary SIM (see 'Set Primary SIM' in "Dual SIM" on page 74).
5. Complete the Cellular Interface options in accordance with the table below.
6. Click **Confirm** to activate the failover policy settings, a green banner will confirm the settings are enabled.

Cellular Interface Policy Settings

MANAGE CELLULAR INTERFACE (LTE) Properties	
Field	Definition
CELLULAR SIM FAILOVER - **Manual/Automatic.**	Automatically switch between the Primary SIM Card and the secondary SIM Card on dis-connection.
Primary SIM Failover	
Failover Probe Address.	Network address to probe in order to determine if connection is active. **Note:** The probe address accepts IPv4, IPv6 addresses and hostnames.
Test interval (seconds).	The number of seconds between connectivity probe tests.
Pings per test.	The maximum number of times a single ping packet is sent per probe before considering the probe failed.
Consecutive test failures before failover.	The number of times a probe must fail before the connection is considered failed.
Failback Policy	
Never / Delayed / On Dis-connect.	Select the policy to be used to determine Failback recovery from the Secondary SIM Card back to the Primary SIM Card.
Never	No Failback recovery is attempted.
Delayed	Attempted failback after *n* minutes. The number of minutes after failover to the secondary SIM Card that the connection should failback to the Primary SIM Card.

On Disconnect	Secondary SIM Failback
	Failback Probe Address ie. The Network address to probe in order to determine if the connection is active.
	Test Interval The number of seconds between connectivity probe tests (this not the same thing as Attempted Failback).
	Pings per Test The maximum number of times a single ping packet is sent per probe before considering the probe failed.
	Consecutive Test Failures (before failover) The number of times a probe must fail before the connection is considered failed.

Network Aggregates - Bonds and Bridges

CONFIGURE > NETWORK CONNECTIONS > Network Interfaces > Select the target interface

The Network Aggregates feature allows you to create or edit bridges that contain any type of interface or other config options which are included in a bridge or bond after it is created, without having to delete the bridge or bond and start over. Such changes can be made remotely without organizing a site visit.. The supported configuration options for bonds and bridges are discussed in the Bridge and Bond Definitions tables later in this topic.

This also includes other settings on bonds, such as the mode or poll interval.

> **Note:** Editing the primary interface will not update its connections.

Operations Manager models with an integrated switch (OM1204-4E, OM1208-8E and OM2224-24E) have a bridge configured by default that includes all of the switch ports, which can be edited or deleted as required.

Definitions of the bridge details as in the **Bridge Form Definitions** table below.

Create A New Bridge

> **Note:** Whether creating a new bridge or editing an existing bridge the page is very similar.

To create a new bridge:

1. Navigate to the **Configure > Network Connections > Network Interfaces** page on the Web GUI.
2. Click on the **New Bridge** button that is located at the top-right of the window.

3. Select which interface will serve as the primary interface for the new bridge.

> **Note:** When the primary interface is selected, its MAC address is displayed in the MAC address field. This MAC address is inherited by the new bridge interface.

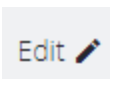
4. Complete the new bridge details form as in the **Bridge Form Definitions** definitions table below.
5. Click the **Create** button to finalize the creation of the new bridge.

Edit an Existing Bridge

To edit an existing bridge:

1. Navigate to the **Configure > Network Connections > Network Interfaces** page on the Web GUI.
2. Click on the bridge that you would like to edit, the bridge details are expanded.
3. Click on the bridge **Edit** button that is located next to the Enable / Disable toggle buttons.
4. Select which interface will serve as the primary interface for the new bridge.
5. Change the bridge details as required in accordance with the **Bridge Form Definitions** table below.
6. Click the **Update** button to finalize the edit process. Updating the bridge will temporarily interrupt network activity on this interface.

Edit Bridge - Form Definitions

New Bridge Field	Definition
Description	The editable **Description** field allows you to add a description of the interface. If the description field is not completed the field will default to a computed value to describe the interface.
Enable Spanning Tree Protocol?	Spanning Tree Protocol allows Operation Manager devices to: • Discover and eliminate any unexpected networks loops so that there is no broadcast radiation and the network stays healthy and reliable • Be able to function with redundant links (intentional network loops) to increase the networks reliability and fault tolerance
Network Interface Selection	Click the checkbox of each network interface you want to include in the bridge.
Primary Interface	Select the interface that is to be used for selecting the MAC address of the aggregate. The new bond inherits the MAC address of the primary interface. On creation, any Network Connections which exist on the Primary Interface will be attached to the Bond/Bridge after it is initially created. When a Bond/Bridge is deleted, any Network Connections which exist on the aggregate interface are handed over to the Primary Interface.
Inherited Connections	When the Primary Interface is selected, the connections inherited by the new bridge are listed here.
	Click to edit the details of an existing interface.

Create A New Bond

> **Note:** Whether creating a new bond or editing an existing bond the page is very similar.

To create a new bond:

1. Navigate to the **Configure > Network Connections > Network Interfaces** page on the Web GUI.
2. Click on the **New Bond** button that is located at the top-right of the window.
3. Select which interface will serve as the primary interface for the new bond.

   > **Note:** When the primary interface is selected, its MAC address is displayed in the MAC address field. This MAC address is inherited by the new bond interface.

4. Complete the new bond details form as in the **Bond Form Definitions** definitions table below.
5. Click the **Create** button to finalize the creation of the new bond. Network connections from non-primary interfaces will be deleted when the new bond is created.

Edit an Existing Bond

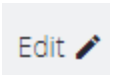
To edit an existing bond:

1. Navigate to the **Configure > Network Connections > Network Interfaces** page on the Web GUI.
2. Click on the bond that you would like to edit, the bond details are expanded.
3. Click on the bond **Edit** button that is located next to the Enable / Disable toggle buttons.

4. Change the bond details as required in accordance with the **Edit Bond Form Definitions** table below.
5. Click the **Update** button to finalize the edit process. Updating the bond will temporarily interrupt network activity on this interface.

Edit Bond - Form Definitions

New Bond Field	Definition
Description	The editable **Description** field allows you to add a description of the interface. If the description field is not completed the field will default to a computed value to describe the interface.
Mode	The mode determines the way in which traffic sent out via the bonded interface is dispersed over the real interfaces. Available modes are: **Round Robin Balancing** - Packets are sequentially transmitted/received through each interfaces one by one. **Active Backup** - If the active secondary interface is changed during a failover, the bond interface's MAC address is then changed to match the new active secondary's MAC address. **XOR Balancing** - Balances traffic by splitting up outgoing packets between the Ethernet interfaces, using the same one for each specific destination when possible. **Broadcast** - All network transmissions are sent on all secondary interfaces. This mode provides fault tolerance. **802.3ad (Dynamic Link Aggregation)** - Aggregated NICs act as one NIC, but also provides failover in the case that a NIC fails. Dynamic Link Aggregation requires a switch that supports IEEE 802.3ad.

	Transmit Load Balancing - Outgoing traffic is distributed depending on the current load on each secondary interface. Incoming traffic is received by the current secondary interface. If the receiving secondary fails, another secondary takes over the MAC address of the failed secondary. **Adaptive Load Balancing** - Includes transmit load balancing (tlb) and receive load balancing (rlb) for IPv4 traffic and does not require any special switch support.
Poll Interval	The poll interval specifies the MII link monitoring frequency in milliseconds. This determines how often the link state of each secondary is inspected for link failures. A value of zero disables MII link monitoring.
Network Interface Selection	Click the checkbox of each network interface you want to include in the bridge.
Primary Interface	Select the interface that is to be used for selecting the MAC address of the aggregate. The new bond inherits the MAC address of the primary interface. On creation, any Network Connections which exist on the Primary Interface will be attached to the Bond/Bridge after it is initially created. When a Bond/Bridge is deleted, any Network Connections which exist on the aggregate interface are handed over to the Primary Interface.
Active Connections	When the Primary Interface is created, the connections inherited by the new bond are listed here. When edited, Active Connections on the aggregate will not be updated if the primary interface is changed.
	Click to edit the details of an existing interface. Updating a bridge will temporarily interrupt network activity on the interface when you click the **Update** button.

Spanning Tree Protocol

CONFIGURE > NETWORK CONNECTIONS > Network Interfaces > Select the target interface

Spanning Tree Protocol (STP) allows Operations Manager devices to discover and eliminate loops in network bridge links, preventing broadcast radiation and allowing redundancy.

When STP is implemented on switches to monitor the network topology, every link between switches, and in particular redundant links, are cataloged. The spanning-tree algorithm blocks forwarding on redundant links by setting up one preferred link between switches in the LAN. This preferred link is used for all Ethernet frames unless it fails, in which case a non-preferred redundant link is enabled.

Note: STP Limitations

If multiple bridges are created on the same switch, they should not be used on the same network segment as they have the same MAC addresses; therefore, STP will likely not work correctly as they will have the same bridge id.

Rapid Spanning Tree Protocol (RSTP), Multiple Spanning Tree Protocol (MSTP) and other proprietary protocols are not supported.

The bridge settings relating to STP cannot be changed from the default values shown below:

group_address

forward_delay (default is 15)

hello_time (default is 2)

max_age (default is 20)

priority (default is 32768 (0x8000))

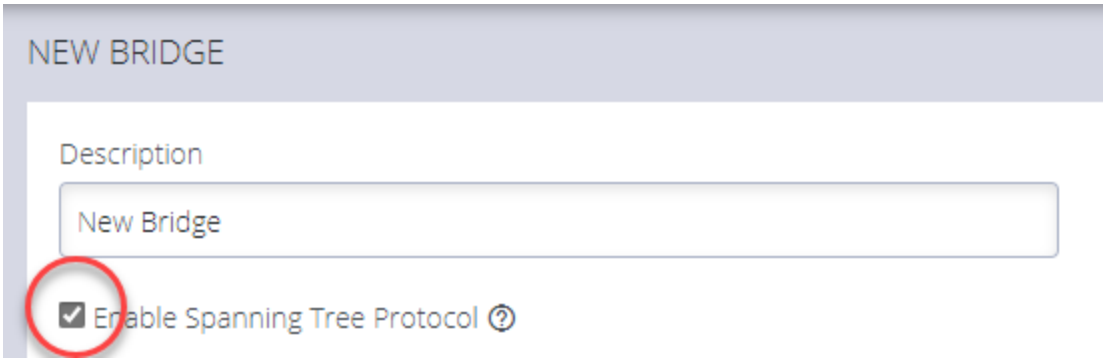
Enable STP in a Bridge

To enable STP you can use the UI or CLI. The procedures are:

Bridge With STP Enabled - UI

CONFIGURE > NETWORK CONNECTIONS > Network Interfaces > Select the target interface > New Bridge page

1. In the **Network Interfaces** page, click the **Create New Bridge** button.
2. Click to select the **Enable Spanning Tree Protocol** option.



Bridge With STP Enabled - OGCLI

```
admin@om2248:~# ogcli get physif system_net_physifs-5
   bridge_setting.id="system_net_physifs-5"
  bridge_setting.stp_enabled=true
 description="Bridge"
  device="br0"
 enabled=true
 id="system_net_physifs-5"
  media="bridge"
 name="init_br0"
  slaves[0]="net2.3"
```

Bridge With STP Disabled - OGCLI

```
admin@om2248:~# ogcli update physif system_net_physifs-5
bridge_setting.stp_enabled=false
 bridge_setting.id="system_net_physifs-5"
 bridge_setting.stp_enabled=false
description="Bridge"
 device="br0"
 enabled=true
id="system_net_physifs-5"
 media="bridge"
 name="init_br0"
 slaves[0]="net2.3"
```

IPsec Tunnels

CONFIGURE > NETWORK CONNECTIONS > IPsec Tunnels

The Opengear OM can use IPsec to securely connect and route between two or more LANs (sometimes referred to as site to site, LAN-to-LAN, L2L VPN), or as a single client endpoint connecting to a central LAN or endpoint (sometimes referred to as host to site, or host to host).

IPsec does not make a formal distinction between initiator and responder, however the Opengear OM can both initiate tunnels (as the "initiator") and have other devices initiate tunnels to it (as a "responder").

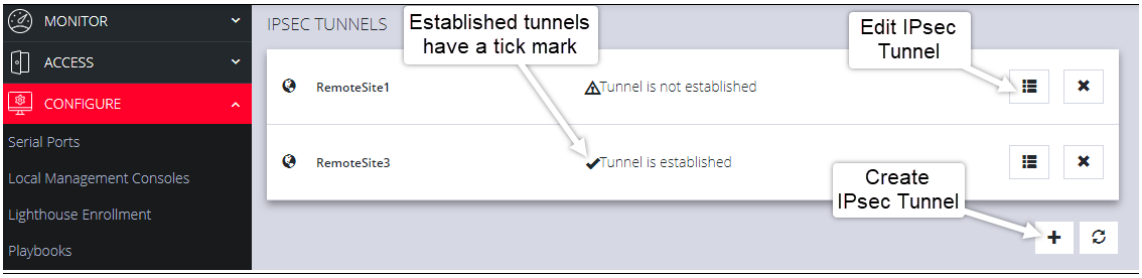
Create, Add or Edit IPsec Tunnels

On the IPsec Tunnels page, you can create, edit, and delete IPsec tunnels.

To create an IPsec tunnel:

1. Click **CONFIGURE > NETWORK CONNECTIONS > IPsec Tunnels.**

   The IPsec Tunnels page with two tunnels previously created.

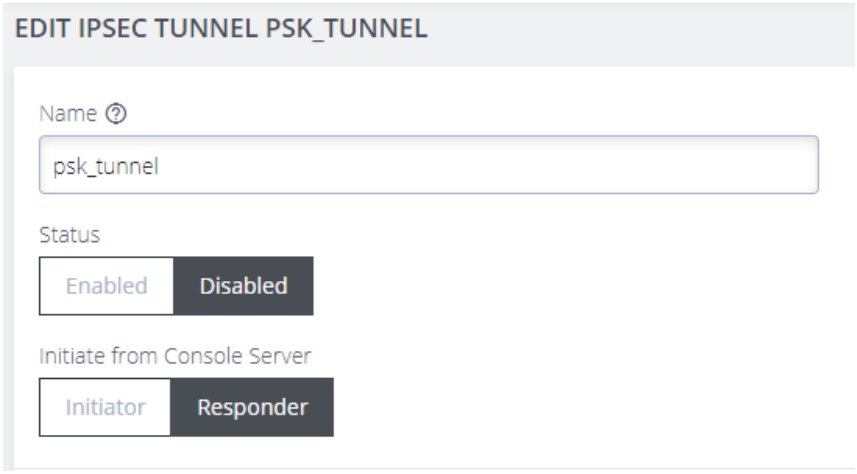


   *If there are no existing tunnels, this **Create Tunnel** button is displayed:*

2. Click **CREATE TUNNEL**. This opens the **EDIT IPSEC TUNNEL** page.

NAME and STATUS

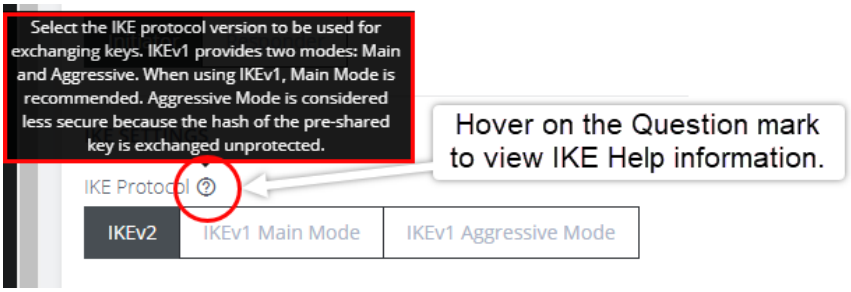
3. In the **Name** section of the page, give your new tunnel a unique name and click the **Enabled** button.



4. Set the Console Server to be the **Initiator** or **Responder**.

> **Note:** When **Initiator**is selected, the device will actively initiate the tunnel by sending IKE negotiation packets to the remote end.

IKE SETTINGS



Continued...

5. Select an **IKE Protocol** version to use for exchanging keys. IKEv1 provides two modes: **Main** and **Aggressive**. When using IKEv1, Main Mode is recommended. Aggressive Mode is considered less secure because the hash of the pre-shared key is exchanged unprotected.
6. Select the **Algorithm Proposal**. This is a set of algorithms used for negotiation when attempting to establish the IPsec tunnel. By default, the device will attempt to negotiate the tunnel using a list of common algorithms which are considered safe. Alternatively, a set of default proposals that guarantee Perfect Forward Secrecy (PFS) can be selected.
7. Select **Initiate** to actively initiate the tunnel by sending IKE negotiation packets to the remote end.
8. Set up the **Phase 1** and **Phase 2** time interval between the key material refresh of the IKE and Child.

AUTHENTICATION

OM Authentication can use PSK or PKI.

9. **For pre-shared key (PSK) authentication**, enter a pre-shared secret key; both ends of the tunnel must use the same key.

   Tip:
   To construct ID_USER_FQDN identities, use `user@example.com`
   To construct ID_FQDN type identities, use `@host.example.com`
   If left blank, the outer local IP address of the tunnel is used as the identity.

10. Enter a **Local ID** Identity or IP address for the local end of the tunnel. If left blank, the outer-local IP address is used as the source address of the tunnel.
11. **For Public Key Infrastructure (PKI) authentication**, upload the certification bundle file or, drag and drop the file into the Certificate Bundle field.

