



# **NSP**

## **Network Services Platform**

Release 20.3

# **Network Supervision Application Help**

**3HE-16066-AAAA-TQZZA**

**Issue 1**

**March 2020**

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# 1 Network Supervision

## 1.1 What is Network Supervision?

The Network Supervision application allows users to monitor the health of objects, such as NEs, cards, ports, or links, using KPIs, and monitor the fault status of a network. Network Supervision uses supervision groups, which can belong to one or more views.

A supervision group is a logical set of monitored objects, in this case NEs and VNFs, that is specified by user-defined filters.

NEs are both physical network functions and virtual network functions. Physical network functions are referred to as PNFs and virtual network functions are referred to as VNFs in the Network Supervision help.

Supervision groups can be used to partition objects into distinct categories and are associated with views. There is no limit to the number of supervision groups to which an object can belong.

The criteria for monitored objects in a supervision group are based on inclusion filters. The inclusion filter is the rule on whether to include an object in a supervision group.

A summary view is a collection of one or more supervision groups that provides a summarized, high-level view of a group of network objects. There is no limit to the number of summary views to which a supervision group can belong, but each summary view can contain only up to 200 supervision groups.

## 1.2 Summary views

When you open Network Supervision for the first time, you must select a summary view. The view opens a summary of NE supervision groups, which are displayed as tile objects, with basic status information for the group. Once a view is selected, Network Supervision will always open to the view, unless you select a different view.


A view is made up of supervision groups, which are displayed as tile objects. Each group tile object provides a high-level view of the status of the NEs within the group:

- Tile banner color indicates the rough percentage of alarm-affected NEs in the group, in accordance with the application KPI threshold settings.
- Number of NEs in the group.
- Number of alarm-affected NEs in the group.
- Number of unacknowledged critical alarms in the group.

Views and supervision groups are created in the Group Manager; see the Group Manager Help for more information.

---





### 1.2.1 How do I select a summary view?

- 1 \_\_\_\_\_  
In the Network Supervision application, click **More**  , **View**.
- 2 \_\_\_\_\_  
Click on the view you want to display.

END OF STEPS \_\_\_\_\_

### 1.2.2 How do I work in a summary view?

Navigate a view using the following tasks:

- **View the contents of a supervision group.** Double-click on the group tile object. The supervision group opens as a matrix, list, or other format.
- **View additional information for a supervision group.** Hover over **More**  and click **More Details**  to expand the group tile. The expanded tile displays the number of alarm-affected cards, ports, and links in the group, as well as the number of acknowledged and unacknowledged alarms.
- **View all current alarms for a supervision group.** Hover over **More**  and click **Current Alarms**  to open the Alarms list.

### 1.2.3 Supervision groups

A supervision group is a logical group of NEs. You can view a supervision group in a variety of formats; see [1.4 “Display formats” \(p. 6\)](#).

## 1.3 Access control in Network Supervision

An operator’s visibility of network equipment is based on access control settings, which are configured by an administrator. Depending on your access settings, some equipment may not be visible. See the User Manager Application Help and your network administrator for more information.

## 1.4 Display formats


You can view the contents of a network supervision group in a variety of list formats and graphical formats.

**Change display format.** Click the Format Changer in the upper right-hand corner of the GUI and select a format from the menu.



Select a display format for the supervision group:















- Matrix; see 1.5 “NE matrix format” (p. 6)
- Topology map; see 1.6 “Topology map format” (p. 7)
- Multi-Layer map; see 1.9 “Multi-Layer map format” (p. 11)
- NE List; see 1.10 “NE List format” (p. 11)
- Link List; see 1.11 “Link list format” (p. 12)

A search function is available in all display formats. Click **Search**  to search for PNFs, VNFs, or VNFCs based on different attributes, such as name or location.

## 1.5 NE matrix format

The NE matrix displays NEs as tile objects, containing basic information about hardware status for the NE. Tile banner color indicates the rough percentage of alarm-affected equipment on the NE, in accordance with the application KPI threshold settings.

The NE matrix allows you to perform the following:

- **View current alarms for an NE.** Hover over **Show More**  on a tile and click **Current Alarms** .
- **View the event timeline for an NE.** Hover over **Show More**  on a tile and click **Event Timeline** .
- **View an NE in a troubleshooting map.** Hover over **Show More**  on a tile and click **Troubleshooting Map** .
- **View the equipment inventory for an NE.** Click **Show More** , **Equipment Inventory**.
- **Add the NE to the Watch view.** Click **Show More** , **Add to Watch View**.
- **View merged alarms for an NE.** Click **Show More** , **Merged Alarms**.
- **View historical alarms for an NE.** Click **Show More** , **Historical Alarms**.
- **View an NE in its management application.** Click **Show More** , **Show Object**. The object is opened for configuration in its management application.
- **View an NE in its web application or element management system.** Click **Show More** , **Show External EMS**. This option is available for Wavence devices using the CorEvo card.
- **Run Analytics reports for an NE.** Click **Show More** , **Analytics**. Select **Inventory Reports**, **Utilization Reports**, or **OAM Reports** from the sub-menu.
- **View additional details for an NE.** Click **Show More** , **More Details**. The tile expands to display additional alarm, status, software version, and physical location information for the NE.


## 1.6 Topology map format

The Topology map displays the NEs in a supervision group as a map of linked objects. Physical topology maps can display either an Operational map view or a Utilization map view. The Operational map view is displayed by default.

### Physical Map Layout

Supervision groups may be administratively enabled for Physical Map Layout. Physical Map Layout allows NEs to be grouped into regions, and further subdivided into zones and subzones. Region and zone groupings provide the basis for clustering map objects when region-based clustering is enabled for a map.











Topology maps with Physical Map Layout may show a geographical map as a background, and the icons for regions, zones, or NEs may be placed on the background map to reflect their actual geographical location.


When objects share the same physical location, the map shows a stacked icon shaded blue. Click on **Legend** , **Vertex Types** for more information. To see the co-located objects individually, drag them off the stack.







Physical Map Layout settings are configured by an administrator with the required permissions. Regions and zones are configured using the Group Manager; see the Group Manager Help. Map backgrounds are configured through the NSP system settings, accessed from the NSP Launchpad; see the *NSP System Administrator Guide*.

### Topology map functions

The Topology map allows you to perform the following:

- **Switch map views.** The Operational map is the default view. To switch to the Utilization view, click **View** , **Utilization**.
- **View quick NE information.** Hover over an NE or link object to display basic system and alarm information for the object.
- **View full NE details.** Click **Info**  to open the Information panel, which displays detailed information about a selected map object.
- **Interpret map information.** Click **Legend**  to open the map legend, which describes the meaning of different objects and status colors seen in the topology map.
- **Highlight links to identify by type.** Click **View Options**  to open the Link Highlight Options panel. Click on the icons to highlight various link types. See [1.23 "How do I highlight links by type on the Topology map?"](#) (p. 17) for more information.
- **Find alarm-affected NEs.** NE objects with alarms carry a badge. The badge color indicates alarm severity, as described in the Legend panel.
- **Filter the topology map content.** Click **Add Filter**  and select one of the filter types: Alarm Severity, Chassis Type, Network Type, Product Type, or Status. A chip filter  is added to the topology map. Click on the chip filter and select one or more criteria related to the filter type. You can add up to three filters. Click **Close**  on a chip filter to remove it from the map. Filtering does not affect the display of regions, zones, or group connectors in a Physical Map Layout.
- **Refresh map data.** Click **Refresh Data**  to update the map contents.
- **View a map object in its management application.** Click on the NE or link object you want to view. In the Information panel, click **More** , **Show Object**. The object is opened for configuration in its management application.  
For NSP deployments that include NRC-X, click on a cross-domain link and choose **More** , **Show in Cross Domain Coordinator**. The Cross Domain Coordinator application opens with the cross-domain link highlighted on the network map.
- **View a list of optical services for cross-domain links.** Click on the cross-domain link you







want to view. In the Information panel, hover over the **More Actions**  button for a link, then select **Show Optical Services**. A list of optical services that terminate on the optical endpoint of the cross-domain link is displayed.



- **Control the map display.** Click on the icons in the map controls panel to perform the following:
  - **Fit to screen**  . Fit the map to the available screen area.
  - **Adjust clustering**  . Reduce the number and density of NE objects on the map by combining NEs into clusters that show a single icon. Cluster icons are square with rounded corners. See [1.24 “How do I manage clusters on the Topology map?”](#) (p. 18) for information about clustering controls.
  - **Adjust vertexes**  . Adjust vertex size, show or hide connectors, and show or hide text labels for vertexes.
  - **Adjust links**  . Show or hide links, adjust link curvature, turn link grouping on or off, and specify the link grouping threshold.
  - **Map view**  . Show a bird’s eye view of the map.
  - **Zoom controls**  . Zoom in and out on the map.
- **Change, save, and restore layouts.** Drag map objects to change their placement on the map. Save the new layout, or restore the map to the common layout set by an administrator. See [1.25 “How do I save and restore layout changes on the Topology map?”](#) (p. 19).
- **Find NEs in the map.** See [1.26 “How do I find NEs in the Topology map?”](#) (p. 20).





## 1.7 Troubleshooting map

The Troubleshooting map displays an NE in a map, along with linked objects.

The Troubleshooting map allows you to perform the following:

- **Switch map views.** The Operational map is the default view. To switch to the Utilization view, click **View**  , **Utilization**.
- **Set number of hops from initial object.** Set the **Hop count**  to show NEs and links a specified number of hops from the initial NE.
- **View quick NE information.** Hover over an NE or link object to display basic system and alarm information for the object.
- **View full NE details.** Click **Info**  to open the Information panel, which displays detailed information about a selected map object.
- **Interpret map information.** Click **Legend**  to open the map legend, which describes the meaning of different objects and status colors seen in the topology map.
- **Refresh map data.** Click **Refresh Data**  to update the map contents.
- **View a map object in its management application.** Click on the NE or link object you want to view. In the Information panel, click **More**  , **Show Object**. The object is opened for configuration in its management application.

For NSP deployments that include NRC-X, click on a cross domain link and choose **More**  , **Show in Cross Domain Coordinator**. The Cross Domain Coordinator application opens with the cross domain link highlighted on the network map.
- **Control the map display.** Click on the icons in the map controls panel to perform the following:
  - **Fit to screen**  . Fit the map to the available screen area.

- **Adjust vertexes**  . Adjust vertex size, show or hide connectors, and show or hide text labels for vertexes.
- **Adjust links**  . Show or hide links, adjust link curvature, turn link grouping on or off, and specify the link grouping threshold.
- **Map view**  . Show a bird's eye view of the map.
- **Zoom controls**  . Zoom in and out on the map.

## 1.8 Utilization map

The Utilization map is a view option for the Topology map and Troubleshooting map. It displays colored arrows to show how much of the capacity on a port is being utilized. The Utilization map lets you quickly assess how efficiently your network is managing traffic, and identify ports that are over- or under-utilized. Network utilization can be analyzed in the Topology map for all NEs and links in a supervision group, and in the Troubleshooting map for a focused set of NEs and links.

The Utilization map displays information based on SNMP or Telemetry statistics; see [1.16 “How do I configure application preferences?” \(p. 14\)](#).

The size of the supervision group may affect performance. Consider the following:

- If the number of links in the supervision group is large, there may be a delay before the Utilization option appears in the View menu.
- Statistics are collected by subscription from qualified ports. If there are too many qualified ports in the supervision group, performance may be affected. For SNMP, Nokia recommends a limit of 4000 physical Ethernet ports per supervision group.

To switch to the Utilization map view option, click **View**  , **Utilization** within the Topology map or Troubleshooting map.

The Utilization map shows NEs connected by link lines that represent physical connections between endpoints. The lines have the following features:

- **Thickness.** The relative capacity on the link is indicated by a thin, medium, or thick line. Thinner lines indicate lower capacity, thicker lines indicate higher capacity.
- **Color.** Physical links between endpoints are shown in grey. Utilization is shown as a green, orange, or red arrow along the grey line. Each color indicates a range of utilization: low, medium, or high. The colors change as utilization (in percent) crosses preset thresholds.
- **Arrow length.** The length of the colored arrow shows the relative utilization of the capacity on the link. Arrows grow from minimal utilization at an endpoint, to 100% utilization at the mid-point crossbar (for bidirectional links). The crossbar represents 100% utilization from either direction. Utilization rates near zero will show a disproportionately long arrow (it may look like about 5%) to provide a visual cue that there is utilization on the link.

