GE VERNOVA

GE PulseNET

Enterprise and Standard

User Guide

Version 6.0

GE VERNOVA

Introduction

This guide provides an overview of GE PulseNET operations—describing its purpose, explaining key concepts, and providing instructions for basic operations.

What is GE PulseNET?

GE PulseNET is a software application used for monitoring devices in Industrial Communications networks. Each device that GE PulseNET monitors serves a specific function in the network. These functions may include acting as a bridge, router, access point/base station, or remote/subscriber. The devices can be widely dispersed geographically and are able to operate with different bandwidths, depending on radio type and frequency. For additional information on specific Industrial Communications products, refer to the GE MDS website.

GE PulseNET Standard edition is intended for small-scale operations with a need to monitor up to 500 devices. GE PulseNET Enterprise edition is intended for large-scale operations with a need to monitor 25,000+ devices.

How Does GE PulseNET Work?

For GE PulseNET to be used to monitor devices, an administrator must first perform a few steps. The Administration Guide gives information on how to perform these tasks.

1. Acquire a license for the number of devices to be monitored
2. Perform discovery on the network to locate the supported devices to be monitored
3. Authorize the devices to be monitored

Authorizing a device will permanently link the device serial number to a GE PulseNET license. The maximum number of devices that can be authorized is limited by the monitoring capacity of the GE license. See “Working with Licenses” in the Administration Guide for more information.

After the devices are authorized for monitoring, GE PulseNET begins polling those devices for configuration, availability, and performance data.

As GE PulseNET monitors the devices, alerts may be raised if any of the devices are having problems. The thresholds that trigger those alerts are set by configuring GE PulseNET rules. Alerts may also be generated if the license is approaching its expiration date or if the GE PulseNET host server is filling its available disk space, for example. For more information, see “Rules and Notifications” in the Administration Guide.

Understanding GE PulseNET Roles

Operators are responsible for tracking the status of the devices that the system is monitoring. Operators have access to a restricted set of dashboards. The User Guide explains the tasks that operators can accomplish.

Administrators control the overall functionality of the system and provide support for operators. Administrators have a number of responsibilities including creating users, requesting and installing licenses, requesting GE support, and managing system settings, schedules, and the sample frequency of data collection. The Administration Guide explains the specialized tasks that administrators can accomplish.

GE PulseNET Documentation

Release Notes

The Release Notes provide:

- A list of new and updated features
- Workarounds for any known issues
- Late-breaking news about the software

Consult this document first, because it may contain updates to information and procedures described in the other GE PulseNET documents.

Installation Guide

The Installation Guide includes:

- Installation prerequisites, system recommendations, and planning guidelines
- Instructions for installing and configuring GE PulseNET on all supported platforms

User Guide

The User Guide provides basic navigation and operation information that all users, especially those with the operator role, will need to effectively use GE PulseNET.

- An overview of GE PulseNET, describing its purpose, explaining key concepts, and providing instructions for basic navigation
- Basic navigation and dashboard overview
- Working with time ranges, charts, and tables
- Managing and monitoring devices, including device detail views
- Creating and scheduling reports and dealing with alerts

Administration Guide

The Administration Guide is intended to help those with the administrator role configure and

manage the GE PulseNET system. This guide provides instructions on how to perform administrative tasks such as:

- Creating and managing users
- Requesting and installing licenses
- Configuring email settings and user access methods
- Creating report schedules and setting rule thresholds
- Setting the polling frequency for data collection
- Discovering and authorizing devices for monitoring
- Requesting GE support

Getting Started

This chapter provides instructions for logging in to GE PulseNET, describes the first dashboard seen, and how to navigate the GE PulseNET browser interface.

Perform these steps before following the instructions in this chapter:

- Obtain a GE PulseNET username and password from the Administrator
- Ensure the Web browser has JavaScript functionality enabled

Logging in to GE PulseNET

NOTE: Before logging in, the GE PulseNET services must be running.

To log in to GE PulseNET using a Web browser:

1. Open a Web browser (for a list of supported browsers, see the Installation Guide).
2. Navigate to a URL with the following syntax: `http://<hostname>:<port>/` where *<hostname>* is the name of the machine that has a running instance of GE PulseNET and *<port>* is the HTTP or HTTPS port specified during installation (the defaults are 8080 and 8443).
3. On the login screen that appears, enter the **Username** and **Password**.
4. Click **Login**.

Operator users are automatically taken to the Summary dashboard.

The appearance of GE PulseNET and the dashboards available will vary depending on the role and permissions assigned. Administrators can access all menus, while Operators have access to a restricted set of dashboards, based on the permissions they have been granted.

Screen Resolution:

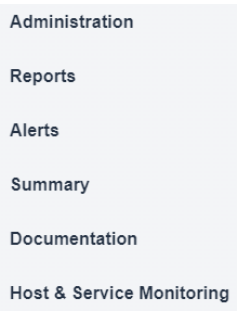
The recommended screen resolution is 1920x1080. The minimum supported resolution for PulseNET is 1024 x 768. Any resolution lower than this will cause the page to not display correctly. If an error message appears while on a higher resolution, please increase the size of the browser.

Navigating GE PulseNET

This section describes basic GE PulseNET navigation. GE PulseNET is designed to display dynamic data that is updated regularly. For this reason, we recommend avoiding the browser navigation buttons, because this may display cached views or result in an error message. Use the links in the Navigation Panel and main display or the breadcrumb trail instead.

Using the Navigation Panel

Use the **Navigation Panel** at the upper left edge of the display to move between dashboards.



This panel lists the dashboards that are available based on the assigned role. The ☰ icon will hide the navigation panel when it is not needed. Click on a dashboard (such as **Documentation**) to bring it up in the display area.

Using the Breadcrumb Trail

The name of the current dashboard is displayed in bold at the top of the dashboard, at the end of a path called the breadcrumb trail. When moving directly from one dashboard to another, the

names of the previous dashboards are displayed in order.

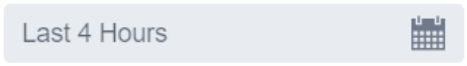
Use the links in the breadcrumb trail to return to previously viewed dashboards in a workflow or series of drilldowns, rather than using the browser's back button.

Using Drilldowns and Popups

Use the graphic and text links in views to drill down to additional details that can help diagnose problems. Depending on the link, it will either drill down to a different dashboard or to a smaller view called a popup that hovers above the dashboard currently being viewed.

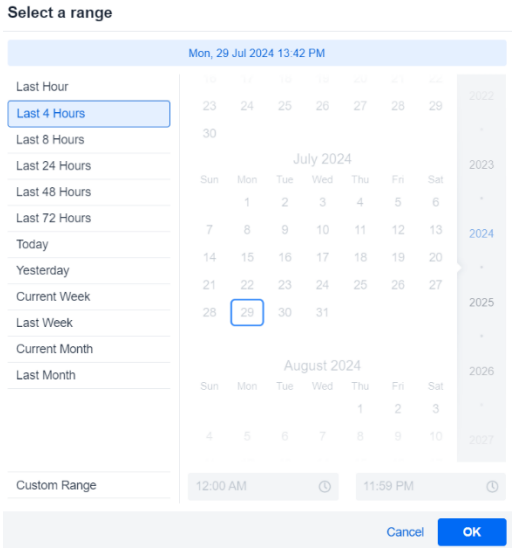
Selecting the Time Range

GE PulseNET controls the time range displayed using a menu called a "zonar." The time range is available on most dashboards and views.



Time Range

The time range in the upper right corner of a dashboard indicates the current time period for all the views on the page. The default setting is the last 4 hours. Changing the time range in a dashboard typically affects the range of data points that are displayed on the dashboard. Select a preconfigured time range, or click Custom Range to access the Timeline and Calendar options, which will allow for specifying a custom range.

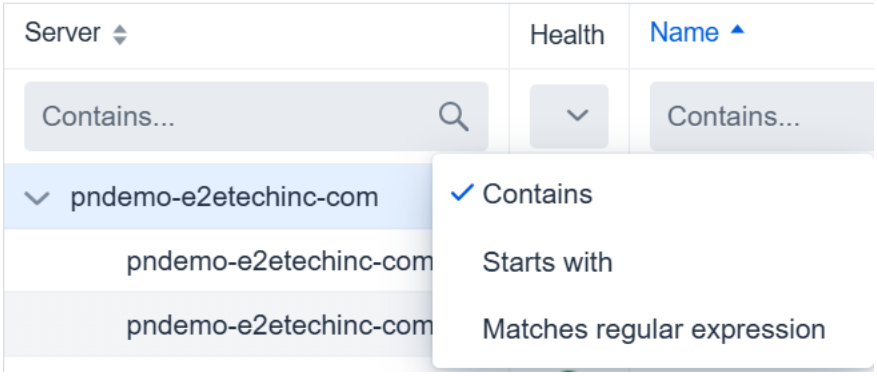


Working with Tables

It is possible to sort, filter, and search the data in a table if these functions are enabled on the table. If a table is sortable, change how the data is sorted by clicking any column heading. A down arrow icon indicates descending order, while an up arrow icon indicates ascending order.

Filtering Results by Values in a Column

Search fields are provided for each column at the top of every tabular display. Use these fields to search for any value, and the tabular display will be filtered to show only those rows that match the value entered. See the Appendix for a list of valid regular expressions.



Working with Columns

To enable and disable columns that will be displayed in the table, click the Customizer icon at the upper right corner of the table and select **Show Columns**.

Select the column to add or remove from Summary. Drag to reorder.

To export the table:

1. At the top right of the table, click the Collapsed Menu icon.
2. In the popup that appears, select **Export**. Choose the file type to export, PDF or CSV.

Working with Graphs

Using the Zoom Controls

Click the ⊕ ⊖ *icons above a graph to zoom in or out on the currently selected range.*

Click the 🔍 *icon to enable Selection Zoom mode:*

1. Position the mouse cursor inside the X/Y axis of the graph. Click and drag the shaded area across the graph to the end of the area that will be enlarged.
2. The graph will be redrawn displaying only the data points in the area selected.

It is possible to zoom into graph data multiple times if needed.

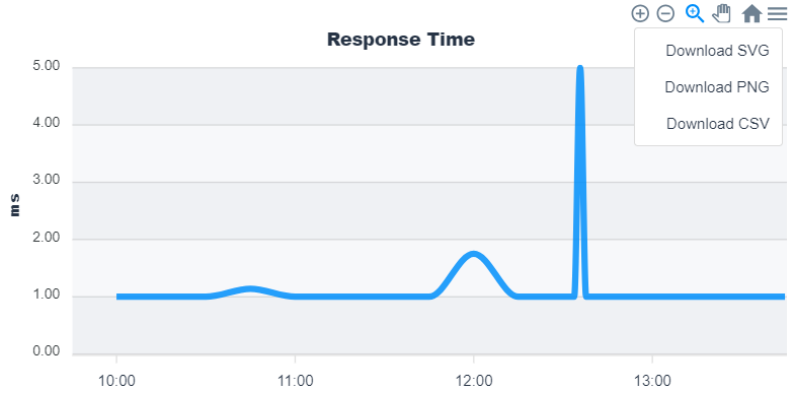
Click the ✋ *icon to enable Panning Mode.* While zoomed into a graph, click and drag to navigate along the time range.

Click the 🏠 *icon to restore a graph to default settings after zooming.*

Exporting the Graph

To export the graph:

1. At the top right of the graph, click the ☰ ⌄ Customizer icon.
2. In the popup that appears, select **Export**. Choose the file type to export, SVG, PNG, or CSV.

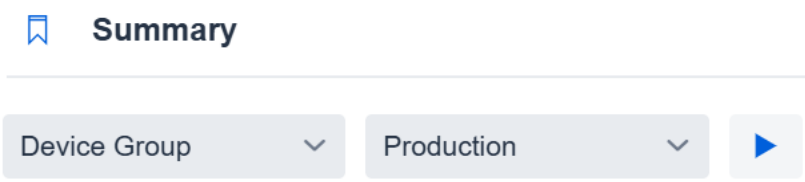


Selecting the Device Group - [Enterprise Only]

Devices shown in the Summary dashboard can be selected either using a Device Group or a Device Filter. For more information about defining device groups or filters, see the **GE PulseNET Administration Guide**.

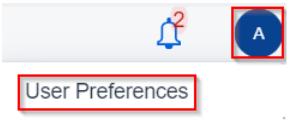
The number of device groups or filters is shown in the lower right corner of the dropdown menu, and once a device group has been chosen it will list which devices are part of that group by clicking the ▶ play button at the right of the selection field.

When a device group or filter has been chosen, the Summary dashboard will include only the devices which match the selected filter.

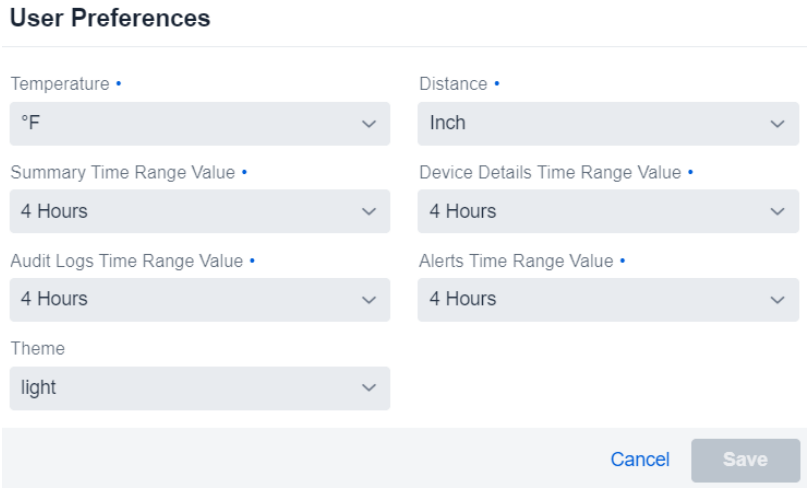


User Preference

The User Preference menu is accessible from the user dropdown in the top-right corner.



It allows for the modification of user-specific settings such as password change, desired system units for temperature and measurements, and how the time range zonar will be set on login.



Working with GE PulseNET

The GE PulseNET monitoring dashboards display data collected from the monitored environment and allow viewing of this data in various formats and levels of detail. This chapter describes the GE PulseNET monitoring dashboards and workflows.

Summary Dashboard

As an Operator, the first dashboard seen when logging in to the system is the Summary dashboard. The Summary dashboard automatically refreshes every three minutes.