TUNNEL SETTINGS

12. Select **Enabled** if enforced UDP encapsulation is required. When enabled, the IKE daemon can simulate the NAT detection payload.

ADDRESSING

13. Enter the **Local Address** to be used as the source address of the tunnel. If left blank, IPsec will automatically use a default.
14. Enter a **Local Subnet**. Specify local traffic to be tunneled. When no subnets are specified, only traffic originating from this device will be tunneled.
15. Enter the **Remote Address** or hostname for the remote end of the tunnel. If left blank, IPsec will accept initiation packets from any address.
16. Enter the **Remote Subnet**. Specify addresses or subnets that are behind the remote end of this tunnel. If no subnet is specified, only traffic originating from the outer remote address will be accepted.

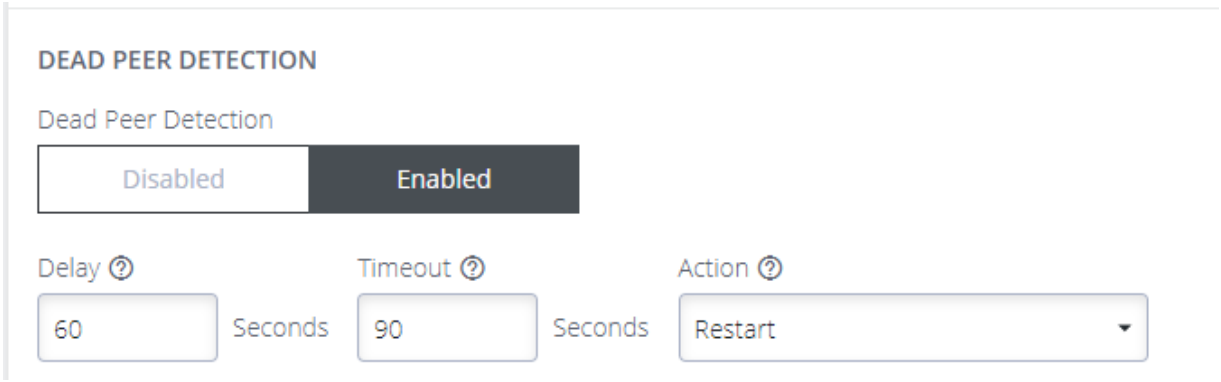
DEAD PEER DETECTION

Tip: Dead Peer Detection may be used to support long-lived tunnels.

Dead Peer Detection (DPD) is a method used by devices to verify the current existence and availability of IPsec peers. A device performs this verification by sending encrypted IKE Phase 1 notification payloads (R-U-THERE messages) to a peer and waiting for DPD acknowledgments (R-U-THERE-ACK messages) from the peer.

Continued...

You can enable DPD and configure the various options to fine-tune the functionality:



- **Delay** - the time interval between polling the peer (default is 60 seconds).
- **Timeout** - the waiting time before deciding that a peer connection is not live (default is 90 seconds).
- **Action** - the action to be performed when a connection is timed-out. (default is Restart).
  - **Restart** will immediately attempt to renegotiate the tunnel.
  - **Clear** will close the CHILD_SA.
  - **Trap** will catch matching traffic.

ENABLE the IPsec TUNNEL

17. When you have completed the IPsec Tunnel set-up process, ensure the IPsec tunnel status is set to **Enabled**, then, click **Save**.

    The new tunnel is now listed on the **CONFIGURE > NETWORK CONNECTIONS > IPsec Tunnels** page.

Network Resilience

CONFIGURE > NETWORK RESILIENCE >

Under the NETWORK RESILIENCE menu, you can manage Out-of-Band (OOB) and IP Passthrough settings.

Out Of Band Failover

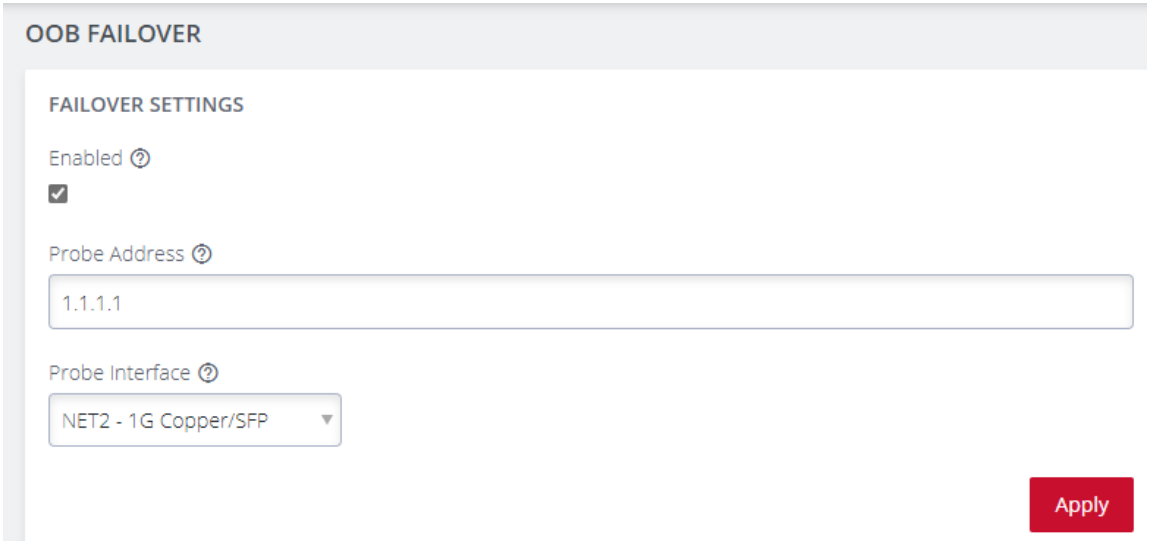
CONFIGURE > NETWORK RESILIENCE > OOB Failover

Out-of-Band (OOB) Failover detects network disruption via the probe interface, and automatically activates the cellular connection to re-establish network access.

OOB failover requires an IPv4 address (in dotted decimal format), or an IPv6 address, or a domain name, which is always reachable and unlikely to change. When OOB failover is enabled, the device regularly pings this address, using the probe interface, to check for network connectivity.

Enable Out-of-Band Failover

1. To manage Out-of-Band Failover, navigate to the **CONFIGURE > NETWORK RESILIENCE > OOB Failover** page:



2. When you have completed the OOB Failover set-up, ensure the OOB Failover status is set to **Enabled**, then, click **Apply**.

OOB Failover Types & Failover Behavior

OOB Setting	Cellular Interface	Mode	Description
Disabled	Enabled	Always up OOB	Failover detection is disabled. Only inbound connections on the cellular interface are routed back out the cellular interface, to enable OOB access from remote networks (e.g. incoming SSH). Otherwise outbound network connections (e.g. VPN client tunnels, SNMP alerts) are established according to the main static routing table, regardless of network state.
Enabled	Disabled	Failover mode	Failover detection is enabled on the selected “probe” interface. The cellular interface remains in a down state with no network configuration. When failover is initiated, the cellular network interface is started and configured. If a default route is installed on the cellular interface, it takes precedence over the default route on the failed “probe” interface. Outbound network traffic (e.g. VPN client tunnels, SNMP alerts) are established or re-established out cellular connection during failover. The advantage of this mode is the secondary connection is completely inactive during normal operation which may be advantageous where the goal is to keep the interface off the Internet as much as possible, e.g. a cellular plan with expensive data rates and no carrier-grade NAT.
Enabled	Enabled	Dormant failover	This mode combines Always Up and Failover mode. Failover detection is enabled, however the cellular interface is kept in a

			dormant up state, i.e. activated and configured but with no traffic being actively routed out it. Only inbound connections on the cellular interface are routed back out the cellular interface, to enable OOB access from remote networks (e.g. incoming SSH). When failover is initiated, the default route of the cellular interface takes precedence over the failed “probe” interface. Outbound network traffic (e.g. VPN client tunnels, SNMP alerts) are established or re-established out the cellular connection during failover. The advantage of this mode is the cellular connection is available for inbound out-of-band access during normal operation.

IP Passthrough

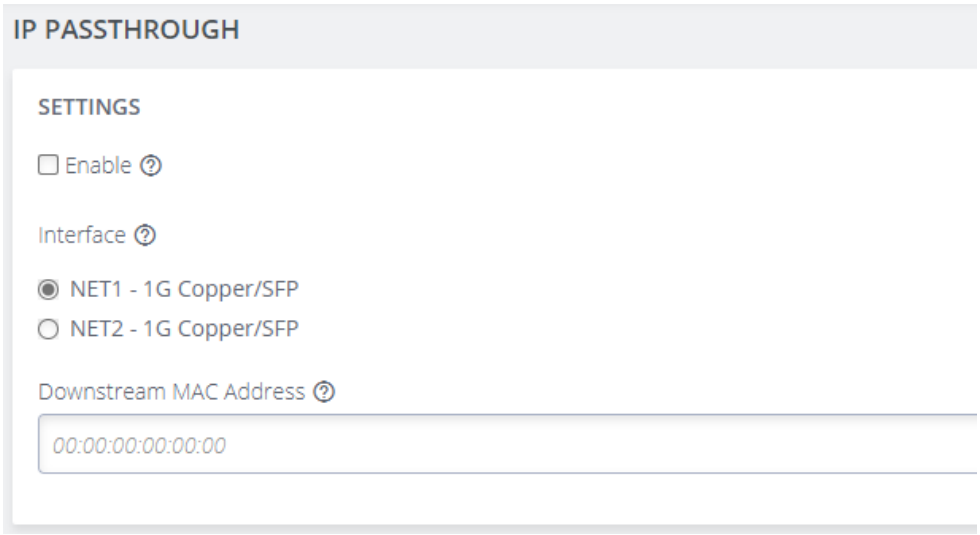
Devices with dialout support and an Ethernet port can enable a special DHCP service called IP Passthrough. When IP Passthrough is enabled, other devices (eg. the "passthrough target" or "downstream host") that are plugged into the Ethernet port will operate as if they are directly connected to the dialout network.

CONFIGURE > NETWORK RESILIENCE > IP Passthrough

1. To manage **IP Passthrough** navigate to the **CONFIGURE > NETWORK RESILIENCE > IP Passthrough** page.

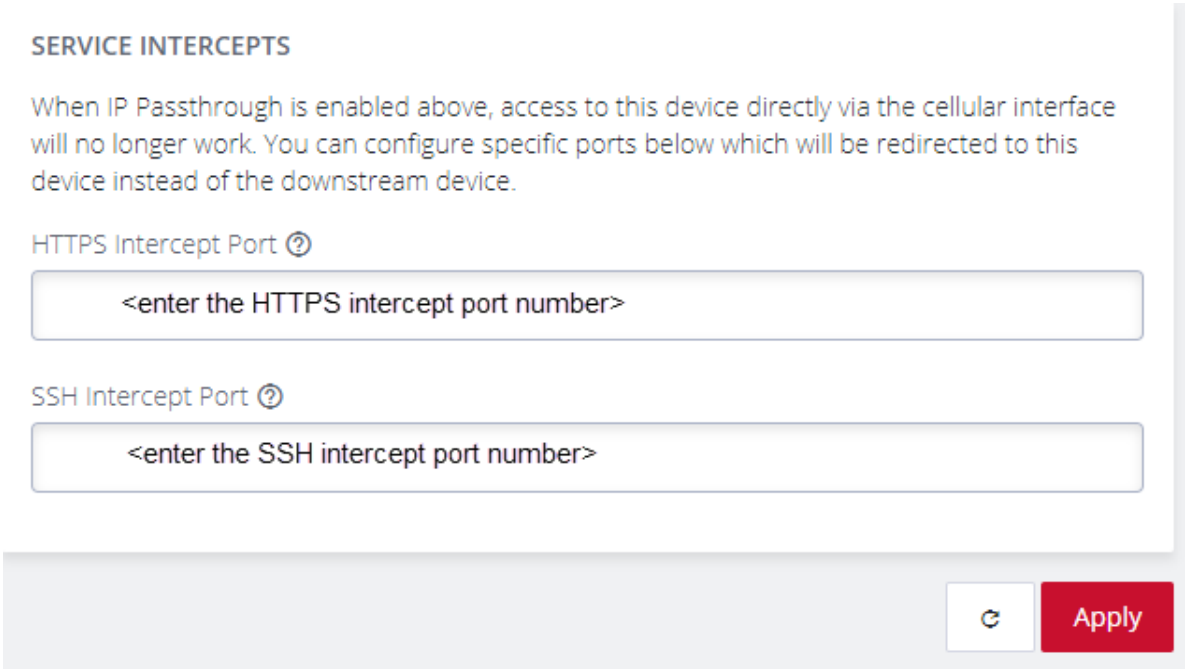
SETTINGS

2. Click the IP Passthrough status checkbox to set the status to **Enabled**.
3. Click the radio button next to the interface type that is used.
4. Enter the MAC address of the downstream device that will make the DHCP requests. The MAC address of the device will be offered a DHCP lease. DHCP requests from other MAC addresses will be ignored.



SERVICE INTERCEPTS

Tip: When IP Passthrough is enabled, access to this device directly via the cellular interface will no longer work. You can configure specific ports below which will be redirected to this device instead of the downstream device.



5. Enter the port number that is to be used for HTTPS Intercepts.
6. Enter a port to be redirected to this device's SSH service.

   Tip: You can use this port to access the Operations Manager command line interface. If you leave this field blank, the SSH service intercept will be disabled.

7. When you have completed the IP Passthrough Settings and Service Intercept form, ensure the IP Passthrough status is set to **Enabled**, then, click **Apply**.

User Management

CONFIGURE > USER MANAGEMENT

Under the User Management menu, you can create, edit, and delete groups and users, as well as assign users to groups. You can also set up remote user authentication.

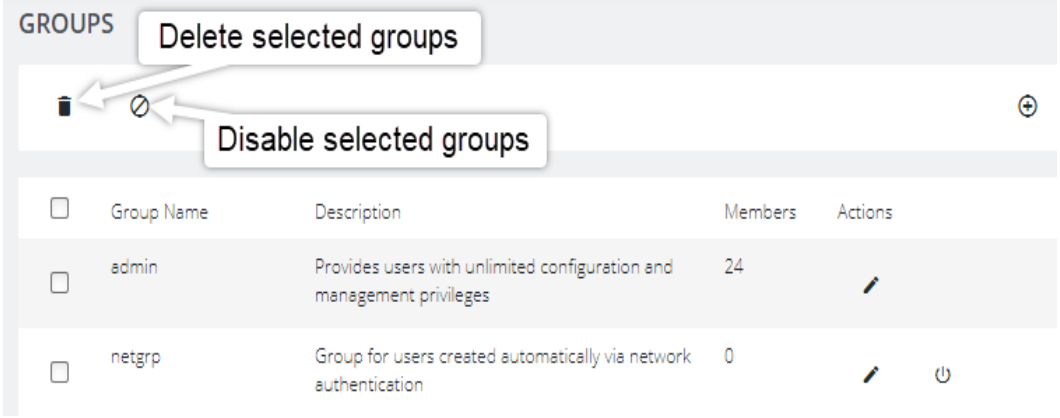
Groups

CONFIGURE > USER MANAGEMENT > Groups

Groups are used to grant privileges to users. When a user is a member of a group, they select the serial ports and serial PDUs, for example, from within the groups. Privileges include lists of accessible serial/USB console ports, these can be defined per-group.

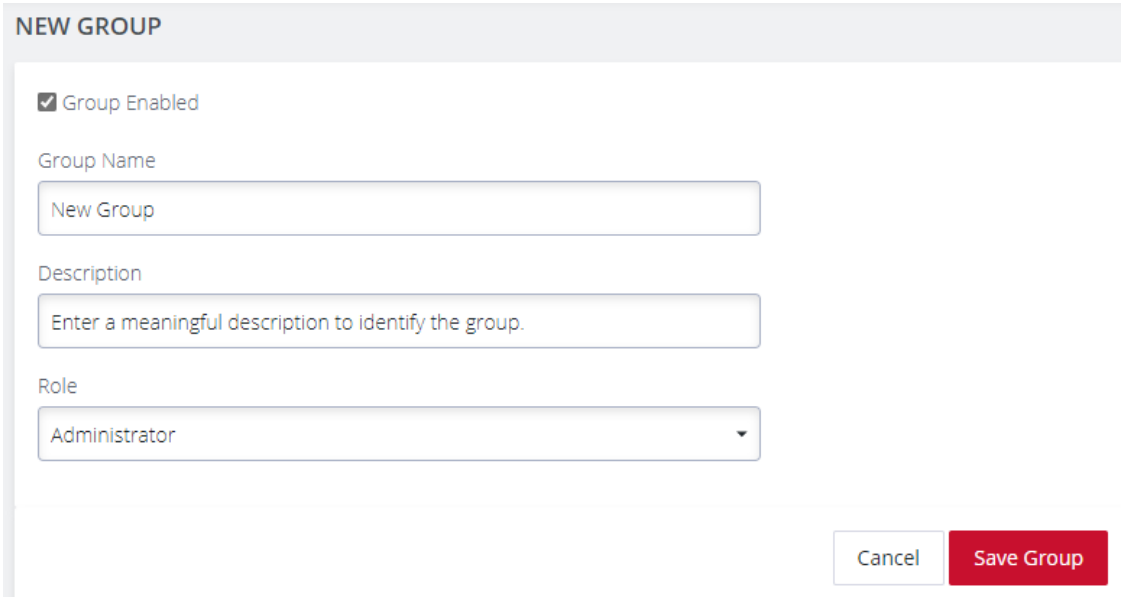
Create a New Group

1. Select **CONFIGURE > USER MANAGEMENT > Groups.**



⊕	Add a new group.
✎	Edit an existing group.
⏻	Enable an existing group.
⊘	Disable an existing group (or disable selected groups).
🗑	Delete a group (or delete selected groups).