A grey line with no colored arrow means either zero utilization, or there is no data available for that link.













If SNMP or Telemetry statistics are not supported, traffic may be present, but no utilization arrow is displayed.

You can set your own preferences for the map refresh rate, and to change thresholds for port speed (line thickness) and utilization percentage (arrow color); see [1.20 “How do I set Utilization Map preferences” \(p. 16\)](#).

Information in the Utilization map is based on statistics collected for IP links on Ethernet physical ports. Statistics must be supported and available for utilization to be displayed; see [1.28.5 “Utilization Map statistics requirements” \(p. 22\)](#).






## 1.9 Multi-Layer map format









The Multi-Layer map allows you to perform the following:

- **Refresh map data.** Click **Refresh Data**  to update the map contents.
- **Search the map.** Click **Search**  to search for PNFs, VNFs, or VNFCs based on different attributes, such as name, or location.
- **View full NE details.** Click **Info**  to open the Information panel, which displays detailed information about a selected map object.
- **Interpret map information.** Click **Legend**  to open the map legend, which describes the meaning of different objects and status colors seen in the map.
- **Configure view options.** Click **View Options**  to show or hide the IGP and physical layers.
- **Save layout changes.** Click **More** , **Save as My Layout** to save your layout settings for the current session and subsequent sessions.
- **View a list of optical services for cross-domain links.** Click on the cross-domain link you want to view. In the Information panel, hover over the **More Actions**  button for a link, then select **Show Optical Services**. A list of optical services that terminate on the optical endpoint of the cross-domain link is displayed.
- **Control the map display.** Click on the icons in the map controls panel to perform the following:
  - **Fit to screen**  . Fit the map to the available screen area.
  - **Adjust vertexes**  . Show or hide connectors and show or hide text labels for vertexes.
  - **Adjust links**  . Show or hide links and specify the link grouping threshold.
  - **Map view**  . Show or hide layer labels, show/hide cross-layer columns, set layer spacing and layer opacity.
  - **Zoom controls**  . Zoom in and out on the map.

### 1.10 NE List format

The NE List displays NEs as list items, with system information for the NE.





- **View current alarms for the supervision group.** Click **Current Alarms**  on the toolbar. To return to the list, click **Object View** .
- **Filter the NE list under a specific column.** Type a text string in the text field at the top of a column and press Enter. Click **Clear Filter**  to clear column filters.
- **Sort the NE list under a specific column.** Click on a column header to sort the list under that column. Click the column header a second time to toggle the sort order (ascending/descending), as indicated by the Up/Down arrow.
- **View current alarms for an NE.** Hover on an NE in the list and click **Current Alarms** .
- **View the event timeline diagram for an NE.** Hover on an NE in the list and click **Event Timeline** .

- **View the NE in a troubleshooting map.** Hover on an NE in the list and click **Troubleshooting Map** .
- **View the equipment Inventory for an NE.** Hover on an NE in the list and click **More** , **Equipment Inventory**.
- **View merged alarms for an NE.** Hover on an NE in the list and click **More** , **Merged Alarms**.
- **View historical alarms for an NE.** Hover on an NE in the list and click **More** , **Historical Alarms**.
- **Add an NE to the Watch view.** Hover on an NE in the list and click **More** , **Add To Watch View**.
- **Open an NE in its management application.** Hover on an NE in the list and click **More** , **Show Object**.
- **Run Analytics reports for an NE.** Hover on an NE in the list and click **More** , **Analytics Reports**.
- **Copy NE information to the clipboard.** Hover on an NE in the list and click **More** , **Open In Copy Window**. In the Copy window, press Ctrl+C or Command+C.

## 1.11 Link list format


The Link List format shows a table of information about physical links in a supervision group. Each row of the table shows information for one physical link. The operational state of the link, and information about both endpoints (A and B), are displayed.








The Link List format allows you to perform the following:

- **Filter and sort the list.** Use the same filtering and sorting functions as other NSP list formats; see [1.10 “NE List format” \(p. 11\)](#).
- **Investigate alarms.** Click **Current Alarms**  on the toolbar.
- **Refresh the list.** Click **Refresh List**  on the toolbar.
- **Open a Troubleshooting map for a link.** Hover on an entry in the list and click **Troubleshooting Map**  at the far right. The Troubleshooting map highlights the link and shows the two endpoint NEs, plus one hop from each endpoint. The Hop count and Explore functions are supported; see [1.7 “Troubleshooting map” \(p. 9\)](#).
- **Open a list of optical services for cross-domain links.** Hover over a cross-domain link in the list and click **More Actions** , **Show Optical Services**. A list of optical services that terminate on the optical endpoint of the cross-domain link is displayed.

## 1.12 Equipment Inventory


The equipment inventory tree allows you to quickly locate affected NE objects (NEs, LAGs, shelves, slots, cards, ports). Affected NE child objects are displayed in an expandable/collapsible hierarchy. The color of an inventory object indicates its state. The various state-colors are described in the Legend.

- **Expand all objects.** Click **Expand All**  on the view header to expand all objects in the Equipment Inventory view, down to the lowest child object level.

- **Collapse all objects.** Click **Collapse All**  on the view header to collapse the Equipment Inventory view, up to the parent NE object level.
- **View full NE details.** Click **Info**  to open the Information panel, which displays detailed information about a selected inventory object.
- **Interpret inventory information.** Click **Legend**  to open the inventory legend, which describes the meaning of different objects and status colors seen in the inventory.
- **Filter the equipment inventory.** Click **Add Filter**  to display only specific objects in the Equipment Inventory view. Select one of the filter types: Type, Operational State, or Administrative State.  
A chip filter   is added to the inventory. Click on the chip filter and select one or more criteria related to the filter type. Click **Close**  on a chip filter to remove it from the map.
- **Refresh data.** Click **Refresh Data**  to update the inventory contents.


### 1.12.1 Inventory objects

Individual inventory objects (child objects) show basic administrative and operational state information. Click on an inventory object to show additional details in the Information panel.

- **Expand an inventory object.** Click **Expand All**  on an inventory object to expand all child objects to the object.
- **Configure an inventory object.** Click **Show Object**  on an inventory object to open a management application configuration form for the object.

## 1.13 Alarm list

Alarms against equipment are displayed in the alarm list. From the alarm list, you can clear alarms, perform impact analysis, and access links to view detailed alarm information and take corrective action. See [“Troubleshooting with the Alarms list and Event Timeline” \(p. 53\)](#).

Access the Alarm list by clicking **Current Alarms**  in the NE Matrix, NE List, or Link List formats, or in the Watch view. Alarm information is also available from the Utility drawer.

For more information about alarm lists see the Fault Management application help.

## 1.14 Event Timeline

The Event Timeline is a graphic representation of events that have occurred on equipment. You can drill down in the timeline to specific events, and view information about those events. The range of time for the timeline is user-configurable from within the Event Timeline display. Event Timeline is a useful tool for identifying state changes and configuration events, especially when used in conjunction with alarms. See [“Troubleshooting with the Alarms list and Event Timeline” \(p. 53\)](#).

Access the Event Timeline by clicking **Event Timeline**  in the NE Matrix or NE list formats, or in the Watch view.

---

## 1.15 Cross-domain links

Network supervision provides visibility of cross-domain links between IP and optical equipment. Cross-domain links are shown on Topology maps as dashed lines, and on Multi-Layer maps as solid lines. They are also included in the Link List format.

For cross-domain links, you can access a list of optical services that terminate on the optical endpoint of the link. The list shows information about those optical services, and provides additional options. A list of optical services is available from the Topology map, Multi-Layer map, and Link List formats; see [1.22 “How do I open a list of optical services for a cross-domain link?”](#) (p. 16).


## 1.16 How do I configure application preferences?

You can specify whether an object’s administrative state is used to calculate its KPI level in Network Supervision.

1 \_\_\_\_\_

Login to NSP as an administrator and launch Network Supervision.

2 \_\_\_\_\_

In the Network Supervision application, click **More**  , **Application Preferences**.

3 \_\_\_\_\_

Enable or disable the checkbox to use object administrative state for KPI calculations.

4 \_\_\_\_\_

Select a statistics type for data collection for the Utilization map view.

5 \_\_\_\_\_

Save your changes.

END OF STEPS \_\_\_\_\_

## 1.17 How do I configure KPI threshold settings?

Use the KPI Threshold Settings form to specify the affected NE/component counts at which Network Supervision GUI objects change color to indicate status change.

1 \_\_\_\_\_

In the Network Supervision application, click **More**  , **KPI Threshold Settings**.

2 \_\_\_\_\_

In the KPI Threshold Settings form, drag the cursors on the threshold line to the levels at which you want object color changes to occur.

- 
- 3 \_\_\_\_\_  
Save your changes.

END OF STEPS \_\_\_\_\_

## 1.18 How do I configure Event Timeline settings?

**i** **Note:** You must be logged into NSP as an administrative user to complete this procedure.

Use the Event Timeline settings form to enable/disable event logging and specify the object types that appear in the Event Timeline.

- 1 \_\_\_\_\_  
In the Network Supervision application, click **More**  , **Timeline Settings**.

- 2 \_\_\_\_\_  
In the Timeline Settings form, enable or disable event recording in the Network Supervision application.


- 3 \_\_\_\_\_  
Enable the checkbox for each network object type that you want to appear in the Event Timeline.

- 4 \_\_\_\_\_  
Save your changes.

END OF STEPS \_\_\_\_\_

## 1.19 How do I configure user preferences?

You can specify a variety of custom view settings in Network Supervision to suit your needs.

- 1 \_\_\_\_\_  
In the Network Supervision application, click **More**  , **User Preferences**.

- 2 \_\_\_\_\_  
In the User Preferences form, configure view capacity, sorting, and refresh settings, as required.


- 3 \_\_\_\_\_  
Save your changes.

END OF STEPS \_\_\_\_\_

---

## 1.20 How do I set Utilization Map preferences



**i** **Note:** Utilization preferences apply in the session in which they are configured, and in subsequent sessions.

- 1 \_\_\_\_\_  
In the Network Supervision application, click **More**  , **Utilization Map Preferences**.
- 2 \_\_\_\_\_  
Configure the Refresh Rate, Port Speed Settings, and Color settings as required.  
Alternatively, restore the default settings.  
The Port Speed settings define the thresholds at which the link lines change thickness. The Color settings define the thresholds at which the arrows change color.
- 3 \_\_\_\_\_  
Close the form.

END OF STEPS \_\_\_\_\_

## 1.21 How do I configure physical links?

**i** **Note:** You must be logged in as an Administrative user to configure physical links.

- 1 \_\_\_\_\_  
Click **More**  , **Physical Links** to open a list of manually-created physical links in the topology map view.
- 2 \_\_\_\_\_  
In the Manually Created Physical Links form, you can create a new link by clicking **Create Physical Link**  . In the Create Physical Link form, you specify the Name, Description, and Latency for the link, and then search endpoints for the link.
- 3 \_\_\_\_\_  
You can delete a physical link from the Manually Created Physical Links form by selecting it in the list and clicking **Delete** at the end of the row.

END OF STEPS \_\_\_\_\_



## 1.22 How do I open a list of optical services for a cross-domain link?

Cross-domain links between the IP and optical domains are shown in the Topology map, Multi-layer map, and Link List. From any of these formats, you can open a list of optical services that use the optical endpoint of the link.

---

1



To open a list of optical services from the Topology map or Multi-layer map:

1. Select a cross-domain link on the map. Information about the link is displayed in the Information panel.
2. Hover over the **More Actions**  button for a link, then select **Show Optical Services**. A list of optical services that terminate on the optical endpoint of the cross-domain link is displayed.
3. View information about the optical services. Filter and sort the list as required.
4. To view the endpoints for an optical service, hover over the service and click **Endpoints** . The endpoints are displayed.

---

2

To open a list of optical services from the Link List:

1. Hover over a cross-domain link in the Link List, then click **More Actions** , **Show Optical Services**. A list of optical services that terminate on the optical endpoint of the cross-domain link is displayed.
2. View information about the optical services. Filter and sort the list as required.
3. To view the endpoints for an optical service, hover over the service and click **Endpoints** . The endpoints are displayed.

