Netspan Operations Manual

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Document Information

Abstract

This document details procedures for preconfiguring a unit and monitoring its performance. Airspan assumes that the personnel performing these instructions have a basic working knowledge of the unit.

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Rev 10.2	June 2020	• Updated figures: ○ Figure 3: Netspan Main Menu ○ Figure 218: Historical Alarms List Screen • Updated tables: ○ Table 19. Add Software Server Configuration Parameters ○ Table 38. Status Type Drop-Down List Content by Node Type ○ Table 39. Reprovision Option Field
Rev 10.1	April 2020	• Updated figures: ○ Figure 49: Configure Columns ○ Figure 77: Edit Node Screen ○ Figure 79: Add PnP Configuration Screen ○ Figure 252: Node Management Status Tab ○ Figure 254: Node Management Screen - State and Control Tab ○ Figure 313: Events List Screen ○ Figure 316: Events List Screen ○ Figure 321: Configuring Event Filtering ○ Figure 322: Configuring Event Filtering ○ Figure 323: Applying Event Filter — Example 1 ○ Figure 324: Applying Event Filter — Example 2 • Updated tables: ○ Table 36. Statistics Type Groups per Node Type ○ Table 38. Status Type Drop-Down List Content by Node Type
Rev 10.0	January 2020	• New section: ○ Re-allocating PCI ○ Core Dump Process • Updated figures: ○ Figure 19: Filtered List of Nodes – Edit All, Manage All, Software All, Export, Reload ○ Figure 20: Node Search Screen

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About This Document

Purpose

This guide explains the processes and procedures involved in managing the network using Netspan. It does not provide information on how to manage Netspan itself. This is detailed in the *Netspan Administration Guide*.

Intended Audience

This guide is intended for the NOC operators who monitors the performance of a unit. Airspan assumes that a person performing these instructions is qualified in performing installations and capable of identifying hazards.

Document Conventions

This document uses the following typographic conventions.

Table 1. Typographic Conventions

Convention	Element
Blue underlined text	Cross-reference links.
Bold text	Keyboard buttons and GUI elements.
Command	Command names or phrases.
`Computer output`	Text displayed by the computer.
Hyperlinks	Website and e-mail addresses.
Danger	Signifies a hazardous situation - if not avoided - will cause death or serious injury. Describes how to avoid it.
Warning	Signifies a hazardous situation - if not avoided - can cause death or serious personal injury. Describes how to avoid it.
Caution	Signifies a hazardous situation - if not avoided - can void the product warranty, and cause property damage. Describes how to avoid it.
Important	Provides necessary information to explain a task.
Note	Provides additional information.
Tip	Provides helpful hints.

Document Organization

Chapter	Contents
1 Understanding Network Operations	Provides an introduction to Netspan, and a high level overview of the workflow required to make Netspan and the network nodes operational.
2 Netspan Overview	Explains the Netspan architecture, outlines its functional capabilities and describes how to connect to a Netspan server. Provides an introduction to the Netspan UI.
3 Node Discovery	Explains the process for adding nodes to the network and using Netspan to discover them.
4 Provisioning	Describes how to provision service profiles, node profiles, nodes, and manage the LTE neighbours.
5 Configuration Management	Describes how to manage paging groups, subscriber station, network elements, regions, sites, call trace server, Netspan-SF server, file server, and SAS server.
6 Software Upgrade	Explains how to upgrade the software on a node, including adding a software server to Netspan, uploading new software to a server and updating a node with that software.
7 Alarm Management	Describes how to view and manage alarms using the Netspan UI.
8 Performance Management	Explains how to monitor the performance of nodes in your network through the Netspan UI.
9 Node Management	Describes the node management functionality available within Netspan, covering how to view node status, inventory, rebooting and reprovisioning.
10 Event Management	Explains how to use the Netspan UI to view event types and the events that have taken place in your network.
A Abbreviations	Lists the abbreviations used in this document and their expansions.

Related Reading

The following documents contain related information:

- ***UGD-D00131 – Netspan Installation and Upgrade Guide***

  This document describes the workflow and procedures for installing and upgrading Netspan.

- ***ARD-D00741 – Netspan Parameters Reference Guide***

  This document describes the parameters required to configure LTE and backhaul nodes using Netspan.

- ***SYN-PSD-0027 – Netspan NBIF Guide***

  This document describes the mechanism implemented in Netspan to interface with the customer NOC or OSS through a northbound interface (NBIF).

- ***ARD-D00740 – Netspan Counters and KPIs Reference Guide***

  This document describes the counters and KPIs that are read from the node population and are reported in the Netspan UI.

- ***ARD-D00742 – Netspan Alarms and Events Reference Guide***

  This document describes the alarms and events that are raised on the node population and are reported in the Netspan UI.

- ***UGD-D01018 – Netspan Administration Guide***

  This document describes the administrative functions that can be performed in the Netspan UI, such as managing users, servers, etc.

- ***UG-D01013 – AirCAP Installation and User Guide***

  This document guides you on how to use AirCAP for commissioning Airspan's iB440 wireless backhaul solution.

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Main Operations	**Worldwide Headquarters**	**Airspan India**
Airspan Communications Ltd. Capital Point 33 Bath Road Slough, Berkshire SL1 3UF, United Kingdom Tel: +44-1895-467-100	Airspan Networks Inc. 777, Yamato Road, Suite 105 Boca Raton, FL 3341-4408, USA Tel: +1 561 893 8670	Airspan Networks India Pvt Ltd. Cyber One, 1107/1108, S Pranavnandji Marg, Sector – 30, Vashi, Navi Mumbai – 400 703. Tel: +91 22 2087 8003

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1 Understanding Network Operations

This document provides the operational workflows and information on how you use Netspan (Airspan's EMS) for adding, discovering, and provisioning nodes and subsequently monitoring their performance. Netspan is a client-server application that consists of an SQL database server, web server, and a set of always-on services.

Netspan is a comprehensive element manager, which is designed around a client-server architecture. The Netspan server runs on a server platform and uses an SQL database to store the configuration and statistics.

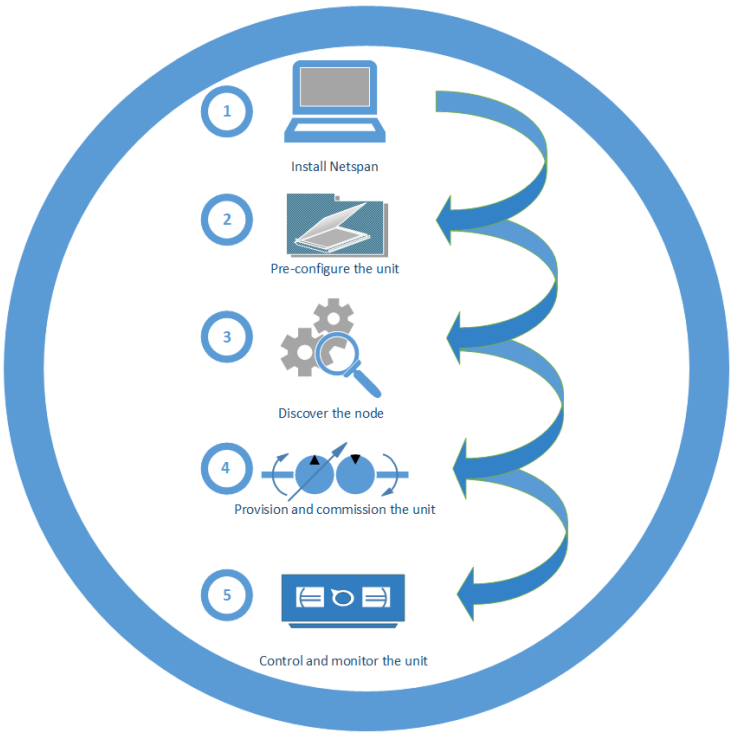
To understand the processes and operations detailed in this document, you need a basic working knowledge of the unit and a broad understanding of the network and routing principles, and network configuration.

Though the framework of each network is unique, following are the fundamental operational processes involved in the workflow:

1. Installing Netspan
2. Adding and discovering nodes
3. Provisioning nodes
4. Controlling and monitoring the nodes

Figure 1 illustrates the flow of network operations.

Figure 1: Network Operations Workflow



Netspan provides an intuitive interface simplifying the management of even the most complex and crucial networks.

Note: In this document, **iBridge LOS** refers to iBridge 440 and **iBridge NLOS** refers to 460.

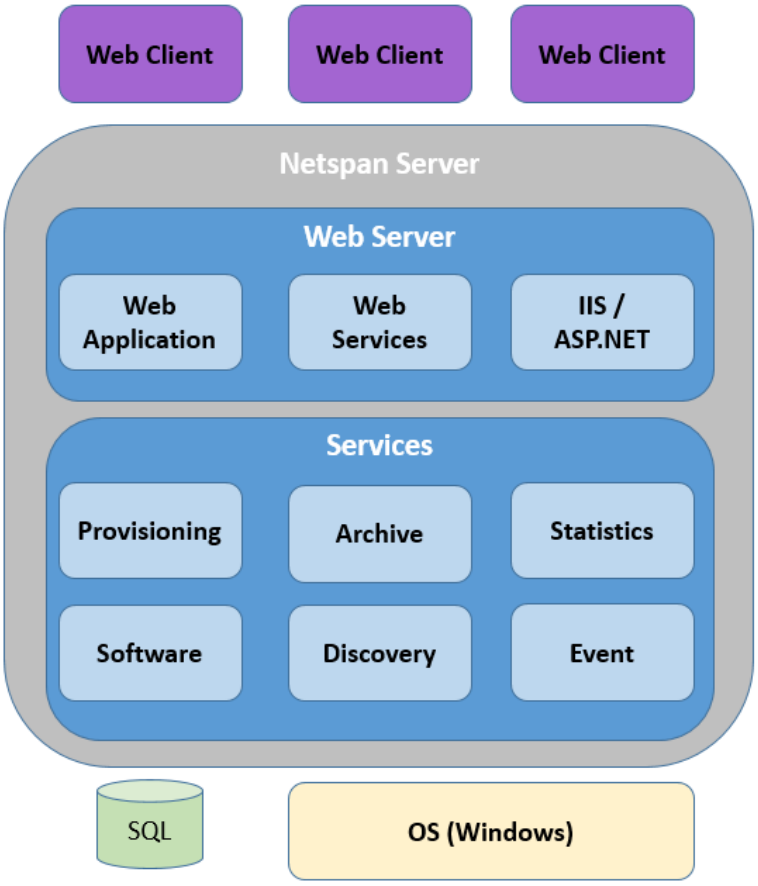
2 Netspan Overview

Netspan is designed to assist you with regulating, unifying, and simplifying the network management operations in heterogeneous environments, including the Airspan nodes.