2. Click the **Add New Group** button. The **NEW GROUP** page opens.



3. Enter a **Group Name**, **Description,** and select a **Role** for the group.

> **Note: Group Name** is case sensitive. It can contain numbers and some alphanumeric characters. When using remote authentication, characters from a user's remote groups that are not allowed are converted to underscores during authentication. Local groups can be created that take that into account, allowing the authentication to continue.

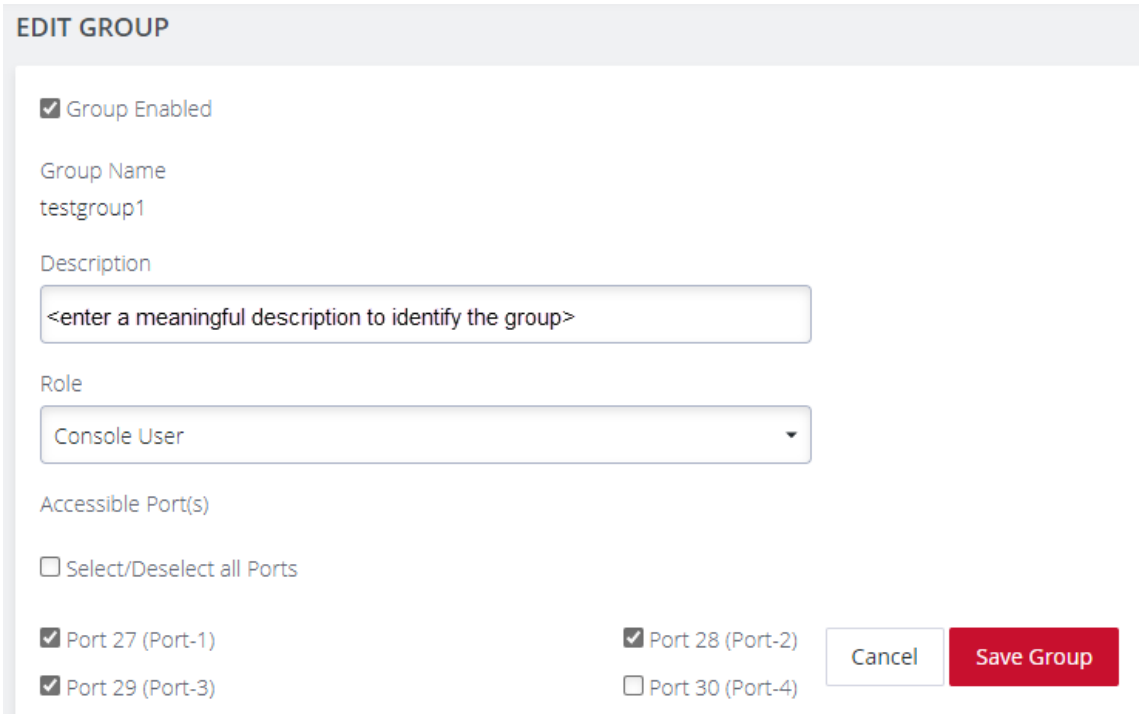
> **Note:** If the **Role** selected is **Administrator**, members of the group have full access to and control of all managed devices, full system configuration privileges, and full access to the command line shell.

> **Tip:** Choosing the **Console User** role allows you to select specific ports this group will be able to access.

4. Click the **Group Enabled** checkbox to enable the group. After creation, groups can also be enabled or disabled from the **CONFIGURE > USER MANAGEMENT > Groups** page.
5. Click **Save Group**.

Edit an Existing Group

1. Select **CONFIGURE > USER MANAGEMENT > Groups**.



2. Click **Edit** in the **Actions** section of the group to be modified and make desired changes.
3. Click **Save Group**.

Continued...

The **CONFIGURE > User Management > Groups** page also allows administrators to delete a group. Users who were members of the deleted group lose any access and administrative rights inherited from the group.

Note: The netgrp group is inherited as the primary group for all remote AAA users who are not defined locally. By default, netgrp has the Administrator role and is disabled. It must be enabled to take effect for remote AAA users.

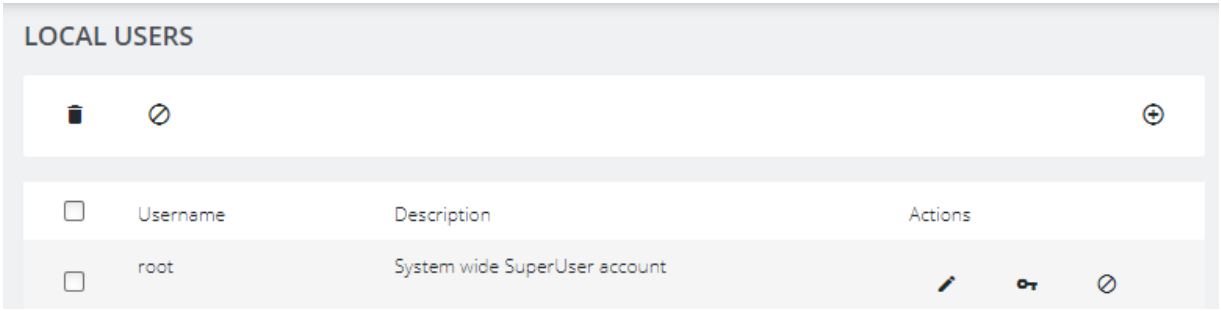
Note: For users that don't have any group, they are still part of netgrp, even if the netgrp membership is not explicitly enabled for the user.
The permissions for the netgrp members is a union of the permissions that have been given in the netgrp AND the permission for the user in AAA (TACACS+, RADIUS, etc).
If your netgrp "role" says "Console User" and you have priv-lvl 13 in TACACS+ (level 15 being the highest), then the union of that is like an admin already, so setting "console user" in netgrp does not matter.

Local Users

CONFIGURE > USER MANAGEMENT > Local Users

The Local Users feature allows a single point for the creation or management of local user accounts. The Local Users feature can use SSH authorized keys to control user access by using their local password; it is a point of control for:

- Authentication and authorization.
- Creating and editing user descriptions.
- Local passwords.
- User roles (admin or co sole user).
- Accessible ports.



See the Button Action Definitions table on the following page:

Button Action Definitions:

	Add a new local user.
	Edit an existing user.
	Enable an existing user.
	Manage SSH Authorized Keys.
	Disable an existing user (or disable selected users).
	Delete a user (or delete selected users).

Create a New User With Password

1. Navigate to the **CONFIGURE > USER MANAGEMENT > Local Users** page.
2. Click the **Add User**  button. The **New User** dialog appears.
3. Enter a Username, Description, and Password that the new user will use.
4. Re-enter the **Password** in the **Confirm Password** field.
5. Select the **Enabled** checkbox.
6. Click **Apply**. A banner will confirm that the data has been saved.

Create a New User With No Password (Remote Authentication)

To create a new user with no password.

> **Note:** If a new user is created with no password, this will cause the user to fall-back use remote authentication.

1. Select **CONFIGURE > User Management > Remote Authentication**
2. Select a Scheme.
3. Enter Settings and click **Apply**.
4. Select **CONFIGURE > USER MANAGEMENT > Local Users**
5. Click the **Add User** button. The **New User** dialog loads.
6. Enter a **Username**, **Description**.
7. Select the **Remote PasswordOnly** checkbox.
8. Select the **Enabled** checkbox.
9. Click **Apply**. A banner will confirm that the data has been saved.

Modify An Existing User Account With Password

1. Select **CONFIGURE > USER MANAGEMENT > Local Users**
2. Click the **Edit User** button and make the required changes.
3. Click **Save User**. A banner will confirm the changes have been saved.

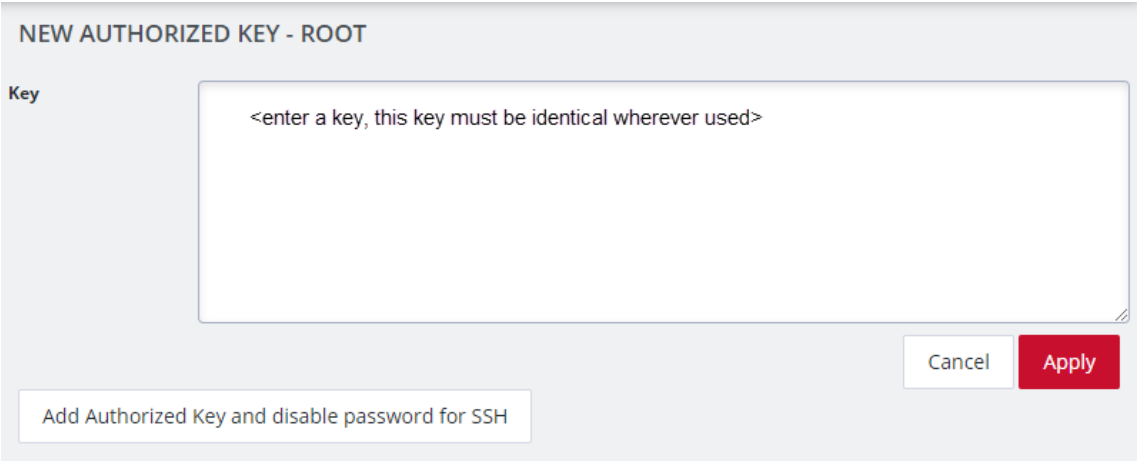
The **Edit Users** dialog allows the user's **Description** to be changed, **Group Memberships** modified, and the user's **Password** to be reset. The username cannot be changed. To disable a user, uncheck the **Enabled** checkbox.

> **Note:** Users of disabled accounts cannot log in to the OPERATIONS MANAGER using either the Web-based interface or via shell-based logins.

Manage SSH Authorized Keys for a User Account

To manage SSH authorized keys for a user:

1. Select **CONFIGURE > USER MANAGEMENT > Local Users**
2. Click the **Manage SSH Authorized Keys** button for that user.
3. Click the **Add Authorized Key** button to add a new key. This opens the **NEW AUTHORIZED KEY** page for this user.



4. Enter the key and click **Apply**. You can also click on **Add Authorized Key** and disable password for SSH for this user from this page.
5. To delete a key, click **CONFIGURE > USER MANAGEMENT > Local Users** and click the **Manage SSH Authorized Key** button for the user.
6. Click the **Delete** button next to the key you wish to remove.

Delete a User's Account

To delete a user's account:

1. Select **CONFIGURE > USER MANAGEMENT > Local Users**
2. Click the **Delete User** button in the **Actions** section next to the user to be deleted.
3. Click **Yes** in the **Confirmation** dialog.

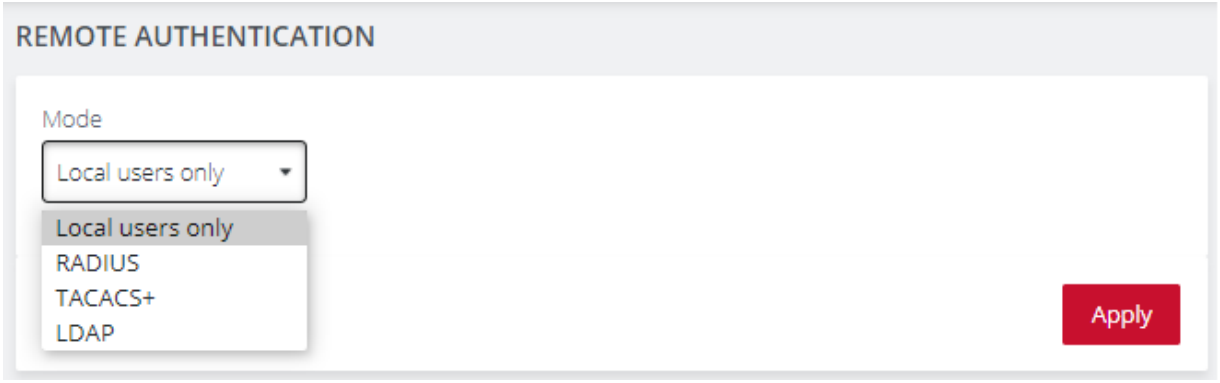
Remote Authentication

CONFIGURE > USER MANAGEMENT > Remote Authentication

The OPERATIONS MANAGER supports three AAA systems. Select the remote authentication mode to be applied (DownLocal, or Local apply for all modes):

- RADIUS
- TACACS+
- LDAP

Navigate to **CONFIGURE > USER MANAGEMENT > Remote Authentication**, the Remote Authentication Home page is displayed.



Tip: All fields in the Remote Authentication form have tooltips that provide additional information to assist with completing the form fields.

Configure RADIUS Authentication

1. Under **CONFIGURE > User Management > Remote Authentication**, select **RADIUS** from the **Mode** drop-down menu.
2. Select the preferred Radius Remote Authentication policy to be applied: **Radius DownLocal**, or **Radius Local** (see the tips below).

   > **Tip: RADIUS DownLocal:** Users are authenticated using a local account as per a regular local login only if the remote AAA server is unreachable or down. If credentials are incorrect or if the user acount does not exist, the user is denied access.

   > **Tip: RADIUS Local:** If remote authentication fails because the user account does not exist on the remote AAA server, the OM device attempts to authenticate the user using a local account as per a regular local login
3. Add the **Address** and optionally the **Port** of the authentication server.
4. Add the **Address** and optionally the **Port** of the RADIUS accounting server to send accounting information to.
5. Add and confirm the **Server password,** also known as the RADIUS Secret.

> **Note:** Multiple servers can be added. The RADIUS subsystem will query them in a round-robin fashion.

Continued...

To provide group membership, RADIUS needs to be configured to provide a list of group names via the Framed-Filter-Id attribute. The following configuration snippet shows how this can be configured for FreeRADIUS:

operator1 Auth-Type := System
Framed-Filter-ID = ":group_name=west_coast_admin,east_coast_user:"

Note: The Framed-Filter-ID attribute must be delimited by the colon character.

Configure TACACS+ Authentication

1. Under **CONFIGURE > USER MANAGEMENT > Remote Authentication**, select TACACS+ from the *Scheme* drop-down menu.
2. Select the preferred TACACS+ Remote Authentication policy to be applied: **TACACS+ DownLocal**, or **TACACS+ Local** (see the tips below).

   Tip: TACACS+ DownLocal: Users are authenticated using a local account as per a regular local login only if the remote AAA server is unreachable or down. If credentials are incorrect or if the user acount does not exist, the user is denied access.

   Tip: TACACS+ Local: If remote authentication fails because the user account does not exist on the remote AAA server, the OM device attempts to authenticate the user using a local account as per a regular local login.
3. Add the **Address** and optionally the **Port** of the TACACS+ authentication server to query.
4. Select the **Login Method**. **PAP** is the default method. However, if the server uses DES-encrypted passwords, select **Login**.
5. Add and confirm the **Server password**, also known as the TACACS+ Secret.

6. Add the **Service**. This determines the set of attributes sent back by the TACACS+ server

> **Note:** Multiple servers can be added. The TACACS+ subsystem queries them in a round-robin fashion.

```
user = operator1 {
    service = raccess {
        groupname = west_coast_admin,east_cost_user
    }
}
```

> **Note:** For Cisco ACS, see Setting up permissions with Cisco ACS 5 and TACACS+ on the Opengear Help Desk.

Configure LDAP Authentication

1. Under **CONFIGURE > User Management > Remote Authentication**, select **LDAP** from the **Mode** drop-down menu.
2. Select the preferred LDAP Remote Authentication policy to be applied: **LDAP DownLocal**, or **LDAP Local** (see the tips below for explanation).

> **Tip: LDAP DownLocal:** Users are authenticated using a local account as per a regular local login only if the remote AAA server is unreachable or down. If credentials are incorrect or if the user acount does not exist, the user is denied access.

> **Tip: LDAP Local:** If remote authentication fails because the user account does not exist on the remote AAA server, the OM device will attempt to authenticate the user using a local account as per a regular local login.

2. Add the **Address** and optionally the **Port** of the LDAP server to query.
3. Add the **LDAP Base DN** that corresponds to the LDAP system being queried. For example:

```
CN=example-user,CN=Users,DC=example-domain,DC=com
```

4. Add the **LDAP Bind DN**. This is the distinguished name of a user with privileges on the LDAP system to perform the lookups required for retrieving the username of the users, and a list of the groups they are members of.
5. Input the password for the **LDAP Bind DN** user and confirm the password.
6. Add the **LDAP Username Attribute**. This depends on the underlying LDAP system. Use sAMAccountName for Active Directory systems, and uid for OpenLDAP based systems.
7. Add the **LDAP Group Membership Attribute**. This is only needed for Active Directory and is generally memberOf.
8. If desired, check **Ignore referrals** option. When checked, LDAP will not follow referrals to other remote authentication servers when logging users in. If multiple remote authentication servers exist on the network, checking this option may improve log in times.

> **Note:** Multiple servers can be added. The LDAP subsystem queries them in a round-robin fashion.