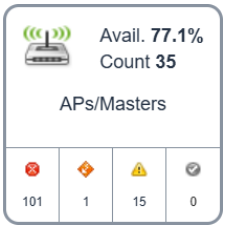
The Summary dashboard has three tabs: the Schematic Tab, the Summary Tab, and the Topology Explorer Tab.

Schematic Tab

The Schematic tab displays a block diagram of the industrial communications infrastructure. It presents a snapshot of the state of all the devices in the network, and the square tiles represent the position that specific devices hold in the communication path.

The network devices are typically connected to various applications that receive and process data, and this is represented by the Applications on the left side of the Schematic tab.

GE PulseNET can identify device roles that include collection points, remote or subscriber devices, access points or base stations, backhaul devices, and other LAN devices. Snap- shots for specific device types are only displayed if the network includes devices of those types.

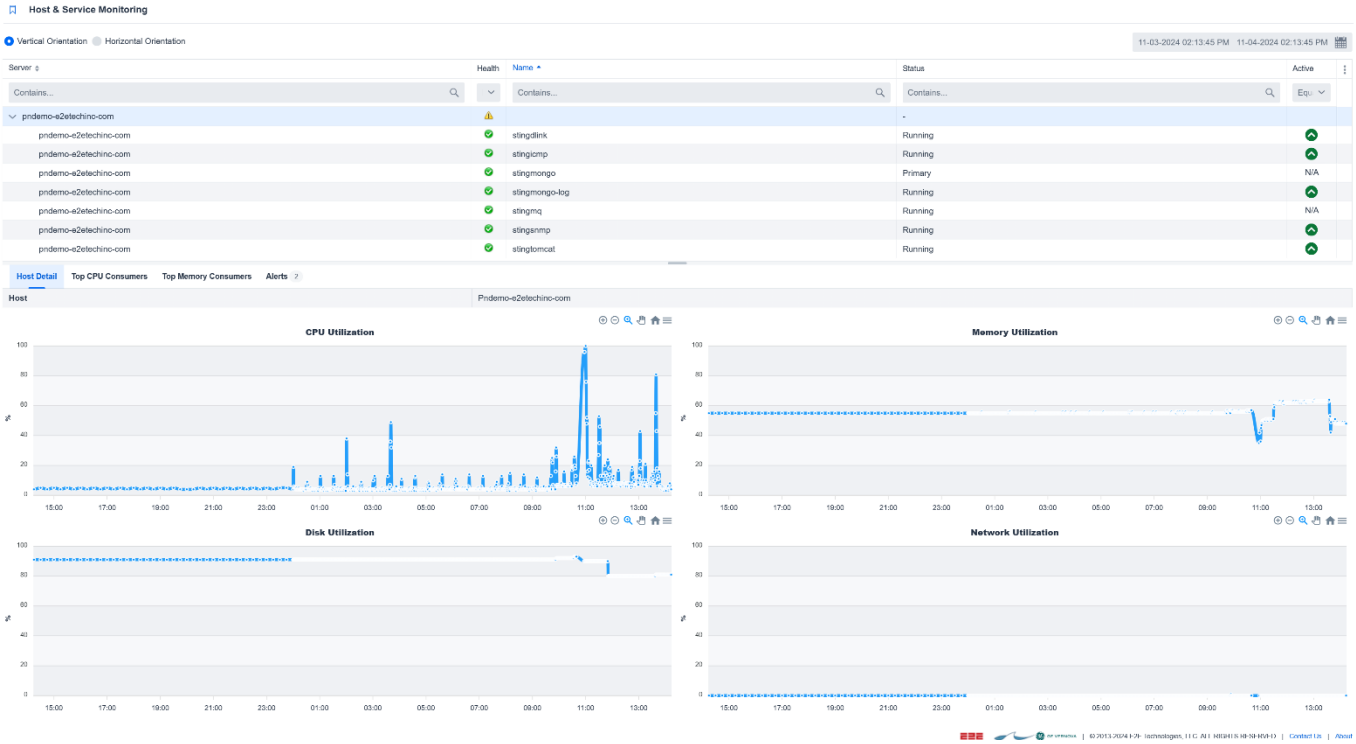


The snapshot views on the Schematic tab provide information about the state of all of the devices of a particular type. The percentage value on each snapshot indicates the average availability of all monitored devices of that type during the currently configured time range.

In the center of each snapshot, under the heading, is a count that indicates the number of devices of that type. Clicking the label or the Device icon on the left side of the snapshot will open the Summary tab and display information about all devices of that type.

Toward the bottom of each snapshot, there are three Alert fatal, critical, and warning. Below each is the number of alerts of that severity that exists in the device group. Clicking an Alert icon or number will open the Summary tab and display information about the type of alert.

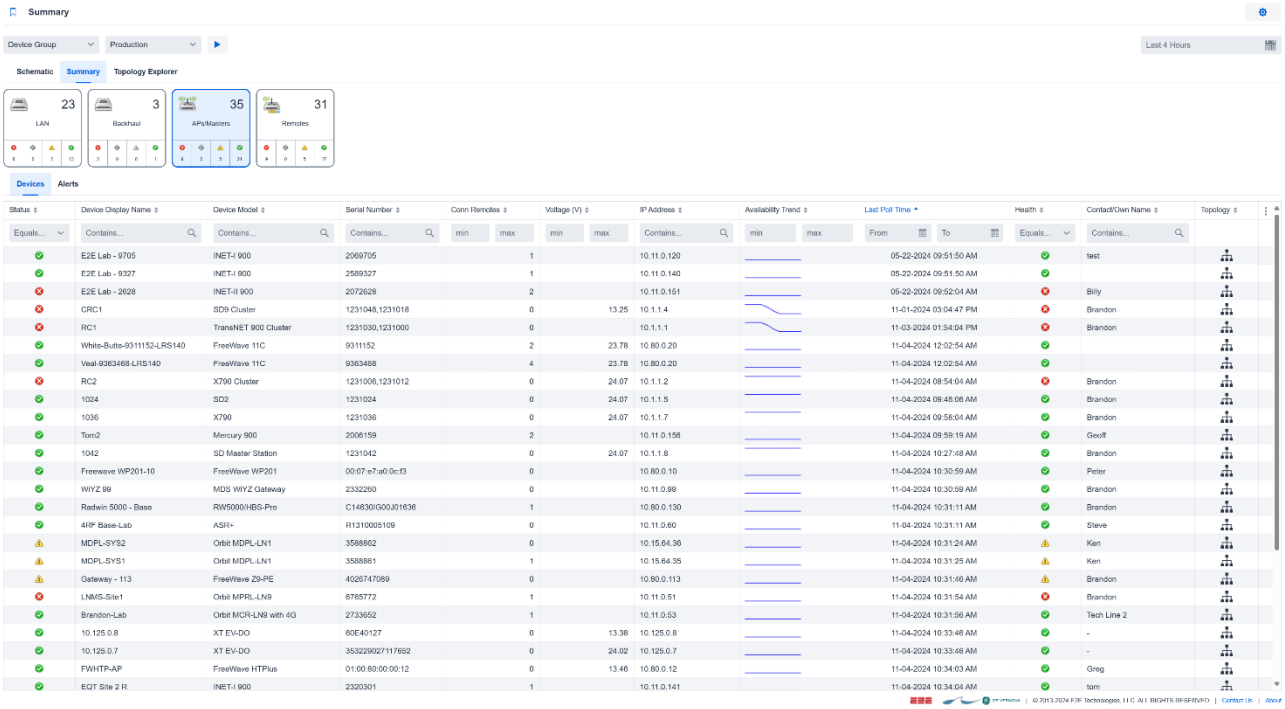
In addition, there is a GE PulseNET Host tile in the lower left corner of the Schematic display. This tile shows a performance snapshot of the GE PulseNET machine itself. Click the label or icon to drill into the machine Performance Summary dashboard.



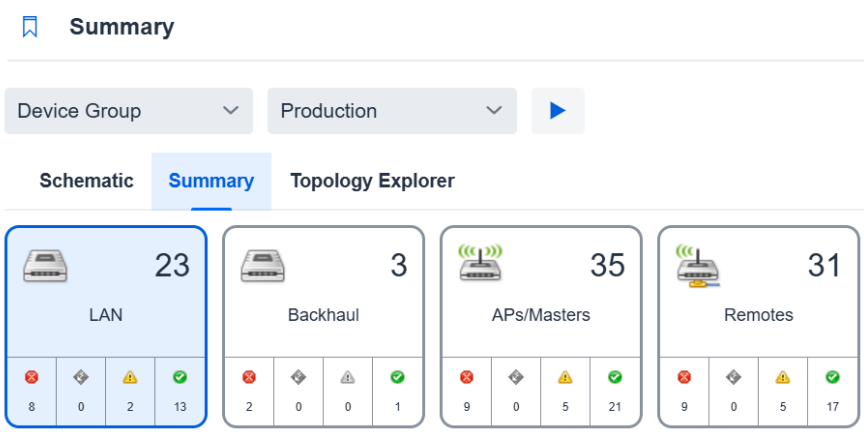
The Performance Summary dashboard displays a historical view of the system resources being used on the GE PulseNET server. This can be especially useful for troubleshooting issues with application, operating system, or hardware performance.

Summary Tab

Click the **Summary** tab to open this view. The Summary display has two sections: the Device Type Health View at the top and the Summary Table at the bottom. Click the Device Type icon on the left or the title of the snapshot to navigate to the Summary tab from any of the device snapshots on the Schematic tab of the Summary dashboard.



Device Type Health View



The Device Type Health view is located toward the top of the Summary tab. This view provides a tile for each kind of device in the communication path. Certain tiles are only displayed if those types of devices exist in the network.

Each tile summarizes the health information for the corresponding device type. Click the device icon at the upper left of a tile or the total number of devices at the upper-right of a tile to view a list of all the corresponding devices in the selected device group. For example, click the AP/Masters icon to see information on each of the access point or master radios. The list is displayed in the Summary Table in the bottom half of the tab.

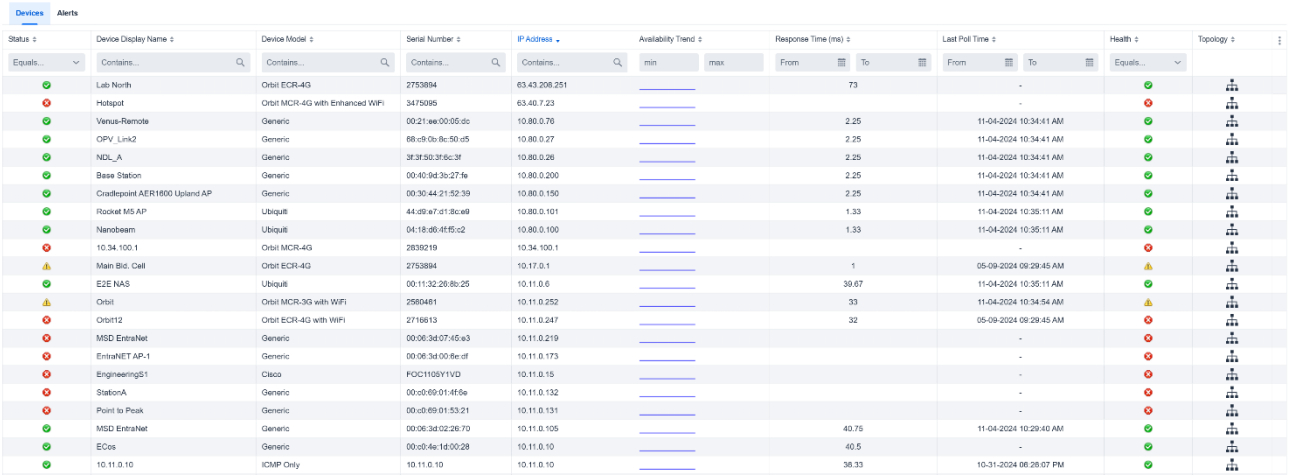
Toward the bottom of each tile, there are four Device Health fatal, critical, warning, and normal. Below each icon is the number of devices in that state of health for the corresponding device type. Click a Device Health icon to view a list of the devices with that state of health in the Summary Table. For example, click the warning icon under Remotes/Subscribers to show the remote devices with this health level. This can aid in troubleshooting those specific devices.

Summary Table

The Summary Table is located toward the bottom of the Summary screen. The Summary Table has two tabs: the Devices tab and the Alerts tab.

Devices Tab

The Devices tab displays a list of devices and provides configuration information, such as the name, location, and IP address, along with some additional metrics of interest.



The Devices tab refreshes automatically every three minutes.

Click any text item in the first few columns to navigate to the Detail view for that device. For more information, see **Detail Views**.

Status Column

The Status column on the far left shows the current alert status for the device. The status icons (including fatal, critical, warning, or normal) represents the current health of the device. They indicate any outstanding, active or uncleared alerts.

Availability Column

The Availability column is an image indicating the trend of the availability over the current time period (default is 4 hours) and NOT a graph of data points. The percentage indicates the current availability of the device, i.e. 100% indicates the device is up whereas 0% indicates the device is down. The trending graph is not an actual graph but an indicator of the trend. For example, it can indicate that the device has been available but is currently unavailable. Or the device was unavailable but is now available. Another indication can be the device was unavailable for a period of time but has returned to being available. **To view the actual data points over the time period, click the image**.

Last Poll Column

The Last Poll column shows the last time GE PulseNET attempted a configuration or performance collection for the device. Hover over or click any metric value to see a graph that plots the selected metric across the time range selected.

Response Time Avg(ms) Column

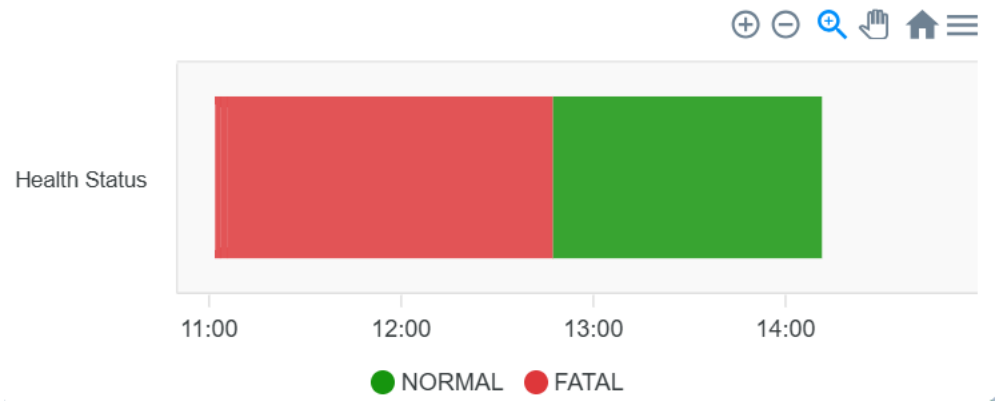
For Dlink master devices, the Current and Average Remotes Count values represent the total current and average number of devices that are downstream from the master, whether connected directly or indirectly. For SNMP access points, the Current and Average Remotes Count values represent the current and average number of devices that are directly associated to that access point.