The Netspan server is accessed using a web browser (for example, Internet Explorer), with all functionality and element management provided through web pages.

Figure 2 shows the Netspan architecture.

Figure 2: Netspan Architecture



The NOC operators are assigned with a role that is appropriate for their function. The Netspan clients operate remotely from the Netspan server. Use a Netspan client to discover and provision a unit. Netspan is a complete management system that supports a variety of high-level operations for huge networks. It provides the following functions:

- Fault management
- Configuration management
- Alarm handling
- Performance management
- Security management

2.1 Connecting to Netspan Server

This section explains how to install Netspan and connect to the Netspan server. You can download the latest version of Netspan from ShareMethods or Airshare, Airspan's product information portal. For more information on how to install Netspan, see *UGD-D00131 Netspan Installation and Upgrade Guide*.

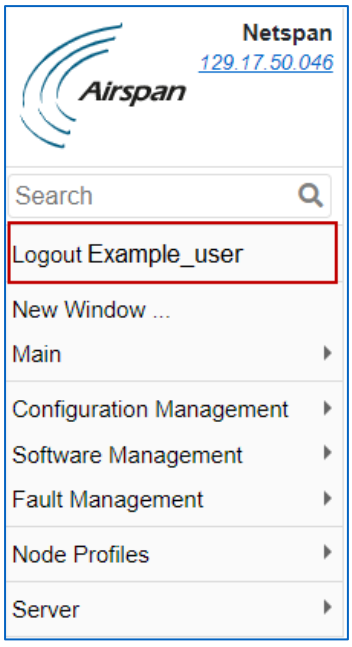
If you are trying to connect to the Netspan server from a server PC, do one of the following:

- Connect as a localhost:
  - Open the web browser.
  - Type localhost/Netspan in the address bar.
  - Press Enter.
- Connect using the Netspan server IP address:
  - Open the web browser.
  - Type the Netspan server IP address in the address bar.
  - Press **Enter**.
- If you are trying to connect to the Netspan server from a client PC, perform the following steps:
  - Open the web browser.
  - Type the Netspan server IP address or Netspan's server hostname in the address bar.
  - Press **Enter**.

2.2 Navigating Netspan UI

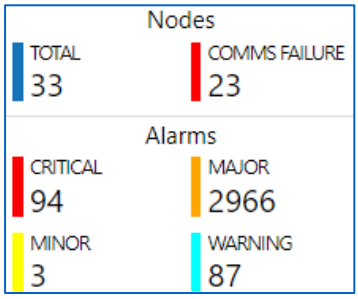
The Netspan UI is extremely flexible, allowing you to navigate to screens in multiple ways depending on the task you are performing. The menu structure on the left of the UI provides you with logical groupings to navigate to a particular screen and action.

Figure 3: Netspan Main Menu



In addition, a quick-links menu is permanently available at the bottom left corner of the navigation pane.

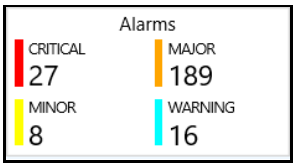
Figure 4: Netspan Quick Links Menu



Each of these options present you with real-time information regarding the current state of operation of your network, as reported to Netspan. Where applicable, these quick menus also provide you with direct links to the corresponding screen in the Netspan UI. For example, clicking the **Alarms** entry opens the **Active Alarms** screen.

To understand the data displayed in the quick links panel, hover your cursor over one of the numbers shown. A tooltip is displayed explaining what that number represents. Table 2 contains a full explanation of the links and data in the quick links menu.

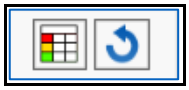
Table 2. Quick Links Menu

Quick Links Menu Title	Category Title	Links to…	Statistics Shown
Alarms 	Critical	Active Alarms screen	Total number of critical alarms.
	Major	Active Alarms screen	Total number of major alarms.
	Minor	Active Alarms screen	Total number of minor alarms.
	Warning	Active Alarms screen	Total number of warning alarms.

2.2.1 Layout Options

At the top, right corner of most Netspan screens is a set of **Layout** options. These vary slightly depending on the nature of the screen being displayed, but provide you with the ability to change the appearance of the screen and once you have, either revert to the original settings or save your changes.

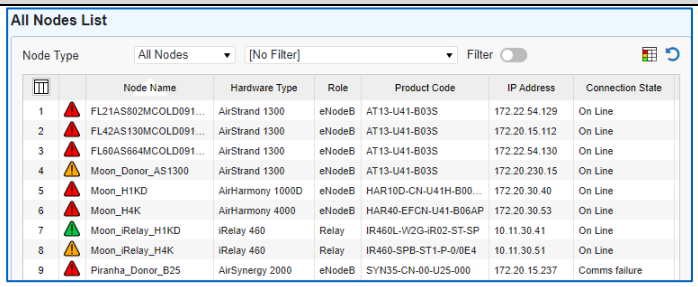
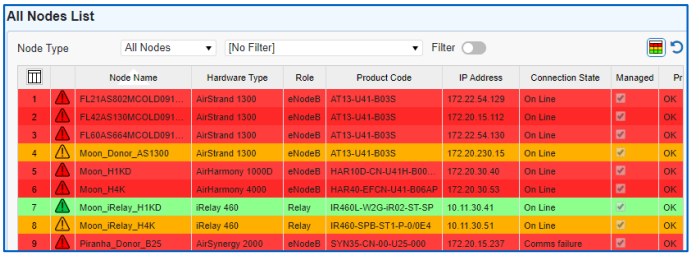
Figure 5: Layout Options



The function of these buttons is explained in Table 3.

Table 3. Layout Button Functions

Button	Name (shown in tooltip)	Function
	Toggle row appearance for rows with alarms	Only available on certain screens, this button enables you to convert the whole table display to be colour coded to make it easy to identify the rows that contain critical, major, and other severities of alarm. In the normal display, the colour coding is limited to the triangular icon next to the node name or alarm ID.

Button	Name (shown in tooltip)	Function
		 Click the **Toggle rows** button and the whole table is coloured according to the severity of the alarm in each row.  In this display, the appearance of the button changes (). Click it again to revert to the previous display. See How to Understand Alarm Details for further information regarding the colour coding of alarms.
	Reset column ordering, width, and sorting	Resets column order, column width, and also allows you to sort the data. This option provides you with the ability to change the appearance of the screen to default.

3 Node Discovery

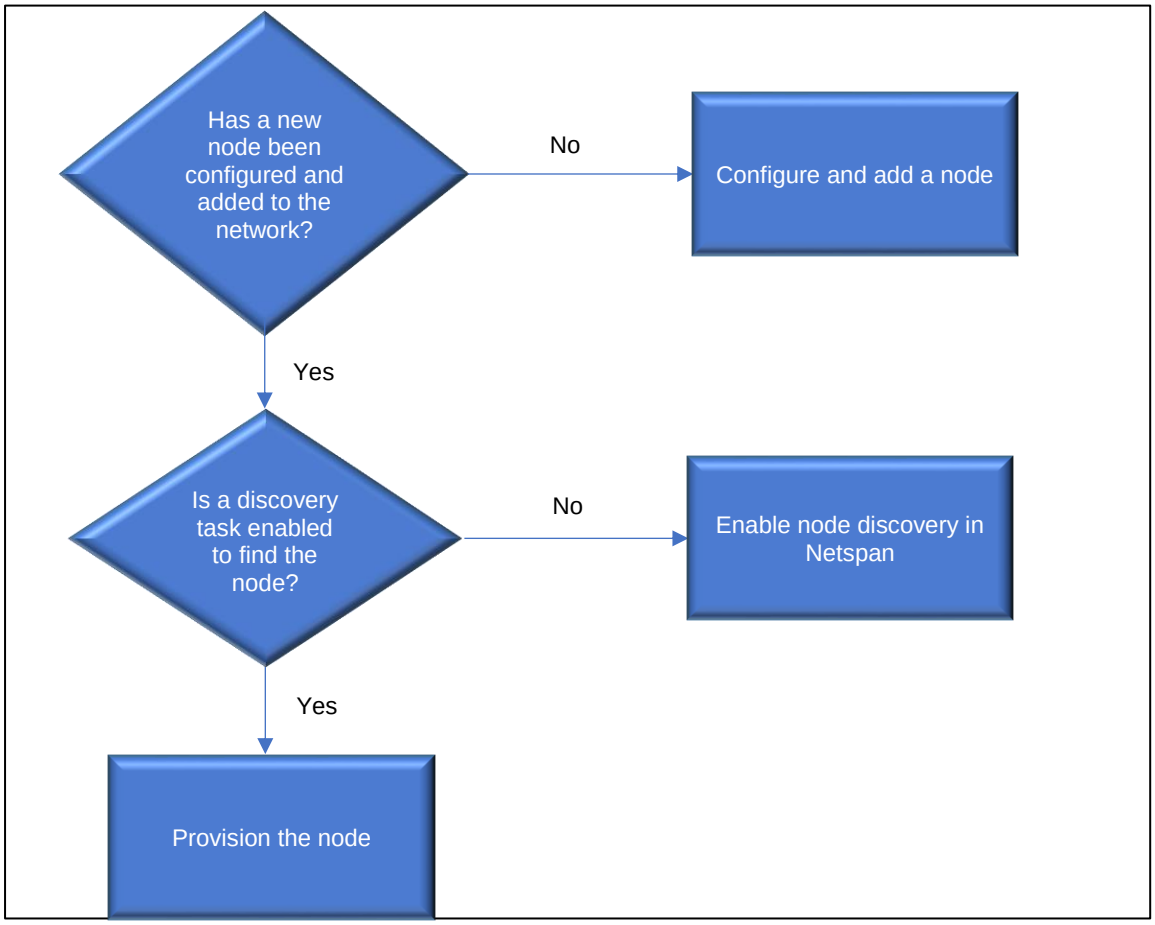
Node discovery is the process through which Netspan becomes aware of the presence of a newly installed node in a network and establishes first contact with that node.