RemoteLocal for AAA Server

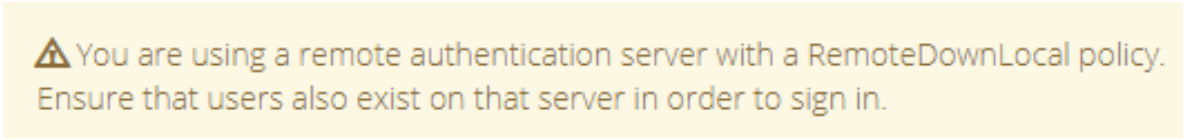
CONFIGURE > USER MANAGEMENT > Remote Authentication

CONFIGURE > USER MANAGEMENT > Local Users

RemoteLocal authentication allows users to be authenticated locally if they don't exist on the AAA server so that users can still access any consoles that are required to be accessed.

A RemoteLocal alert banner ensures all users are made aware that if the RemoteLocal policy is selected their local users will not be accessible.

If a RemoteDownLocal policy is selected and the AAA server is contactable, then local authentication won’t be used.

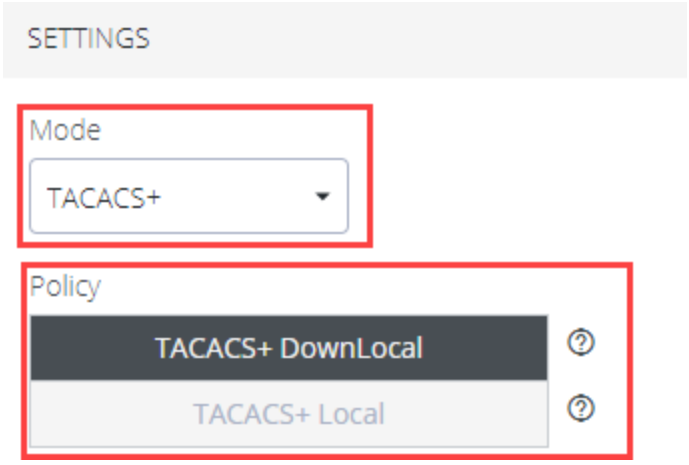


Note: This feature is backwards compatible with previous versions of software (the rest api version is unchanged).

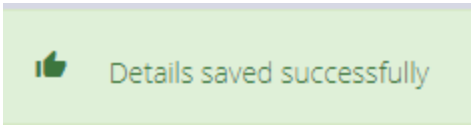
Change Authentication Policy

Changing the Authentication policy is simple.

1. Navigate to **CONFIGURE > USER MANAGEMENT > Remote Authentication**.
2. Ensure the required protocol mode is selected (TACACS+, RADIUS, LDAP).



3. Select the authentication policy you require (DownLocal or Local).
4. Click **Apply**. The policy change is confirmed by a green confirmation banner.



Authentication Scenarios

The following example shows RADIUS protocol mode, but the behavior is the same for other protocols such as TACACS+ or LDAP.

- User does not exist:
  - When using RemoteLocal authentication for all types of remote servers, if remote authentication fails because the user does not exist on the remote AAA server, the OM device will attempt to authenticate the user using a local account as per a regular local log in.
- Remote Server Down / Unreachable:
  - If the remote AAA server is unreachable or down, the OM device tries to authenticate the user using a local account as per a regular local log in.
- Remote server is up, but incorrect credentials:
  - The user is denied access. Warnings indicate that RemoteLocal is enabled.

Local Password Policy

CONFIGURE > USER MANAGEMENT > Local Password Policy

A Password Complexity policy allows network administrators to implement and enforce a password policy that meets the customers' security standards for local users (including root). This functionality enables administrators to mandate the setting of complex passwords thus making it difficult for malicious agents to succeed in password attacks.

Enabling this feature will:

- Enforce the use of complex passwords so as to improve security.
- Schedule expiry of passwords to enforce regular password updates.

Note: Password policy such as complexity and expiry can only be configured by an administrator. Password requirements are applied to all accounts.

Tip: Password policy may be enabled and configured via the Web GUI, rest-api and ogcli. The password policy also applies to underlying CLI tools.

Set Password Complexity Requirements

CONFIGURE > USER MANAGEMENT > Local Password Policy

> **Note:** Some password complexity rules are required, other rules are optional. Optional rules can be selected by clicking on the relevant checkbox.

See also "Password Policy Implementation Rules" on page 127

To set the password complexity requirements:

1. Navigate to CONFIGURE > USER MANAGEMENT > Local Password Policy.
2. Click the **Enforced** button to implement the password complexity policy (the policy is not activated until the **Apply** button is clicked).
3. Enter the information required to form the password complexity rules to comply with your company policy:
   - Password cannot be a palindrome (required)
   - Minimum length (required)
   - Must contain an upper case letter (optional)
   - Must contain a numeric character (optional)
   - Must contain a special character (non-alphanumeric eg. e.g. #,$,%)
   - Disallow user names in passwords (optional)

   See "Password Policy Implementation Rules" on page 127
4. Click the **Apply** button to activate the password complexity policy.

Set Password Expiration Interval

CONFIGURE > USER MANAGEMENT > Local Password Policy

See also "Password Policy Implementation Rules" on the next page

Password Expiration schedules the expiry of passwords to enforce regular password updates. When this feature is applied and a password becomes expired, an expired password prompt is displayed at log-in.

> **Note:** The Password Expiration policy affects local passwords only and does not apply to remote authentication modes.

To set the password expiration interval:

1. Navigate to CONFIGURE > USER MANAGEMENT > Local Password Policy.
2. Click the **Enabled** button to implement the password expiration policy (the policy is not activated until the **Apply** button is clicked).
3. Input a number to represent the desired number of days between mandatory password updates. The default time is 90 days and the minimum is 1 day.
4. Click the **Apply** button to activate the password interval policy.

Password Policy Implementation Rules

Rule	Policy
Expiry Rules	The expiry time is measured in number of whole days. When the expiry period is reached users are required to update their password on their next login. The default expiry period is 90 days and the minimum is one (1) day.
	If there are existing user passwords when the expiry is enabled, the expiry time will be applied from when the password was initially set by the user. If a password falls outside the new expiry period the user will be immediately prompted to change the password.
	Local Password policy is only applied to local passwords and does not apply to remote authentication modes.
	When local password policy is enabled it will remain in force until the feature is turned off.
	If the minimum password length is modified and then the password complexity feature is disabled, the minimum length requirement is not updated.
Complexity Rules	The password cannot be a palindrome (this requirement cannot be disabled except by disabling password complexity entirely). (A palindrome is a word or other sequence of characters that reads the same backward as forward, such as *madam* or *racecar*).
	The minimum length (enforced) must be at least 8 characters (this requirement cannot be disabled except by disabling password complexity entirely).
	The password should contain at least one upper case alphabetic character (enabled or disabled separately).
	The password must contain at least one numeric character (enabled/disabled separately).

	The password should contain at least one special character (e.g. #,$,%) (enabled/disabled separately).
	The password cannot contain your user-name.
	Complexity requirements will apply when a user next tries to update their password.
	An administrator can force the expiry of a users password by running the ogCLI command: `passwd --expire {username}` to force a user to change their password.
	The operations `ogadduser`, `ogpasswd` and `ogsshaddsshkey` have been removed. You should instead use ogCLI for these operations.

Services

CONFIGURE > SERVICES

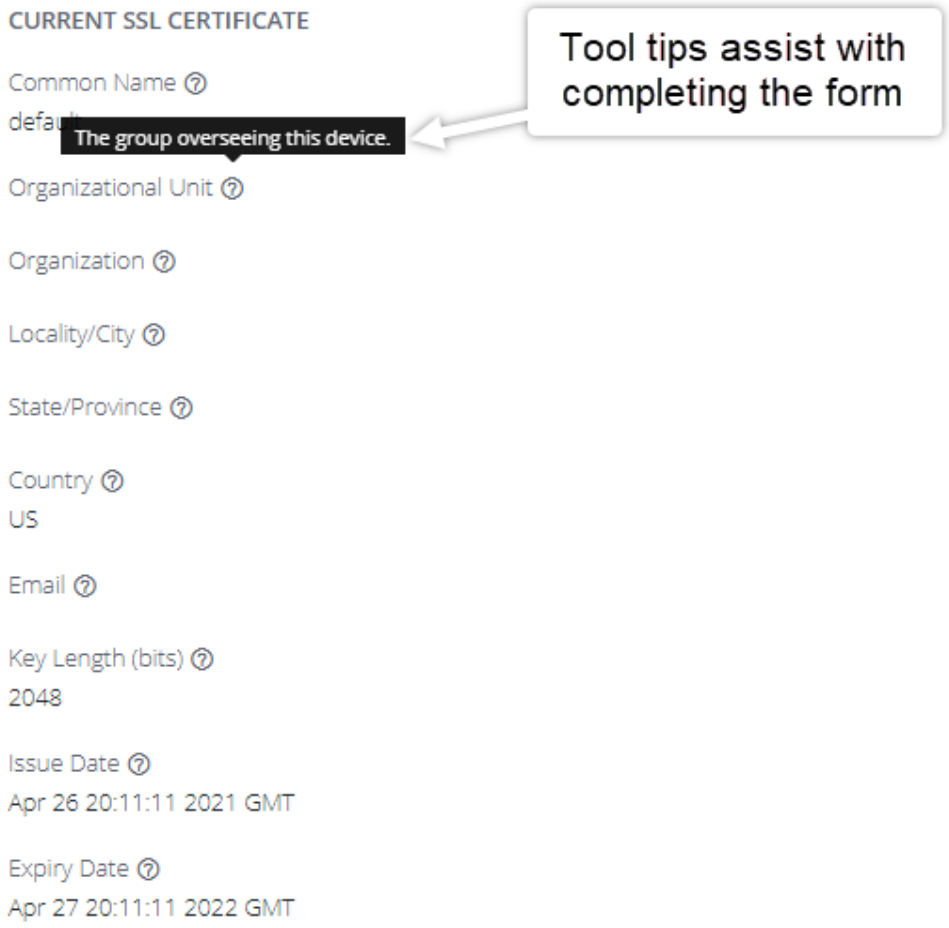
The **CONFIGURE > SERVICES** menu lets you manage services that work with the OPERATIONS MANAGER.

HTTPS Certificate

CONFIGURE > SERVICES > HTTPS Certificate

The OPERATIONS MANAGER ships with a private SSL Certificate that encrypts communications between it and the browser.

To examine this certificate or generate a new Certificate Signing Request, select **CONFIGURE > SERVICES > HTTPS Certificate**. The details of the **Current SSL Certificate** are shown on the landing page.



Below this listing is a **Certificate Signing Request** form, which can be used to generate a new SSL certificate. Complete the form, then click **Apply**.


CERTIFICATE SIGNING REQUEST
Tool tips assist with completing the form content
Common Name
The group overseeing this device.
Organizational Unit
Organization
Locality/City
State/Province
Country
Australia
Email
Key Length (bits)
2048
Challenge Password
Confirm Password
Private Key File
Choose File
No file chosen
Apply

Network Discovery Protocols

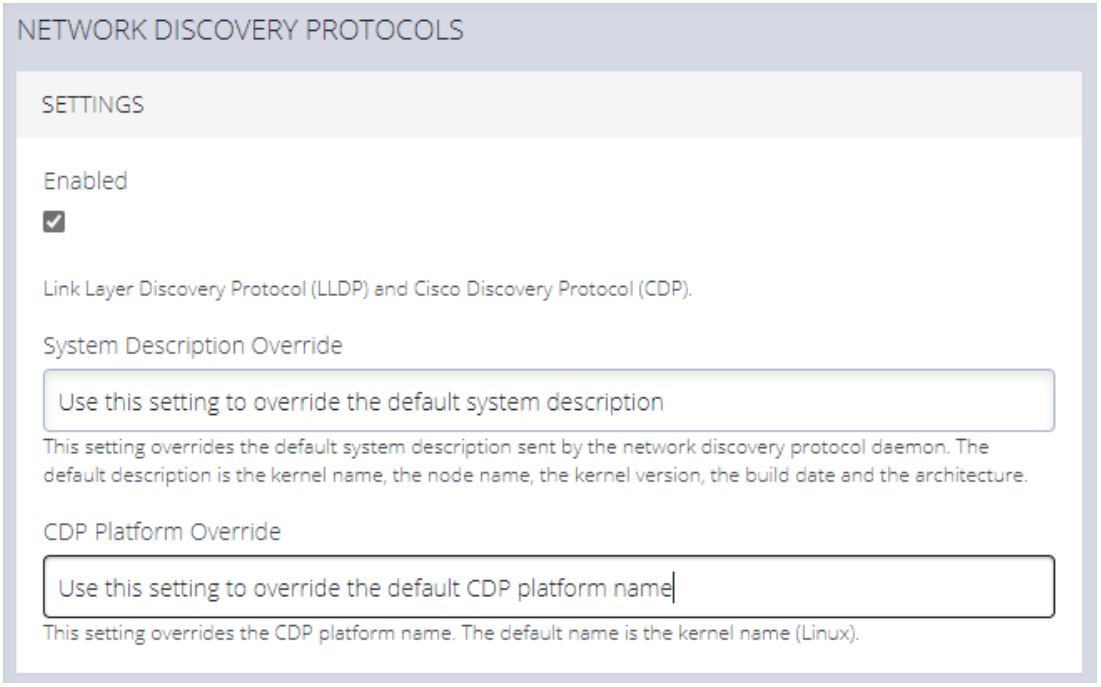
CONFIGURE > SERVICES > Network Discovery Protocols

The OPERATIONS MANAGER displays LLDP/CDP Neighbors when enabled for a connection. See **CONFIGURE > SERVICES > Network Discovery Protocols** to enable/disable.

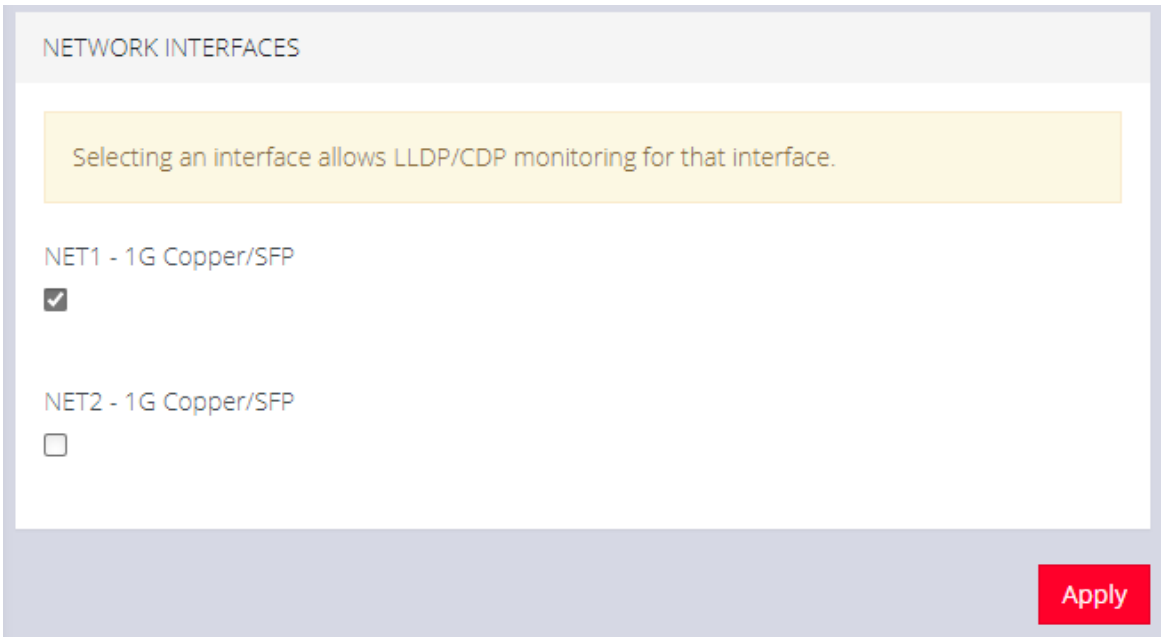
The **CONFIGURE > SERVICES > Network Discovery Protocols > LLDP/CDP NEIGHBORS** page allows you to enable this service by clicking the **Enabled** checkbox.

You can set a System Description that overrides the default system description sent by the network discovery protocol daemon. The default description is the kernel name, the node name, the kernel version, the build date and the architecture.

A value can be entered in the CDP Platform Override to override the CDP platform name. The default name is the kernel name (Linux).



Select one or more checkboxes in the **NETWORK INTERFACES** section of the page and click **Apply**.



Routing

CONFIGURE > SERVICES > Routing

The Operations Manager supports Static Routing and Dynamic Routing. Static Routing is currently configured via the ogcli interface, while Dynamic Routing is configured via the UI.

Dynamic Routing

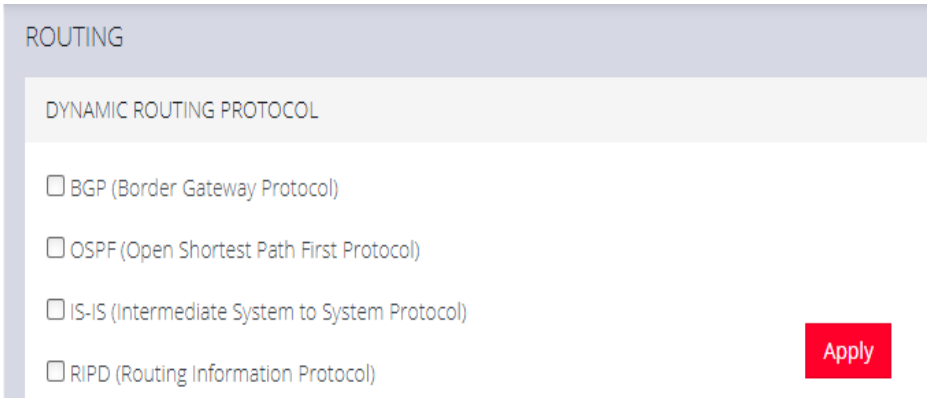
To enable Dynamic Routing on the OM, navigate to the **CONFIGURE > SERVICES > Routing** page.