---

END OF STEPS

## 1.23 How do I highlight links by type on the Topology map?

The Topology map format provides an option to highlight selected link types on a map, using colors to identify the type of link. You can highlight the following link types:

- Copper: Ethernet link using coaxial copper cable
- Fiber: Ethernet SFP link using optical fiber cable
- LAG N+0: LAG link without protected ports
- LAG N+N: LAG link with member ports protected (supported for Wavence NEs only)
- Protected: protected radio link (supported for Wavence NEs only)
- Unprotected: unprotected radio link (supported for Wavence NEs only)


---

1

Choose the Topology map format from the Format Changer drop-down.

---

2

Click **View Options**  to open the Link Highlight Options panel.

View options are available in the Operational view of the Topology map.

---

3

Click on the icons to enable or disable highlighting for each of the link types. The links on the map show colors indicating the link type.

END OF STEPS

---

## 1.24 How do I manage clusters on the Topology map?

You can reduce the number and density of NE objects on the Topology map by enabling clustering, which combines NEs into clusters that show as a single icon. Cluster icons are square with rounded corners.

Clustering can be based on either distance, or region grouping.


Distance-based clustering is available for all supervision groups. Distance refers to the separation of object icons on the map display. As you zoom in, the cluster icons automatically open to show the NE icons they contain, and when you zoom out, NEs that are close together are automatically clustered, according to cluster range and limit settings.

Region-based clustering is available only for supervision groups enabled for Physical Map Layout; see “Physical Map Layout” in the [1.6 “Topology map format” \(p. 7\)](#) topic. Clusters are based on the region and zone groupings configured by an administrator, and are not affected by separation distance or zoom level. Typically, region-based clusters and the objects they contain are positioned on a background map according to their actual geographical location.

---

1

On the map controls panel, click **Adjust clustering** . The Clustering controls menu opens. Configure the following, as required:

- **Use Region grouping.** Enables or disables region-based clustering. Region-based clustering is available only for supervision groups enabled with Physical Map Layout.
- **Clustering.** Enables or disables distance-based clustering. Available only when the **Use region grouping** slider is disabled. Distance-based clustering is supported for all supervision groups.
- **Cluster charts.** Enables or disables status charts (cluster charts) for clusters and link groups.
- **Cluster inclusion range.** For distance-based clustering, sets the separation distance at which NEs are clustered, subject to the zoom level.
- **Cluster limit – Network.** For distance-based clustering, allows clustering of densely located NEs in addition to clustering based on the cluster inclusion range, so you can cluster groups of NEs even if the cluster inclusion range setting doesn't. This network-wide setting applies to all supervision groups.
- **Cluster limit – Screen.** For distance-based clustering, allows clustering of densely located NEs in addition to clustering based on the cluster inclusion range, so you can cluster groups of NEs even if the cluster inclusion range setting doesn't. This screen-based setting applies to the current supervision group, screen view, and zoom level. You can preserve the view and layout by clicking **More** , **Save as My Layout**.

- **Show boundaries.** Enables or disables the grey boundary area that appears when a region-based cluster is opened. Available only when the **Use region grouping** slider is enabled.
- **Move group with contents.** When enabled, if you change the placement of a region-based cluster, any zones and NEs within that cluster will also move to the new location on the map. When disabled, you can change the placement of a region-based cluster, but any zones and NEs within that cluster will retain their original map locations when the cluster is opened. Available only when the **Use region grouping** slider is enabled.

---


2


To open the contents of a distance-based cluster on the map, double-click on the cluster icon, or zoom in. Zoom out to restore clusters.

---

3

To open the contents of a region-based cluster on the map, double-click on the cluster icon. To back out to a higher cluster level, use the Map Layout Regions navigation path above the map. Zoom controls do not open or restore region-based clusters.

When a region or zone contains zones or subzones, the map shows a stacked cluster icon. Click **Legend** , **Clusters and Bundles** for more information.

Whether they are clustered or not, when objects share the same physical location, the map shows a stacked icon shaded blue. Click **Legend** , **Vertex Types** for more information. To see the co-located objects individually, drag them off the stack.

It can happen that one or more NEs in a supervision group are not assigned to any region. In such a case, the Topology map creates a cluster called “Nodes without a region” that contains the unassigned NEs. Double-click to access the NEs in the “Nodes without a region” cluster, and contact an administrator if required. NEs can only be assigned to regions by an administrator using the Group Manager application.

---

END OF STEPS


## 1.25 How do I save and restore layout changes on the Topology map?

On the Topology map, you can click and drag map objects to change their placement on the map layout. Perform this procedure to save a new layout, or restore the map to the common layout set by an administrator.


---


1


Click and drag map objects to place them according to your needs. You can drag NEs, links, or clusters.

 **Note:** If the supervision group is enabled for Physical Map Layout, when you move a cluster object the contents of that cluster may keep their original locations, depending on clustering control settings. See [1.24 “How do I manage clusters on the Topology map?”](#) (p. 18).

---

2 \_\_\_\_\_  
To save the new layout for the current and subsequent sessions, click **More**  , **Save as My Layout**.

3 \_\_\_\_\_  
To return the map layout to the common layout set by an administrative user, click **More**  , **Restore to Common Layout**.

4 \_\_\_\_\_  
To set the current map layout as the common layout, click **More**  , **Set as Common Layout**. This option is available only for supervision groups that are not enabled with Physical Map Layout. You must have administrator permissions to perform this step.  
For supervision groups enabled with Physical Map Layout, administrators must use the Group Manager application to save a common layout; see the Group Manager Help.

END OF STEPS \_\_\_\_\_

## 1.26 How do I find NEs in the Topology map?

Use this procedure to find specific NEs in the Topology map.

1 \_\_\_\_\_  
Click **Find in Map** .

2 \_\_\_\_\_  
Select an object type from the dropdown menu. You can search for NEs by name or management address.

3 \_\_\_\_\_  
Type a search string in the text field. A list populates with potential matches as you type. The list displays a maximum of fifty results. If the NE you are trying to find is not in the list, refine your search string.

4 \_\_\_\_\_  
Click on an item in the list to find that NE in the map.

END OF STEPS \_\_\_\_\_

## 1.27 How do I create views and supervision groups?

You create network views and supervision groups for Network Supervision using the Group Manager application; see the Group Manager application Help for more information.

---

## 1.28 Network Supervision general operations

This section describes specific application functions for which users may need additional information in order to maintain proper system operations. Where appropriate, recommendations are provided to assist in the resolution of functional issues.

### 1.28.1 Mediation software capabilities

Actions performed on objects in the Network Supervision application depend on the capabilities of the object's source mediation software. In particular, certain application functions described in the Network Supervision Help may not be available when the NSP is deployed with the NFM-T, but in the absence of the NFM-P:

- The Event Timeline function is disabled for NFM-T objects in the Watch view, NE Matrix, and NE list.
- Event Timeline settings cannot be configured in an NFM-T-only deployment. Default settings are used.
- The Policy Agent function is not available in an NFM-T-only only deployment.
- The CBAM Access Point function is not available in an NFM-T-only deployment.

### 1.28.2 MDM adaptors and Network Supervision

Available application functions for model-driven NEs in Network Supervision can vary based on the adaptors installed. To verify the adaptors you have installed, check the Discovered Nodes list in the Device Administrator application. The Summary panel for the NE provides the list of adaptors installed for each application.

### 1.28.3 Map view performance

Users should consider the performance information in this section when working in Network Supervision map views.

Nokia recommends a maximum of 2000 NEs per supervision group. Multi-layer maps support a recommended maximum of 4000 objects.

Users should expect the following Multi-layer map loading times with different numbers of NEs:

- for 250 NEs (125 physical links); approximately six seconds for the initial page loading and four seconds to reload
- for 500 NEs (250 physical links); approximately nine seconds for the initial page loading and six seconds to reload
- for 2000 NEs (1000 physical links); approximately 50 seconds for the initial page loading and 28 seconds to reload

### 1.28.4 How do I purge assurance event records?

The event timeline in applications is a log of events that is mapped over a specified period of time. You can filter the event types presented on the timeline, such as alarm events, OAM test failures, and configuration and state change events. You can use the event timeline to search for patterns in events over a period of time.

---

Perform this procedure to purge assurance event records when the AssuranceEventLoggingTurnedOff alarm is raised. This alarm is raised when the database disk space used to log assurance events grows above the predefined threshold.

Assurance Event logging is disabled to protect the database disk space.

**i** **Note:** You must be logged into the NFM-P as an administrator to perform this procedure.

- 1 \_\_\_\_\_  
From the NFM-P main menu, choose Tools→Events→Event Policies. The Manage Event Policies form opens.
- 2 \_\_\_\_\_  
Choose the assurance.AssuranceEvent event type and click Properties. The Event Policy - assurance.AssuranceEvent (Edit) form opens.
- 3 \_\_\_\_\_  
Click the More Actions button and choose Purge Event Records. The Event Policy - assurance.AssuranceEvent (Edit) Filter form opens.
- 4 \_\_\_\_\_  
Click OK to purge all event records.
- 5 \_\_\_\_\_  
If necessary, configure the Event Retention Time (hours) to a value lower than the default value.
- 6 \_\_\_\_\_  
Save the changes and close the forms.

END OF STEPS \_\_\_\_\_

### 1.28.5 Utilization Map statistics requirements

Information in the Utilization map is based on statistics collected for IP links on Ethernet physical ports. Statistics must be supported and available for utilization to be displayed. The Operational State of NEs and ports must be Up.

Statistics are collected using SNMP or Telemetry.

For SNMP, NEs must be managed by the NFM-P and reachable using SNMP. The following NEs support the required statistics for the utilization map:

- 7450 ESS, Release 15.0 or later
- 7750 MG and MG VSR, Release 10.0 or later
- 7750 SR and VSR, Release 15.0 or later
- 7950 XRS, Release 15.0 or later

---

For Telemetry, NEs must be configured for Telemetry collection; see the Telemetry Monitor documentation.



**Note:** For the Utilization map, Telemetry collection must be enabled for NEs discovered by the NFM-P. NEs discovered by the NSP using MDM are not supported.

The following NEs, when discovered using the NFM-P, support Telemetry statistics for the utilization map:

- 7450 ESS, Release 15.0 or later, for chassis types that support Telemetry
- 7750 MG, Release 10.0 or later, for chassis types that support Telemetry
- 7750 SR, Release 15.0 or later, for chassis types that support Telemetry
- 7950 XRS, Release 15.0 or later, for chassis types that support Telemetry



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## 2 Managing VNFs using CBAM

### 2.1 Network function virtualization overview

Network function virtualization (NFV) allows network administrators to uncouple network functions from underlay hardware NEs so that the functions can run as software images. These network functions include load balancers, firewalls, and NAT. The purpose of NFV is to provide a simpler way to deliver and manage the network components required for a virtualized infrastructure. Network administrators are able to dynamically deploy network elements and services without needing to physically provision the underlying routers. The virtualized network element that represents the physical node is called a virtualized network function (VNF).

VNF management is provided by the external application CBAM, to which the NFM-P provides an interface using the Network Supervision application.

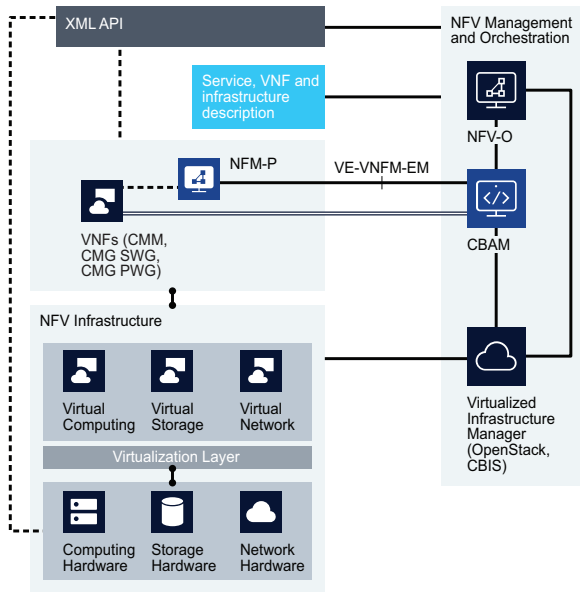
### 2.2 CloudBand Application Manager overview

The Nokia CloudBand Application Manager (CBAM) is a VNF manager that automates VNF lifecycle management and cloud resource management. CBAM has standards-based APIs to allow it to work with any vendor VNF, EMS, VIM, or NFV Orchestrator (NFVO).