Note: This process is only relevant for manually installed devices and is not relevant for PnP nodes.

In order to discover new nodes for Netspan, these nodes first need to be commissioned and made available in the network. Once they are present, you can instruct Netspan to find them by creating and initiating a discovery task.

This section explains how to add nodes to the network and subsequently discover them. Once they have been discovered, you are then able to provision them ready for operation. The provisioning of nodes is covered in Provisioning.

Figure 6: Node Discovery Flowchart



Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

This chapter covers the following topics:

3.1 How to Enable Discovery on a Node

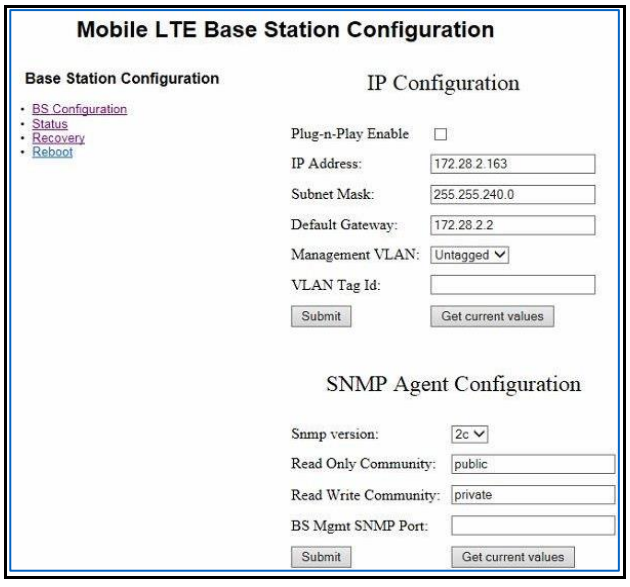
To enable Netspan to discover a node on your network, you must first add and configure that node.

Note: Airspan assumes that the personnel performing this configuration has a basic knowledge of the process. The process explained here is applicable to nodes of the type eNodeB, iBridge2, iBridge NLOS, or iRelay.

To add a node:

1. Connect the node to a network accessible to the Netspan server.
2. On the node terminal, open a browser instance and enter the address of the web page to configure node's connection.
3. Set the configuration parameters for a particular node type. Note that the exact set of parameters you need to define will vary depending on the node type you are configuring. To illustrate the potential variances in the fields you may see Figure 7, Figure 8, and Figure 9 which show different configuration screens for a mobile LTE base station, an Air4G eNodeB terminal, and an iBridge 460 local terminal.

Figure 7: Configuring a Mobile LTE Base Station

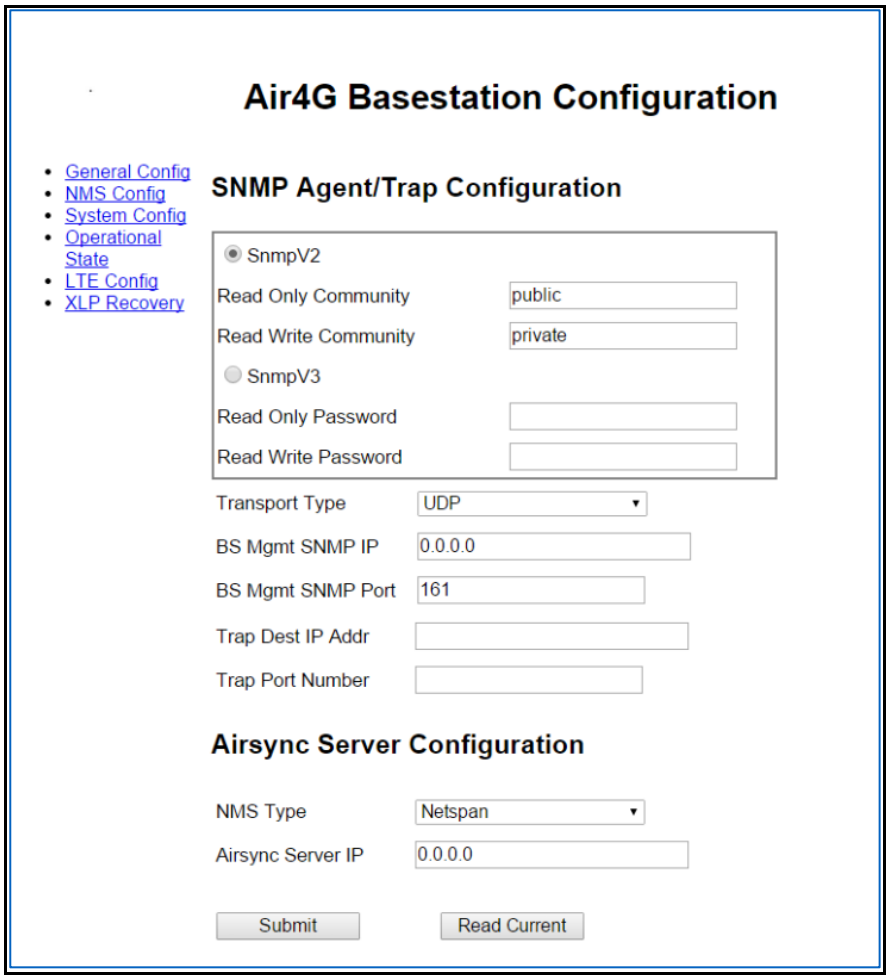


For more information on the configuration parameters, see Table 4.

Table 4. Mobile LTE Base Station Node Configuration Parameters

Parameter	Description
IP Configuration Parameters	
Plug-n-Play Enable	Specifies whether PnP is enabled or disabled. This needs to be disabled (checkbox cleared) in order to manually discover the node. If PnP is enabled, the node will be auto-discovered by Netspan and the rest of this procedure will not be required.
IP Address	Specifies the management IP address of the node.
Subnet Mask	Specifies the subnet mask of the node.
Default Gateway	Specifies the default gateway of the node.
Management VLAN	By default, the management VLAN will be Untagged. If your network includes a management VLAN, select Tagged.
VLAN Tag Id	Specifies the management VLAN ID if you have selected the Tagged option for the management VLAN.
SNMP Agent Configuration Parameters	
SNMP Version	Specifies the SNMP version to use, either V2C or V3.
Read Only Community	Specifies the appropriate *Read Only* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Read Write Community	Specify the appropriate *Read Write* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
SNMPv3 Access	Specifies the SNMP rights. **Note**: You can set a value for this parameter only if **SNMP Version** = **Version 3**.
SNMPv3 Password	Specifies the SNMP community string [SNMPv2] or password [SNMPv3]. **Note:** You can set a value for this parameter only if **SNMP Version** = **Version 3**.
BS Mgmt SNMP Port	If you leave this field empty, the node uses default SNMP port number (i.e. 161) to communicate with Netspan.