Dynamic Routing supports four routing protocols, these are:

- BGP (Border Gateway Protocol)
- OSPF (Open Shortest Path First Protocol)
- IS-IS (Intermediate System to System Protocol)
- RIPD (Routing Information Protocol)

Select the preferred routing protocol then click **Apply**.

> **Note:** If no protocol is selected, no route sharing services are run on the OM.



Static Routing (via the ogcli)

To enable Static Routing on the OM, open an ogcli terminal by navigating to **ACCESS > Local Terminal**.

Static Routing ogcli Help

For Help on implementing a Static Route protocol via ogcli, enter the command:

```
ogcli help static_routes
```

Create Static Route - Example:

```
ogcli create static_route << 'END'
destination_address="10.1.45.0"
destination_netmask=24
gateway_address="192.168.1.1"
interface="system_net_physifs-1"
metric=100
END
```

Static Routing Arguments

Argument	Description
`get`	Get a list of static routes.
`create`	Add a static route.
`replace`	Similar to the "Create Static Route" example given on the previous page. Creates a single static route by specifying its UUID; or a list of static routes. Overwrites existing routes.
`delete`	Delete all static routes.
`merge`	Merge the existing configuration list with a new list.

SSH

CONFIGURE > SERVICES > SSH

To modify the properties of the port used for connecting to serial consoles via SSH, navigate to **CONFIGURE > SERVICES > SSH** .

The following table gives the definitions of the configurable SSH properties.

Parameter	Definition
Serial Port Delimiter	The delimiting character used to separate the username with port selection information. The default delimiter is a plus sign (+). For example, username+port@address.
Port Number for Direct SSH Links	If SSH is configured to be reachable on a non-standard port, the Direct SSH links on the serial ports page will use this port number.
Max Startups Start	The number of unauthenticated connections before they are refused.
Max Startups Rate	This is the percentage of unauthenticated connections refused. This percentage is a probability that increases linearly until the unauthenticated connections reach full.
Max Startups Full	The number of unauthenticated connections allowed.

Unauthenticated Access to Serial Ports

For information about Unauthenticated Access to Serial Ports, see "Unauthenticated SSH to Serial Ports" on the next page.

Unauthenticated SSH to Serial Ports

Configure > Services > SSH

The Unauthenticated SSH Access feature provides the option to access console ports (using TCP high ports) by establishing per-port SSH connection between a console and serial ports at a remote device. This allows a single step log-in and avoids the necessity for two log-ins to reach a remote end device within secure, closed networks.

Usually, you would need to authenticate on the Opengear appliance, followed by any log in to a device you are connecting to via the serial port.

When unauthenticated access is enabled SSH is available to all serial ports on the device without requiring a password.

> **Note:** Unauthenticated access can be used with or without IP aliases for serial ports.

> **Caution:** For security, **Unauthenticated SSH** should only be used when operating within a trusted, closed network, for example within a lab. There is a security risk in allowing any kind of unauthenticated access to serial ports and any terminals connected to them.

Enable Unauthenticated SSH

Authenticated or Unauthenticated access is determined via a global configuration option. Unauthenticated access to individual ports is achieved by command such as `ssh -p 300X user@<IP>`.

Enable SSH

> **Note:** This feature may be enabled using the default settings without the need for configuration.

1. Open the SSH form, **Configure > Services > SSH > SSH (form)**.
2. Complete the SSH form (if this is the first time Unauthenticated SSH has been used), a description of the input data is provided at Properties and Settings in this topic.
3. When required, enable the Unauthenticated SSH feature by clicking the **Enabled** button.

   > **Note:** Unauthenticated access to all serial ports will be available through SSH on TCP port 3000+ or Serial Port IP aliases.

Enable/Disable

Enabling or disabling this feature is done in the user interface.

To **enable** the feature click on the **Enabled** button then click the **Apply** button. The feature is enabled immediately and a pop-up will confirm that the feature is enabled.

> **Note:** Clicking the **Apply** button saves any changes you have made to the SSH form. A Details Saved banner confirms that the changes have been saved.

To **disable** the feature click on the **Disabled** button then click the **Apply** button. There is no confirmation pop-up when the feature is disabled.

Connecting Directly to Serial Ports

For ports that have been configured with the SSH access service, you can connect directly to a port and start a session, bypassing the chooser, by using one of the four conventions described in the following:

Convention	Example

Use a network client to connect to the service network Base Port + serial port number.	`# SSH to serial port 1 by TCP port`
	`ssh -p 3001 -l operator 70.33.235.190`
	In this example, the SSH base port is TCP port 3000, so SSH to TCP port 3001 directly connects you to serial port 1

SSH to the Opengear device, log in adding :portXX to your username (e.g. root:port01 or operator:port01)	`# SSH to serial port labelled Router` `ssh -l operator:Router 70.33.235.190`
SSH to the Opengear device, log in adding the :port-label to your username (e.g. root:Router or operator:Router)	`# SSH to serial port 1 by port name` `ssh -l operator:port01 70.33.235.190`
Configure per-port IP aliases	

Note: For additional reading on connecting to serial ports see:

https://opengear.zendesk.com/hc/en-us/articles/216373543-Communicating-with-serial-port-connected-devices

Note: Serial ports in the Local Console and Disabled ports modes are not available for SSH connection.

Feature Persist

If the device has an active console session after closing pmshell, connecting to the device again will resume the session and you are not prompted for the device password.

Properties and Settings

Property	Definition/Range
Serial Port Delimiter	A character that separates the User name and port selection information. The default value is the + character. *Default is '+', maximum length is 1.* *The prohibited characters are '\', '"', '`', ' ', '=' and '#'.* **Source: schema** required ssh_delimiter: string (default = "+"; minimum = 1; maximum = 1; validator = ("ssh_url_

	delimiter")),
	Source: validator
	if (strlen(v) != 1) valid = 0;
	else if (v[0] == '\'') valid = 0;
	else if (v[0] == '"') valid = 0;
	else if (v[0] == '`') valid = 0;
	else if (v[0] == ' ') valid = 0; // breaks sshd_config
	else if (v[0] == '=') valid = 0; // breaks sshd_config
	else if (v[0] == '#') valid = 0; // breaks sshd_config
	else if (!isprint(v[0])) valid = 0;
	else {
	valid = 1;
	}

Port Number for Direct SSH Links	This port number will be used for direct SSH links on the serial ports page. Set this option if you have configured SSH to be reachable on a non-standard port.
Max Startups Start	The number of connections pending authentication before new connections *begin* to be refused. *Required start: int (minimum = 1; default = 10)*

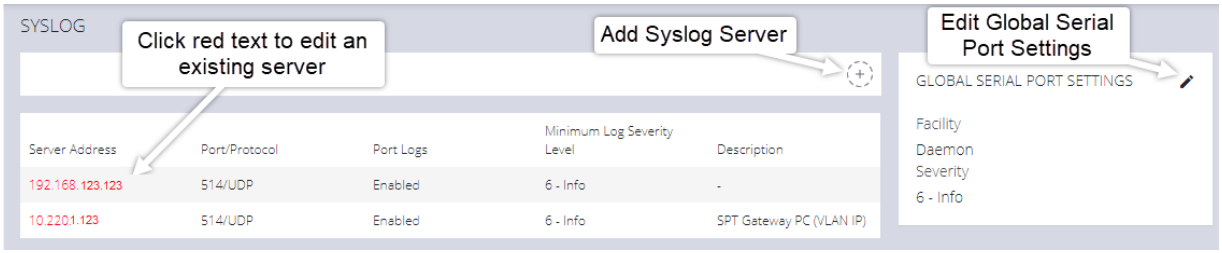
Max Startups Full	The number of connections pending authentication before *all* new connections are refused. *Required full: int (minimum = 1; default = 100)*
Max Startups Rate	This is the percentage rate at which new connections are refused once the Max Startups value is reached. The rate is increased to 100% at Max Startup Full. *Required rate: int (minimum = 1; maximum = 100; default = 30),* *The rate at which connections are refused randomly begins at max startup rate and increases linearly until the number of connections pending authentication reach max startups full, in which case 100% of new connections are refused.*
Unauthenticated Access to Serial Ports	This is the feature Enable/Disable button.

Syslog

CONFIGURE > SERVICES > Syslog

Administrative users can specify multiple external servers to which the Syslog can be exported via TCP or UDP. There is a drop-down on each serial port to enable the logging and to define the “scope” of logging.

The Syslog page lists any previously added external syslog servers. See also "Remote Syslog" on page 147.



Add a New Syslog Server

> **Note:** The combination of server address, protocol and port should be unique. There can be no duplicates. However, the same server could be used if the other entry is an IPv6 address to the same Syslog server.

Use the following procedure to add a new Syslog Server.

1. Navigate to **CONFIGURE > SERVICES > Syslog**.
2. Click the **Add Syslog Server** button. The **Add Syslog Server** form opens.
3. In the **Description** field, add a suitable description that will help to identify the new server.
4. Enter the **Server Address**.
5. Click the **Protocol** switch to select either **UDP** or **TCP**.

6. Enter the correct **Port**. If no port is entered, UDP defaults to port 514 and TCP defaults to 601.
7. From the drop-down list, select the required severity level to be logged, eight levels of log severity are supported.

   Note: This configuration acts as a filter, such that any log equivalent or higher will be sent to the remote Syslog server.

8. Click **Add** to complete the process.

Global Serial Port Settings

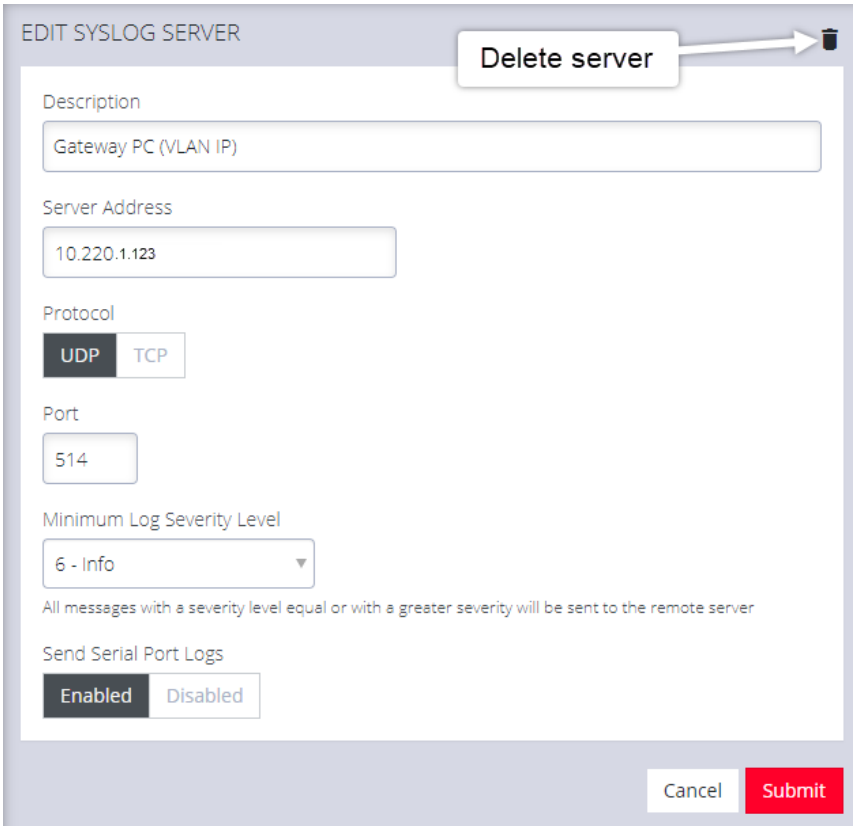
Global Serial Port Settings will define the Facility used and the Severity of all Syslog serial port activity sent from this node. There are two setting functions, Facility, and Severity. From the drop-down menus, select the preferred Facility and Severity as required.

For definitions of Facility and Severity, see "Syslog Facility Definitions" on page 150 and "Syslog Severity Definitions" on page 151.

Edit or Delete an Existing Syslog Server

To edit an existing syslog server, click the hyperlinked **Red Text** server name in the server list (see the Syslog page image on the previous page). Make the required changes, then click the **Submit** button.

Delete a server by clicking the Delete icon at the top-right of the **Edit Syslog Server** page.



Remote Syslog

Configure > Services > Syslog

Configure > Services > Syslog > Create Syslog Server

Configure > Services > Syslog > Edit Syslog Server

Configure > Services > Syslog > Global Serial Port Settings

Configure > Serial Ports > Edit Serial Port

The Remote Syslog facility provides the flexibility to specify a Remote Syslog server so that you can redirect console serial port logs to the Remote Syslog server so as to provide a central (and regional) repository where you can view the port-related activity. When remote logs are being received, local logs continue to be recorded.

Devices in a network can produce thousands of log entries; due to the number of logs occurring each hour, users demand the ability to configure the facility and severity for console port logs. The Remote Syslog collector can be configured so as to categorize and prioritize the logs appropriately thus allowing you to easily identify issues as they arise.

The Remote Syslog server provides the flexibility to:

- Analyze logs centrally.
- Monitor for suspicious activities.
- Collect and view analytics (for example, Splunk).

Remote Syslog Requirements

IP address of syslog server

Syslog server port number

Remote Syslog Server Logging Levels

Local Log Level limits the Syslog information being logged. Any log entry with a value equal or greater than the level specified in the config is sent to the remote server.

Port Logging Levels

1. Navigate to the **Serial Ports** page and enable port logs through the serial port (**Configure > Serial Ports**)
2. For the serial port number you have selected, click the **Edit Serial Ports** button in the **Actions** column.
3. Navigate to **Logging Settings** and select the required logging level.
4. Click the **Apply** button. The change will be applied within a few seconds.

Global Serial Port Settings

Navigate to: Configure > Services > Syslog > Global Serial Port Settings

1. In the **Global Serial Ports** tab
    i. Select the required Facility.
    ii. Select the required Severity.

    > **Note:** See the tables below for definitions of **Facility** and **Severity** .

2. Click the **Update** button and wait for the update confirmation banner:

The Syslog will log only those entries of the nominated event type.

Edit or Delete an Existing Syslog Server

Configure > Services > Syslog > Edit Syslog Server

1. In the Configure > Services > Syslog tab click on the **IP address** of the target server. The **Edit Syslog Server** tab is opened for editing.
2. You can delete a server by clicking the **Delete** button at the top right of the Edit tab page.

Create Syslog Server Tab - Field Definitions

Configure > Services > Syslog > Create Syslog Server

Field	Definition
Description	Unique, familiar text description or name given to this syslog server that users will recognize.
Server Address	The IP address of the remote syslog server you are using for logging.
Protocol	Click to select the required protocol for data transmission to the syslog server.
Port	The Remote Syslog Server IP address.
Minimum Log Severity Level	Log entries with a value equal or greater than the level specified are sent to the remote server.
Send Serial Port Logs	Click to enable serial port logging.
Create Button	Click to initiate the remote syslog, wait for confirmation banner.

Syslog Facility Definitions

Facility	Definition
Kern	Kernel messages
User	User-level messages
Mail	Mail system
Daemon	System daemons
Auth	Security/authentication messages
Syslog	Messages generated internally by syslogd
lpr	Line printer subsystem
News	Network news subsystem
uucp	UUCP subsystem
Cron	Clock daemon
Authpriv	Security/authentication messages
ftp	FTP daemon
Local	Locally used facilities

Syslog Severity Definitions

Severity	Definition
0- Emergency	System is unusable.
1 - Alert	Action must be taken immediately.
2 - Critical	Critical conditions.
3 - Error	Error conditions.
4 - Warning	Warning conditions.
5 - Notice	Normal but significant conditions.
6 - Info	Informational messages
7- Debug	Debug-level messages

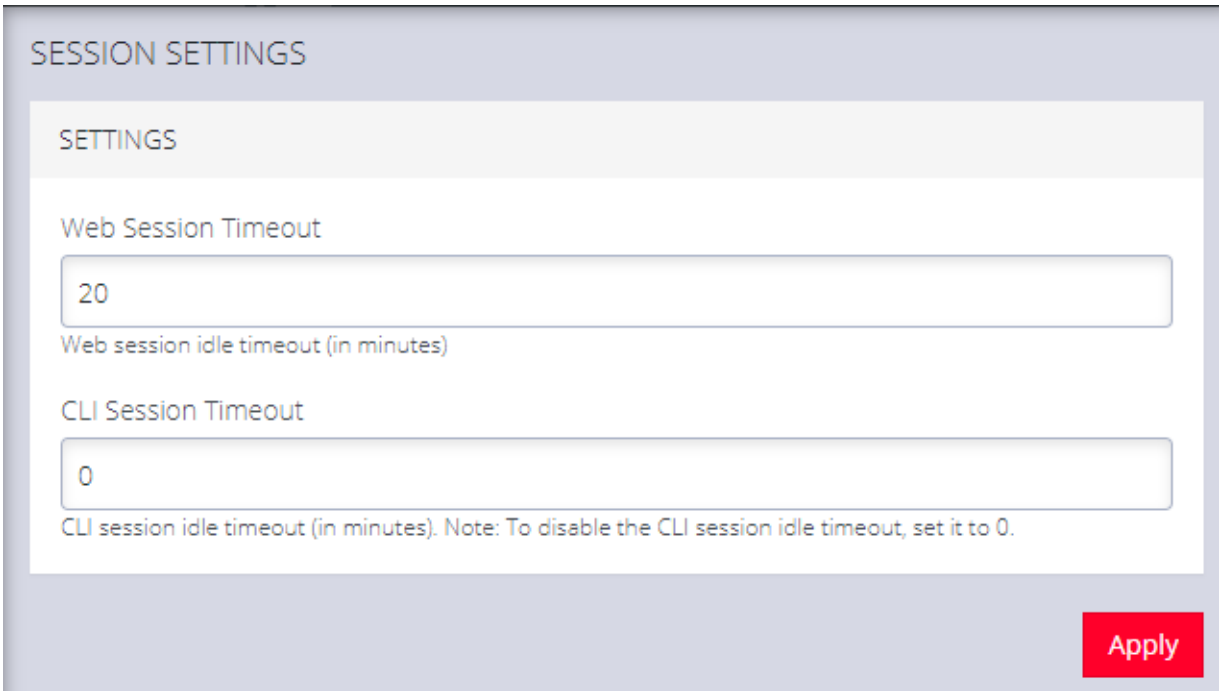
Session Settings

SETTINGS > SERVICES > Session Settings

To modify Web GUI and CLI session settings navigate to the **SETTINGS > Services > Session Settings** page.