When GE PulseNET is monitoring Dlink devices passively, Response Time is not collected.

Health Column

The Health Column on the far right shows the historical alert status of the device, including but not limited to the current status. The alert icons (including fatal, critical, warning, or normal) represent the most severe historical health status of the device over the current time period. By hovering or clicking on the icon, the health history is displayed in graphical form showing the time range currently being viewed (the default period is 4 hours).

Clicking on the individual Health History icon will open a dialog box that will display the outstanding alerts for that device. From this dialog box, acknowledge and clear the alerts. For information about acknowledging and clearing alerts, see **Working with Alert Details**.



Topology Column
The last column in each row is a link to the Topology Viewer. For more information, see **Topology Viewer Icon**.

Alerts Tab

The Alerts tab lists outstanding alerts for the currently displayed device type or a specific device in a workflow. For example, clicking a Warning health icon on the Access Points tile will list all outstanding Warning-level alerts for the access points that are being monitored.

For each alert in the list, the Alerts display provides the following information:

- An Alert icon that represents the severity (fatal, critical, warning) of the alert
- The name of the device for which the alert was raised
- The time at which the alert was raised
- Whether the alert has been acknowledged
- Whether the alert has been cleared, and if so, the time it was cleared
- The alert message

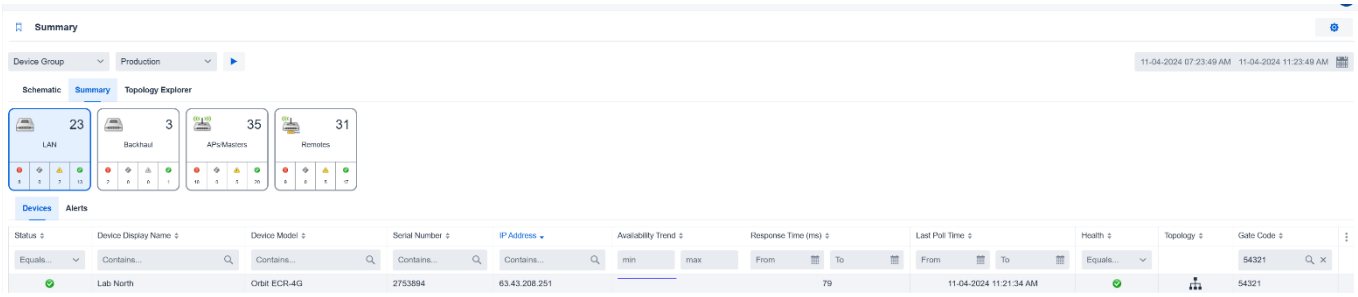
On the Alerts tab, select one or more alerts in the table and either Acknowledge or Clear them.

Click any value in an alert row to open the Alert details dialog box. For more information, see the **Working with Alert Details** section below.

For an overview of all device and host alerts, visit the **Alerts Management Dashboard** from the left-side main navigation menu. For more information about the Alerts Management Dashboard, see **Alerts Dashboard**.

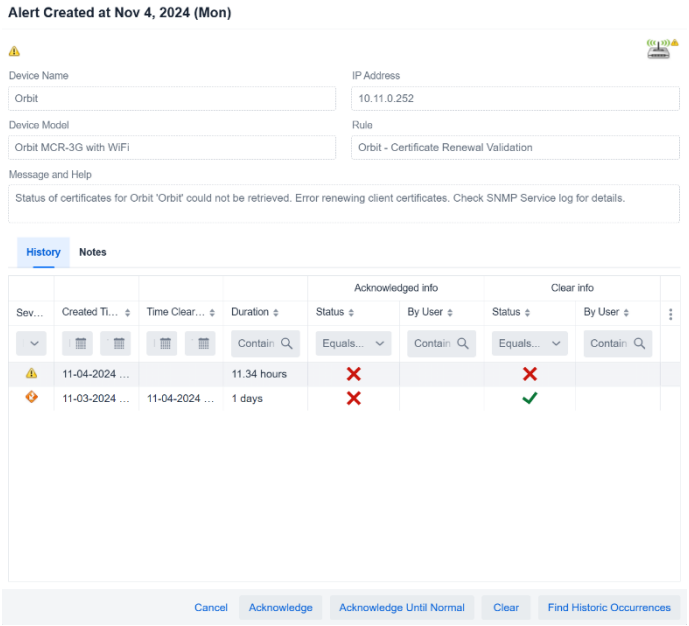
Working with Custom Data Fields

GE PulseNET allows Admins to create custom data fields for devices that can be viewed, filtered, and sorted on the **Device Summary** page. For more information about creating Custom Data Fields, see the **Custom Data Configuration** section of the Admin Guide.



To Sort and Filter Custom Data Fields:

1. Navigate to the **Summary** page.
2. Ensure that the desired Custom Data Fields are selected for display in the column selector.
3. To sort and reverse sort the contents of the custom data field column, click on the column header.
4. To filter the contents of the custom data field column, type search criteria into the filter field located in the column header.



Working with Alert Details

In the Alert details dialog box, the following actions can be performed:

- *Acknowledge* — Once an alert has been acknowledged, the By User column shows the GE PulseNET user who acknowledged the alert. If an acknowledged alert fires again at a later time (usually because the condition has occurred again), the Acknowledged Info column will show that the new condition is unacknowledged.
- *Acknowledge Until Normal* — This option is available for alerts that have not yet been cleared. The alert and all consecutive alerts fired by the same rule on the same object are acknowledged until the first alert fired after the alert source returns to a normal state. Select the alert and then click Acknowledge Until Normal. *Acknowledged Until Normal* and the related user name will appear in the Acknowledged Info column.
- *Clear* — In most cases, each alert is cleared automatically when the condition that triggered it is resolved. For example, an alert fires when a metric for a monitored device exceeds a certain threshold. If the metric value returns to within normal range, the original alert is cleared automatically. If the alert condition occurs again, the alert reappears.

- Only clear alerts when they do not clear themselves. Clear an alert by clicking the Clear button. If the alerts list is set to show only current alerts, the cleared alerts are filtered from the list. If the list is filtered to show cleared alerts too, then cleared alerts will also appear with a green checkmark icon.
- *Find Historical Occurrences* — Click Find Historical Occurrences to open the Alert Historic Occurrences view. This view displays the historical occurrences of an alert, starting from the beginning of the current time range. Use << Get More and Get More >> to scroll through more historical occurrences. (If there are 15 or fewer historical occurrences, Get More links are not provided.)
- *Cancel* — Click Cancel to close the Alert Details dialog box.

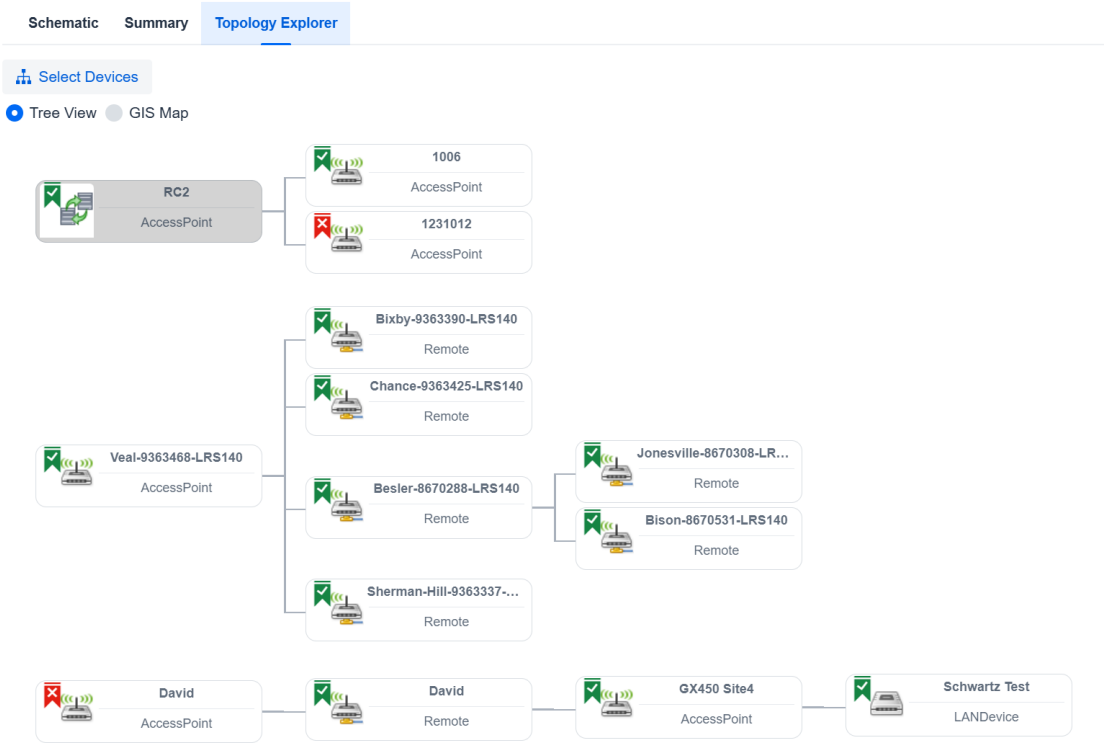
Topology Explorer Tab

The Topology Explorer is a way to represent a logical hierarchy of connected devices.

Displaying the Logical Device Hierarchy

1. From the Summary dashboard, click the **Topology Explorer** tab.
2. Click **Select Devices**.
3. In the Selection dialog box that appears, select one or more devices from the list.
4. Click **Map**.

The devices and any associated downstream devices are displayed in a tree view.



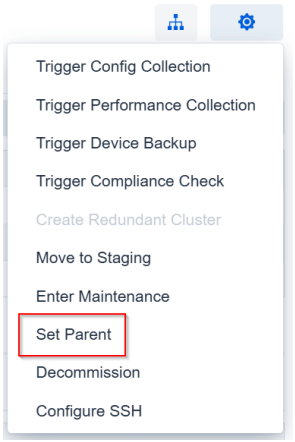
Alternate between the Minimized and Normal zoom levels using the Zoom Level controls at the top right of the tree view. The Minimized view only shows each device's name and type icon, while the Normal view includes information on the device's current availability. The more devices selected, the larger the mini-map to view all selected devices becomes. Click within the mini-map and drag the shaded rectangle to pan around the topology diagram.

Hover the cursor over a device to view its configuration details. Click a device to navigate to its Detail view. For more information, see **Detail Views** below.

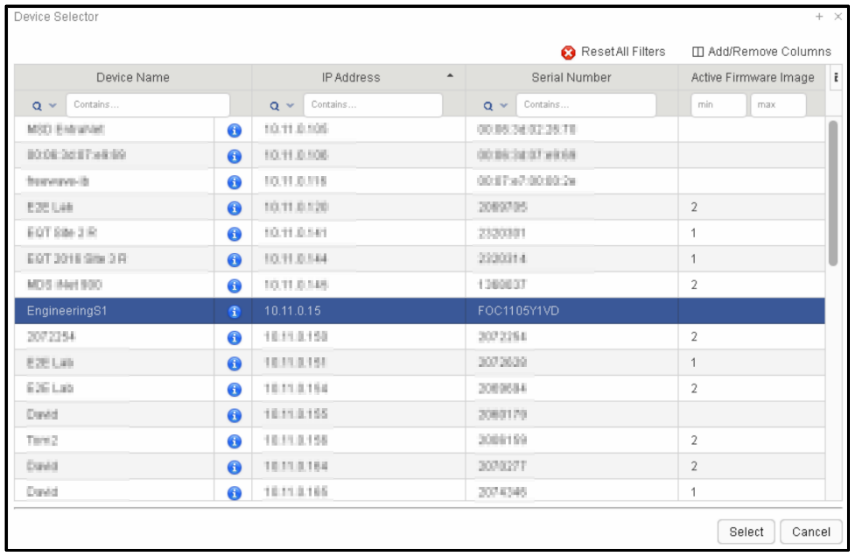
Setting Device Parent

Any device can be added as a parent device. This allows manual control over topology and connected remotes.

1. On the Device Detail display for any device, click the **Gear**  icon near the top right corner and select **Set Parent.**



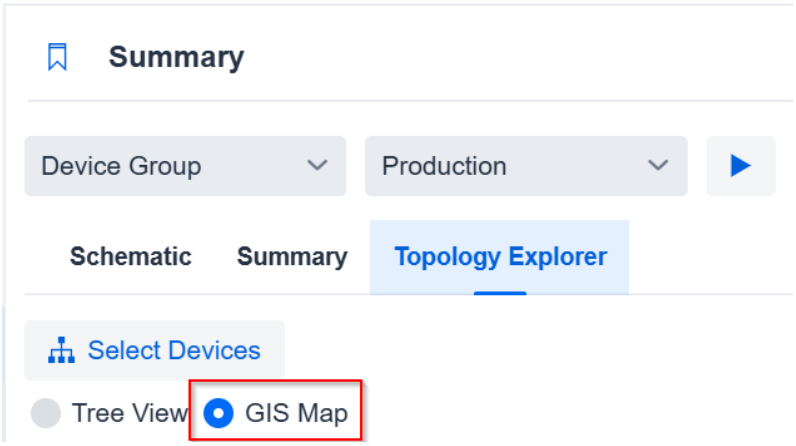
2. In the **Device Selector** window, select the parent device for the current device.



3. Once the device is set as the parent, it will be shown in the connected remotes tab and the Topology View. The link will have a dotted line and the endpoint will be purple.

Note: Best practice is to allow PulseNET to programmatically connect endpoints. In certain cases this cannot be done through PulseNET this option allows you to manage those devices.

Displaying the Topology on a GIS Map - [Enterprise Only]



With Enterprise it is possible to display the network topology on a GIS map. To use the GIS mapping feature, the computer that will be used to view the GIS map must be able to access maps.google.com. After selecting devices and displaying the logical hierarchy as explained above, click Render On and choose GIS Map from the dropdown menu.