Figure 8: Configuring an Air4G eNodeB Terminal



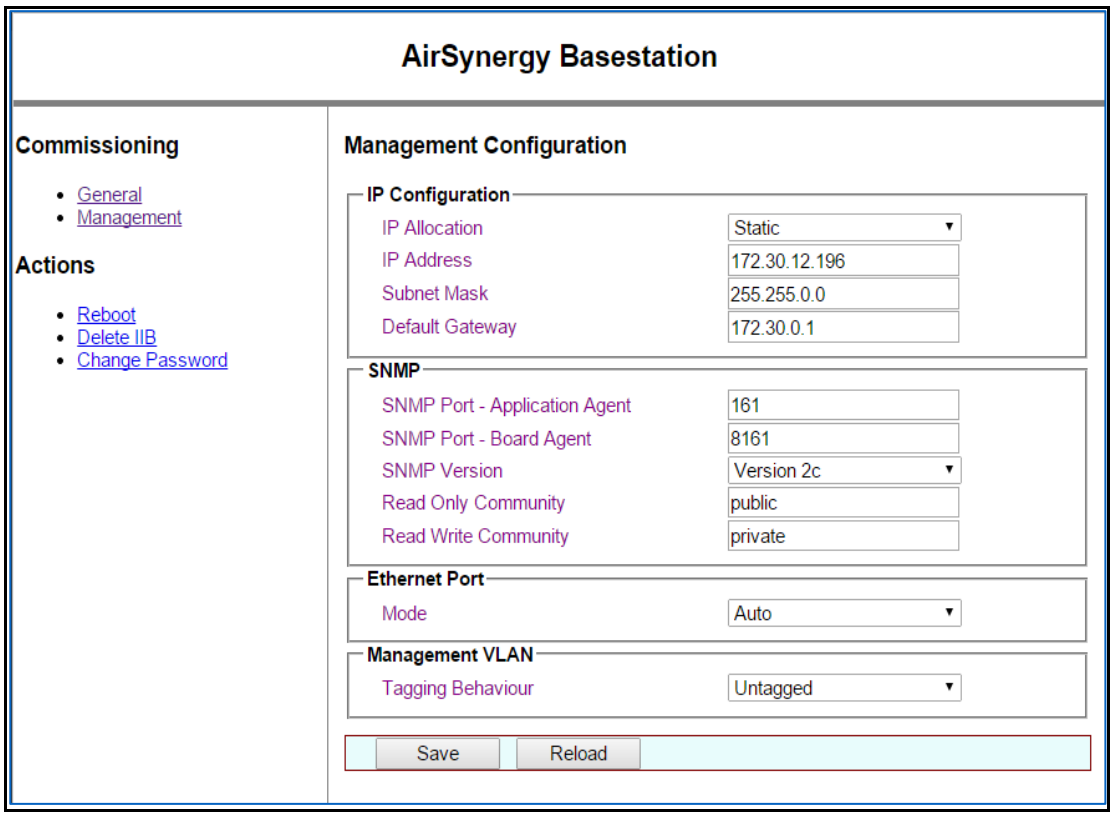
For more information on configuration parameters, see Table 5.

Table 5. Air4G eNodeB Configuration Parameters

Parameter	Description
SNMP Agent/Trap Configuration	
SNMP V2	Select the SNMP version to use, either V2 or V3. It is recommended to use V2. The radio buttons for each SNMP version are mutually exclusive.
Read Only Community	Specifies the appropriate *Read Only* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Read Write Community	Specify the appropriate *Read Write* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
SNMPv3 Access	Specifies the SNMP rights. **Note**: You can set a value for this parameter only if **SNMP Version** = **Version 3**.
SNMPv3 Password	Specifies the SNMP community string [SNMPv2] or password [SNMPv3]. **Note:** You can set a value for this parameter only if **SNMP Version** = **Version 3**.

Parameter	Description
Read Only Password	Specifies the appropriate *Read Only* password. **Note:** This password string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Read Write Password	Specify the appropriate *Read Write* password. **Note:** This password string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Transport Type	Define the transport type to be used.
BS Mgmt SNMP IP	SNMP IP address to use to communicate with Netspan.
BS Mgmt SNMP Port	If you leave this field empty, the node uses default SNMP port number (i.e. 161) to communicate with Netspan.
Trap Dest IP Addr	The IP address to send trap information to.
Trap Port Number	The IP number to communicate trap information on.
Airsync Server Configuration	
NMS Type	Network Management System used to control the node. Select Netspan.
Airsync Server IP	IP address of the Airsync server.

Figure 9: Configuring an iBridge 460 local terminal



For more information on configuration parameters, see Table 6.

Table 6. iBridge 460 Node Configuration Parameters

Parameter	Description
IP Configuration	
IP Allocation	Select the IP allocation method for the node. This will usually be **Static**.
IP Address	Specifies the management IP address of the node.
Subnet Mask	Specifies the subnet mask of the node.
Default Gateway	Specifies the default gateway of the node.
SNMP	
SNMP Port - Application Agent	SNMP port used for the application agent.
SNMP Port - Board Agent	SNMP port used for the board agent.
SNMP Version	Specifies the SNMP version to use, either V2 or SNMPv3. It is recommended that you select either **V2**.
SNMPv3 Access	Specifies the SNMP rights. **Note**: You can set a value for this parameter only if **SNMP Version** = **Version 3**.
SNMPv3 Password	Specifies the SNMP community string [SNMPv2] or password [SNMPv3]. **Note:** You can set a value for this parameter only if **SNMP Version** = **Version 3**.
Read Only Community	Specifies the appropriate *Read Only* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Read Write Community	Specify the appropriate *Read Write* permission. **Note:** This community string value must be identical to the one you specified in Netspan when creating relevant Discovery task.
Ethernet Port	
Mode	Defines the mode for Ethernet port discovery.
Management VLAN	
Tagging Behaviour	If your network includes a management VLAN, select **Tagged**. Otherwise, select **Untagged**.

4. Click **Submit** (or **Save**, depending on the button shown on the screen) to commit your configuration settings.
5. Reboot the node to apply the IP configuration.

Note: For more information on setting the IP connectivity, see appropriate node commissioning manual.

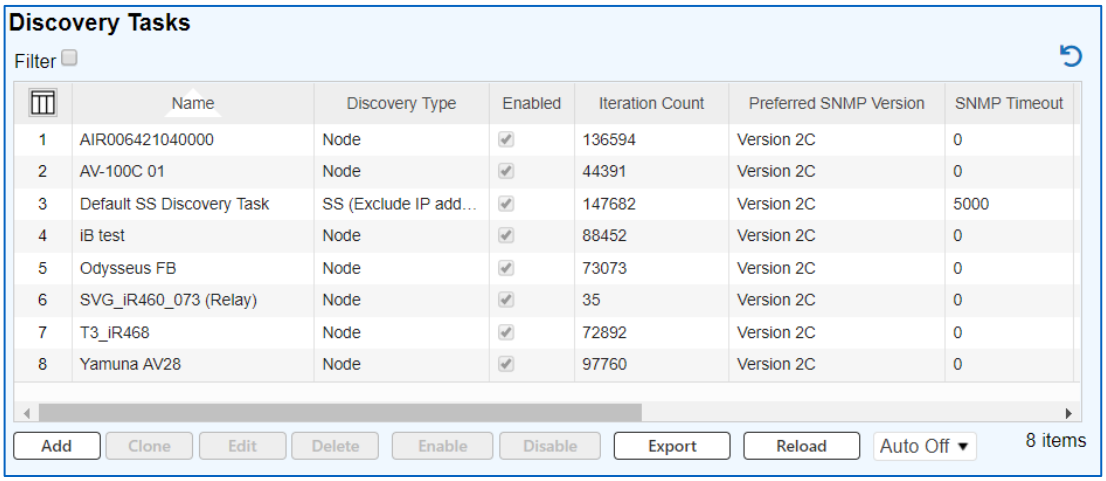
3.2 How to Discover a Node in Netspan

Once you have a node that is commissioned and available in your network, as described in How to Enable Discovery on a Node, you need to instruct Netspan to find that node by initiating a node discovery task.

To enable node discovery on Netspan:

1. On the main Netspan menu choose **Server** > **Discovery Tasks**. The Discovery Tasks screen will be displayed with a list of all discovery tasks currently defined in your system.

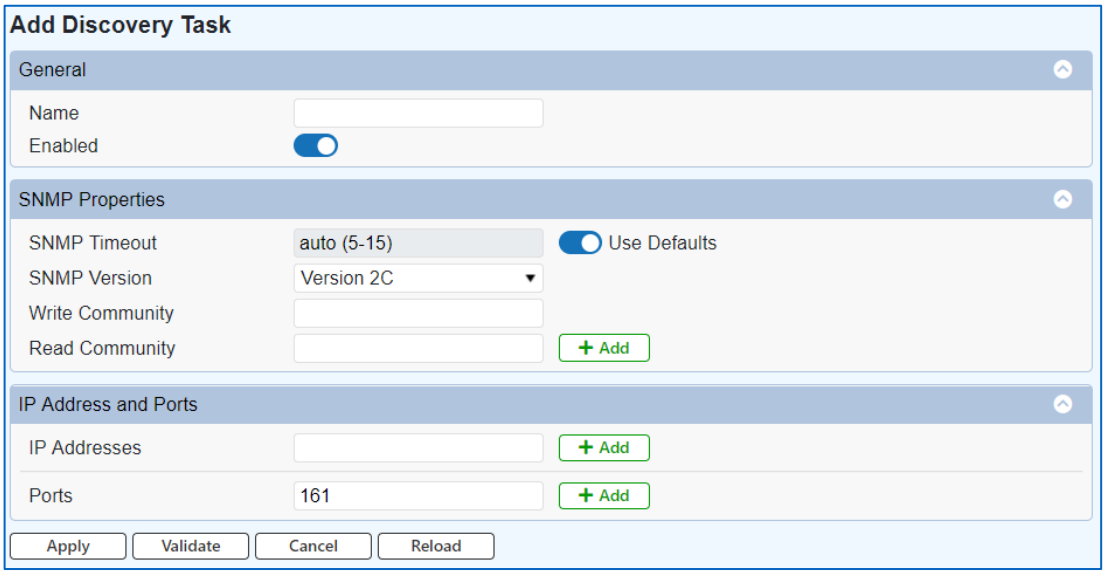
Figure 10: Discovery Tasks List Screen



2. To enable a configured task which is not currently active, click on the task in the list to select it and click **Enable**. The checkbox in the **Enabled** column will now be ticked for your nominated task and an information message will be displayed at the bottom of the Netspan screen, stating that your discovery task is now enabled.

3. Alternatively, you can create a new discovery task. To do this, click **Add** below the task list. This opens the **Add Discovery Task** screen.