- **Web GUI Session Timeout**: This value can be set from 1 to 1440 minutes.
- **CLI Session Timeout:** This value can be set from 1 to 1440 minutes or set it to 0 to disable the timeout. Changes take effect the next time at the next login via the CLI.

When completed, click the **Apply** button to save the settings.



Firewall

CONFIGURE > FIREWALL

In the **CONFIGURE > FIREWALL** menu you can configure:

- **Firewall Management**
- **Interzone Policies**
- **Services**

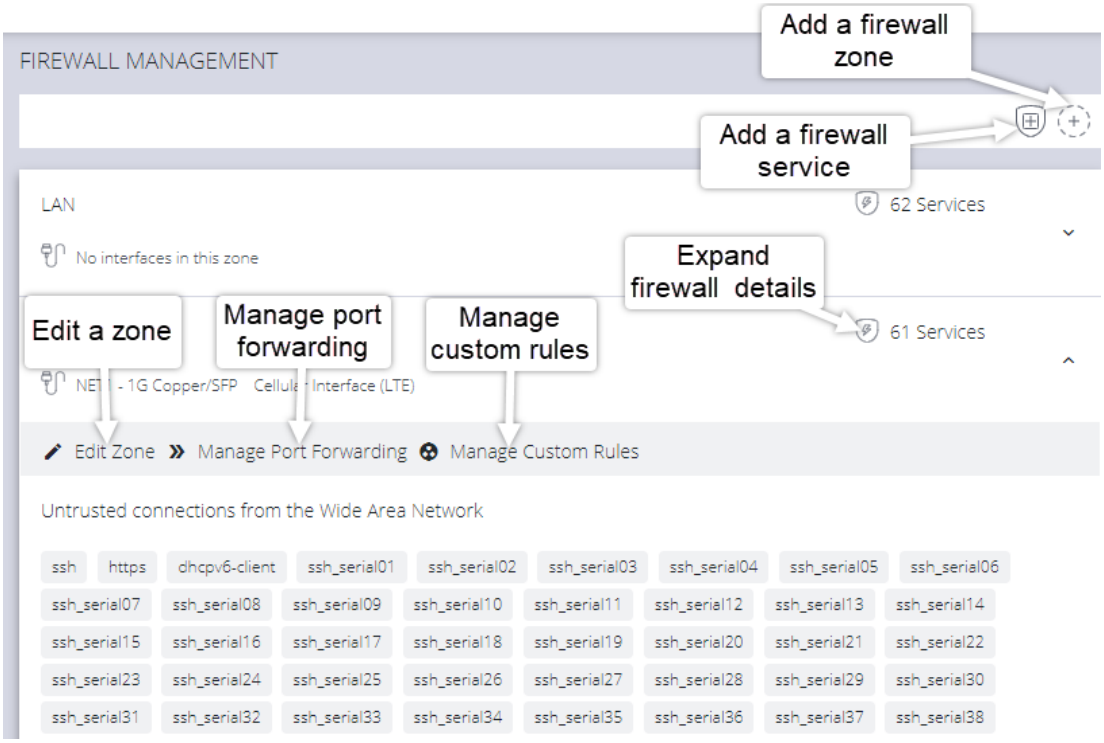
Firewall Management

CONFIGURE > FIREWALL > Management

Navigate to the Firewall Management page, **CONFIGURE > FIREWALL > Management**, from here you can:

- Add a new firewall zone.
- Add a firewall service.
- Edit a firewall zone - manage the zone setup.
- Manage port forwarding.
- Manage custom rules for firewalls.

Firewall Management Main Page



Firewall Zone Settings

To change firewall management settings navigate to **CONFIGURE > FIREWALL > Management**.

You can inspect details of any zone by clicking the **Expand** icon to the right of the zone. Once expanded, you can click **Edit Zone** to change settings for a particular zone.

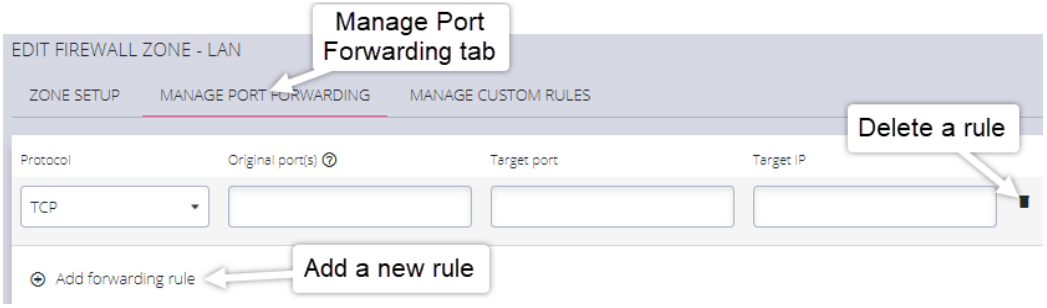
The **Edit Zone** page has three tabs. The **ZONE SETUP** page allows you to:

- Modify the Name of the zone.
- Add a Description for this zone.
- Permit all Traffic.
- Masquerade Traffic.
- Select Physical Interfaces.
- Manage Permitted Services by clicking on Plus or Minus next to each.

> **Tip:** You can use the **Filter Interfaces** and **Filter Available Services** text boxes to limit the list content that is displayed.

Port Forwarding

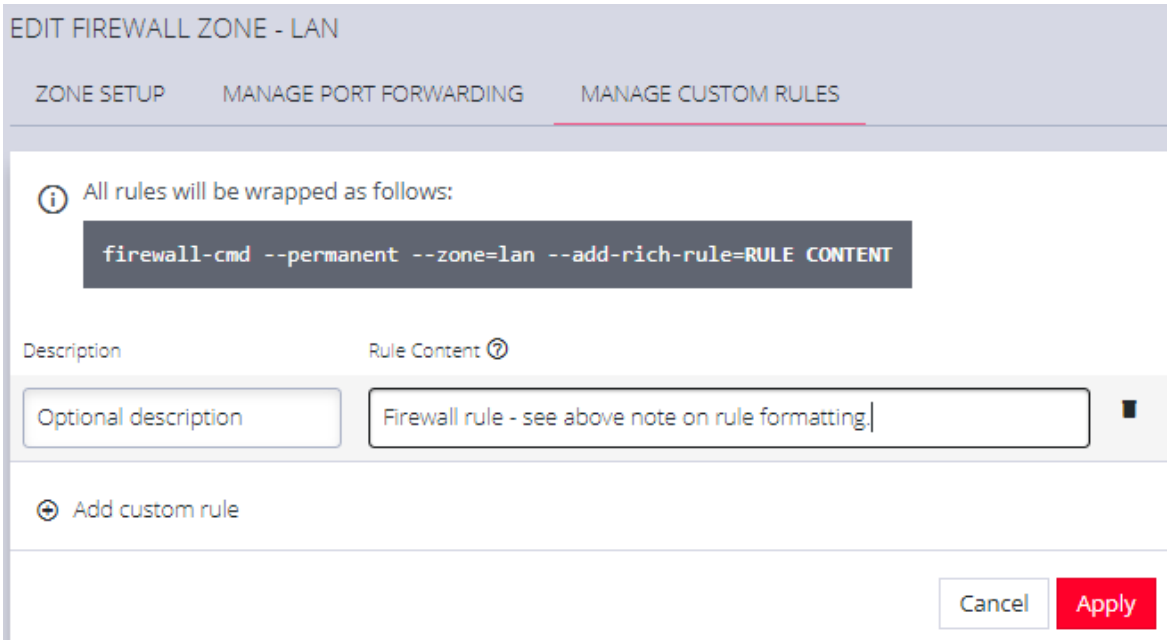
The **MANAGE PORT FORWARDING** tab allows you to add, edit, and delete forwarding rules for the particular zone you are editing.



Manage Custom Rules

The third tab, **MANAGE CUSTOM RULES**, allows you to add, edit , and delete custom firewall rules for the zone you are editing. These custom rules continue to exist after reboots, upgrades, and power cycles.

These rules are prioritized by the order they are added.



To add a new custom rule:

1. Click **Add custom rule**.
2. Enter an optional description for this rule.
3. Enter the rule content, custom rule content formatted with firewall-cmd syntax.
4. Click **Apply**.

> **Note:** All rules will be wrapped as follows:
> firewall-cmd --permanent --zone=lan --add-rich-rule=RULE CONTENT

Interzone Policies

CONFIGURE > FIREWALL > Interzone Policies > Create Interzone Policy

In the Operations Manager, Interzone firewall policy is implemented through Firewalld; this is a zone-based firewall which allows you to define zones and create rules to manage the traffic between the zones.

The firewalld feature provides a dynamically managed firewall with support for network/firewall “zones” to assign a level of trust to a network and its associated connections, interfaces or sources.

The feature allows you to define policies to configure forwarding between zones and can be configured to allow directional forwarding from one or more ingress zones to one or more egress zones.

Rules and filtering may be applied at the zone level. When you add a zone, you select which services are part of that zone. Interzone policy allows these rules and filtering to be applied so as to control the type of traffic allowed to be forwarded.

The default policy, ie. when no zones are added, is that no traffic is forwarded.

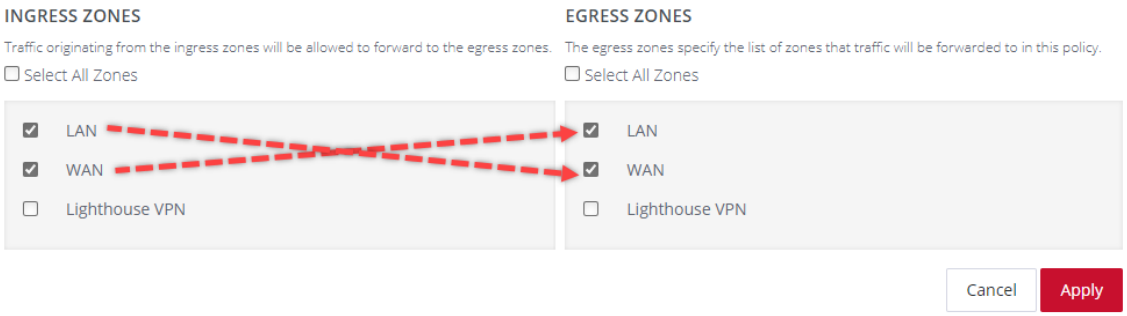
Create an Interzone Policy

CONFIGURE > FIREWALL > Interzone Policies > New Interzone Policy

1. Navigate to the **Interzone Policies** page: CONFIGURE > FIREWALL > Interzone Policies.
2. Click the **Add Firewall Policy** button , the **New Interzone Policy** page opens for editing.
3. In the **Name** field, enter a name that clearly identifies this policy instance to other users.

4. In the **Description** field provide a detailed description of this interzone policy (optional).
5. Click to check the boxes for each Ingress and Egress zone that is to be included in this policy. You can configure traffic in both directions by selecting both zones in the Ingress and Egress as in indicated by the red arrows in the image below:

Two Directional Traffic Interzone Policy:

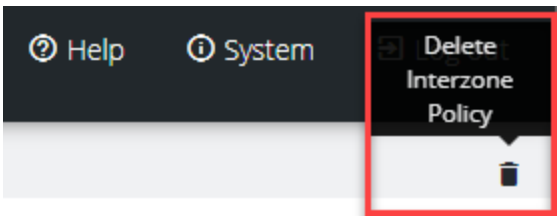


> **Note:** Additional zones may be added to the zones list at: CONFIGURE > FIREWALL > Management > New Firewall Zone.
> Zone customized rules may be edited at CONFIGURE > FIREWALL > Management > Firewall Management.

6. Click the **Apply** button to implement the policy, a green banner will inform you that the policy details are saved successfully. The interzone policy is now in force.

Edit or Delete an Interzone Policy

CONFIGURE > FIREWALL > Interzone Policies > Edit Interzone Policy

1. Navigate to the **Interzone Policies** page: CONFIGURE > FIREWALL > Interzone Policies.
2. Click the name of the policy you wish to edit (editable policies are identified by red text). The **Edit Interzone Policy** page opens for editing.
3. Edit the policy details to be changed.
4. If necessary, change the the **Description** field to provide a detailed description of the edited interzone policy.
5. To **delete** a policy, click on the **Bin** widget in the top-right corner of the **Edit** page.
6. 

7. Click the **Apply** button to implement the edited policy, a green banner will inform you that the policy details are saved successfully. The edited interzone policy is now in force.

Customized Zone Rules

Customized zone rules may be applied to any zone at CONFIGURE > FIREWALL > Management > Firewall Management: "Firewall Management" on page 154.

Firewall

CONFIGURE > FIREWALL

In the **CONFIGURE > FIREWALL** menu you can configure:

- **Firewall Management**
- **Interzone Policies**
- **Services**

Date & Time

CONFIGURE > DATE & TIME

The Date & Time section of the navigation bar provides a means to

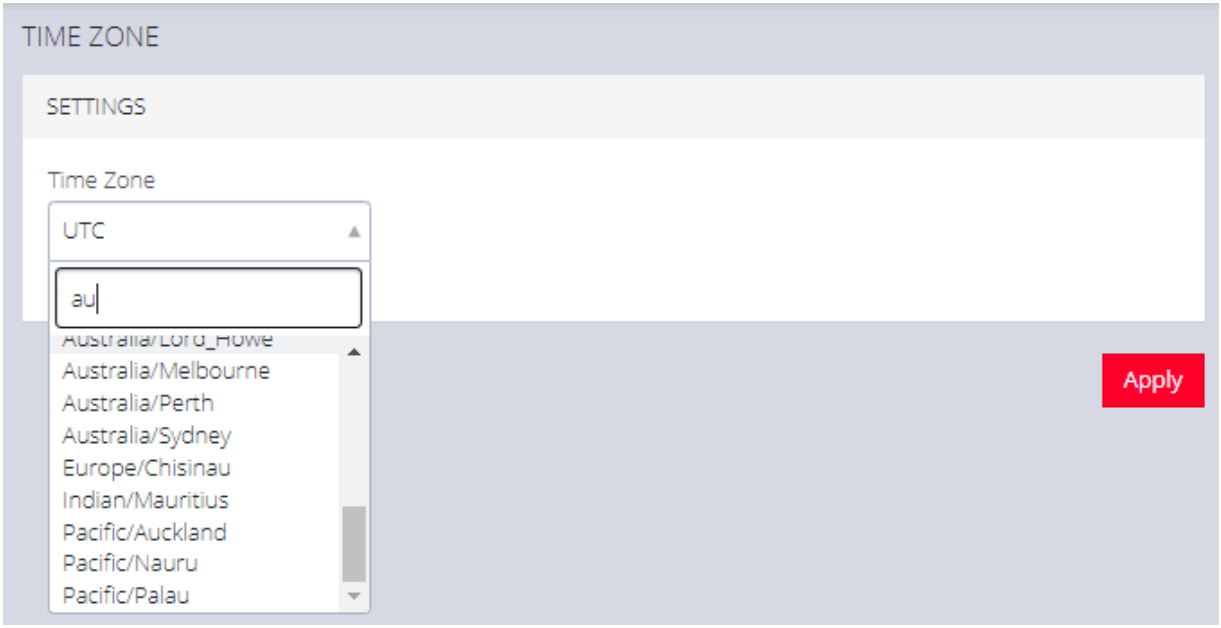
- Set the time zone
- Manually set the correct time and date
- Automatically set the date and time

Time Zone

CONFIGURE > DATE & TIME > Time Zone

To set the time zone:

1. Navigate to the **CONFIGURE > DATE & TIME > Time Zone** page.
2. Select the Operations Manager's time-zone from the **Time Zone** drop-down list. A filter is provided to make selection easier.
3. Click **Apply**.