The NFM-P provides an interface with CBAM, which acts as the VNF manager in this solution. The NFM-P uses the Ve-Vnfm-Em reference point to exchange notifications on VNF lifecycle changes and monitor virtual resources with CBAM. The Network Supervision application allows you to configure a CBAM access point to monitor managed VNFs and execute lifecycle management actions.

The NFM-P provides the following functions when interfacing with CBAM:

- element management for VNFs
- VNF assurance, alarm monitoring, and status tracking
- VNF KPI monitoring
- lifecycle management proxy actions
- policy-based lifecycle changes
- initiating VNF custom actions



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## 2.2.1 Supported VNFs

The CBAM as VNF manager solution currently supports the following VNFs:

- CMG
- CMM
- VSR-I
- CSGN

## 2.3 CBAM access point

The NFM-P supports CBAM integration through a CBAM access point created in the Network Supervision application. You must input CBAM and NFM-P login credentials in order to create the access point. You must also specify NFM-P discovery rules to enable VNF automatic discovery. This procedure requires administrator or nfvMgmt access privileges.

Once the access point is successfully created, you can view a list of CBAM access points associated with the NFM-P. From the list of CBAM access points, you can cross-launch to the CBAM GUI, rescan CBAM VNFs, or open the Details tab for an access point. The Details tab allows you to view the associated discovery rule and the connection status for the specified CBAM access point. The connection status is also displayed in the list of CBAM access points, and is verified by

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the NFM-P once every two minutes. If the NFM-P fails to connect to a CBAM access point three times in a row, the access point is marked as disconnected and an alarm is raised.

The following are prerequisites before creating a CBAM access point:

- Ensure the specified CBAM login credentials have access to the CBAM APIs via ReST. See the *Installing CloudBand Application Manager Guide* for more information.
- Ensure the NFM-P SSL certificates are installed on CBAM. See the *CloudBand Application Manager Administrator Guide* for more information.
- If the CBAM access point uses an IPv6 address, ensure the CBAM can resolve the address or hostname of the NFM-P server.

### 2.3.1 Reconnecting a CBAM access point

When the connection to a CBAM access point is interrupted, you can trigger a manual connection attempt using the Network Supervision application. In the CBAM Access Points list, click on the access point you need to reconnect, and click the Retry Subscription icon.

The NFM-P verifies the connection to a CBAM access point once every two minutes. If the connection attempt fails three times in a row, the NFM-P raises an alarm and stops attempting to verify the connection, instead marking the access point as disconnected.

## 2.4 CBAM access point creation

Before you can perform manual and automatic lifecycle management tasks through the Network Supervision application, you must configure a CBAM access point.

Once the access point is successfully created, you can view a list of CBAM access points associated with the NFM-P. From the list of CBAM access points, you can cross-launch to the CBAM GUI, rescan CBAM NFVs, or open the Details tab for an access point. The Details tab allows you to view the associated discovery rules and the connection status for the specified CBAM access point. The connection status is verified by the NFM-P once every two minutes. If the NFM-P fails to connect to a CBAM access point three times in a row, the access point is marked as disconnected and an alarm is raised.

**i** **Note:** If you are using the NSP in shared-mode deployment, ensure that the `auth_nfmp_` enabled parameter in the NSP is set to true so that NFM-P users are authenticated; see the NSP documentation for more information about configuring user authentication.

### 2.4.1 Workflow to create a CBAM access point

The following workflow describes the steps to create a CBAM access point.

1. If required, create an NFM-P user account assigned to a user group with the NFV Operator role. See the *NFM-P Administrator Guide* for information about creating users.
2. If required, create discovery rules in the NFM-P for the VNFs you need to discover. See the *NSP NFM-P User Guide* for information about creating discovery rules.
3. Ensure the specified CBAM login credentials have access to the CBAM APIs via ReST. See the *Installing CloudBand Application Manager Guide* for more information.

4. Ensure the NFM-P SSL certificates are installed on CBAM. See the *CloudBand Application Manager Administrator Guide* for more information.
5. If the CBAM access point uses an IPv6 address, ensure the CBAM can resolve the address or hostname of the NFM-P server.
6. Using the Network Supervision application, create a CBAM access point. See [2.5 “How do I create a CBAM access point?” \(p. 27\)](#).

## 2.5 How do I create a CBAM access point?

Before you can perform manual and automatic lifecycle management tasks on CBAM-managed VNFs through the Network Supervision application, you must configure a CBAM access point. See [Chapter 2, “Managing VNFs using CBAM”](#).

### 2.5.1 To create a CBAM access point

1

In the Network Supervision application, click on the More button and select CBAM Access Points. The CBAM Access Points list appears.

2

Click on the Add button. The Add CBAM Access Point panel appears.

3

Configure the parameters. For the NFM-P user name and password, provide the credentials of a user account assigned to a user group with the NFV Operator role.



**Note:** The user account you provide must not be assigned to a user group with the Administrator role.

4

Perform the following for each VNF product type you need to discover:

1. Click on the + button beside Add VNF Product Types. A VNF product type row is added to the form.
2. Configure the VNF Type parameter. VNF product names associated with the chosen VNF type appear in the VNF Product Names field. If required, click on the Edit button beside the VNF Product Names field and enter additional custom VNF product names.
3. Select discovery rules for the VNF type. You can select a discovery rule for each VNF component of a compound node, and separate discovery rules for IPv4 and IPv6.

5

To use the CBAM API v4.0 for this access point, enable the Use API v4.0 parameter.

6

Click on the Add button. The CBAM access point appears in the CBAM Access Points list.

END OF STEPS

## 2.6 Discovering a CBAM as a GNE

You can discover a CBAM server as a GNE using the NFM-P to perform basic equipment and alarm management. This section provides information specific to CBAM server configuration and discovery in the NFM-P. The *NSP NFM-P User Guide* chapter "Device commissioning and management" and the *CloudBand Application Manager Administrator Guide* section "CBAM management over SNMP interface" should be consulted for full procedural details.

### 2.6.1 Alarm management support

The following table describes NFM-P alarm management support limitations for the specified CBAM releases. For a list of CBAM alarms, see the CBAM alarm documentation.

CBAM Release	Notes
18.5	SNMPv2 mediation only.
19.0	A limitation in the CBAM can create a discrepancy between alarms displayed in the CBAM GUI and the NFM-P. You can compare against the alarm list in the CBAM GUI and use the NFM-P to clear stale alarms.

### 2.6.2 Post-installation instructions

The following instructions provide information specific to CBAM server configuration and discovery in the NFM-P. Perform the following

1. Use the NFM-P client to create an SNMP v2 mediation policy for CBAM management. See the *NSP NFM-P User Guide* for information about creating mediation policies.
2. Use the NFM-P to configure a discovery rule for the CloudBand Application Manager that includes the SNMP v2 mediation policy; see the *NSP NFM-P User Guide* for information about creating discovery rules.

## 2.7 Upgrading a CBAM access point

After you upgrade the software on a CBAM access point, the Network Supervision application attempts to establish communication with the access point. The following table describes post-upgrade tasks that may be required when you upgrade a CBAM access point.

Task	Steps
Enable CBAM API v4.0 support	Enable the Use API v4.0 parameter on the CBAM access point configuration form in the Network Supervision application.

## 2.8 VNF discovery

You cannot instantiate VNFs using a CBAM interface. You can only discover VNFs from CBAM using NFM-P discovery rules specified during access point creation. The NFM-P requires that the VNFD template for discovered VNFs have post-instantiation scripts to enable SNMP and configure other protocols necessary for automatic node discovery. When the NFM-P discovers VNFs from a CBAM access point, it adds them as a rule element for the associated discovery rule.

The Unmanaged VNFs tab lists the VNFs managed by the CBAM instance that were not discovered by the specified NFM-P discovery rule. The list is updated once every two minutes.

## 2.9 VNF instantiation

You can manually instantiate a VNF through the CBAM using the Network Supervision application. Instantiating a VNF requires a JSON file for the VNF, and a CBAM access point configured on the Network Supervision application.

## 2.10 How do I instantiate a VNF?

You can instantiate a VNF in the Uninstantiated VNFs tab of the CBAM Access Point form. Before you can instantiate a VNF, you require a JSON file for the VNF, which can be stored locally.

- 1 \_\_\_\_\_  
In the Network Supervision application, click on the More button and select CBAM Access Points. The CBAM Access Points list appears.
- 2 \_\_\_\_\_  
Choose a CBAM access point and click on Details. The CBAM Access Point form appears.
- 3 \_\_\_\_\_  
Click on the Uninstantiated VNFs tab. A list of uninstantiated VNFs appears.
- 4 \_\_\_\_\_  
Choose a VNF and click on Instantiate. The Instantiate form appears.
- 5 \_\_\_\_\_  
Click Choose File and provide the JSON file for the VNF to be instantiated.

---

6

Click on the Instantiate button. The VNF is instantiated, and the instantiation event is added to the Event Timeline.

END OF STEPS

---

## 2.11 How do I upgrade a CMG?

You can trigger an upgrade of a CMG VNF managed by the CBAM using the Network Supervision application. Before you can trigger the upgrade, the following two files are required:

- A CMG upgrade package, which must be uploaded to the CBAM catalog. See the CBAM documentation for more information about using the catalog.
- A CMG upgrade JSON file, which can be stored locally.

1

Select a CMG and click on the More button, then select Upgrade. The upgrade panel opens.

2

Specify the package ID for the upgrade package in the Package Version parameter. You can obtain the package ID from the catalog on the CBAM.

3

Click on the Choose File button, and select the upgrade JSON file that corresponds to the upgrade package.

4

Click Upgrade, then click OK to confirm. The CMG is placed in an Upgrade state in the Network Supervision application until the upgrade is complete.

END OF STEPS

---

## 2.12 Lifecycle change notifications

Lifecycle change notifications (LCNs) are messages sent from CBAM to the NFM-P with details on VNF lifecycle updates. When the CBAM access point is created, the NFM-P requests two different LCN subscriptions for the CMG and CMM. LCNs are used to inform the NFM-P of changes related to VNF instantiation, termination, scaling, healing, or variable modifications. When the NFM-P receives an LCN, it scans the VNF information from the CBAM access point and updates its VNF database accordingly.

Regardless of LCNs, the NFM-P automatically polls the CBAM access point for VNF updates once every hour.



**Note:** In a redundant deployment scenario, the CBAM LCN subscription fails after main server switchover takes place. To resubscribe, you must restart the Network Supervision application and open the CBAM access point.

---

## 2.13 VNF lifecycle management

Certain VNF lifecycle changes can be initiated from CBAM or the Network Supervision application. Whenever a lifecycle change is triggered in CBAM, it informs the NFM-P via an LCN.

VNFs can be instantiated in CBAM and advertised to the NFM-P via an LCN. When the NFM-P receives information on a newly instantiated VNF, it creates an associated VNF object and attaches a discovery rule to that object automatically. When the NFM-P discovers a VNF, it retrieves information related to supported operations, scaling and healing templates, extensions, and compute resources.

VNFs can be terminated in CBAM and advertised to the NFM-P via an LCN. When the NFM-P receives information on a terminated VNF, it unmanages the VNF object and removes all associated VNFCs.

VNFs can be deleted in CBAM and advertised to the NFM-P via an LCN. When the NFM-P receives information on a deleted VNF, it removes the VNF from its database and unmanages the associated network element.

VNFs can be healed to trigger a reboot in CBAM or the Network Supervision application. Healing must be enabled in the CBAM VNFD before this operation can be performed in the GUI. If the VNFD requires additional parameters for VNF healing, the parameters are visible in the Network Supervision application.