The GIS map is useful for observing the exact geographical location of devices and for assessing whether terrain or the location of man-made structures in the vicinity may be interfering with the performance of a device. To see the street view with terrain features, click the Terrain checkbox. To see a satellite map, click Satellite and select whether map labels will be displayed.

Click a device to view summary information about the device in a popup box. Click the name of the device on that dialog box to navigate to the Detail view for the device. For information about Detail views, see **Detail Views** below.

If the selected devices do not have GPS coordinates in the GE PulseNET database, a message will appear at the bottom of the map that there is no GPS information for one or more devices. Add the location data of the devices to the GIS map in one of two ways:

1. Zoom in to find the exact location on the map for one of the devices. Right click and select the device from the popup that appears. This will enter the GPS coordinates at the cursor location into the GE PulseNET database for that device.
2. Click the name of one of the devices listed at the bottom of the view. Enter the desired GPS coordinates and click **Save**.

Once the device's GPS coordinates are in GE PulseNET, it is possible to edit those coordinates by clicking the device icon on the GIS map and clicking the edit icon to the right of the GPS coordinates field. The GPS coordinates editor also allows removal of GPS coordinates from that device by clicking **Remove GPS Coordinates**.

Detail Views

The Detail view provides the configuration, availability, and performance details for a device. It checks for new data every three minutes and refreshes when new data is available. Much of the information provided on the Detail view depends on the time range setting. For example, if the time range is changed, then the performance graphs will reflect statistics for those values that were collected during that specific time interval.

Device Display Panels

The Detail view is divided into two panels: the Summary panel at the top of the view and the tabbed Metrics panel below.

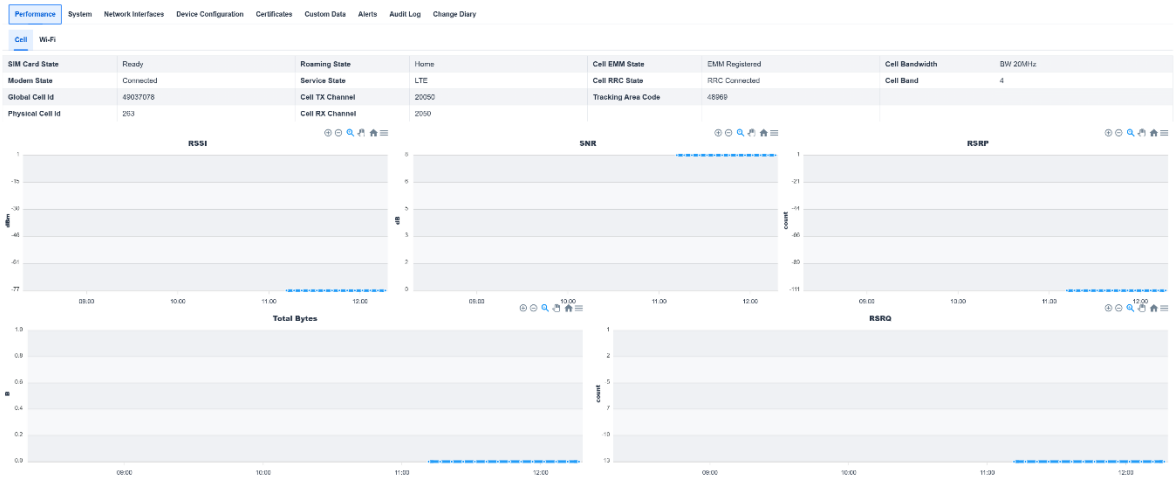
The Summary panel displays configuration information for the device, such as the IP address, serial number, and last poll time. Most of this information is obtained by reading values from the devices themselves.

Device Contact	Tech Line 2	**GPS Status**	Nofix		
IP Address	63.43.208.251	**GPS Position**		**Uptime**	13 days 22 hours 36 minutes 21 seconds
Serial Number	2693708	**Location**	Saint Paul MN	**Last Poll Time**	11-04-2024 12:39:55 PM
Description	GE MDS Orbit SNMP Agent	**Device Name**	Lab-Orbit-1	**Last Config Poll**	11-04-2024 12:39:55 PM

The Metrics panel for a device will include some or all of the following tabs: Performance, Device Configuration, Remotes Connected, Network Interfaces, Alerts, Change Diary, Audit Log and Syslog.

Performance Tab

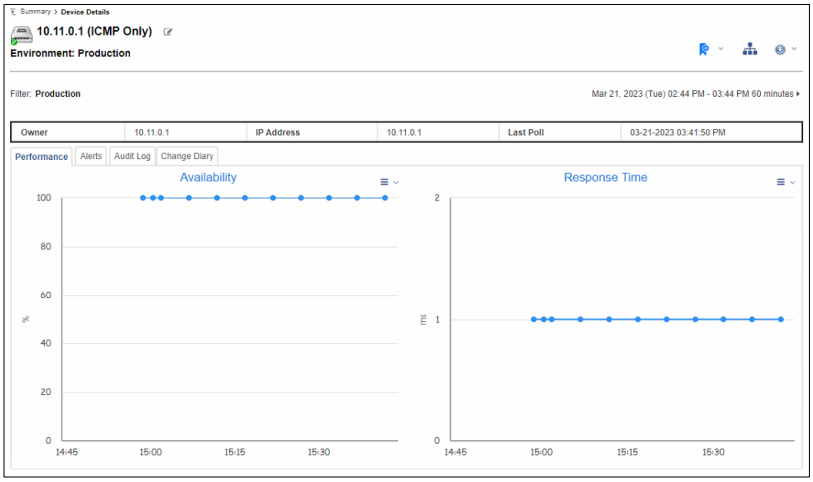
The Performance tab provides a number of metrics and graphs that pertain to the performance of the device.



When hovering the cursor over a particular metric on a chart, it will show the exact value for that data point. Change a chart from one type to another to view the displayed information in a different format or zoom into a chart. For more information, see **Working with Graphs**.

ICMP Only View

Devices discovered using the PulseNET Device Monitor (ICMP Only) will display the following metrics in the Device Detail View.



Network Interfaces Tab

The Network Interfaces tab displays a list of network interfaces that are configured on the device, and it provides information about each interface.

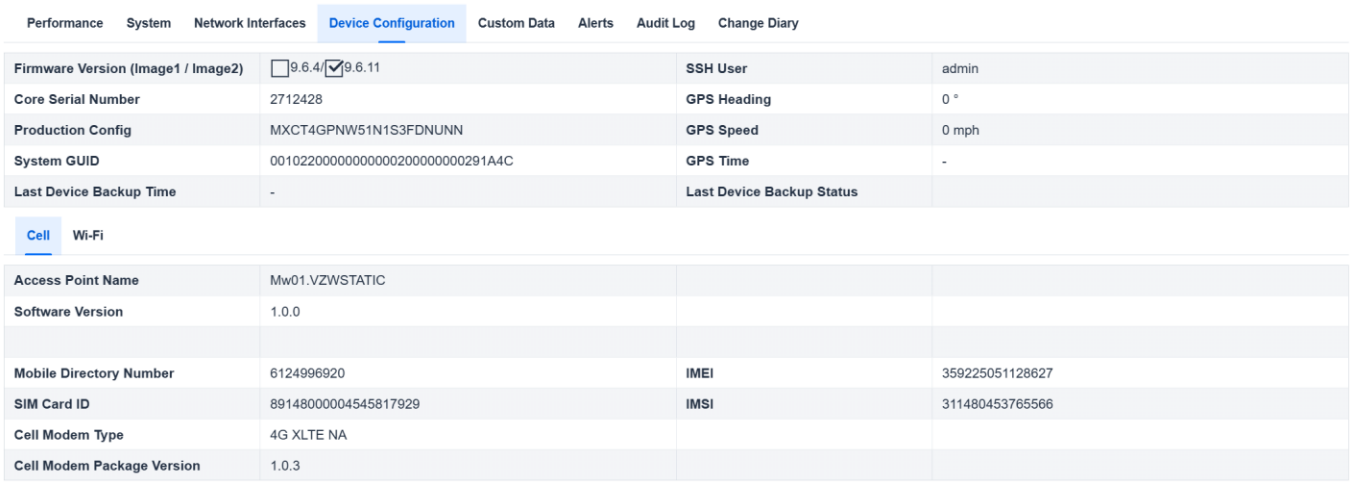
For each network interface listed, the tab provides the following information if it is available from the device. Some devices provide more interface metrics than others.

- The name of the network interface
- The status (admin and operational) of the network interface
- The min and max throughput in
- The min and max throughput out
- The min and max errors in
- The min and max errors out
- The MAC address of the network interface
- The type of network interface

Hover the cursor over any metric value to see a chart that plots the metric over a specific interval. The time over which any metric is plotted on a chart depends on the time range setting.

Device Configuration Tab

The Device Configuration tab provides configuration information collected directly from a device based on the collection schedule that has been configured (see “Collection Schedules” in the Administration Guide for additional information).



Performance | System | Network Interfaces | Device Configuration | Custom Data | Alerts | Audit Log | Change Diary

Firmware Version (Image1 / Image2)	☐9.6.4/☑9.6.11	SSH User	admin
Core Serial Number	2712428	GPS Heading	0 °
Production Config	MXCT4GPNW51N1S3FDNUNN	GPS Speed	0 mph
System GUID	0010220000000000200000000291A4C	GPS Time	-
Last Device Backup Time	-	Last Device Backup Status	

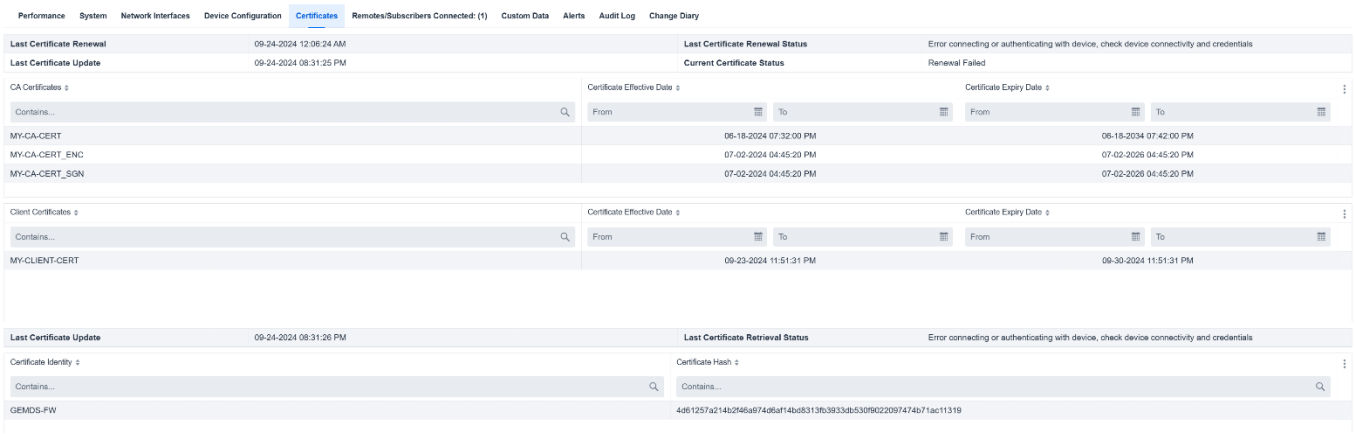
Cell | Wi-Fi

Access Point Name	Mw01.VZWSTATIC		
Software Version	1.0.0		
Mobile Directory Number	6124996920	IMEI	359225051128627
SIM Card ID	89148000004545817929	IMSI	311480453765566
Cell Modem Type	4G XLTE NA		
Cell Modem Package Version	1.0.3		

If a device is configured to allow communication through Telnet, SSH, or HTTP, the Device Configuration tab provides access to the device through a corresponding link, located toward the bottom left of the tab.

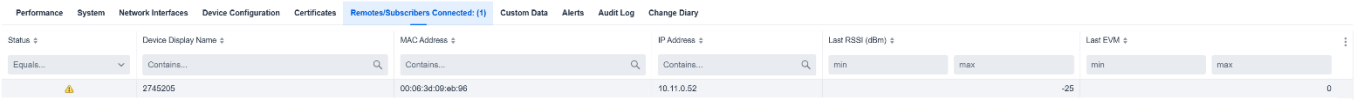
Certificates Tab

This tab is only applicable to Orbit devices. The Certificates Tab lists the security certificates and firmware certificates for the device, as well as their current status.



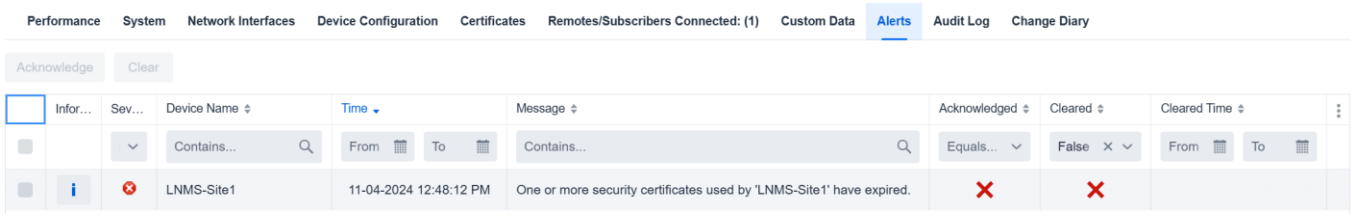
Remotes/Subscribers Connected Tab

This tab is only applicable to Access Point/Master devices. The Remotes/Subscribers Connected tab lists the authorized remotes that are connected to the access point or master, and the table provides some summary information for those remote devices.



Alerts Tab

The Alerts tab lists any active alerts for this device. The alerts that appear in the list depend on the alert filters shown at the top of each column in the table.