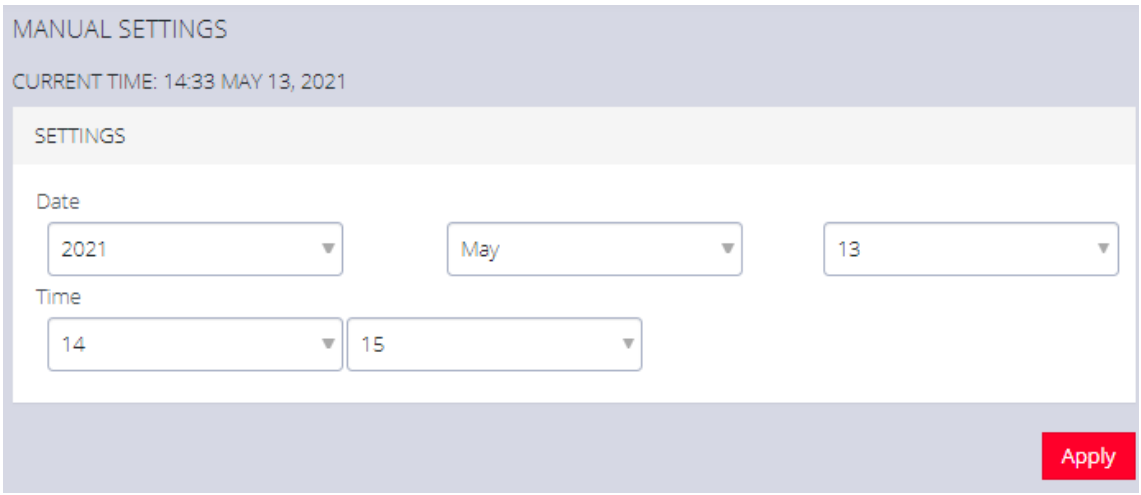


Manual Settings

CONFIGURE > DATE & TIME > Manual Settings

To manually set the correct time and date:

1. Click **CONFIGURE > DATE & TIME > Manual Settings**.
2. Enter the current **Date** and **Time**.
3. Click **Apply**.



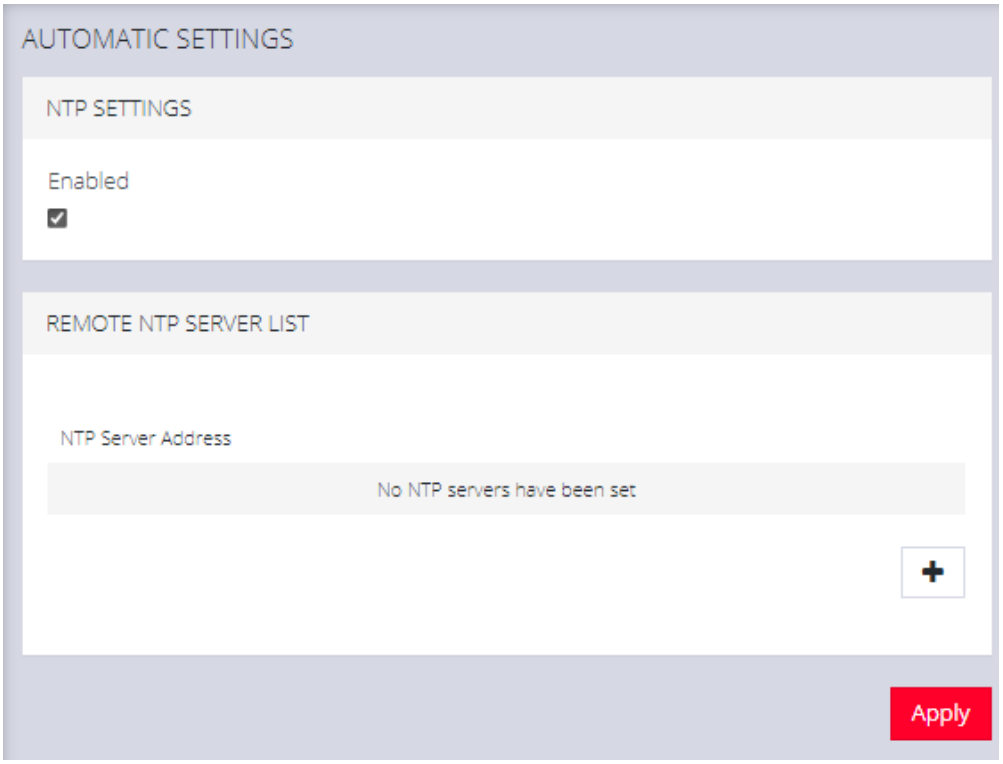
Note: When Automatic time setting is enabled, the manual settings are ignored and only automatic settings are applied. Devices enrolled in Lighthouse must be on the same time zone.

Automatic Settings

CONFIGURE > DATE & TIME > Automatic Settings

Automatic Setting of the date and time:

1. Click **CONFIGURE > DATE & TIME > Automatic Settings**.
2. Click the **Enabled** checkbox.
3. Enter a working NTP Server address in the **NTP Server Address** field.
4. Click **Apply**.



Note: When Automatic time setting is enabled, the manual settings are ignored and only automatic settings are applied. Devices enrolled in Lighthouse must be on the same time zone.

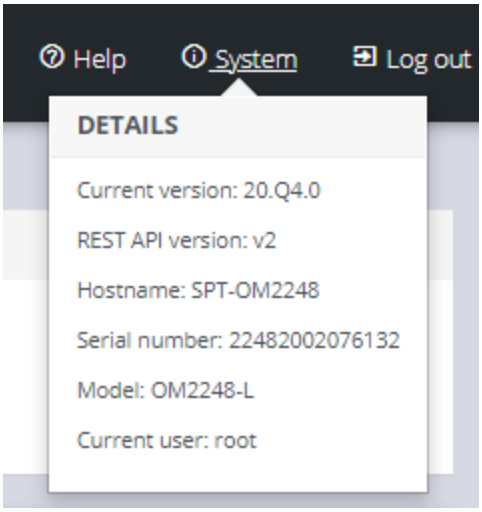
System

CONFIGURE > SYSTEM

The **CONFIGURE > SYSTEM** menu lets you change the Operations Manager host-name, perform system upgrades, and reset the system.

Check System Details

To ascertain current system details click on the System link at the top-right of the OM window.

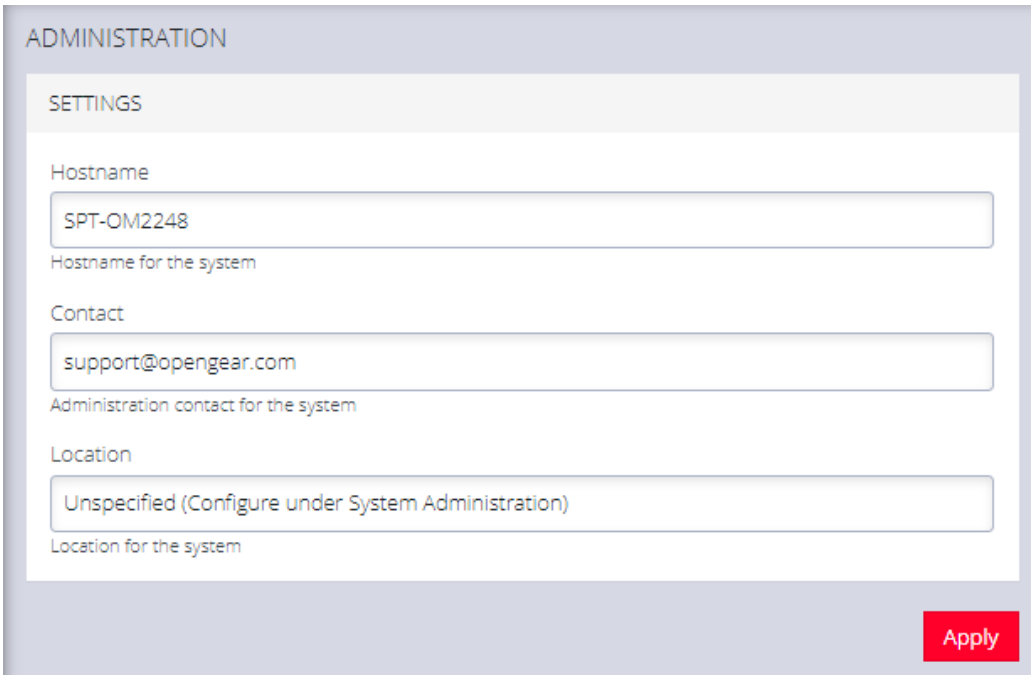


Administration

CONFIGURE > SYSTEM > Administration

To set the hostname, add a contact email, or set a location for the OPERATIONS MANAGER:

1. Click **CONFIGURE > SYSTEM > Administration**.
2. Edit the **Hostname** field.



3. Click **Apply**, the new settings are saved.

Factory Reset

CONFIGURE > SYSTEM > Factory Reset

You can perform a factory reset, where logs and docker containers are preserved and everything else is reset to the factory default.

To return the OPERATIONS MANAGER to its factory settings:

1. Select **CONFIGURE > SYSTEM > Factory Reset**.
2. Read the Factory Reset warning notice.

   Warning: This will delete all configuration data from the system and reset all options to the factory defaults. Any custom data or scripts on the device will be lost. Please check the box below to confirm you wish to proceed.

3. If you still wish to proceed with the reset, Select the **Proceed with the factory reset** checkbox.
2. Click **Reset**.

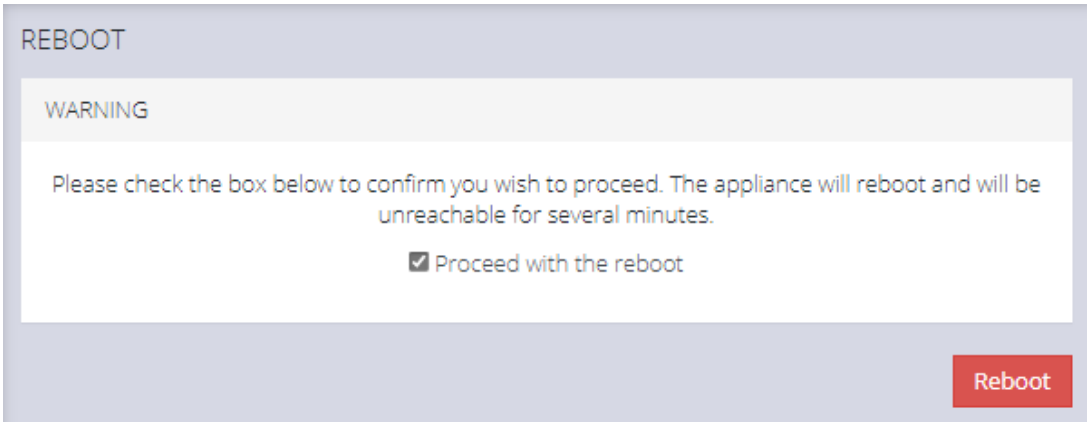
   Warning: This operation performs the same operation as the hard factory erase button. This resets the appliance to its factory default settings. Any modified configuration information is erased. You will be prompted to log in and must enter the default administration username and administration password (Username: root Password: default). You will be required to change this password during the first log in.

Reboot

CONFIGURE > SYSTEM > Reboot

To reboot the OPERATIONS MANAGER:

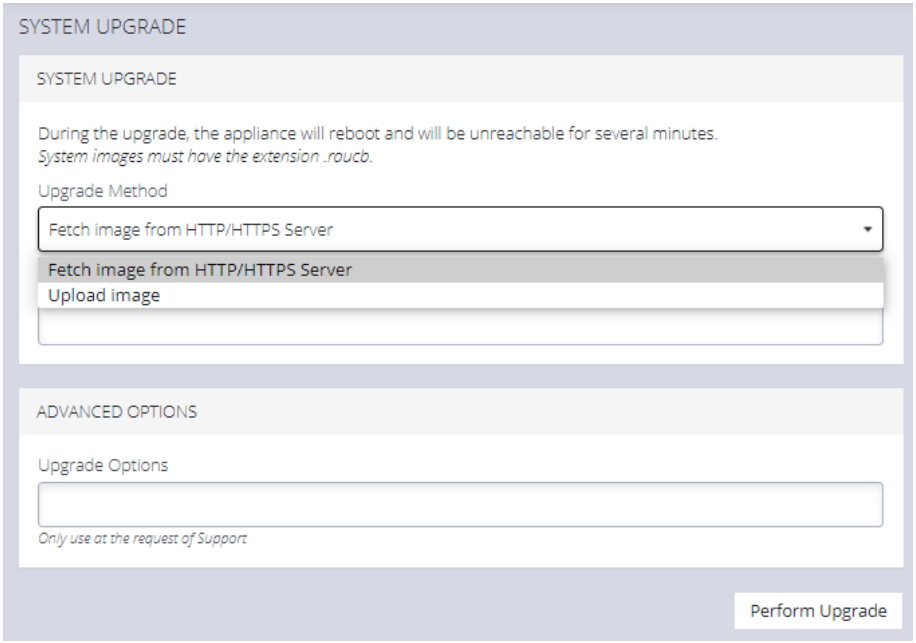
1. Navigate to **CONFIGURE > SYSTEM > Reboot**.
2. Select **Proceed with the reboot**,
3. Click **Reboot**.



System Upgrade

CONFIGURE > SYSTEM > System Upgrade

You can perform a system upgrade when new firmware is released. After specifying the location of the firmware and beginning the upgrade process, the system will unavailable for several minutes and then reboot. Unlike a factory reset, users, and other configuration data is maintained after the upgrade.



To perform a system upgrade:

1. Navigate to the **CONFIGURE > System > System Upgrade** page.
2. Select the **Upgrade Method,** either **Fetch image from HTTP/HTTPS Server** or **Upload Image**.

Continued...

Upgrade Via Fetch From Server

If upgrading via **Fetch image from HTTP/HTTPS Server**:

1. Enter the URL for the system image in the **Image URL** text-entry field.
2. Click **Perform Upgrade**.

Upgrade Via Upload

If upgrading via **Upload Image**:

1. Click the **Choose file** button.
2. Navigate to the directory containing the file.
3. Select the file and press **Return**.
4. Click **Perform Upgrade**.

> **Note:** The **Advanced Options** section should only be used if a system upgrade is being performed as part of an Opengear Support call.

Once the upgrade has started, the System Upgrade page displays feedback as to the state of the process.

SNMP

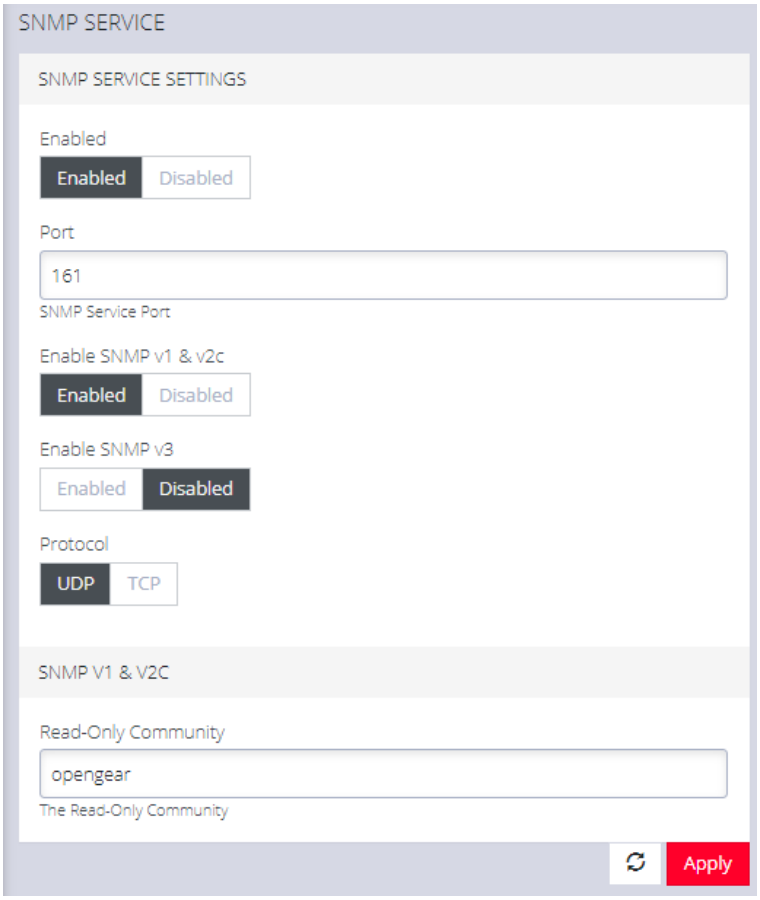
CONFIGURE > SNMP

The **CONFIGURE > SNMP** menu has two options, **SNMP Service** and **SNMP Alert Managers**.

SNMP Service

CONFIGURE > SNMP > SNMP Service

Navigate to the **CONFIGURE > SNMP > SNMP Service** to open the **SNMP Service** page.



SNMP Service allows you to specify which SNMP services to enable. When you click on **ENABLED** for **SNMP V1 & V2** or **SNMP V3**, a detail form appears where you can add service specific settings.

You can also specify the **SNMP Service Port** and choose between **UDP** or **TCP** for the **Protocol**.

SNMP Alert Managers

CONFIGURE > SNMP > SNMP Alert Managers

Navigate to **CONFIGURE > SNMP > SNMP Alert Managers** to open the **SNMP Alert Managers** page.

See the "Multiple SNMP Alert Managers" on the next page feature for information about configuring more than one SNMP manager.

On this page, you can set the following:

- **Address**: The IPv4 Address or domain name of the computer acting as the SNMP Manager.
- **Version**: The version of SNMP to use. The default is v2c.
- **Port**: The listening port used by the SNMP Manager. The default value is 162.
- **Manager Protocol**: The transport protocol used to deliver traps to the SNMP Manager. The default value is UDP.
- **SNMP Message Type**: The type of SNMP message to send to the SNMP manager. The INFORM option will receive an acknowledgment from the SNMP manager and will retransmit if required. The TRAP option does not expect acknowledgments.