Figure 11: Add Discovery Task Screen



4. Complete the fields according to the descriptions provided in Table 7.

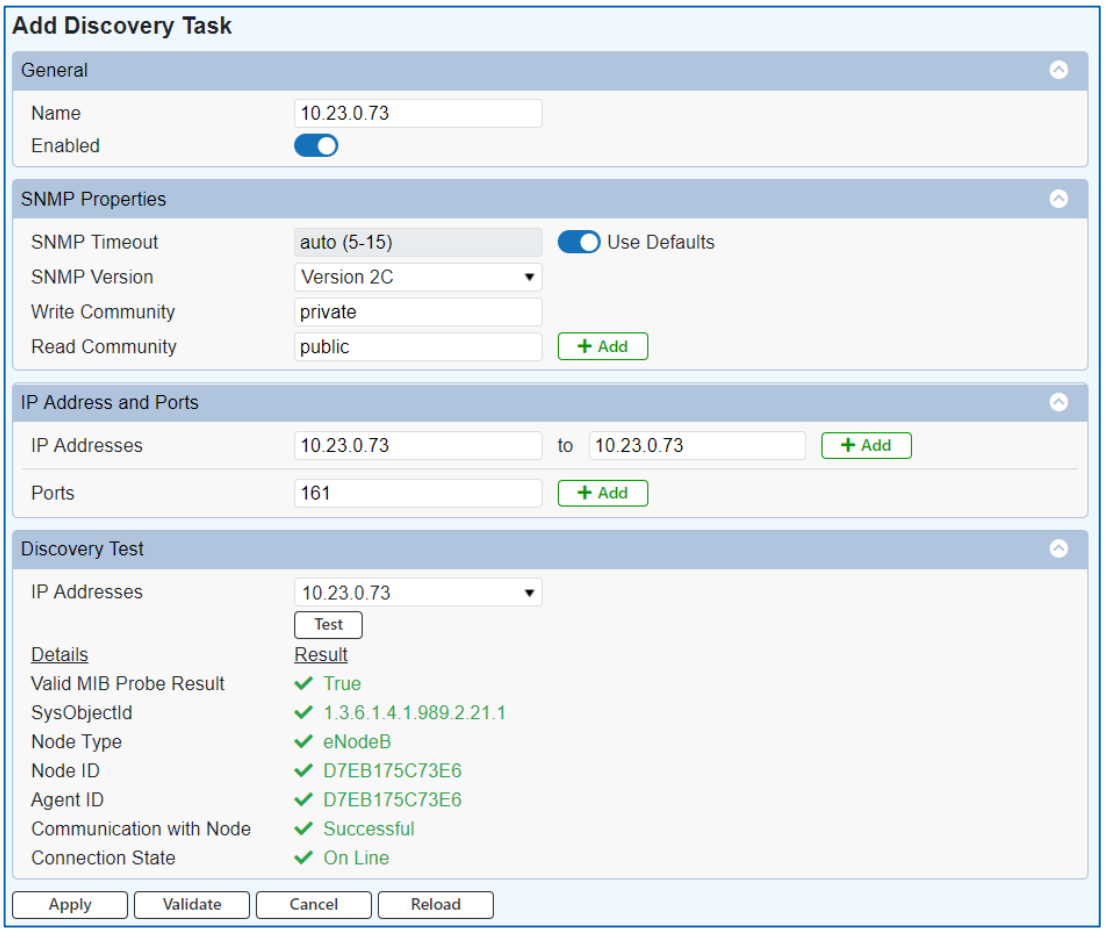
Table 7. Add Discovery Task Parameters

Parameter	Description
General Properties	
Name	Enter a name for the discovery task you are creating. This needs to be a string of 2-64 unicode characters excluding '<', '&', and leading or trailing spaces.
Enabled	Whether your task is to be enabled immediately on creation. You can define the task now, but enable it at a later time by leaving this checkbox unchecked.
SNMP Properties	
SNMP Timeout	Specify the SNMP timeout value for the discovery task. Select the **Use Defaults** checkbox to automatically populate the value or clear the checkbox and enter a value in the range from 1 to 20. Values are in seconds.
SNMP Version	Select the SNMP version to use from the drop-down list, either SNMPv2C or SNMPv3. The recommended value is SNMPv2C.
Access	Specifies the SNMP rights. **Note**: You can set a value for this parameter only if **SNMP Version** = **Version 3**.
Read Write Password	Specifies the SNMP community string [SNMPv2] or password [SNMPv3]. **Note:** You can set a value for this parameter only if **SNMP Version** = **Version 3**.
Write Community	Enter the write community applicable to the task. This needs to be a string of 1-64 characters from a-z, A-Z, 0-9, and special characters -_.;:#@/. This value needs to exactly match the write community value defined when the node was commissioned (see How to Enable Discovery on a Node for details). If the entries here and on the node do not match, then Netspan will not be able to discover the node.
Read Community	Enter the read community applicable to the task. This needs to be a string of 1-64 characters from a-z, A-Z, 0-9, and special characters -_.;:#@/. This value needs to exactly match the read community value defined when the node was commissioned (see How to Enable Discovery on a Node for details). If the entries here and on the node do not match, then Netspan will not be able to discover the node.
IP Address and Ports	
IP Addresses	Specify the IP address(es) of the node(s) to be discovered. • For IPv4 this will be in the form n.n.n.n, where n is an integer ranging from 0 to 255. • For IPv6 this will be in the form x:x:x:x:x:x:x:x. Click the **add** button (+) to define multiple IP addresses. Where you enter multiple addresses, Netspan pings each address in turn to try to find the defined node. **Note**: Regardless of whether you are using IPv4 or IPv6 addresses, you can define an address range in instances where you want to ping multiple addresses. After entering the first address, click the **add** button to indicate that you want to enter multiple addresses. Rather than having to enter each address individually, a second entry field will be shown next to the main IP address field with the word '**to**' in

Parameter	Description
	between. Enter the last IP address of the range you want to examine. Netspan will ping each address from your range. For IPv4, it is recommended to limit the IP address range to 1024 IP addresses as a large range can cause Netspan to slow down. For IPv6, a maximum range of 1024 IP addresses (/118) can be entered per Discovery Task.
Ports	Specify the UDP port used by the node to be discovered. Click the **Add** button (+) to define multiple ports.

5. Once you have defined your discovery task, a **Test** panel will be displayed at the bottom of the screen. If you want to try your discovery task to see if it reaches the node(s) you are trying to discover, click **Test** in this panel. Results will be returned, showing whether the node has been discovered by Netspan.

Figure 12: Discovery Task Test



6. Click **OK** to add your discovery task to the task list. You will be returned to the Discovery Tasks screen.
7. If you have created your task in step 3 without choosing to enable it from creation, you can now choose it in the task list and enable it manually as described in step 2.

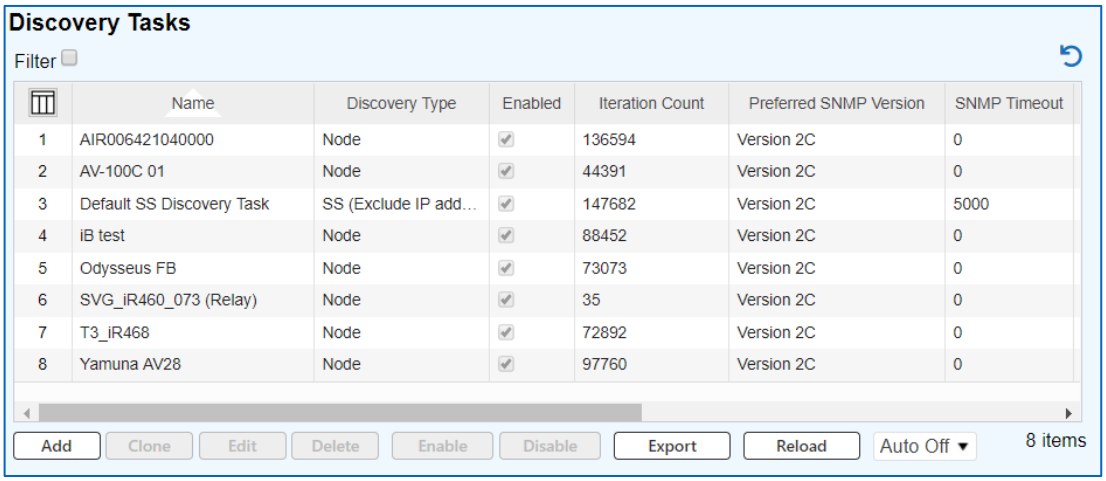
3.3 How to Disable Node Discovery

There may be occasions when you want to disable a node discovery task, for example: when you want to change the parameters of a task or when the task has been running and the required nodes have been discovered.

To disable node discovery:

1. On the main Netspan menu, choose **Server** > **Discovery Tasks**. The **Discovery Tasks** screen will be displayed with a list of all discovery tasks currently defined in your system.

Figure 13: Discovery Tasks List Screen



2. To disable a discovery task that is currently active, click on the required task (or tasks, if you want to disable multiple tasks at once) in the list to select it and click **Disable**. The checkbox in the **Enabled** column will now be cleared for your nominated task and an information message will be displayed at the bottom of the Netspan screen, stating that your discovery task is now disabled.