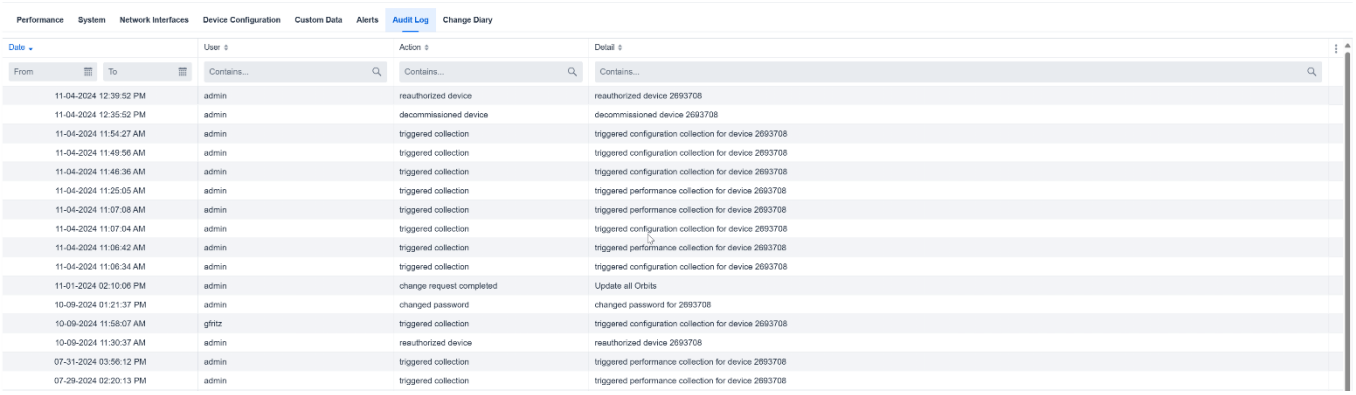


From the Alerts tab, acknowledge and clear alerts in the same way as using the **Alert History** dialog box. For information about acknowledging and clearing alerts, see **Working with Alert Details**.

For an overview of all device and host alerts, visit the **Alerts Management Dashboard** from the main navigation menu. For more information about the Alerts Management Dashboard, see **Alerts Dashboard**.

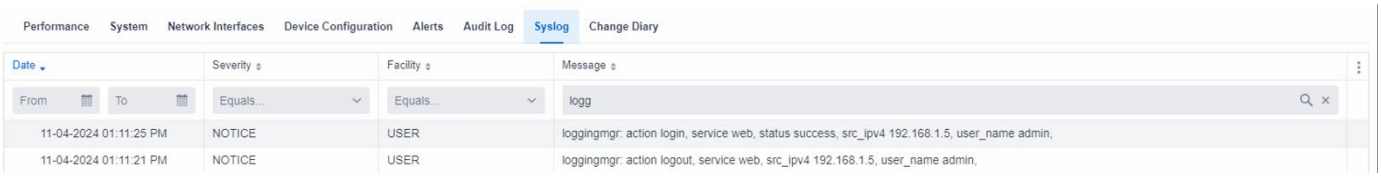
Audit Log Tab

The Audit Log tab provides a list of the changes that have been made within GE PulseNET for this device. Each log entry shows the date and time an operation was performed, the name of the GE PulseNET user who initiated the operation, the action that was performed and any associated details.



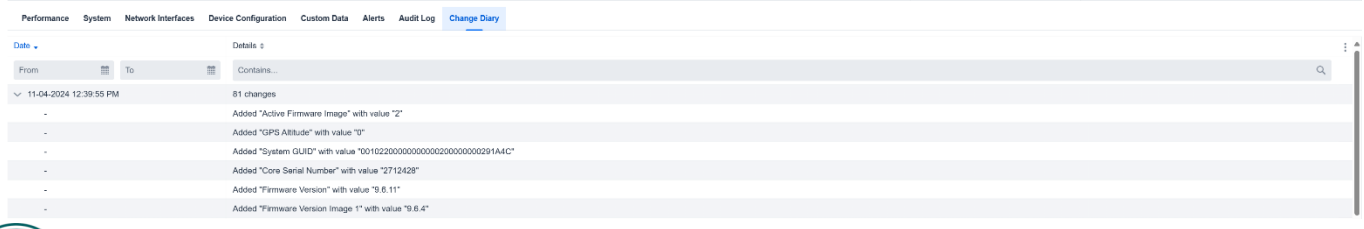
Syslog Tab

The Syslog tab provides a list of the event messages that have been sent by this device. Each syslog entry shows the date and time the message was sent, the severity level of the message, the facility code (i.e. the machine process that created the message), and the actual message that was sent.



Change Diary Tab

The Change Diary tab provides a list of all new device property changes that have been made within GE PulseNET for this device. Each diary entry shows the date and time the change was made and any associated details.



Topology Viewer Icon

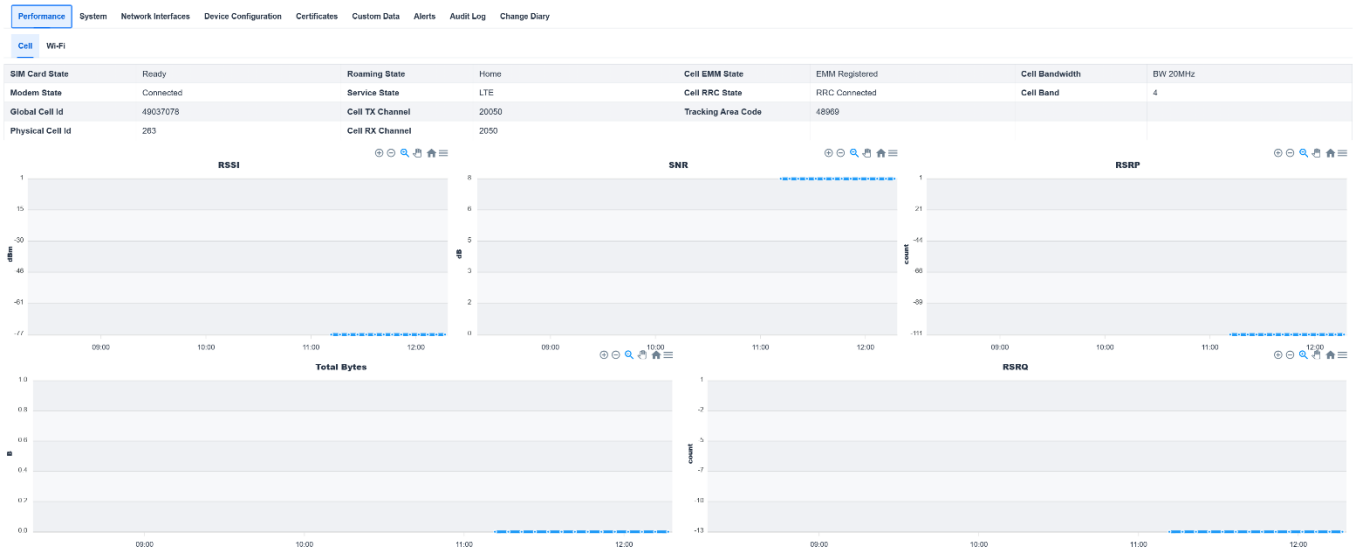
Access the Topology Viewer from a device list by clicking the Topology Viewer icon in the row for a particular device. For information about device lists, see **Device Configuration Tab**. It is also possible to access the Topology Viewer from any Detail view by clicking the Topology Viewer icon on the far right of the view. For information about Detail views, see **Detail Views**. Navigate within the Topology Viewer in the same way as the Topology Explorer. For a description of this navigation, see **Topology Explorer Tab**.

Additional features for the Orbit Platform

The GE MDS Orbit Platform is capable of housing more than one network interface, in addition to the on-board Ethernet and bridge interfaces. PulseNET represents each of the additional interfaces by displaying separate sub-tabs under the Performance and Configuration tabs.

Cellular/Dual-Cell/HPUE Interface

Performance information for the cellular interface can be viewed by clicking the Cell tab under the Performance tab on an Orbit device. Cellular performance metrics include the SIM card state, roaming state, modem state, and service state. It also displays graphs for cellular RSSI, RSRP, RSRQ, and total bytes transferred.



Configuration information for the cellular interface can be viewed by clicking the Cell tab under the Device Configuration tab on an Orbit device. Cellular configuration parameters include the Access Point Name, software version, mobile directory number, SIM card ID, global cell ID, physical cell ID, IMEI, IMSI, and tracking area code.

Performance | System | Network Interfaces | Device Configuration | Custom Data | Alerts | Audit Log | Change Diary

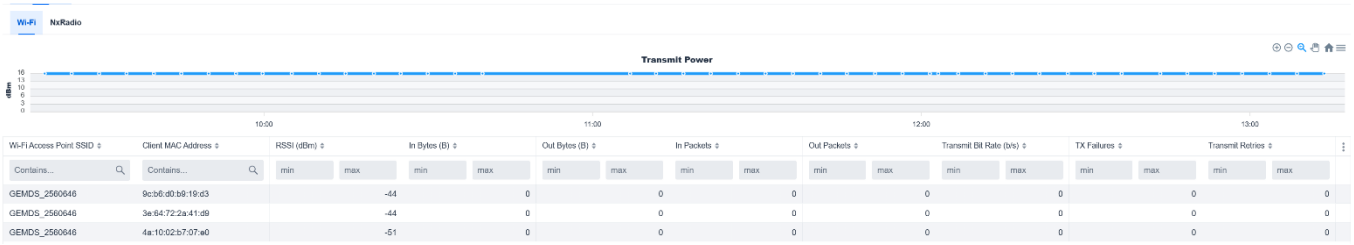
Firmware Version (Image1 / Image2)	☐9.6.4/☑9.6.11	SSH User	admin
Core Serial Number	2712428	GPS Heading	0 °
Production Config	MXCT4GPNW51N1S3FDNUNN	GPS Speed	0 mph
System GUID	00102200000000000200000000291A4C	GPS Time	-
Last Device Backup Time	-	Last Device Backup Status	

Cell | Wi-Fi

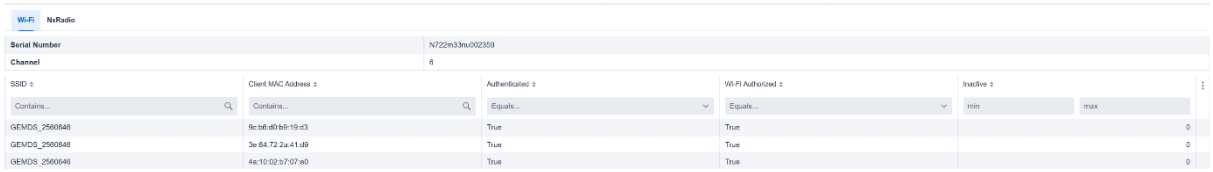
Access Point Name	Mw01.VZWSTATIC		
Software Version	1.0.0		
Mobile Directory Number	6124996920	IMEI	359225051128627
SIM Card ID	89148000004545817929	IMSI	311480453765566
Cell Modem Type	4G XLTE NA		
Cell Modem Package Version	1.0.3		

Wireless Interface

Performance information for the wireless interface can be viewed by clicking the Wifi tab under the Performance tab on an Orbit device. Wireless performance metrics include the transmit power and a table listing each wifi client that is connected.



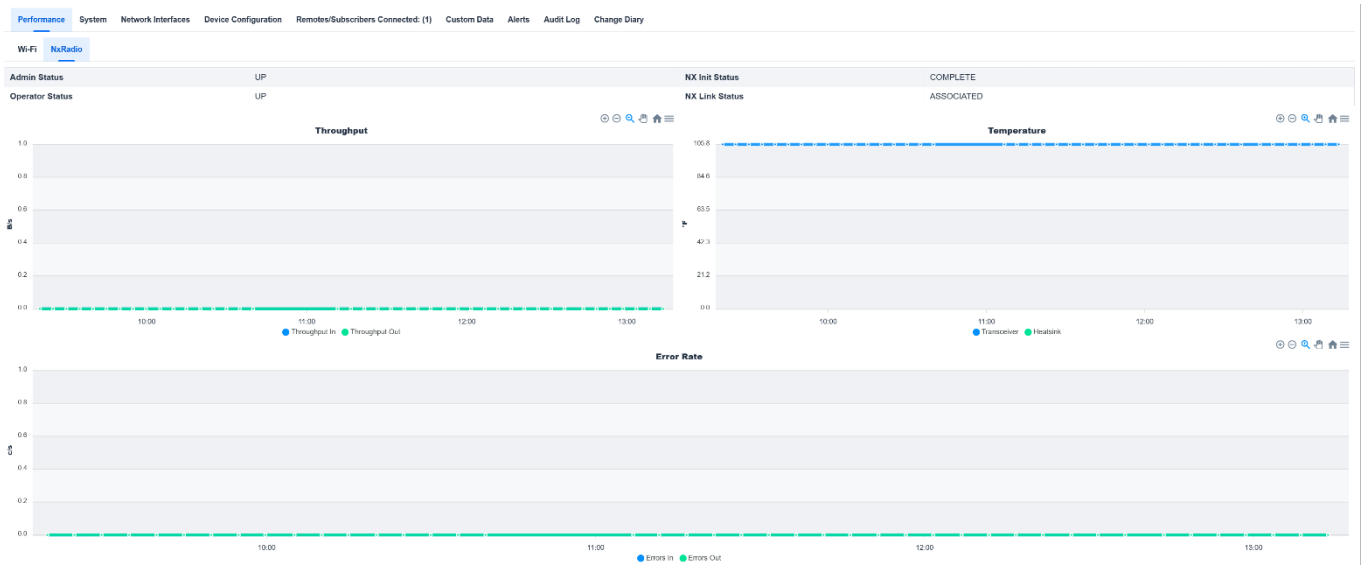
Configuration information for the wireless interface can be viewed by clicking the Wifi tab under the Device Configuration tab on an Orbit device. Wireless configuration parameters include the serial number, wireless channel and a list of parameters for each connected client.



NX Interface

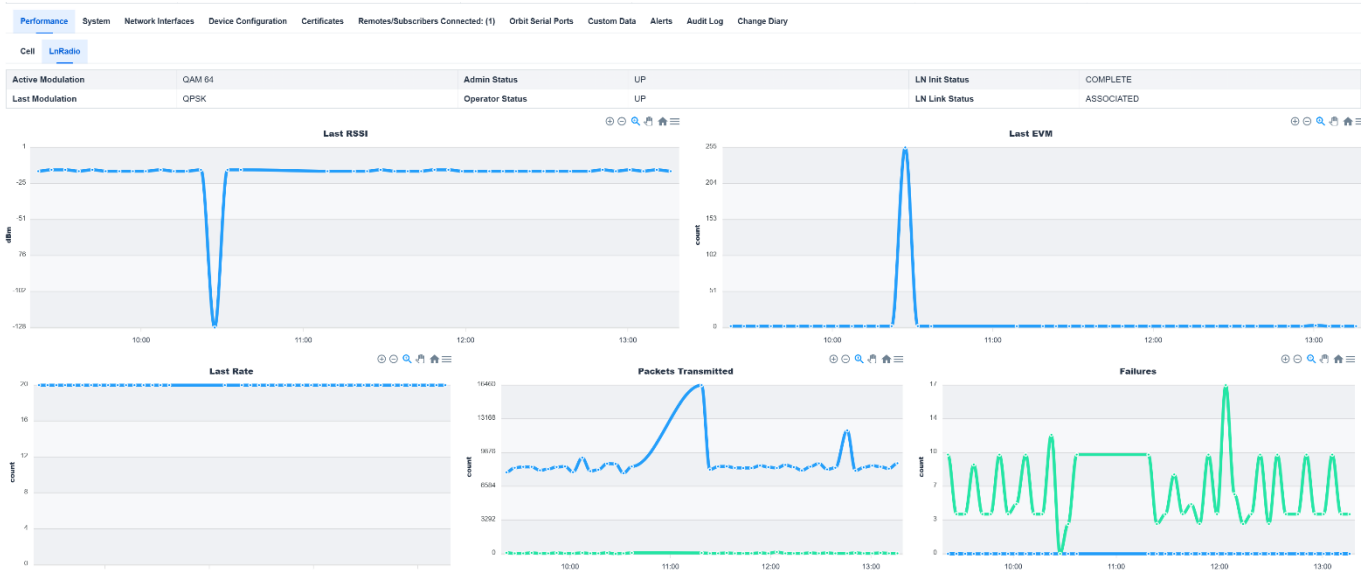
Performance information for the Orbit NX interface can be viewed by clicking the NxRa- dio tab under the Performance tab on an Orbit device. NX performance metrics include the administrative and operational status, the NIC initialization state, the link state, as well as performance graphs for interface throughput and errors.