For SNMP V1 & V2C, you can specify a **Community**. This is a group name authorized to send traps by the SNMP manager configuration for SNMP versions 1 and 2c. This must match the information that is setup in the SNMP Manager. Examples of commonly used values are log, execute, net and public.

Multiple SNMP Alert Managers

CONFIGURE > SNMP > SNMP Alert Managers > Add New SNMP Alert Manager

The Multiple SNMP Alert Managers feature provides the option to configure more than one SNMP manager. Multiple SNMP Alert Managers can receive trap and inform events that can be used to trigger remedial action; events can be sent to multiple SNMP Alert Managers. The AR functionality sends traps to all configured SNMP Alert Managers for a reaction of type SNMP. Whether you input an IPv6 address or a domain name, the correct protocol needs to be selected.

Create or Delete an SNMP Manager

To create a new SNMP manager:

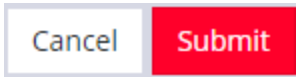
1. Navigate to **Configure > SNMP > SNMP Alert Managers**.
2. Click the **Add New SNMP Manager** button (a plus character in the top-right of the window)
3. Complete the new **SNMP Alert Manager Form** as per the **Definitions** table below.
4. Click the **Submit** button. A banner appears confirming that the new SNMP Manager has been successfully created.
5. The new manager appears in the list of SNMP Alert Managers.
6. To delete an SNMP manager, click on the IP address of the item to open the **Edit SNMP Manager** page for that SNMP Manager.
7. Click on the **Delete SNMP Manager** widget in the top-right of the page.

Note: If you would like to use an IPv6 Address, then you need to select either UDP6 or TCP6 from the list of protocols. Whether you input an IPv6 address or a domain name, the correct protocol needs to be selected.

Note: For SNMP V3 TRAPS, an Engine ID will be provided by default if none is specified. This is generated by the snmpd service and can be found in the SNMPD RUNTIME CONF /var/lib/net-snmp/snmpd.conf. Traps will be sent for Alerts added in **Configure > SNMP Alerts.** Traps will also be sent to all the configured SNMP Alert Managers for a Playbook SNMP Reaction.

New SNMP Alert Manager Page Definitions

New SNMP Alert Manager Field	Definition
Description	The editable Description field allows you to add a description of the SNMP Alert Manager.
Server Address	The IPv4/IPv6 address or domain name of the computer acting as the SNMP Alert Manager.
Port	The listening port used by the SNMP Alert Manager. The default value is 162.
Protocol	The transport protocol used to deliver traps or informs (for SNMP v3). UDP - Speeds up transmissions by enabling the transfer of data before an agreement is provided by the receiving party. TCP - A commonly used protocol used to transmit data from other higher-level protocols that require all transmitted data to arrive. UDP6 - Similar to UDP but uses IPv6. TCP6 - Similar to TCP but uses IPv6.

Version	The version of SNMP protocol to use. The default value is v2c. For further reading on SNMP versions we suggest: https://en.wikipedia.org/wiki/Simple_Network_Management_Protocol#Protocol_versions
SNMP V1 & V2C Community	A group name authorized to send traps by the SNMP alert manager configuration for SNMP versions 1 and 2c. This will need to match what is setup in the SNMP alert manager. Examples of commonly used values are log, execute, net and public.
	Click the **Submit** button to finalize the New SNMP Manger process.
	Click the bin widget to **Delete** an SNMP Manager (in the Edit SNMP Manager page).

Advanced Options

The OPERATIONS MANAGER supports a number of command line interface (CLI) options and REST API.

address : Primary Lighthouse address to enroll with

api_port : Optional port to use for the primary address when requesting enrollment

external_endpoints : List of additional "address:port" endpoints to fall back to when enrolling

password : LH global or bundle enrollment password

bundle : Name of LH enrollment bundle

Communicating With The Cellular Modem

Interfacing with the cellular modem is currently only available via CLI.

Usage:

`mmcli [OPTION?]` - Control and monitor the ModemManager

Options:

-h, --help	Show help options
--help-all	Show all help options
--help-manager	Show manager options
--help-common	Show common options
--help-modem	Show modem options
--help-3gpp	Show 3GPP related options
--help-cdma	Show CDMA related options
--help-simple	Show Simple options
--help-location	Show Location options
--help-messaging	Show Messaging options
--help-voice	Show Voice options

--help-time	Show Time options
--help-firmware	Show Firmware options
--help-signal	Show Signal options
--help-oma	Show OMA options
--help-sim	Show SIM options
--help-bearer	Show bearer options
--help-sms	Show SMS options
--help-call	Show call options

Application Options:

`-v, --verbose` Run action with verbose logs

`-V, --version` Print version

`-a, --async` Use asynchronous methods

`--timeout=[SECONDS]` Timeout for the operation

OGCLI Guide

The Operations Manager employs an API-first approach, so all configuration tasks are brokered via its RESTful API. The Web GUI and ogcli tool are convenient clients of this API. The ogcli allows you to inspect and modify the configuration tree from the command line.

Commands For Exploring ogcli Usage

Note: Double-quotes around strings should be protected from the shell. For single quotes use the dedicated quotes key, do not use the shared Tilde key, for example:

```
'password="mypass"' and NOT `password="mypass"'
```

The ogcli features tab completion to assist when typing commands. Additionally, extensive help is available by running commands that you can try out, for example:

```
####### ogcli #######
ogcli --help = show this help message then exit
ogcli --usage = show usage examples then exit
ogcli --notation = show the simple notation reference
then exit
ogcli --list-endpoints = list all the endpoints
ogcli help <endpoint> = show help information for this
endpoint
-d = increase debugging (up to 2 times)
```

```
####### ogcli (continued) #######-j = use JSON instead
of simple notation (for coloured, structured print out-
put).
-u USERNAME, --username USERNAME = authenticate as a dif-
ferent user
-p PASSWORD, --password PASSWORD = authenticate with the
supplied password
```

ogcli Sub Commands

```
####### sub-command operations #######
get (g) fetch a list or item
replace (r) replace a list or item
update (u) update an item
merge (m) merge a provided list with existing config
create (c) create an item
delete (d) delete a list or item
help (h) help for an endpoint
export (e) export the existing configuration
import (i) import the existing configuration
```

Commonly Used ogcli Commands

```
####### Replace MOTD displayed at log in #######
ogcli replace banner 'banner="DESIRED MESSAGE HERE"'
```

```
####### Retrieve items #######
ogcli get user <username> > record
```

####### Replace items #######

Modify items:

```
ogcli update user <username> < partial_record
```

For fields where the value is a string:

```
ogcli update user <username> 'field="value"'
```

For fields where the value is not a string, e.g. to enable/disable a user:

```
ogcli update user <username> field=value
```

####### Create items #######

```
Ogcli create user <username>
```

####### Delete items #######

```
ogcli delete user <username>
```

####### Merge items in a list #######

```
ogcli merge syslog_servers < list of records
```

####### Export all config #######

```
ogcli export [/path/to/file]
```

```
####### Import config #######
ogcli import [/path/to/file]
ogcli import < [/path/to/file]
```

ogcli takes records from stdin so a variety of options are available when passing records.

```
####### Create user #######
ogcli create user << 'END'
 description="superuser"
 enabled=true
 groups[0]="admin"
 no_password=true
 username="root"
END

echo 'username="root"
description="superuser"
no_password=false
password="mysecretpass"' | ogcli
create user
```

ogcli takes records from stdin so a variety of options are available. ogcli also takes records from any additional command line arguments.

Configuration Task Examples in ogcli

These examples contain a variety of notations and usage patterns to help illustrate the flexibility of ogcli. The examples can be copied and pasted into the CLI.

```
####### Change root password #######
sudo ogcli update user root 'password="oursecret"'
```

```
####### Create admin user #######
sudo ogcli create user <<'END'
 username="adal"
 description="Ada Lovelace"
 enabled=true
 no_password=false
 groups[0]="groups-1"
 password="oursecret"
END
```

```
####### Manually set date and time #######
sudo ogcli update system/timezone 'timezone-
e="America/New_York"'
sudo ogcli update system/time 'time="15:30 Mar 27,
2020"'
```

```
####### Enable NTP #######
sudo ogcli update services/ntp <<'END'
 enabled=true
 servers[0].value="0.au.pool.ntp.org"
END
```

```
####### Set system hostname #######
sudo ogcli update hostname 'hostname="oob01"'
```

```
####### Adjust session timeouts #######
sudo ogcli update system/cli_session_timeout 'timeout-
t=180'
sudo ogcli update system/webui_session_timeout 'timeout-
t=180'
```

```
####### Setup TACACS remote AAA #######
sudo ogcli update auth <<'END'
 mode="tacacs"
 tacacsAuthenticationServers[0].host name-
e="192.168.250.21"
 tacacsMethod="pap"
 tacacsPassword="tackey"
END
```

```
####### Setup RADIUS remote AAA #######
sudo ogcli update auth <<'END'
 mode="radius"
 radiusAuthenticationServers[0].host-
name="192.168.250.21"
 radiusAccountingServers[0].hostname="192.168.250.21"
 radiusPassword="radkey"
END
```

```
####### Create user group with limited access to
console ports #######
sudo ogcli create group <<'END'
 description="Console Operators"
 groupname="operators"
 role="ConsoleUser"
 mode="scoped"
 ports[0]="ports-10"
 ports[1]="ports-11"
 ports[2]="ports-12"
END
```

```
####### View and configure network settings #######
sudo ogcli get conns
sudo ogcli get conn system_net_conns-1

sudo ogcli update conn system_net_conns-1 'ipv4_static_
settings.address="192.168.0.3"'

sudo ogcli create conn <<'END'
 description="2nd IPv4 Static Address Example"
 mode="static"
 ipv4_static_settings.address="192.168.33.33"
 ipv4_static_settings.netmask="255.255.255.0"
 ipv4_static_settings.gateway="192.168.33.254"
 physif=”net1”
END
```

```
####### Set up serial console ports #######
sudo ogcli get ports
sudo ogcli get ports | grep label
sudo ogcli get port ports-1

sudo ogcli update port "serial/by-opengear-id/port05"
<<'END'
 mode="consoleServer"
 label="Router"
 pinout="X2"
 baudrate="9600"
 databits="8"
 parity="none"
 stopbits="1"
 escape_char="~"
 ip_alias[0].ipaddress="192.168.33.35/24"
 ip_alias[0].interface="net1"
 logging_level="eventsOnly"
END
```

```
####### Enable cellular modem #######
sudo ogcli get physifs

sudo ogcli update physif wwan0 <<'END'
 enabled=true
 physif.cellular_setting.apn="broadband"
 physif.cellular_setting.iptype="IPv4v6"
END
```

```
######## Disable cellular modem ##############
sudo ogcli update physif physif wwan0 'enabled=false'
```

```
####### Enable remote syslog #######
sudo ogcli create services/syslog_server 'address-
s="192.168.34.112"'

sudo ogcli create services/syslog_server <<'END'
 address="192.168.34.113"
 protocol="UDP"
 port=514
END
```

```
####### Enable local console boot messages #######
sudo ogcli get managementports

sudo ogcli update managementport mgmtPorts-1 'ker-
neldebug=true'
```

Available Endpoints

Here is the full list of available endpoints that can be used with the ogcli sub-commands:

ENDPOINT	OPERATIONS	ARGS
alerts/authentication	get/replace	
alerts/config_change	get/replace	
alerts/networking	get/replace	
alerts/system	get/replace	
auth	get/replace	
auto_response/beacons	get/merge/delete	
auto_response/beacon	create/get/replace/delete	id
auto_response/reactions	get/merge/delete	
auto_response/reaction	create/get/replace/delete	id
auto_response/status	get	
auto_response/status/beacon-modules	get	

auto_response/status/beacons	get	id
cellfw/info	get	
conns	get/merge	
conn	create/get/replace/delete	id
export	get	
failover/settings	get/replace	
failover/status	get	
firewall/policies	get/merge	
firewall/policy	create/get/replace/delete	id
firewall/predefined_services	get	
firewall/rules	get/merge/delete	
firewall/rule	create/get/replace/delete	id
firewall/services	get/merge	
firewall/service	create/get/replace/delete	id
firewall/zones	get/merge	

firewall/zone	create/get/replace/delete	id
groups	get/merge/replace	
group	create/get/replace/delete	id
ip_passthrough	get/replace	
ip_passthrough/status	get	
ipsec_tunnels	get/merge	
ipsec_tunnel	create/get/replace/delete	id
lighthouse_enrollments	get	
lighthouse_enrollment	create/get/delete	id
logs/portlog	get	id
managementports	get/merge	
managementport	get/replace	id
monitor/lldp/chassis	get	
monitor/lldp/neighbor	get	
pdus	get/merge	

pdu	create/get/replace/delete	id
physifs	get/merge	
physif	create/get/replace/delete	id
ports	get/merge	
port	get/replace	id
port_power	replace	id
port_sessions	get/delete	
port_session	get/delete	idpid
ports/auto_discover/schedule	get/replace	
ports/fields	get	
search/ports	get	
services/https	get/replace	
services/lldp	get/replace	
services/ntp	get/replace	
services/routing	get/replace	

services/snmp_manager	get/replace	
services/snmpd	get/replace	
services/ssh	get/replace	
services/syslog_servers	get/merge	
services/syslog_server	create/get/replace/delete	syslog_ server_id
ssh/authorized_keys	get/merge	
ssh/authorized_key	create/delete	user-idkey-id
static_routes	get/merge/replace/delete	
static_route	create/get/replace/delete	id
system/admin_info	get/replace	
system/banner	get/replace	
system/cell_reliability_test	get/replace	
system/cli_session_timeout	get/replace	
system/firmware_upgrade_status	get	

system/hostname	get/replace	
system/model_name	get	
system/serial_number	get	
system/ssh_port	get/replace	
system/system_authorized_keys	get/merge	
system/system_authorized_key	create/delete	key-id
system/time	get/replace	
system/timezone	get/replace	
system/version	get	
system/webui_session_timeout	get/replace	
users	get/merge/replace	
user	create/get/replace/delete	user-id

Docker

Docker is a tool designed to make it easier to create, deploy, and run applications by distributing them in containers. Developers can use containers to package up an application with all of the parts it needs, like libraries and dependencies, and then ship it out as one package. Docker is running by default on the OPERATIONS MANAGER. You can access commands by typing docker in the Local Terminal or SSH.

For more information on Docker, enter `docker --help`.

Cron

Cron service can be used for scheduled cron jobs runs. Daemon can be managed via the /etc/init.d/crond interface, and cron tables managed via crontab. Crontab supports:

Usage:

crontab [options] file

crontab [options]

crontab -n [hostname]

Options:

-u <user> define user

-e edit user's crontab

-l list user's crontab

-r delete user's crontab

-i prompt before deleting

-n <host> set host in cluster to run users' crontabs

-c get host in cluster to run users' crontabs

-x <mask> enable debugging

To perform start/stop/restart on crond service:

```
/etc/init.d/crond start
```

Cron doesn't need to be restarted when crontab file is modified, it examines the modification time on all crontabs and reload those which have changed.

To verify the current crond status:

```
/etc/init.d/crond status
```

To check current cron jobs running with the following command to list all crontabs:

```
crontab -l
```

To edit or create a custom crontab file:

```
crontab -e
```

This opens a personal cron configuration file. Each line can be defined as one command to run. The following format is used:

minute hour day-of-month month day-of-week command

For example, append the following entry to run a script every day at 3 am:

```
0 3 * * * /etc/config/backup.sh
```

Save and close the file.

Initial Provisioning via USB Key

Also known as “ZTP over USB”, this feature allows provisioning an unconfigured (factory erased) unit from a USB storage device like a thumb drive.

The USB device must contain a filesystem recognized by the OM (currently FAT32 or ext4) with a file named manifest.og in the root directory. This file specifies which provisioning steps will be done. An article with a partial description of the file format is here:

https://opengear.zendesk.com/hc/en-us/articles/115002786366-Automated-enrollment-using-USB

The USB device can be inserted any time (before or after power is applied to the unit) and as long as the unit is unconfigured, the ZTP over USB process will be triggered. Here “unconfigured” has the same meaning as for ZTP: no changes made to the ogconfig data store.

> **Note:** Setting the root password on first log in counts as a config change.

The following manifest.og keys are implemented. This provides image installation, Lighthouse enrollment, and arbitrary script execution:

manifest.og contains <key>=<value> pairs. Recognized keys are:

image : Firmware image file name on the USB device's filesystem that will be flashed after boot once the image is validated

script : Configuration script to run

address : Primary Lighthouse address to enroll with

api_port : Optional port to use for the primary address when requesting enrollment

external_endpoints : List of additional "address:port" endpoints to fall back to when enrolling

password : LH global or bundle enrollment password

bundle : Name of LH enrollment bundle

EULA and GPL

The current Opengear End-User License Agreement and the GPL can be found at http://opengear.com/eula.

UI Button Definitions

The table below provides a definition of the button icons used in the UI.

Button Icon	Definition
	Edit buttons
	Add item (eg. SNMP Manager)
	VLAN interface or create VLAN interface.
	Bonded interfaces or create new bond
	Bridged interfaces or create new bridge
	Standard network interface
	Cellular interface
	Interface with bridge
	Interface with bond
	Bin widget. **Delete** selected object.