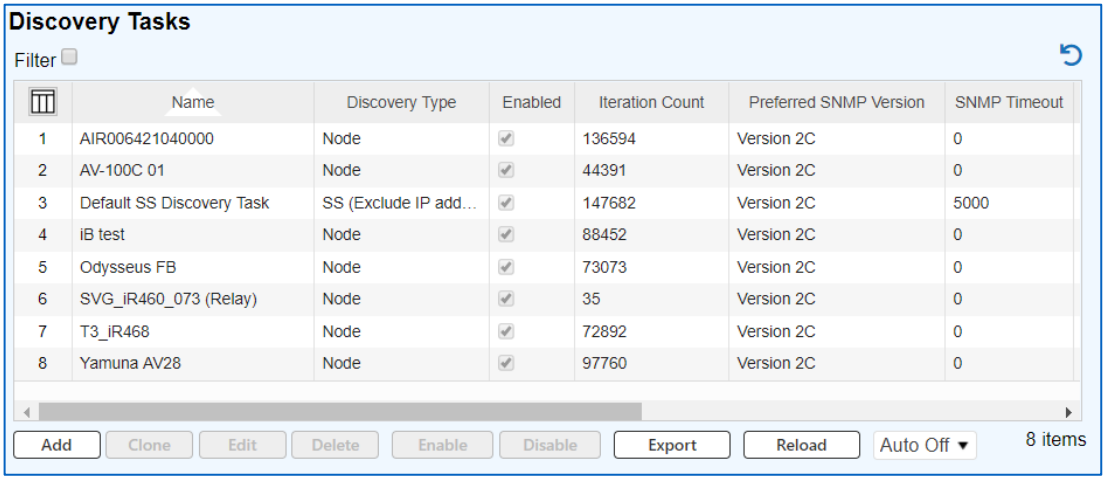
3.4 How to Delete a Node Discovery Task

There may be occasions when you want to delete a node discovery task, for example when the task has been running and the required nodes have been discovered.

To delete a node discovery task:

1. On the main Netspan menu, choose **Server** > **Discovery Tasks**. The **Discovery Tasks** screen will be displayed with a list of all discovery tasks currently defined in your system.

Figure 14: Discovery Tasks List Screen



2. To delete a discovery task, click on the required task (or tasks, if you want to delete multiple tasks at once) in the list to select it and click **Delete**. Your task will be removed from the list.

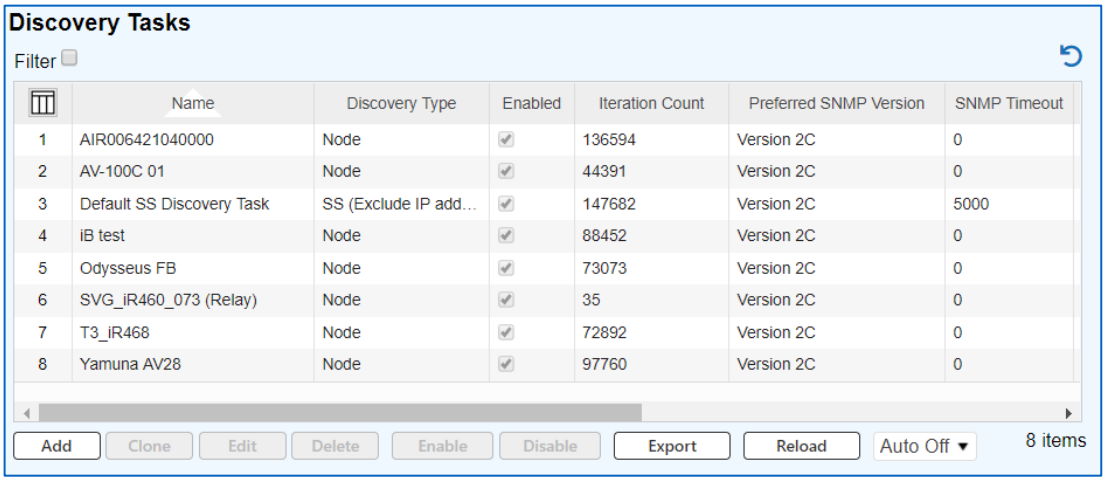
3.5 How to Edit a Node Discovery Task

There may be occasions when you want to edit an existing node discovery task, for example to change the IP address of the node you want to discover.

To edit a node discovery task:

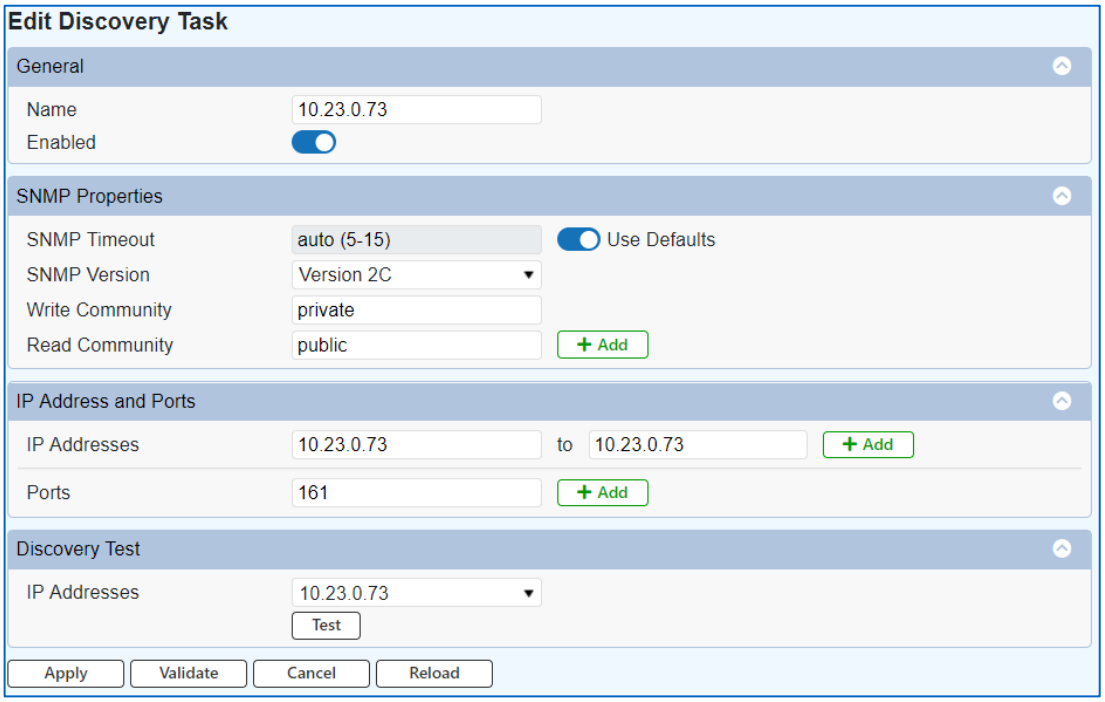
1. On the main Netspan menu, choose **Server** > **Discovery Tasks**. The **Discovery Tasks** screen will be displayed with a list of all discovery tasks currently defined in your system.

Figure 15: Discovery Tasks List Screen



2. Click on the task in the list to select it and click **Edit**. The **Edit Discovery Task** screen will be displayed with the details of your selected task pre-populated.

Figure 16: Edit an Existing Discovery Task



3. Change the parameters of the task as required. Refer Table 7 for more information on the values you can enter.
4. If you want to test your revised discovery task, click **Test** in the **Discovery Test** panel. The results of your test will be displayed on the screen.
5. Click **OK** to commit your changes and return to the Discovery Tasks list screen.

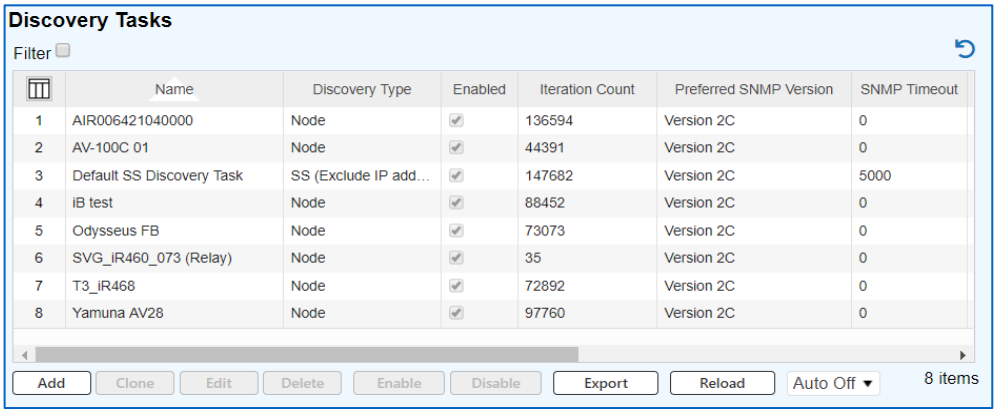
3.6 How to Clone a Node Discovery Task

There may be occasions when you want to clone an existing node discovery task rather than creating one from scratch. This generates a discovery task, with identical parameter values to the original task, which you can edit to make the task unique.

To clone a node discovery task:

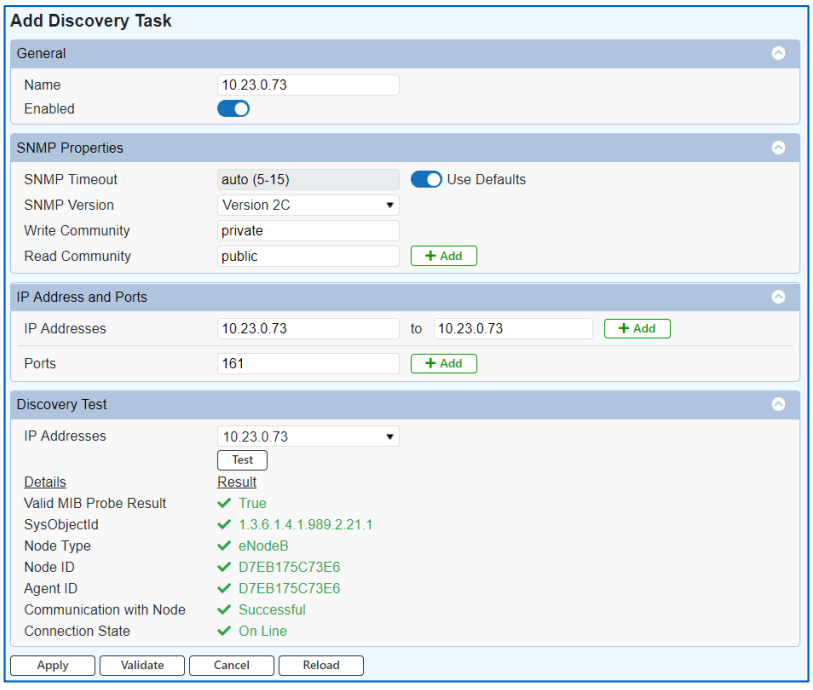
1. On the main Netspan menu, choose **Server** > **Discovery Tasks**. This displays the **Discovery Tasks** screen, which shows a list of all discovery tasks currently defined in your system.