Configuration parameters for the Orbit NX interface include the current modem type and the device mode (access point or remote).



LN Interface

Performance information for the Orbit LN interface can be viewed by clicking the LnRa- dio tab under the Performance tab on an Orbit device. LN performance metrics include active modulation, previous modulation, power supply voltage, administrative and operational status, LN initialization state, link status, as well as graphs for temperature, RSSI, EVM, data rate, throughput, and errors.



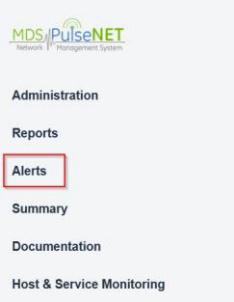
Configuration information for the Orbit LN interface includes the device mode (access point or remote), active channel, FEC setting, and the active TX and RX frequencies.

MDPL (Master Dual Protected LN)

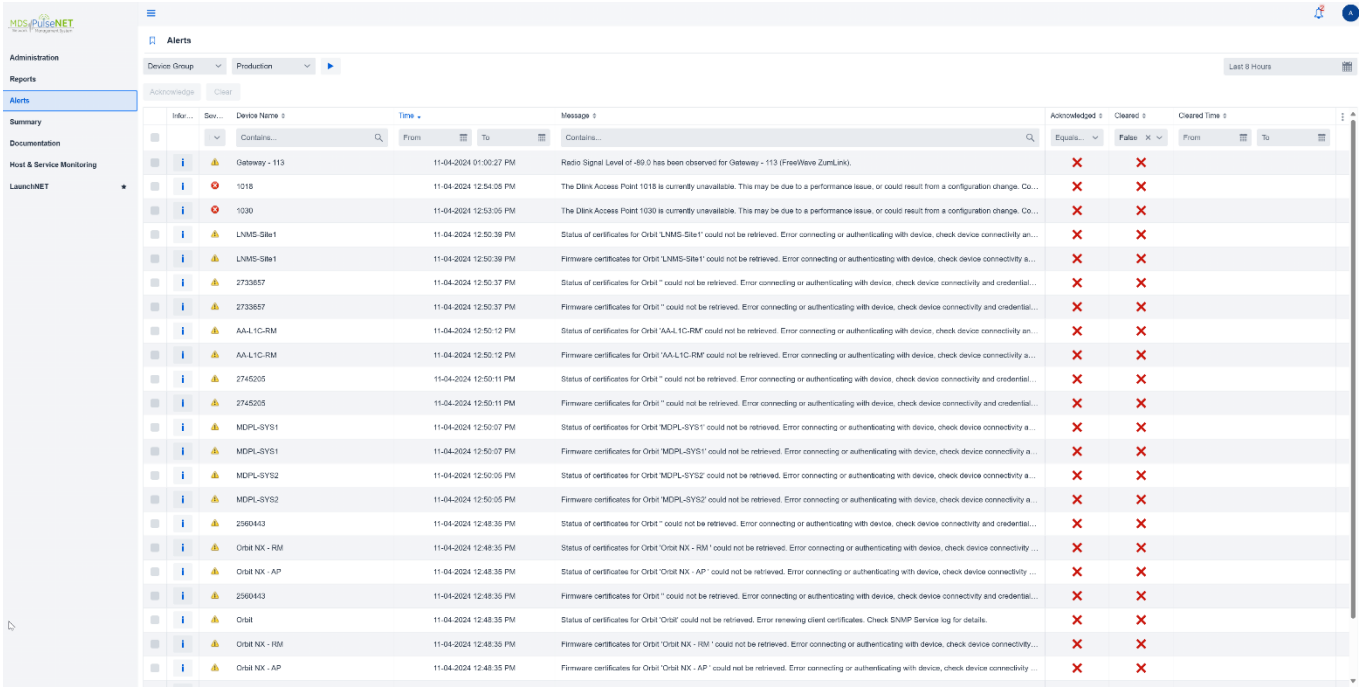
The MDPL has the characteristic of redundancy built into the single device chassis. To depict this the two devices are called "siblings" and are displayed in the topology as shown with two boxes and a connecting line between them. The online system will be depicted with a green color.

While viewing one of the devices, switch to its sibling device by selecting "Sibling" from the gear icon.

Alerts Dashboard



This section describes the **Alerts** dashboard, which displays an overview of all device or host alerts. Open the left-side Navigation panel and click on **Alerts** to see the **Alerts Management View**.



In the **Alerts Management View** window, a table will appear (pictured above) with a complete list of all device and host alerts on the network. In order to sort these alerts, click on the table headers of each column. The alerts can be sorted according to severity, device name, time or status.

Click the **Acknowledge** button to assign the alert to the current user. Click the **Clear** button to clear the alert from the table.

To see more details about the individual alert, click on the alert line in the table to go to the **Alert Details** dialog box. For more information about working with alerts, see the **Working with Alert Details** section above.

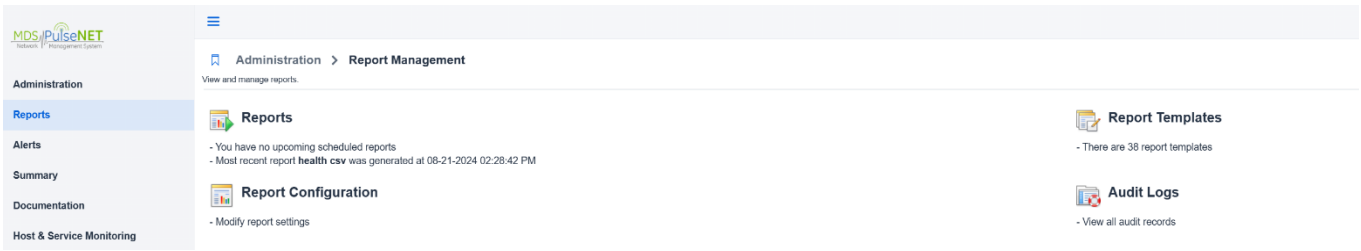
Working with Reports

Reports are a convenient way to share data about the monitored environment with others in the organization. A report can also provide a quick, high-level
perspective on the data. A report can be generated using one of the predefined report templates included in GE PulseNET, or a custom report template can be created.

This section describes the **Reports** dashboard, which is the starting point for working with reports. Use it for generating new reports, scheduling reports, deleting previous reports, and downloading reports. Open the left-side Navigation panel and click on Reports to see the Report Management view.

Managing Reports

Click Reports to get started. Once in the reports view there are four options: Reports, Report Templates, Report Configuration, and Audit Logs.



Report Configuration - settings shown below.

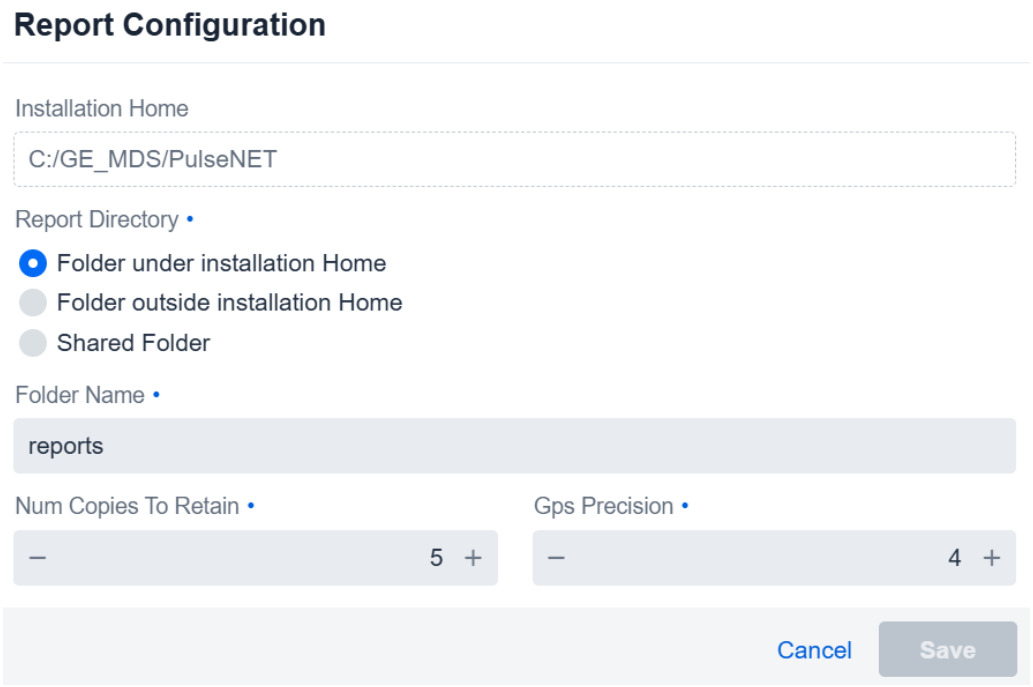
Installation Home : is the main path in which the folder that stores the reports is held, this is the default path so if storing under `\GE_MDS\PulseNET` the Report directory will be used.

Report Directory : is how the reports are stored. For example: if reports are stored on a local drive outside of the PulseNET directory. Select the Radio button called "Folder outside installation Home" and update the Absolute path and set the folder. If using a network drive to store reports select "Shared Folder", then input the Username and Password that has access to the folder and update the "Absolute Path".

Folder Name : is only used when "Folder under installation Home" is set. This folder has to be within the `\GE_MDS\PulseNET` directory.

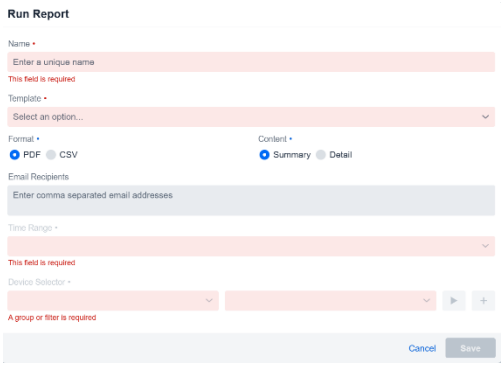
Absolute Path : Is the path in which the report directory is stored. Example: When using "Folder outside of installation Home" a possibility would be `E:\PulseNET_Reports`. When using "Shared Folder" possibility would be `//<IP_Address>/Shared/Reports` (Note: this field only displays when the report directory is set to "Shared Folder")

Num of Copies To Retain : Is the number of reports that will be kept. Once that number is reached PulseNET will start deleting reports.

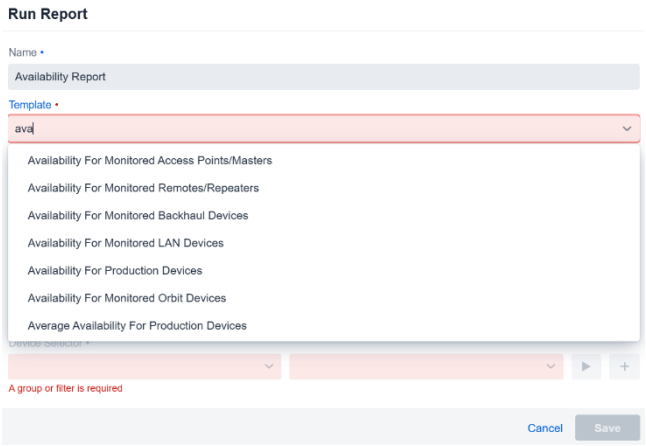


Running a Report

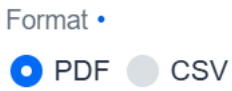
1. Click the **play** button to open the report setup display to enter information for the required fields and any other optional fields as necessary.



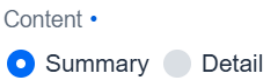
2. Enter a unique **Name** for the report and select a **Report Template** from the list of available reports.



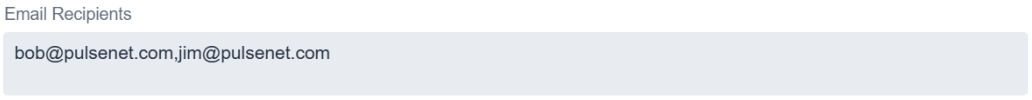
3. Select a report **Format** (PDF or CSV).



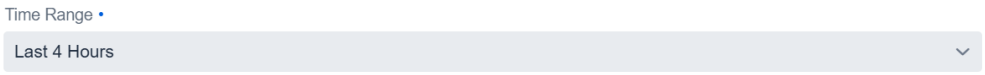
4. Select the type of **Content** which will be used in the report either *Summary* or *Detail*. A *Summary* content shows the latest values for metrics. The *Detail* content shows the raw data for each metric as a graph (for pdf reports) and as csv data (for csv reports).