VNFs can be scaled in or scaled out in CBAM or the Network Supervision application. Scaling must be enabled in the CBAM VNFD before this operation can be performed in the GUI. When performing a scaling operation, you must specify a scaling aspect and a new level. The scaling level cannot exceed the maximum scaling level specified in the CBAM VNFD. If the VNFD requires additional parameters for VNF scaling, the parameters are visible in the Network Supervision application.

**i** **Note:** For the CMM, only CPPS modules can be scaled.

**i** **Note:** To add or remove cards on the VNF, you must use the scaling operation. Nokia does not recommend using CLI to add or remove cards.

## 2.14 VNF custom actions

If there are custom actions defined in the TOSCA template for a VNF, you can trigger them using the Network Supervision application. Click on the More button on a VNF and then choose VNF > Custom Actions to view a list of any custom actions that have been defined for the VNF.

## 2.15 How do I trigger a custom action on a VNF?

You can trigger custom actions that have been defined for a VNF using the Network Supervision application. The actions must be defined in a TOSCA template that has been configured on the CBAM.

1

---

Click on the More button on a VNF panel and select VNF > Custom Actions. The Custom Actions window appears.

---

2

Select a custom action from the drop-down list and click OK. The custom action is triggered. You can view details about the results of the action in the event timeline for the VNF.

END OF STEPS

---

## 2.16 CBAM VNFD requirements

The VNF Descriptor is a package that describes the configuration of the VNF network. It consists of OpenStack Heat templates which define VNF specifications. This section describes the configuration requirements for the CBAM VNFD to allow the NFM-P to discover and manage CBAM VNFs. The VNFD package must be compatible with the release of the CBAM being used to manage the VNFs.

For more information on CBAM VNFD template creation, see the CBAM documentation suite.

### 2.16.1 Template requirements

Ensure the CBAM VNFD templates meet the following requirements:

- The template must populate the `vnfProductName` parameter. This parameter allows the NFM-P to determine which VNFs it is not currently managing. The value of the parameter must use one of the following valid product names:
  - Cloud VMG
  - Cloud MG
  - Virtualized Service Router - Integrated
  - CMM
  - C-SGN
- The VNF instantiation workflow should include the application startup. This ensures that CBAM sends LCNs to the NFM-P only when the VNF application is up. If the application startup is not included in the VNF instantiation workflow, the discovery of the VNF into the NFM-P will be delayed.
- The ansible workflow should push initial configuration on the VNF. This configuration entails the prerequisite configuration requirements for a network element to be discovered by the NFM-P. The system interface should be configured based on the value defined in the `systemIpAddr` extension. This configuration minimizes the error situation where the actual system interface IP address is different from its definition in the extension.
- The VNFC healing workflow, if implemented, should include the additionalParam `vnfcToHeal` configured with a resourceId. The template must not use a UUID as the parameter value, as is already in use as an OpenStack term. The VNFD should be VIM agnostic and should use only CBAM-specific information.
- The template must include required parameters that should be pushed to the VNF during deployment. The following parameters should be available to the NFM-P as VNF extensions or VNFC resource metadata:
  - The `systemIpAddr` parameter must be available as a VNF extension.

- 
- Each VNFC Resource must contain slotId information that uniquely identifies the card object. For VNFs that do not support cards, there must be information to uniquely identify the object that the NFM-P creates.
  - The OAM/CPM VNFC must include the mgmtIP. The key for this metadata should be **nokia\_vnf\_ipAddr**. For a CMG, the IP from that vnfcResource will be used for the mgmtIP with a **nokia\_vnf\_slotId** of A.
  - Each CMG aspect defined in the template must include an extension that defines the type of card to which it corresponds. This extension helps the domain make decisions during preScale.


---

## 3 VNF threshold policies

### 3.1 VNF threshold policy overview

You can assign a threshold policy to a VNF to allow the NFM-P to trigger automatic lifecycle management operations based on defined KPIs or alarms. A threshold policy allows you to monitor a set of pre-defined KPIs and create rules to define when the application indicates an overload, underload, or healing condition. The policy also allows you define an automatic triggered action to be performed when any of these conditions is met. These corrective actions include performing a scaling operation, performing a healing operation, or raising an alarm. When a lifecycle management action is triggered, the NFM-P automatically sends a lifecycle change notification to CBAM.

You can create a template to define a list of conditions and specify an action to be automatically performed when those conditions are met. The template can be used to create a VNF threshold policy, but you can modify the default conditions and actions imported from the template each time you create a new policy.

 **Note:** The first execution of a threshold policy may not be accurate.

### 3.2 VNF threshold policy template design

VNF threshold policies specify the KPIs used to indicate whether a VNF or VNFC is in an overload, underload, or healing condition. The policy can be used to automatically trigger lifecycle management operations such as scaling or healing. To create a VNF threshold policy, you must specify a template that details the default KPIs and actions for each condition. The NFM-P includes sample templates for the CMM and CMG, but you can also create a new template. This section describes the format and syntax requirements for creating a new VNF threshold policy template.

#### 3.2.1 YAML

OpenStack templates are written using the YAML markup language. This chapter describes only the formatting and syntax requirements to create a *.yaml* file for VNF threshold policy templates. For more information about YAML, see the CBAM or OpenStack documentation suites.

#### 3.2.2 Workflow to create a VNF threshold policy template

The following workflow describes the steps to create a VNF threshold policy template. See [3.2.3 “Template format” \(p. 36\)](#) for information about the overall template format and keyword syntax.

- 1 \_\_\_\_\_  
Define the template name, NE type, monitoring window, maximum retries, and sampling frequency at the top of the *.yaml* file. See [3.2.3 “Template format” \(p. 36\)](#) and [3.2.4 “Template keywords” \(p. 37\)](#).

---

2

**i** **Note:** At least one of the following three steps is required for template creation.  
If required, create an `Overload_Condition_Criteria` section and define rules elements. See [3.2.5 “Rules” \(p. 37\)](#) and [3.2.6 “Rule keywords” \(p. 38\)](#).

---

3

If required, create an `Underload_Condition_Criteria` section and define rules elements. See [3.2.5 “Rules” \(p. 37\)](#) and [3.2.6 “Rule keywords” \(p. 38\)](#).

---

4

If required, create a `Healing_Condition_Criteria` section and define rules elements. See [3.2.5 “Rules” \(p. 37\)](#) and [3.2.6 “Rule keywords” \(p. 38\)](#).

---

5

Review the template for any syntax errors.

---

6

Format the template to ensure the Network Supervision application user can read and understand contents clearly.

---

7

Save the `.yaml` file with a filename that indicates the purpose of the template.

---

8

Upload the template to the template directory in the NSP NFM-P file system. See [3.3 “Template directory” \(p. 41\)](#).

### 3.2.3 Template format

The policy template must follow the format below. The template can exclude any of the sections for overload, underload, or healing condition criteria, but it must include at least one of them. The instances of `<string>`, `<integer>`, and `<rule #>` should be replaced with values to be determined by the user.

**i** **Note:** The value of the Name parameter must be unique, and cannot be duplicated in another template on the same system.

-

```
Name: <string>
NE_Type: <string>
Monitoring_Window: <integer>
Sampling_Frequency: <integer>
Overload_Condition_Criteria:
  Rules:
```

---

```
- <rule 1>
- <rule 2>
- <rule n>
Underload_Condition_Criteria:
Rules:
- <rule 1>
- <rule 2>
- <rule n>
Healing_Condition_Criteria:
Rules:
- <rule 1>
- <rule 2>
- <rule n>
```

### 3.2.4 Template keywords

You must specify values for the following keywords at the top of the template:

- **Name** — identifies the policy as it will appear in the Network Supervision application policy agent
- **NE\_Type** — specifies whether the template is for the CMM or CMG; specify “cmm” or “cmg”
- **Monitoring\_Window** — specifies the window of time that the NFM-P monitors the specified KPIs; specify a time between 1 and 120 minutes
- **Sampling\_Frequency** — specifies how frequently the KPI data is retrieved within the specified monitoring window; specify 1, 5, 10, 15, 30, 45, or 60 minutes

**i** **Note:** **Sampling\_Frequency** is not required for the CMM. By default, the sampling window for the CMM is 2.

### 3.2.5 Rules

If the policy template includes a section for overload, underload, or healing criteria, it must include at least one rule in the section. Rules must follow the format below. The instances of variables such as **<string>** should be replaced with values to be determined by the user.

```
—
- Name : <string>
Condition : (<KPI_Value> <operator> ${Threshold_Value})
Action : <action>
Hold_Time: <integer>
Values : {${Threshold_Value}: '<integer>'}
—
```

**i** **Note:** \$ is a prefix used to identify variables.

### 3.2.6 Rule keywords

You must specify values for the following keywords within a template rule:

- **Name** — identifies the rule name as it will appear in the Network Supervision application
- **Condition** — specifies a logical statement including a KPI value, operator, and threshold value
- **Action** — specifies the action to perform if the condition is satisfied; specify “scaleOut”, “scaleIn”, “heal”, “alarm”, “instantiate”, or “terminate”
- **Hold\_Time** — specifies the time, in minutes, before waiting to trigger the action again if the condition is still satisfied
- **Values** — defines values for variables used in the logical conditions

#### Condition syntax

The Condition line is a logical statement that needs to be satisfied to perform the specified action. It includes at least one KPI value, logical operator, and threshold value. Multiple conditions can be grouped using logical operators. You must include a space between each KPI, operator, and variable.

The threshold value is a user-defined variable used to compare with the specified KPI value. The threshold value name has no syntax requirements, but it is recommended that you choose a name that indicates the KPI and type of threshold. For example, a threshold value that defines the maximum value for the KPI value CMG\_NE\_KPI\_Bearer\_Count should be defined as CMG\_NE\_KPI\_Bearer\_Count\_Max. Following this convention allows you to more easily compare the configured threshold value with the current value during VNF policy creation.

The following table lists the KPIs that can be used as part of a rule condition.

Table 3-1 VNF condition KPIs

KPI value	NFM-P class name	Property	MIB name
<b>CMG NE level KPIs</b>			
CMG_NE_KPI_Bearer_Count	isa.PdnGwCardStats	bearers	TIMETRA-MOBILE-PDN-MIB.tmnxMobPdnStatEntry
CMG_NE_KPI_Combined_Session_Count	isa.PdnGwCardStats	combinedPdnSessions	TIMETRA-MOBILE-PDN-MIB.tmnxMobPdnStatEntry
CMG_NE_KPI_Combined_Bearer_Count	isa.PdnGwCardStats	combinedBearers	TIMETRA-MOBILE-PDN-MIB.tmnxMobPdnStatEntry
CMG_NE_KPI_Session_Count	isa.PdnGwCardStats	sessions	TIMETRA-MOBILE-PDN-MIB.tmnxMobPdnStatEntry
CMG_NE_KPI_Subscriber_Count	isa.PdnGwCardStats	ues	TIMETRA-MOBILE-PDN-MIB.tmnxMobPdnStatEntry
CMG_NE_KPI_SGW_Bearer_Count	isa.MgCardStats	bearers	TIMETRA-MOBILE-SERVING-MIB.tmnxMobServStatEntry
CMG_NE_KPI_SGW_Subscriber_Count	isa.MgCardStats	ues	TIMETRA-MOBILE-SERVING-MIB.tmnxMobServStatEntry

Table 3-1 VNF condition KPIs (continued)