Figure 17: Discovery Tasks List Screen



2. To clone a discovery task, click on the required task in the list to select it and click **Clone**. The **Add Discovery Task** screen will be displayed with the details of your selected task pre-populated.

Figure 18: Add Discovery Task Screen for Cloning



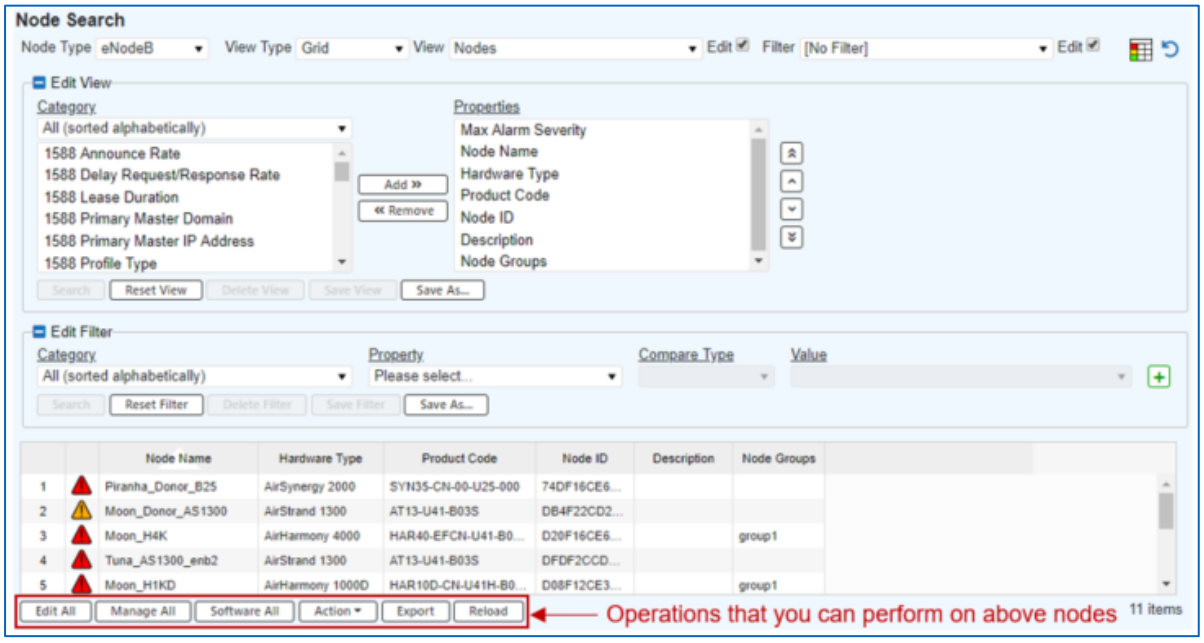
3. Change the parameters of the task as required to create your new task. Refer Table 7 for further information about the values you can enter.
4. If you want to test your new discovery task, click **Test** in the **Discovery Test** panel. The results of your test will be displayed on the screen.
5. Click **OK** to commit your changes and return to the Discovery Tasks list screen.

3.7 Node Search

Through multiple orders of filtering, the *Node Search* feature enables you to reduce the list of nodes to just those you are interested in. The list of nodes is automatically filtered based on your selected criteria.

You can use this feature to edit, manage, upgrade the software, export, or reload the filtered list of nodes as a batch. For detailed instructions on how to perform node search effectively, see Performing Node Search.

Figure 19: Filtered List of Nodes – Edit All, Manage All, Software All, Export, Reload



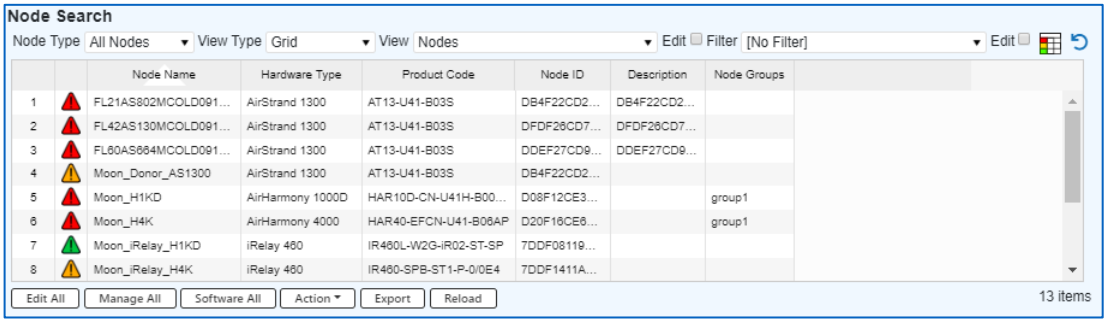
3.7.1 Performing Node Search

This section explains how to perform some of the most intuitive tasks to enhance your node search and to filter a list of nodes configured in your network.

To search for specific nodes operating on your network:

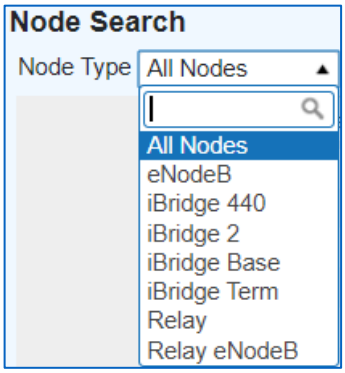
1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node Search**. This displays the **Node Search** page.

Figure 20: Node Search Screen



2. Select the **Node Type** drop-down list to display all the available node types deployed in your network. From this list, select the appropriate node type that you want your search to return. Figure 21 shows the expanded view of the **Node Type** drop-down list.

Figure 21: Selecting the Node Type



3. The **View Type** drop-down list gives you the options to view the data in either tabular or graphical format by setting it to **Grid** or **Chart**, respectively. In either case, you have the option to use multiple filter features. The default **View Type** is **Grid**.

Figure 22: Selecting the View Type

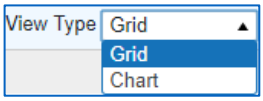


Figure 23 shows an example node search where the **View Type** is **Grid**.

Figure 23: Node Search Screen – Tabular Format

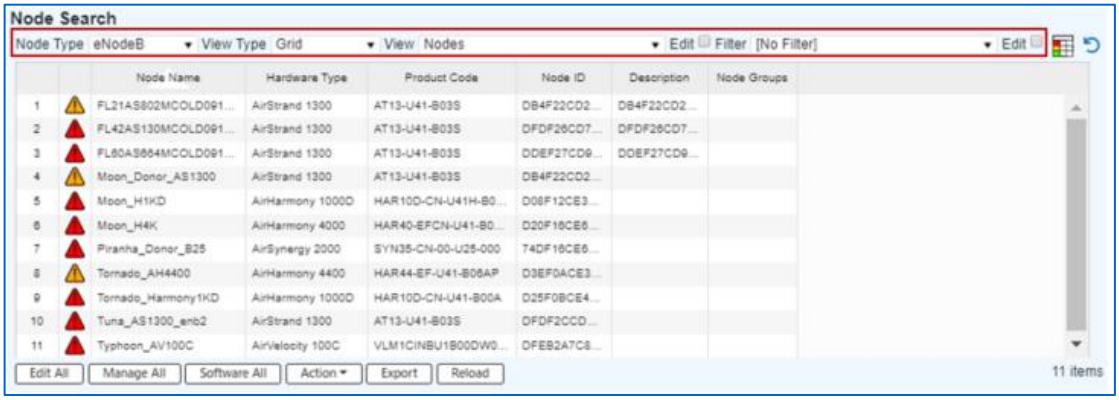
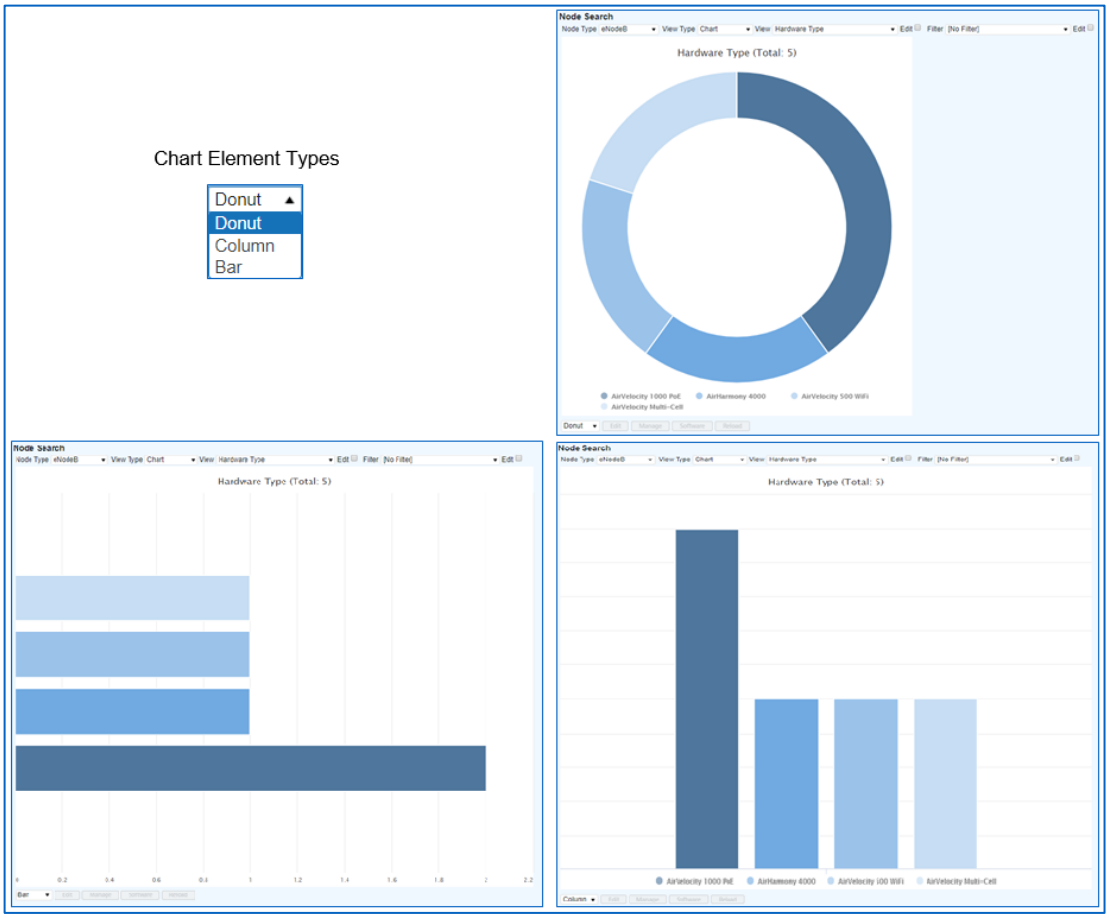