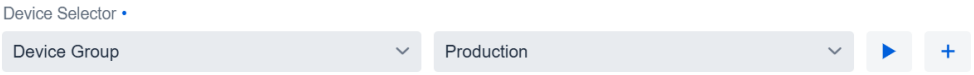
5. Enter optional email recipients for this report. (Note: for more than one email recipient use commas to separate email addresses)



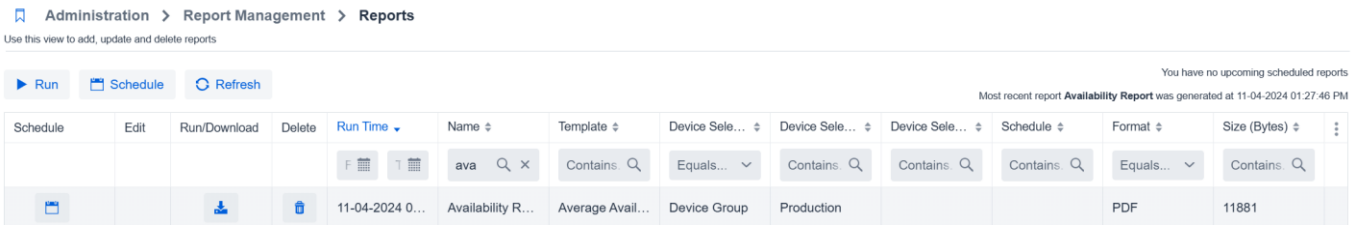
6. Select the time range for the report. Click the **Edit** icon at the end of this field to select an alternate time range from the dropdown list. (Note: if the edit icon is grayed out, go to the report template for the selected template and enable the “Is Customizable” checkbox for Time Range).



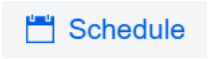
7. In the Device Selector select the device group or device filter for which this report will include data by clicking the **Edit** icon at the right of this field. It is also possible to click the running man icon to view a list of the devices for which data will be included in this report. (Note: if the edit icon is grayed out, go to the report template for the selected template and enable the “Is Customizable” checkbox for Device Selector)



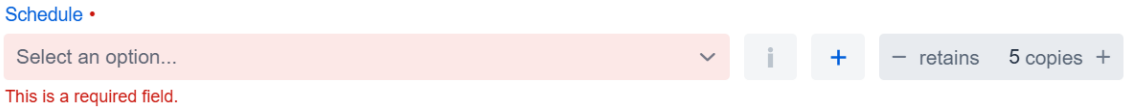
8. Click **Save** to save and execute this report.
9. After the report has run, it will appear in the report table and the user may download the report or select an application to view the report. Click the **Download** icon to download a copy of the report to the local machine. If this report will be run on a scheduled basis, click the **Calendar** icon to set up the schedule frequency on which to run the report. Each report will remain available for downloading in the reports table until it is manually deleted.



Running a Report at a Scheduled Time

1. To run a Scheduled Report, go to Reports and click on the 

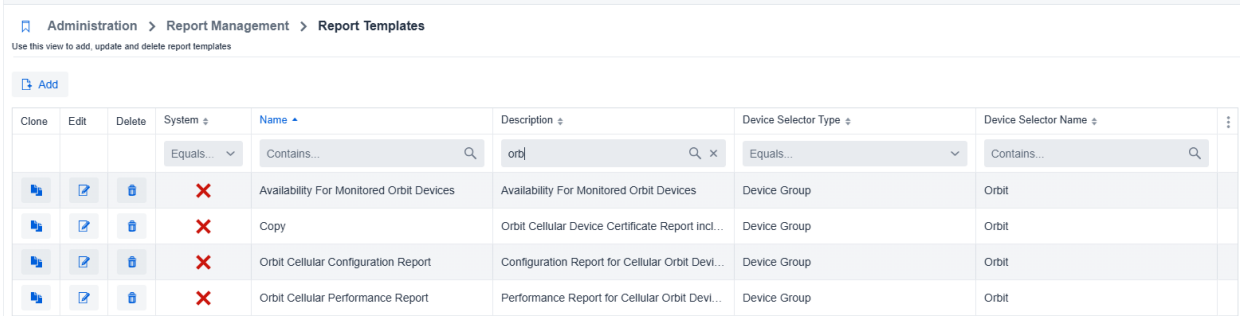
button. Once in the view follow the instructions for **“Running a Report”** with the additional field called “Schedule” to select how the report runs and how many copies PulseNET will retain of this report.



Once a report has been scheduled, the icon will change  . Clicking it again at this point will **disable** the schedule set for this report. Use this option if you want to retain the report configuration, but no longer need the report to regularly generate.

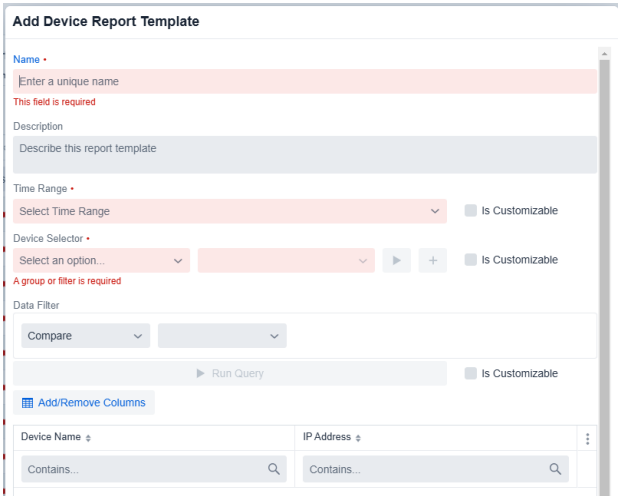
Managing Report Templates - [Enterprise Only]

GE PulseNET is delivered with a number of predefined report templates, which may be copied, edited, or deleted as needed. To copy an existing report template, click the clone icon in the first column in the Report Template view. To edit a template click the edit icon in the second column, and to delete a template click the delete icon in the third column.



Adding a New Report Template

To add a new report template, click the **Add** button at the top of the report templates list. This will open the Add Report Template display. Enter a unique report name and then create a description for the new report.



Selecting the Time Range

Select the **Time Range** from one of the predefined ranges in the dropdown menu. If another user needs to be able to run this report, and select their own time range at runtime, check the **Is Customizable** checkbox.

Using the Device Selector

Enter the **Device Selector**, which specifies which devices will be included in this report. Choose to use an existing device filter or device group by selecting from the first dropdown menu. Then choose the name of the device filter or group from the second dropdown menu. To see which devices will be included in the report, click the green run icon. If an existing device filter or group which meets the need does not exist, click the green plus icon to add a new device filter or group. If another user will be running the report with their own selected device filter or group at runtime, check the **Is Customizable** checkbox.

Creating the Data Filter

Create a **Data Filter**, which will further narrow the list of devices included in the report. If another user will be running the report and selecting their own data filter at runtime, check the **Is Customizable** checkbox. In the Data Filter section, define a set of criteria which are used to select the devices that appear on the report. Data filters provide a very robust and powerful set of features that can be used to create complex search parameters. They are defined using several types of operators: **And, Or, Not, Compare**.

The **Compare** operator allows selection of devices that have a specific parameter that matches a chosen value. For example, comparing to determine whether the IP address of a device starts with “10.0.0”.

Comparison operators include the following operators:

- **Equals:** The search string in the third field must exactly match the value of the chosen parameter.
- **Not Equals:** The comparison will return a match if the parameter’s value contains anything except the literal search string. **Contains:** The comparison will return a match if the search string is contained anywhere within the parameter’s value.
- **Starts With:** The comparison will return a match if the parameter’s value begins with the literal search string.
- **Ends With:** The comparison will return a match if the parameter’s value ends with the literal search string.
- **Matches:** Allows the use of regular expression wildcards to form the search string.
- **Is In:** The comparison will return a match if the parameter’s value matches any of the items in a comma separated list of values.
- The **AND** operator allows inclusion of devices which have *all* of the specific parameters and matching values that are included in the filter.
- The **OR** operator allows inclusion of devices which have *any* of the specific parameters and matching values that are included in the filter.
- The **NOT** operator allows exclusion of devices which have the specific parameters and matching values in the filter.

Once an operation is chosen (And/Or/Not/Compare) a property must be specified (one that exists on the device type selected in the Device Selector.) To reference which properties are supported on the devices, click the green run icon in the Device Selector section to display the list of devices that match the device filter or group. On that list, click any of the blue information icons to see a detailed list of device properties. While defining the data filter, choose any listed properties for the filter criteria.

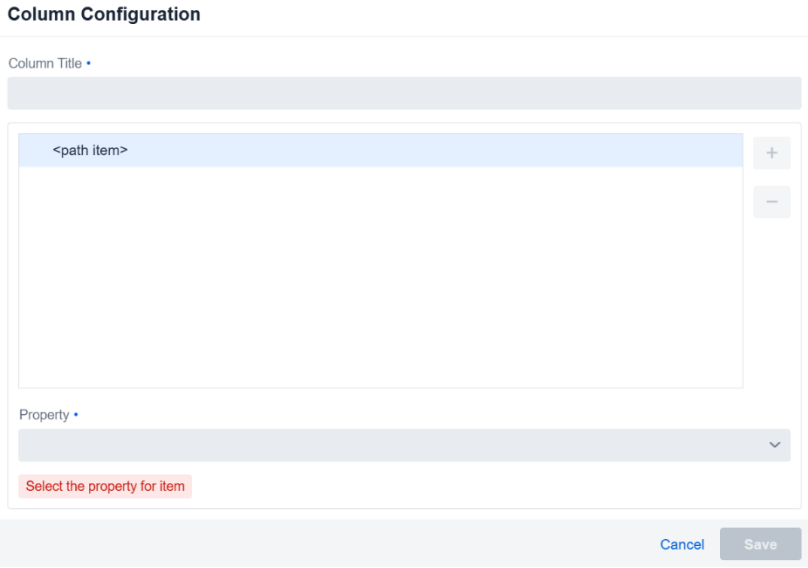
At any time while defining the filter, click the green run icon to see the list of devices that match the current filter settings.

Adding Columns to the Report

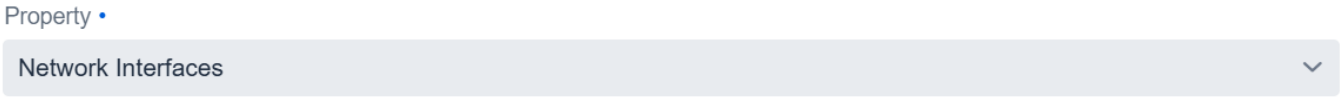
Now that the devices to be queried have been defined, design the output format by specifying the columns which will appear on the final report. To select the columns, click **Add/Remove Columns** at the top right side of the device list. Select columns for properties which exist on the type of devices selected in the Device Selector. To see which columns are supported on the devices, click the green run icon in the Device Selector section, and click any of the blue information icons to see a detailed list of device properties. Choose any of the listed properties as columns for the report.

Check the box on the items that will be included as columns for the report. By default the Device Name and IP Address are pre-selected, but can be deselected as needed. At least one, and no more than 15 columns must be selected for the report. When satisfied with the report, click **Save** to store the new report template and make it available for use in GE PulseNET. By default any report template created by any user will become available to all users.

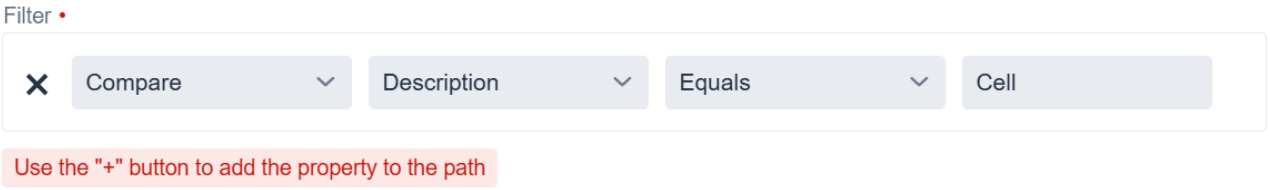
For Orbit Cell, Wifi, LN, and NX interfaces values may not show up correctly when creating a report. If this happens go to the Add/Remove Columns and click on the Add Device Data Path button.



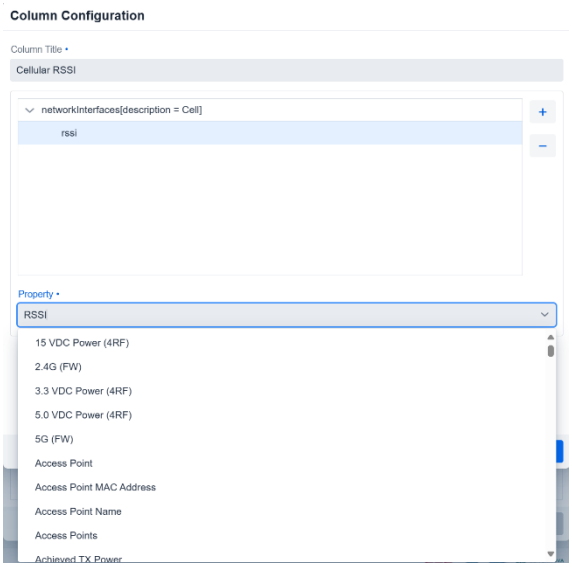
Column Title – This is a unique field. For example, if we wanted to display the RSSI of an Orbit Cellular device we would use. Cellular RSSI.
Next select the property path in most cases it will be Network Interfaces.



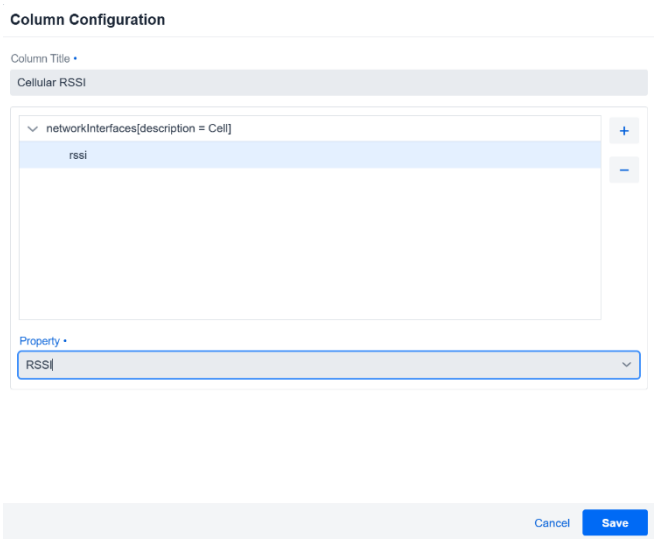
Once that is selected it will prompt for a filter. Fill in the required fields.



Once the filter is complete click the + icon, and it will create another record in the tree.
Then select the property in which to display.



Once the property has been selected click save.