KPI value	NFM-P class name	Property	MIB name
<b>CMG alarm KPI<sup>1</sup></b>			
CMG_NE_ALARM_Number_Of_Occurrences_ <alarm name> For example, CMG_NE_ALARM_Number_Of_ Occurrences_VNFHealingRequired	—	—	—
CMG_NE_ALARM_Last_Time_Detected_ <alarm name>	—	—	—
<b>CMG VM level KPIs</b>			
MG_VM_KPI_CPU_Utilization	equipment. CpuUtilizationStats	busyCoreUtil	TIMETRA-SYSTEM-MIB. tmnxCardCpuResMonitorEntry
MG_VM_KPI_CPU_Utilization_vFP	equipment. VirtualFwdPlaneStats	vFPAvgUtiliza- tion	TIMETRA-CHASSIS-MIB. TmnxCARDVFPStatsEntry
MG_VM_KPI_Bearer_Count	isa.PdnGwCardStats	bearers	TIMETRA-MOBILE-PDN-MIB. tmnxMobPdnStatEntry
MG_VM_KPI_Combined_Session_Count	isa.PdnGwCardStats	combinedP- dnSessions	TIMETRA-MOBILE-PDN-MIB. tmnxMobPdnStatEntry
MG_VM_KPI_Combined_Bearer_Count	isa.PdnGwCardStats	combinedBear- ers	TIMETRA-MOBILE-PDN-MIB. tmnxMobPdnStatEntry
MG_VM_KPI_Session_Count	isa.PdnGwCardStats	sessions	TIMETRA-MOBILE-PDN-MIB. tmnxMobPdnStatEntry
MG_VM_KPI_Subscriber_Count	isa.PdnGwCardStats	ues	TIMETRA-MOBILE-PDN-MIB. tmnxMobPdnStatEntry
MG_VM_KPI_SGW_Bearer_Count	isa.MgCardStats	bearers	TIMETRA-MOBILE-SERVING-MIB. tmnxMobServStatEntry
MG_VM_KPI_SGW_Subscriber_Count	isa.MgCardStats	ues	TIMETRA-MOBILE-SERVING-MIB. tmnxMobServStatEntry
MG_VM_KPI_User_Plane_PDN_sessions	isa.PdnGwUpfStats	upPdnSessions	TIMETRA-MOBILE-PDN-CUPS-MIB. tmnxMobPdnStatUpfEntry
MG_VM_KPI_User_Plane_Bearer_ sessions	isa.PdnGwUpfStats	upBearers	TIMETRA-MOBILE-PDN-CUPS-MIB. tmnxMobPdnStatUpfEntry
MG_VM_KPI_User_Plane_Combo_Bearers	isa.PdnGwUpfStats	comboUpBear- ers	TIMETRA-MOBILE-PDN-CUPS-MIB. tmnxMobPdnStatUpfEntry
MG_VM_KPI_User_Plane_Combo_PDN_ Session	isa.PdnGwUpfStats	comboUpP- dnSessions	TIMETRA-MOBILE-PDN-CUPS-MIB. tmnxMobPdnStatUpfEntry
MG_VM_KPI_CPU_Utilization_vFP	equipment. VirtualFwdPlaneStats	vFPAvgUtiliza- tion	TIMETRA-CHASSIS-MIB. TmnxCARDVFPStatsEntry
MG_VM_KPI_PORT_Utilization_Egress	equipment. InterfaceStats	transmittedOc- tets	IF-MIB.ifEntry
MG_VM_KPI_PORT_Utilization_Ingress	equipment. InterfaceStats	receivedOctets	IF-MIB.ifEntry

Table 3-1 VNF condition KPIs (continued)

KPI value	NFM-P class name	Property	MIB name
<b>CMG LB VM level KPI</b>			
LB_VM_KPI_CPU_Utilization	equipment. CpuUtilizationStats	busyCoreUtil	TIMETRA-SYSTEM-MIB. tmnxCardCpuResMonitorEntry
LB_VM_KPI_PORT_Utilization_Egress	equipment. InterfaceStats	transmittedOc- tets	IF-MIB.ifEntry
LB_VM_KPI_PORT_Utilization_Ingress	equipment. InterfaceStats	receivedOctets	IF-MIB.ifEntry
<b>CMG card count KPIs</b>			
MG_VM_Count Card type: card_iom_mg_vsr	—	—	—
LB_VM_Count Card type: card_iom_vsr	—	—	—
<b>CMM NE level KPIs</b>			
CMM_NE_KPI_UE_Capacity	ltecmm. CMMInstanceCapac- ity	totalNumUes	—
CMM_NE_KPI_Percent_Utilization	ltecmm. CMMInstanceCapac- ity	percentUtiliza- tion	—
<b>CMM alarm KPI<sup>1</sup></b>			
CMM_NE_ALARM_Number_Of_Occurrences_ <alarm name> For example, CMM_NE_ALARM_Number_Of_ Occurrences_CmmLSS_hostReset	—	—	—
CMM_NE_ALARM_Last_Time_Detected_ <alarm name>	—	—	—
<b>CMM CPPS VM level KPIs</b>			
CPPS_VM_KPI_UE_Capacity	ltecmm. CppsVNFCMember- Capacity	uesInCpps	—
CPPS_VM_KPI_Percent_Utilization	ltecmm. CppsVNFCMember- Capacity	percentUtiliza- tion	—

**Notes:**

1. In rule conditions, alarms must always be checked against the number of occurrences. For example, **CMM\_NE\_ALARM\_CmmLSS\_hostReset > \$No\_of\_Occurrence**.

The following table lists the operators that can be used in rule conditions.

Operator	Usage	Operator	Usage
\$	Prefix used to identify variables	%	modulus
&&	and	==	equal to
	or	!=	not equal to
!	not	>	greater than
+	addition	<	less than
-	subtraction	>=	greater than or equal to
*	multiplication	<=	less than or equal to
/	division		

**i** **Note:** The Network Supervision threshold policy framework may trigger multiple concurrent actions for the same policy. You should ensure that rule definitions in the threshold policy result in logical actions for each condition.

### 3.3 Template directory

Templates must be saved in the `/opt/nsp/integration/NetworkSupervision/KPITCA/TemplateLibrary` directory of the active NSPOS server where Network Supervision app is installed. The template directory includes the following sample templates:

- CMM\_Rule\_Template\_Example\_n.yaml
- CMG\_Rule\_Template\_Example\_n.yaml
- Sample\_CMM\_Rules.yaml
- Sample\_CMG\_Rules.yaml

**i** **Note:** The Sample\_ files are for reference only. Only the Template\_Example files can be used.

### 3.4 VNF threshold policy template sample

The following policy template sample demonstrates the format and syntax required to create a valid policy template.

#### 3.4.1 Sample

```
Name: Sample CMG Rules
NE_Type: cmg
Monitoring_Window: 15
Sampling_Frequency: 5
```



Healing\_Condition\_Criteria:

Rules:

- Name : VNFCDown Heal Alarm

Condition : ((CMG\_NE\_ALARM\_Number\_Of\_Occurrences\_VNFHealingRequired >  
\$No\_Of\_Occurrence) &&

(CMG\_NE\_ALARM\_Last\_Time\_Detected\_VNFHealingRequired +  
\$Wait\_Time < CURRENT\_TIME))

Action : heal

Hold\_Time: 15

Values : {\$No\_Of\_Occurrence: '1', \$Wait\_Time: '5'}



---

## 4 Network Supervision use case examples

### 4.1 Using the Matrix View format to identify and troubleshoot equipment problems

Network operators are tasked with resolving problems in complex networks. Some network problems are identified using trouble tickets, others by active monitoring. For operators who are actively monitoring the network, there are several options in Network Supervision for identifying problems and investigating root causes. For example, Network Supervision provides multiple display formats for showing information about network equipment: Matrix View, NE List, Topology View, and others. Each format provides a different perspective for identifying problems, comparing KPIs, and troubleshooting to find root causes.

In this article we'll look at the Matrix View format, and see how problem indicators on NE tiles help identify which NEs need closer inspection. Then we'll discuss how to troubleshoot those NEs using three main entry points and workflows.

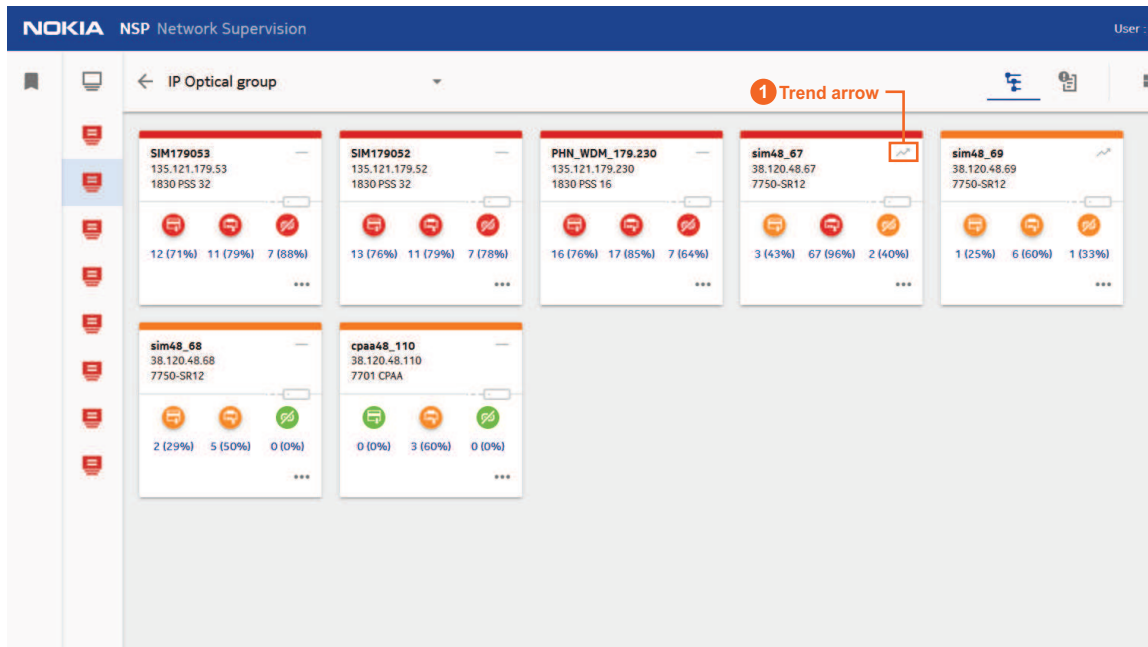
This article assumes you are already familiar with summary views and supervision groups, and know how to recognize when a supervision group requires closer inspection.

#### 4.1.1 Problem indicators in the Matrix View

The Matrix View shows the NEs in a supervision group as tiles in a grid. When you're looking at the tiles in the Matrix View, how can you tell which NEs have problems that require investigation?

There are three main problem indicators on the NE tiles:


- Tile location
- Tile color
- Trend arrows



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**Tile location:** Tiles in the upper left have the most serious problems. Network Supervision sorts the tiles at every Trend Time interval, and moves tiles to the upper left based on either the number of unacknowledged critical alarms, or the number of components affected (cards, ports, links). You can choose to sort based on alarms or components by setting User Preferences. Trend Time interval is also configurable.

**Tile color:** Red means trouble. Tiles may be green, yellow, orange, or red, and problems are more serious as the colors change, in that order. The colors indicate the percentage of affected components on the NE. You can set KPI Threshold settings to customize the percentages at which the colors change.


**Trend arrows:** If you see one of these  on an NE tile, problems on that NE have become worse since the last Trend Time interval.

As you actively monitor the NE matrix, the NE tiles that sift to the upper left, show red, or have a trend arrow, indicate that you may need to investigate the NE to troubleshoot and identify problems.

## 4.1.2 Entry points for troubleshooting

OK, you've identified an NE that needs further investigation. Now what?

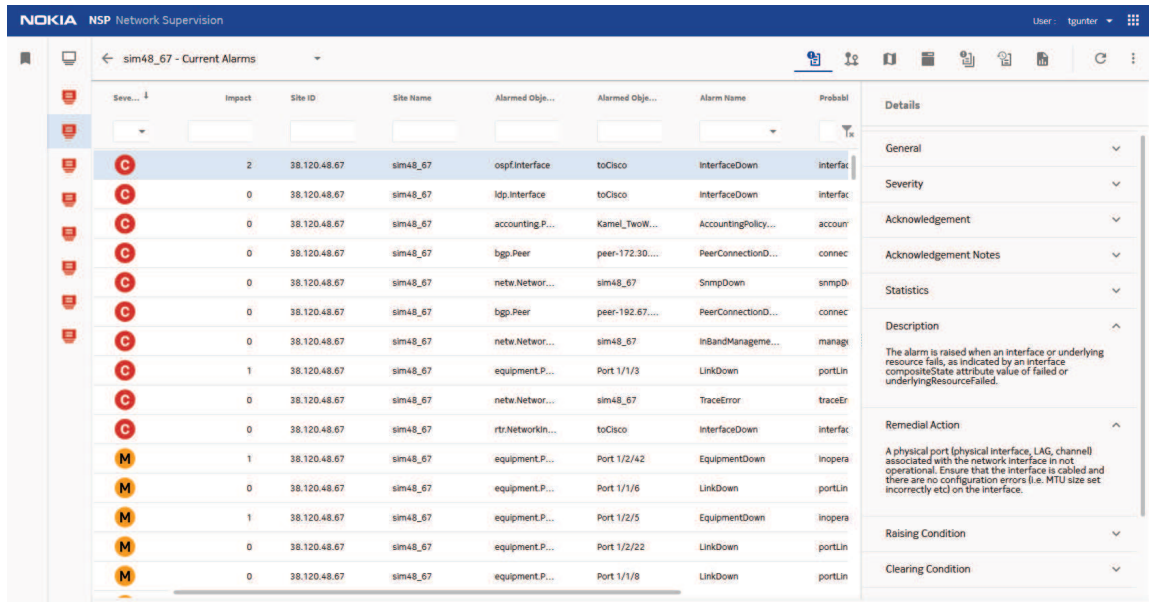
At the bottom of each NE tile is a **Show More** **\*\*\*** menu. When you hover over the **Show More** **\*\*\*** menu, three icons appear:

- **Current Alarms** 
- **Event Timeline** 
- **Troubleshooting Map** 

The icons provide entry points for active troubleshooting. Clicking on an icon starts a workflow that allows you to troubleshoot the root cause of the problem. Let's look at the troubleshooting workflows one at a time.

### 4.1.3 Troubleshooting using the Current Alarms list

The Current Alarms list shows all alarms on the NE that have not been cleared. You can filter and sort the alarms using the column headings; for example, you can sort to show all critical alarms at the top of the list, or sort by impact, or probable cause.



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When you select an alarm in the list, information about that alarm appears in the Details panel. The Description and Remedial Action are expanded by default; these details may provide enough information to fix the problem. Expanding Additional Text may provide further help. You can expand any of the Details headings as needed.

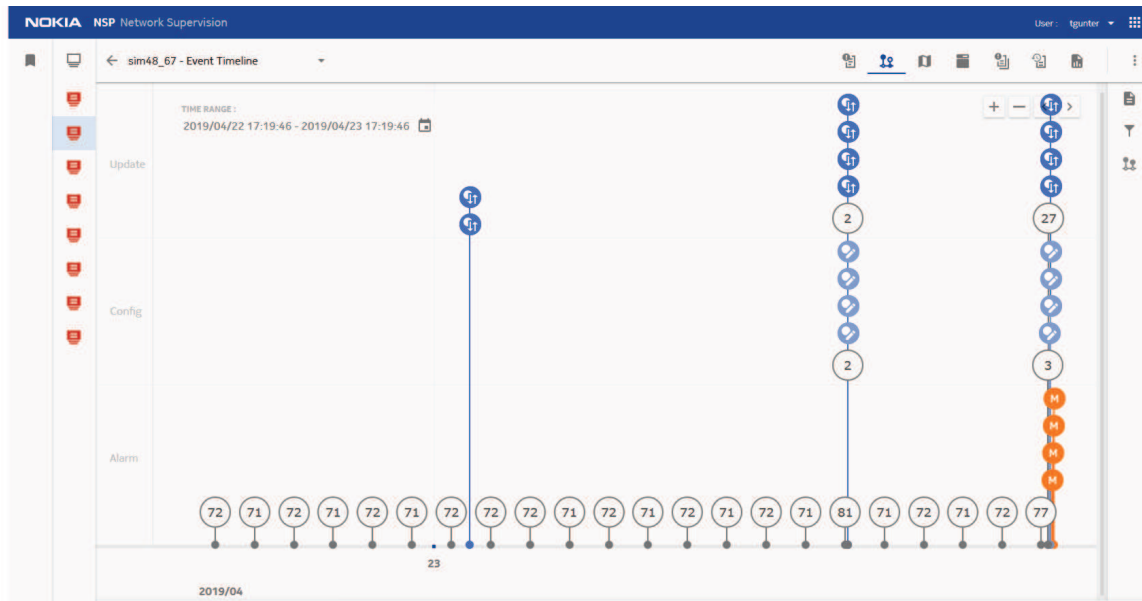
You may have to select more than one alarm in the list to identify the root cause of the problem.

From the Current Alarms list, you can select several other options for troubleshooting or more information, using the icons or the **More** menu located above the list. For instance, you can open the Event Timeline (discussed next).

To fix the problem, you may need to open the NFM-P properties form for the NE by clicking **More** , **Show object**. The properties form for the object opens in the NFM-P client, and you can make configuration changes to resolve the issue.

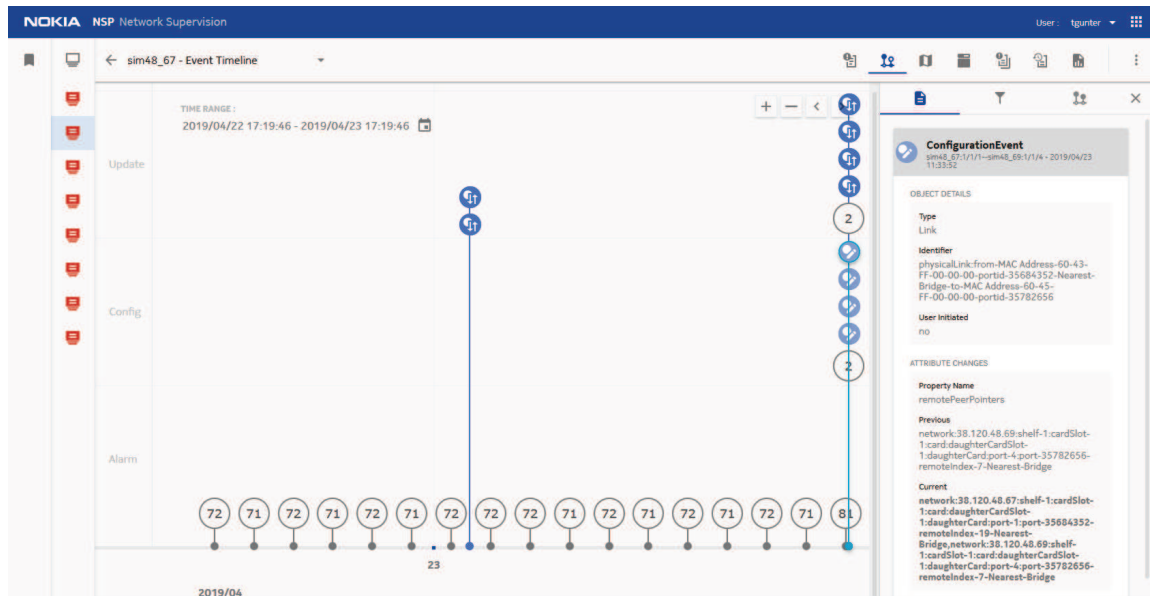
### 4.1.4 Troubleshooting using the Event Timeline

If you know the approximate time that a problem began, the Event Timeline provides you with quick identification of equipment events that may have caused the problem. Events can be alarms, configuration changes, or equipment updates.




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Events are shown either individually or as a cluster, depending on the zoom level. Alarms are shown on the lower part of the timeline, configuration events are shown in the middle, and updates along the top. When you click on an event icon in the timeline, an information panel opens showing more details. For instance, a state change event might show that it was user-initiated, possibly indicating a maintenance window, or similar activity.



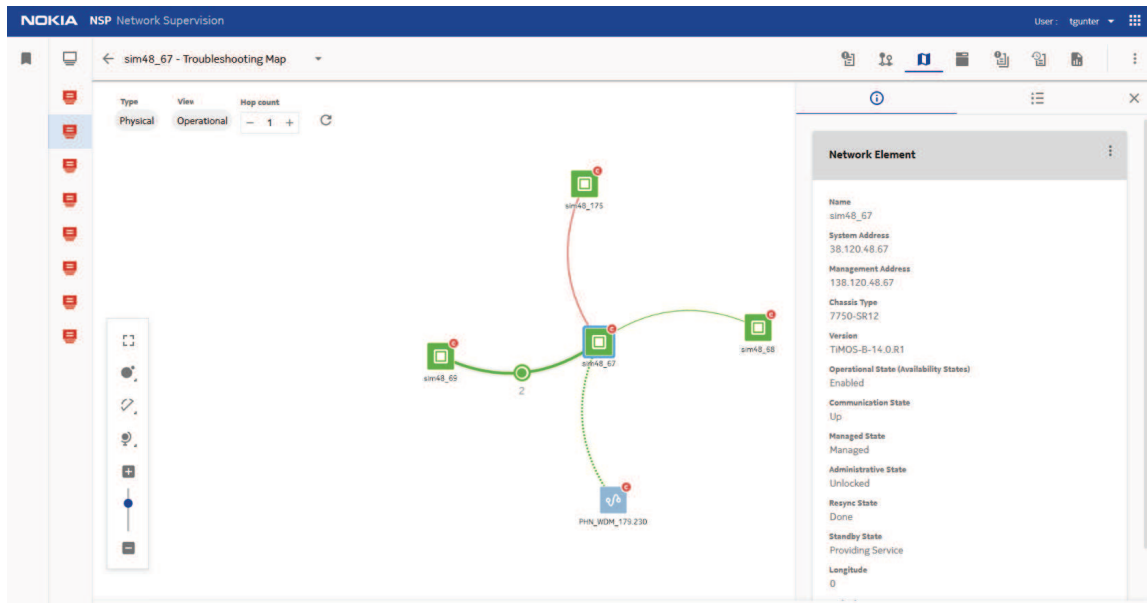
29442

By default, the timeline shows the 24-hour period immediately prior to when it was opened. You can configure the time range to narrow down the number of events. This is useful when you have an indication of when the problem started.

As with the Current Alarms list, from the Event Timeline you can select several other options for troubleshooting, more information, or to fix the problem, using the icons or the **More**  menu.

#### 4.1.5 Using the Troubleshooting Map


Some problems have their root cause in equipment other than the NE you are investigating. The Troubleshooting Map shows related equipment in the segment of network topology immediately surrounding the initial problem NE. Map tools allow you to explore for issues on NEs and links that are closely connected to that initial NE.





29444

When you open the Troubleshooting Map, the initial NE is shown, along with the NEs to which it has immediate links. The links are shown also. If NEs have alarms, a badge appears on the NE icon, showing the highest level alarm on the NE. When you hover over NEs or links, basic information is displayed.

Typically, you look at the NEs that have alarms and are immediately connected to the initial NE that you are investigating, to see if they have issues that are causing the problem on that NE. You can expand the map to investigate additional NEs farther away from the initial NE, by right-clicking on an NE in the map and choosing Explore. The map expands outward by the number of hops you have configured in the Hop count.

To show more detailed information, you can open an information panel on the right. When you click on any NE or link on the map, it's outlined in blue and details are displayed in the panel. The displayed information may be enough to identify the root cause, but if not, you can use the **More actions**  menu in the panel to show the equipment inventory or open a Current Alarms list for any NE on the map, to further troubleshoot on the related NEs.

If the problem is an equipment configuration error, you can fix it on the properties form for an NE by clicking **More** , **Show object**. If you need to investigate further, you can choose several other options for troubleshooting or more information, using the icons or the **More**  menu located above the map.

The Troubleshooting Map has display controls and a legend to help you manage the view and identify map objects.

## 4.1.6 Matrix view - use case summary

The Network Supervision application provides multiple methods for identifying and investigating equipment problems in the network. In this article, we discussed how to identify problems using the Matrix View, then looked at three main entry points and workflows for troubleshooting and fixing the root cause of equipment problems:

- Current Alarms
- Event Timeline
- Troubleshooting Map

Any of these methods may lead to the successful resolution of equipment problems. The best method will depend on the type of problem encountered, and on the operator's preference and experience. There are other troubleshooting methods in Network Supervision besides those described here, such as Equipment Inventory and Analytics Reports, or using display formats other than the NE Matrix. More detailed procedures, descriptions, and workflows are available in the NSP Help Center.

The Network Supervision application works in conjunction with the NFM-P, Fault Management, Service Supervision, and other NSP applications to provide effective management of network equipment, using efficient workflows and navigation to solve problems in dynamic networks.