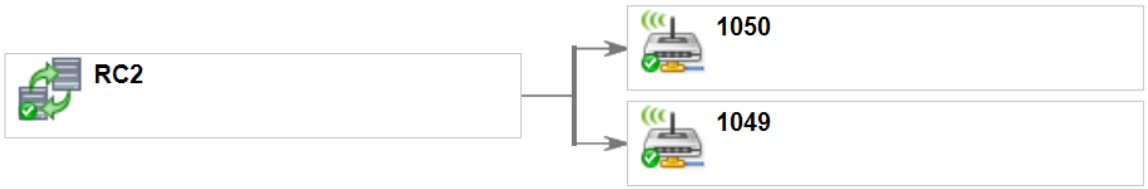
Once in the Nested Property Path view, in the property field dropdown, select Network Interfaces. In the filter portion select “Compare”, then “Description/Own Msg”, then “Contains”, in the blank field you will want to select what type of Orbit interface. For this example we will be using “Cell”. Other values may include, Cell, LnRadio, NxRadio, Wi-Fi. Please note that these values are case sensitive.

Once done click “save” and “save the report template. Verify that the values are displayed.

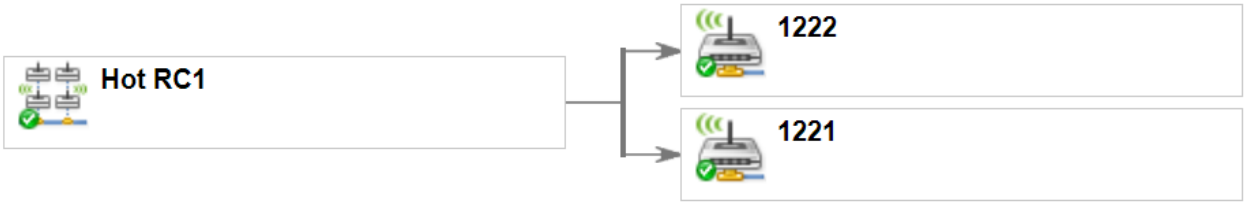
Audit Logs - This view entails all details of users logging in and out, devices being authorized and decommissioned, and application settings that change in PulseNET.

Redundant Cluster Devices - [Enterprise Only]

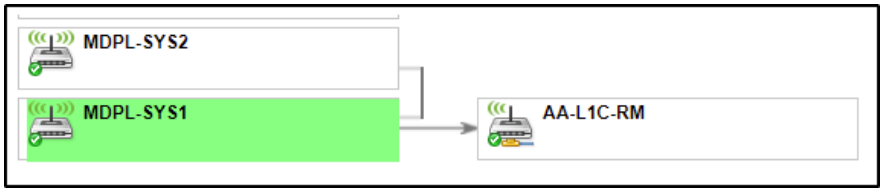
In a DLINK cRC (cold Redundant Cluster) only the active master is powered on, so the information GE PulseNET collects for the active master is the information that GE PulseNET displays for the cRC. For that reason, only the cRC itself must be monitored. Therefore, cRCs are represented on the **Summary** dashboard (Summary view and Topology Explorer), and the devices within cRCs are not. Similarly, cRCs are represented on the **Topology Viewer** and the devices within them are not. To access the Detail View of a cRC, click the cRC in the Summary dashboard or Topology Viewer. To access the detail view of a device within the cRC, on the detail view for the cRC, on the **Devices** tab, click the device.



In a DLINK hRC (hot Redundant Cluster,) each member remains powered on and GE PulseNET is able to communicate with both devices. Therefore, the masters are represented on the **Summary** dashboard, but the hRC is not. However, on the **Topology View** the hRC is shown with its downstream devices, but the masters are not. To access the detail view of a device in an hRC, click the device while in either the Summary dashboard or the Topology Viewer. To access the detail view of an hRC, drill into the detail view of one of the masters and click the **hRC** icon.



The Orbit MDPL has redundancy built into the single device chassis. To depict this the two devices are called "siblings" and are displayed in the topology with two boxes and a connecting line between them. The online system is colored green.



Appendix A

LN/NX Polled Parameters List

By default, the PulseNET Collection Schedule named *Orbit Ln/Nx Remote Collection* uses **AP polling with limited collections**. If polling with *Orbit Ln/Nx AP Collection*, PulseNET will collect all of the MIB values.

Values collected from both LN/NX Remotes running the Collection Schedule Named: **Default SNMP Collection**

System Uptime (Performance)
System Temperature (Performance)
System MPR Heatsink Temperature 1 (Performance)
System MPR Heatsink Temperature 2 (Performance)
System MPR Relay Switch Position (Performance)
System MPR Power Supply Voltage 1 (Performance)
System MPR Power Supply Voltage2 (Performance)
System Power Supply Voltage (Performance)

Interface Index (Configuration)
Interface Description (Configuration)
Interface Name (Configuration)
Interface Speed (Configuration)
Interface Physical Address (Configuration)
Interface Admin Status (Configuration)
Interface Operational Status (Performance)
Interface In Octets (Performance)
Interface Out Octets (Performance)
Interface In Unicast Packets (Performance)
Interface Out Unicast Packets (Performance)
Interface In N Unicast Packets (Performance)
Interface Out N Unicast Packets (Performance)
Interface In Discards (Performance)
Interface Out Discards (Performance)
Interface In Errors (Performance)
Interface Out Errors (Performance)

Values collected from NX Remotes using the Collection Schedule: **Default SNMP Collection**

NX Link Status (Performance)
NX Init Status (Performance)
NX Alarms (Performance)
NX Temperature (Performance)
NX AP Info Connected Time (Performance)
NX AP Info Average RSSI (Performance)
NX AP Info Average LQI (Performance)
NX Current Device Mode (Performance)

Values collected from LN Remotes when using the Collection Schedule: **Default SNMP Collection**

LN Link Status (Performance)
LN Init Status (Performance)
LN Current Device Mode (Performance)
LN Alarms (Performance)
LN Temperature (Performance)
LN AP Info Connected Time (Performance)
LN AP Info RSSI (Performance)
LN AP Info Error Vector Magnitude (Performance)
LN AP Info Mod (Performance)
LN Modem Stats TX Success (Performance)
LN Modem Stats TX Error (Performance)
LN Modem Stats RX Success (Performance)
LN Modem Stats RX Error (Performance)
LN Active Modulation (Performance)
LN Last RSSI (Performance)
LN Last Error Vector Magnitude (Performance)
LN Last Mod (Performance)
LN Last Rate (Performance)

When using AP polling with a limited collection, only specific MIB OIDs are polled from the AP.
****Note** when a configuration poll runs, all values are collected directly from the device regardless of AP or Remote.**

Values collected from the AP for NX Remotes using the Collection Schedule: **Orbit LN/NX AP Collection**

NX Status Connected Remote Link Status (Performance)
NX Status Connected Remote Average RSSI (Performance)

Values collected from the AP for LN Remotes using the Collection Schedule: **Orbit LN/NX AP Collection**

LN Status Connected Remote Link Status (Performance)
LN Status Connected Remote RSSI (Performance)
LN Status Connected Remote Error Vector Magnitude (Performance)
LN Status Connected Remote Stats TX Error (Performance)
LN Status Connected Remote Stats RX Error (Performance)
LN Status Connected Remote Stats Alarmed (Performance)
LN Status Connected Remote Stats Temperature (Performance)

Values collected for Cellular Devices using the Collection Schedule: **Orbit Cellular Collection**
Note when a configuration poll runs, all values are collected from the device.

Cell Sim State (Performance)
Cell Modem State (Performance)
Cell Roaming State (Performance)
Cell Service State (Performance)
Cell RSSI (Performance)
Cell RSRP (Performance)
Cell RSRQ (Performance)
Cell SNR (Performance)
Cell EMM State (Performance)
Cell RRC State (Performance)

LW Serial Number
LW Firmware Revision
LW Hardware Id
LW Current Device Mode
LW Link Status
LW Init Status
LW Current Device Mode
LW Temperature
LW Ap Info Connected Time
LW Ap Info Rssi
LW Ap Info Snr
LW Ap Info Mod
LW Mac Stats Tx Queue Full
LW Mac Stats Tx Retry
LW Modem Stats Tx Error
LW Modem Stats Rx Error
LW Status Conn Rem Address
LW Status Conn Rem Ip Address

LW Status Conn Rem Link Status
LW Status Conn Rem Rssi
LW Status Conn Rem Snr
LW Status Conn Rem Mod
LW Status Conn Rem Stats Tx Error
LW Status Conn Rem Stats Rx Error
LW Status Conn Rem Stats Temp
LW Init Status
LW Current DeviceMode
LW Ap Info Connected Time
LW Mac Stats Tx Queue Full
LW Mac Stats Tx Retry

Appendix B

Regular Expression Wildcard Details

Matching Characters

Wildcard	Matches
x	The character x
\\	The backslash character
\0n	The character with octal value 0n (0 <= n <= 7)
\0nn	The character with octal value 0nn (0 <= n <= 7)
\xhh	The character with hexadecimal value 0xhh
\t	The tab character ('\u0009')
\n	The newline (line feed) character ('\u000A')
\r	The carriage-return character ('\u000D')
\f	The form-feed character ('\u000C')
\a	The alert (bell) character ('\u0007')
\e	The escape character ('\u001B')
\cx	The control character corresponding to x

Logical operators

Wildcard	Matches
XY	X followed by Y
X|Y	Either X or Y

Matching with Character Classes

Wildcard	Matches
[abc]	a, b, or c (simple class)
[^abc]	Any character except a, b, or c (negation)
[a-zA-Z]	a through z or A through Z, inclusive (range)
[a-d[m-p]]	a through d, or m through p: [a-dm-p] (union)
[a-z&&[def]]	d, e, or f (intersection)
[a-z&&[^bc]]	a through z, except for b and c: [ad-z] (subtract
[a-z&&[^m-p]]	a through z, and not m through p: [a-lq-z](subtraction)

Matching with Predefined Character Classes

Wildcard	Matches
.	Any single character
\d	A single digit: [0-9]
\D	A single non-digit: [^0-9]
\s	A single whitespace character: [\t\n\x0B\f\r]
\S	A single non-whitespace character: [^\s]
\w	A single word character: [a-zA-Z_0-9]
\W	A single non-word character: [^\w]

Matching with POSIX character classes (US-ASCII only)

Wildcard	Matches
\p{Lower}	A single lower-case alphabetic character: [a-z]
\p{Upper}	An single upper-case alphabetic character:[A-Z]
\p{ASCII}	All ASCII:[\x00-\x7F]
\p{Alpha}	An alphabetic character:[\p{Lower}\p{Upper}]
\p{Digit}	A single decimal digit: [0-9]
\p{Alnum}	An alphanumeric character:[\p{Alpha}\p{Digit}]
\p{Punct}	Punctuation: One of !"#$%&'()*+,-./:;<=>?@[\]^_`{|}~
\p{Graph}	A single visible character: [\p{Alnum}\p{Punct}]
\p{Print}	A single printable character: [\p{Graph}\x20]
\p{Blank}	A single space or a tab: [\t]
\p{Cntrl}	A single control character: [\x00-\x1F\x7F]
\p{XDigit}	A single hexadecimal digit: [0-9a-fA-F]
\p{Space}	A single whitespace character: [\t\n\x0B\f\r]

Boundary Matches

Wildcard	Matches
^	The beginning of a line
$	The end of a line
\b	A word boundary
\B	A non-word boundary
\A	The beginning of the input
\G	The end of the previous match
\Z	The end of the input but for the final terminator, if any
\z	The end of the input

Greedy quantifiers

Wildcard	Matches
X?	X, zero or once
X*	X, zero or more times
X+	X, one or more times
X{n}	X, exactly n times
X{n,}	X, at least n times
X{n,m}	X, at least n but not more than m times

Reluctant quantifiers

Wildcard	Matches
X??	X, zero or once
X*?	X, zero or more times
X+?	X, one or more times
X{n}?	X, exactly n times
X{n,}?	X, at least n times
X{n,m}?	X, at least n but not more than m times

Possessive quantifiers

Wildcard	Matches
X?+	X, zero or once
X*+	X, zero or more times
X++	X, one or more times
X{n}+	X, exactly n times
X{n,}+	X, at least n times
X{n,m}+	X, at least n but not more than m times

About GE MDS

Over two decades ago GE MDS began building radios for business-critical applications. Since then we have installed millions of radios in countries across the globe. We overcame impassable terrain, brutal operating conditions, and complex network configurations to succeed. We also became experts in wireless communication standards and applications worldwide. The result of our efforts is that to-day thousands of organizations around the world rely on GE MDS wireless networks to manage their critical assets.

The majority of GE MDS radios deployed since 1985 are still installed and performing within our customers' wireless networks. That's because we design and manufacture our products in-house, according to ISO 9001, which allows us to meet stringent global quality standards. Thanks to our durable products and comprehensive solutions, GE MDS is the wireless leader in industrial automation—including oil and gas production and transportation, water/wastewater treatment, supply, and transportation, electric transmission and distribution, and many other applications. GE MDS is also at the forefront of wireless communications for private and public infrastructure and online transaction processing. As your wireless needs change, you can continue to expect more from GE MDS. We'll always put the performance of your network above all.

GE MDS ISO 9001 Registration

GE MDS adheres to the internationally-accepted ISO 9001 quality system standard.

To GE Customers

We appreciate your patronage. You are our business. We promise to serve and anticipate your needs. We will strive to give you solutions that are cost effective, innovative, reliable and of the highest quality possible. We promise to engage in a relationship that is forthright and ethical, one that builds confidence and trust. Data sheets, frequently asked questions, application notes, firmware upgrades and other updated information is available on the GE MDS Web site.

Manual Revision and Accuracy

This manual was prepared to cover a specific version of our product. Accordingly, some screens and features may differ from the actual version you are using. While every reasonable effort has been made to ensure the accuracy of this guide, product improvements may also result in minor differences between the manual and the product shipped to you. If you have additional questions or need an exact specification for a product, please contact our Customer Service Team using the information below. In addition, manual updates can often be found on the GE MDS Web site.

About End 2 End Technologies

End 2 End (E2E) Technologies offers a unique combination of wireless communications and information technology expertise. We improve efficiency, reduce risk and lower the cost of industrial field operations via modernization and management of our customer's wireless communications networks. From initial planning through lifecycle support we assist your team in adopting a wireless solution that keeps communication costs low while maximizing network reliability and performance. For more information visit us at www.e2etechinc.com.

Customer Support

If you have problems, comments, or questions pertaining to the GE PulseNET application, please contact GE MDS via one of the methods below:

Phone: 585-241-5510
Email: gemds.techsupport@ge.com
Fax: 585-242-8369

License Credits

GE PulseNET contains several third party components. Please refer to the complete list of these components at www.e2etechinc.com/index.php/about/legal.