## 4.2 Routine NE maintenance with Network Supervision

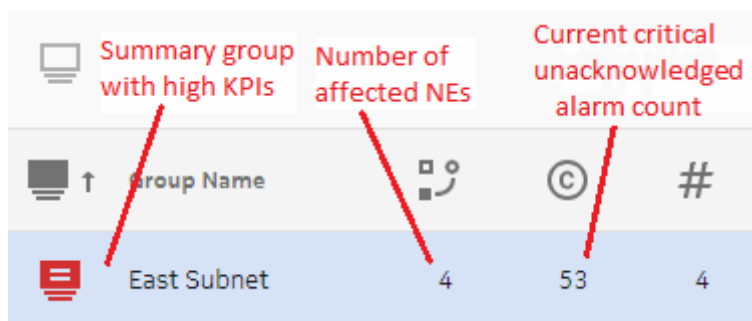
### 4.2.1 Purpose

This article shows you how to use the Network Supervision application to monitor the status of your network hardware (NEs and their installed equipment) and to locate and troubleshoot the root cause of problems.

### 4.2.2 Starting points for troubleshooting monitored NEs

Any of the following events could indicate that you need to troubleshoot your network:


- One or many KPI icons turn red or show upward trending arrows  on NEs in the Watch view. To add NEs to the Watch view, hover over an NE tile in the NE Matrix and click **Show More**  , **Add To Watch View**.
- A summary group turns red or shows upward trending arrows in the Summary view.



Summary group with high KPIs	Number of affected NEs	Current critical unacknowledged alarm count	
Group Name			#
East Subnet	4	53	4

- NE tiles change color or show upward trending arrows  in the NE Matrix.

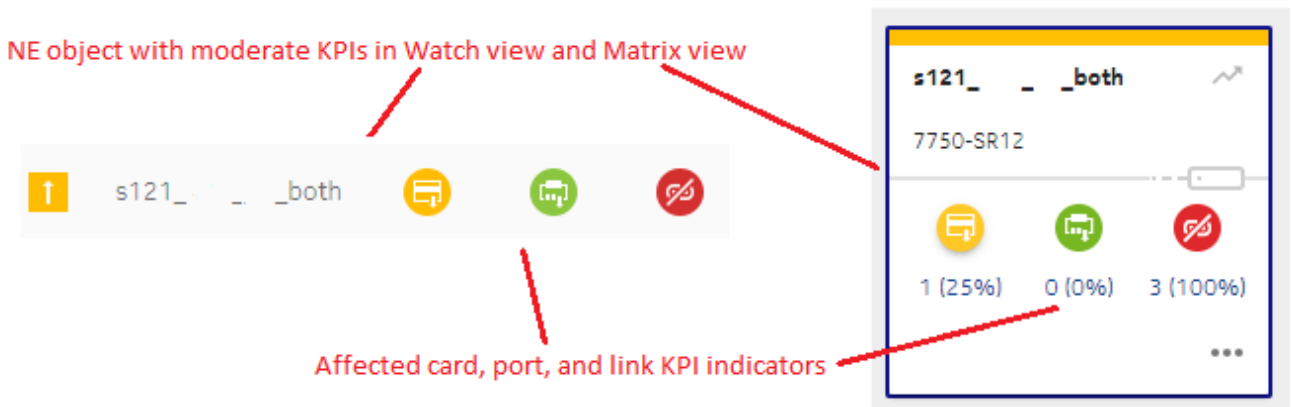
### 4.2.3 Triaging steps for a summary group

- 1 \_\_\_\_\_  
Select an affected summary group in the Summary view.
- 2 \_\_\_\_\_  
Determine the number of affected NEs and critical alarms for the group.
- 3 \_\_\_\_\_  
Click on the summary group to display its NEs in the NE Matrix.  
From the Matrix, you can open the **Alarms list**  to view alarms for the entire summary group.
- 4 \_\_\_\_\_  
Proceed to [4.2.4 “Triaging steps for an NE” \(p. 51\)](#).

END OF STEPS \_\_\_\_\_

### 4.2.4 Triaging steps for an NE

- 1 \_\_\_\_\_  
Select an affected NE in the Watch view or NE Matrix.
- 2 \_\_\_\_\_  
Determine which KPIs on the NE are affected (yellow or red color): the number of cards, ports, or links that are down.



Also look for upward trending arrows on NEs in the Watch view or NE Matrix. These indicate affected NEs that developed problems recently.

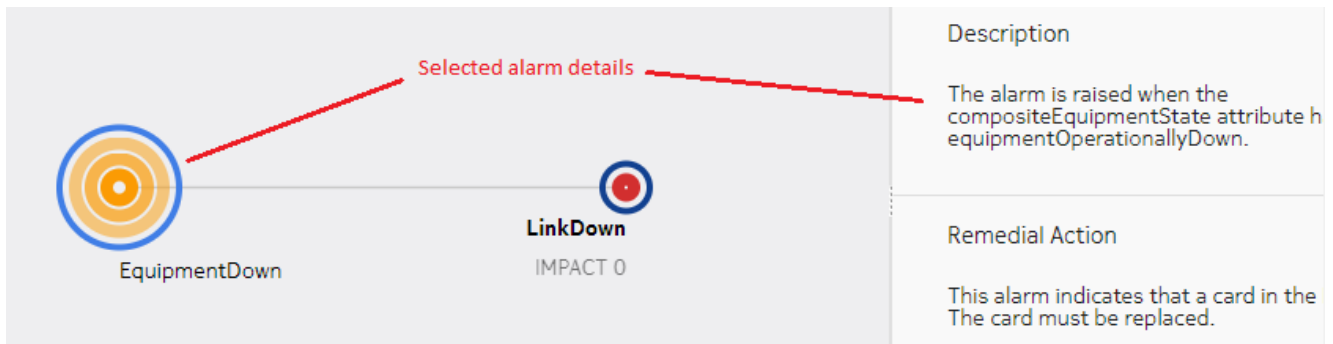
- 
- 3 \_\_\_\_\_
- Select one or more of the following methods to troubleshoot the problem.

### Troubleshooting with the Alarms list and Event Timeline

- 4 \_\_\_\_\_
- Open the Alarms list to view all standing alarms for the selected NE; on the NE tile, click **Show More** **⋮** , **Current Alarms** **🔔** .

- 5 \_\_\_\_\_
- Click on an alarm message in the list to display complete details of the alarm, including descriptive and remedial information.
- If you suspect that the affected object for the selected alarm is a cause of the current problem, you can open the affected object in its management application directly from the Alarms list. On the selected alarm item, click **More** > **Show Affected Object**. Make configuration changes to the affected object while monitoring the object in Network Supervision to determine if KPIs improve as a result of the change.

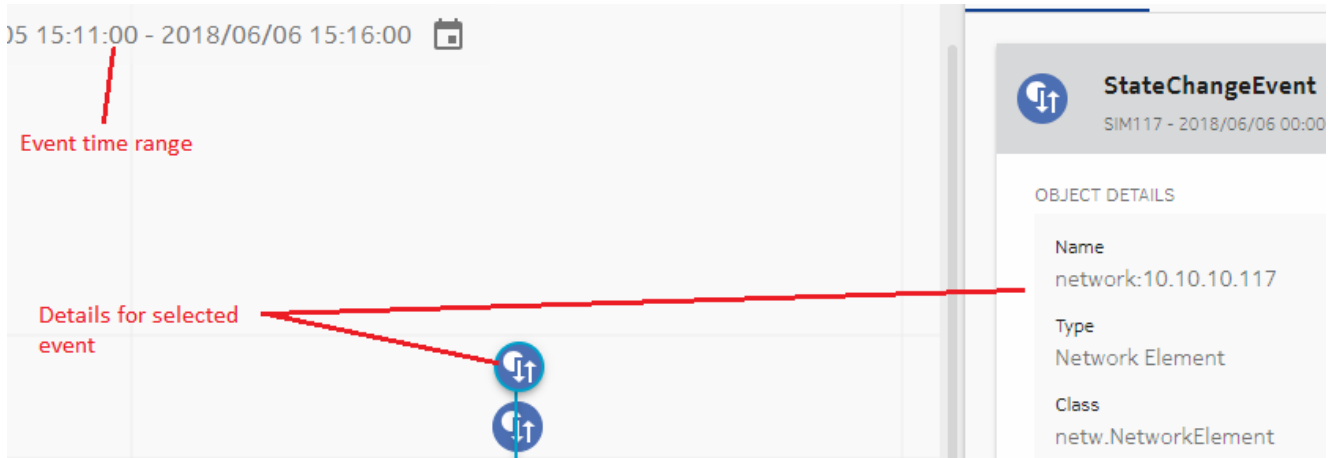
- 6 \_\_\_\_\_
- To further investigate a selected alarm, open its Impact Analysis diagram to view objects impacted by the alarm. On the selected alarm item, click **Show Impacts** **🔗** .
- The selected alarm object is circled in dark blue. Click on an alarm object to view details and remedial information.



If you suspect that the affected object for the selected alarm is a cause of the current problem, you can open the affected object in its management application from the Impact Analysis view. At the bottom of the Details panel, click **Show Affected Object** **!** . Make configuration changes to the affected object while monitoring the object in Network Supervision to determine if KPIs improve as a result of the change.

- 7 \_\_\_\_\_
- Open the **Event Timeline** **🕒** for the alarm to view events that occurred just prior to the alarm being raised, and determine the possible cause (for example, an object configuration change).



Adjust the date range around the alarm event using the **Date Chooser**  .

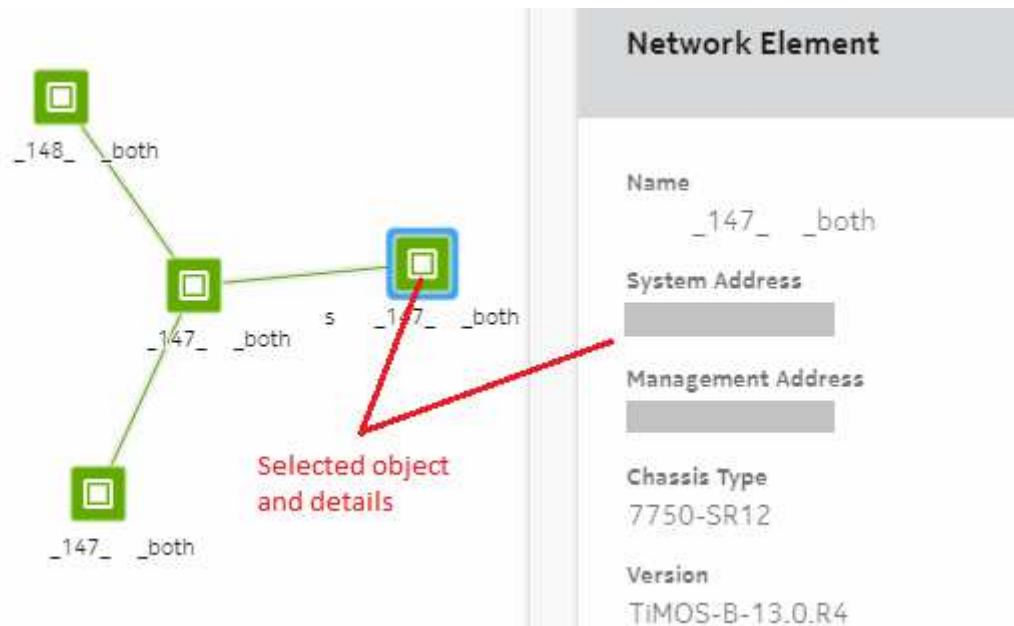


Select an event icon in the timeline to view information related to the event.

## Troubleshooting with the Troubleshooting Map

8

Return to the NE Matrix or Watch view and open the **Troubleshooting Map**  for the selected NE. Click on a red NE or link object and then click on the **Info**  button to view details about the object.



NE objects with alarms carry a badge. The badge color indicates alarm severity, as described in the Details panel. Hover over an NE or link object to view basic status or alarm information about the object.

To correct a problem on an affected object, you can open the object in its management application to change its configuration, or to undo a previous configuration change that caused the problem. On the Details panel, click **Show More ...** , **Show Object**. Make configuration changes to the affected object while monitoring the object in Network Supervision to determine if KPIs improve as a result of the change.

**9**

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When troubleshooting is complete, verify that all alarms have cleared and KPI indicators are green.

**END OF STEPS**

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