Figure 24 shows an example node search where the **View Type** is **Chart**. When the **View Type** is set to **Chart**, you can find the chart element drop-down list in the bottom left corner of the **Node Search** page.

You can see your chart rendered in the **Donut**, **Column,** or **Bar** format by making the appropriate chart element selection. The display is automatically updated each time you select a different chart element.

Figure 24: Node Search Screen – Graphical Format

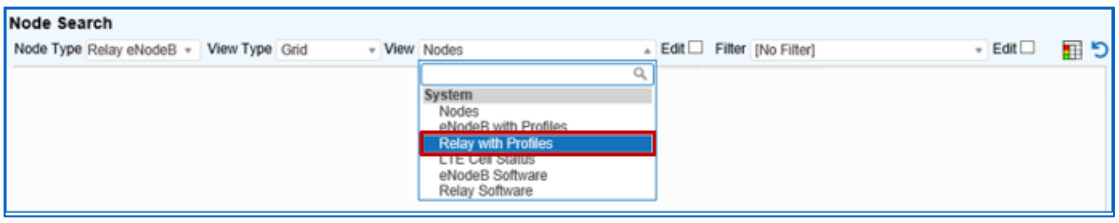


4. To limit your node search to a specific **System**, **User,** or **Global** property, select an appropriate entry from the **View** drop-down list.

   You cannot modify and save a *System* view, but you can save the modified *System* view as a *User* or as a *Global* view for future use. For more information on how to create a *User* or *Global* view, see Table 8.

   Netspan retains the node type and filtering criteria when switching between view types.

Figure 25: Selecting a View



To refine your search further and to narrow down your results, select the **Edit** checkbox next to the **View** drop-down list. The **Edit View** uses *industry standard* mechanisms to add and remove properties from a filter list. You can modify the **Edit View** by adding or removing properties from the available categories. The **Edit View** panel also contains options to search, reset, delete or save a view. For more information on these actions, see Table 8.

Node search view provides a method to generate a subset of the actual available data. By creating several node search views, you can produce many subsets of data from the same information source.

Figure 26: Node Search – Edit View

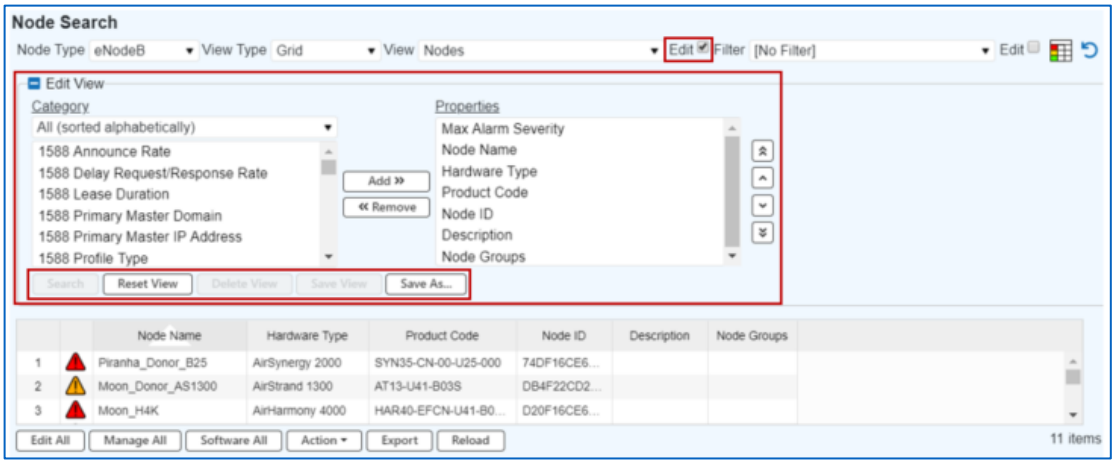
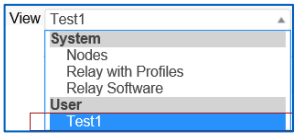
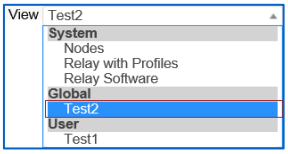


Table 8. Edit View Properties

Property	Description
Category	Lists the properties that are associated with the selected category. **Note:** You can alphabetically sort the pre-populated categories by selecting **All (sorted alphabetically)** from the **Category** drop-down list.
Properties	Lists the properties that are populated in the search result grid or chart. **Note:** • If the **View Type** is **Chart**, the maximum number of entries you can add to the **Properties** list is **three**. • The order of the properties in your search result depends on the sequence of the entries in this list.
Add	Adds entries from the **Category** list to the **Properties** list. It allows you to customize your view by adding the node properties that you want to include in your search result. **Procedure:** a. Click to select the entries that you want to add to the **Properties** list. **Tip:** Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. b. Click **Add**. The selected properties are now added to the **Properties** list.
Remove	Removes entries from the **Properties** list. It allows you to customize your view by removing the node properties that you do not want to include in your search result. **Procedure:** a. Click to select the entries that you want to remove from the **Properties** list.

Property	Description
	Tip: Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. b. Click **Remove**. The selected properties are now removed from the **Properties** list.
Move to Top ()	Moves the property to the top of the **Properties** list.
Move Up ()	Moves the property above the preceding item in the **Properties** list.
Move Down ()	Moves the property below the succeeding item in the **Properties** list.
Move to Bottom ()	Moves the property to the bottom of the **Properties** list.
Search	Displays the updated view of the search result. This button is enabled only when the **Edit View** is modified.
Reset View	Resets the search to the original view.
Delete View	Deletes the selected view. **Note:** • You cannot delete a *System* view. • This button is enabled only when a user-defined view is selected. • To delete a *Global* view, you need administrator privileges.
Save View	Saves the changes that you made to the selected view. **Note:** • This button is enabled only when a user-defined view is selected. • You cannot save changes made to a *System* view. If the selected view is from the *System* category, this button is greyed out. However, you can save the modified *System* view as a *User* or *Global* view. • You can save the changes made to a selected *Global* view only if you are a user with administrator privileges.
Save As	Saves the selected view. Netspan allows you to save a specific view for future use. This option allows you to save the customized information and set it as a *User* or *Global* view. **Procedure:** a. After customizing your **Properties** list (by adding or removing properties for a selected category), click **Save As**. b. In the **Save As** box, specify a name for the view that you are creating.

Property	Description
	c. Click **Save** or **Save Global** depending on what view you want to create. For more information, see the description in the **Save As > Save** and **Save As > Save Global** fields in this table. **Note:** • You need administrator privileges to save your preferences as a *Global* view. • The name of a view should be unique. • The saved *User* views appear in the **View** drop-down list under the **User** category. For example, **Test 1** is a user-defined view. 
Save As > Save	Completes the **Save As** action. **Note:** This button appears only when you select **Save As.**
Save As > Save Global	Creates a *Global* view that is visible to all users. Use this option when you want to share a view with other users, for example, a view that is useful for the entire organization. You need administrator privileges to create, delete, or modify a *Global* view. **Note:** • The saved Global views appear in the **View** drop-down list under the **Global** category.  • This button appears only when you select **Save As**.
Cancel Save	Cancels the save action. **Note:** This button appears only when you select **Save As.**

You can enhance your node search based on your requirement by making an appropriate selection from the **Filter** drop-down list. To further refine your search process, select the **Edit** checkbox next to the **Filter** drop-down list.

The **Edit Filter** panel also contains options to search, reset, delete or save a filter. For more information on these actions, see Table 9.

Figure 27: Node Search – Edit Filter

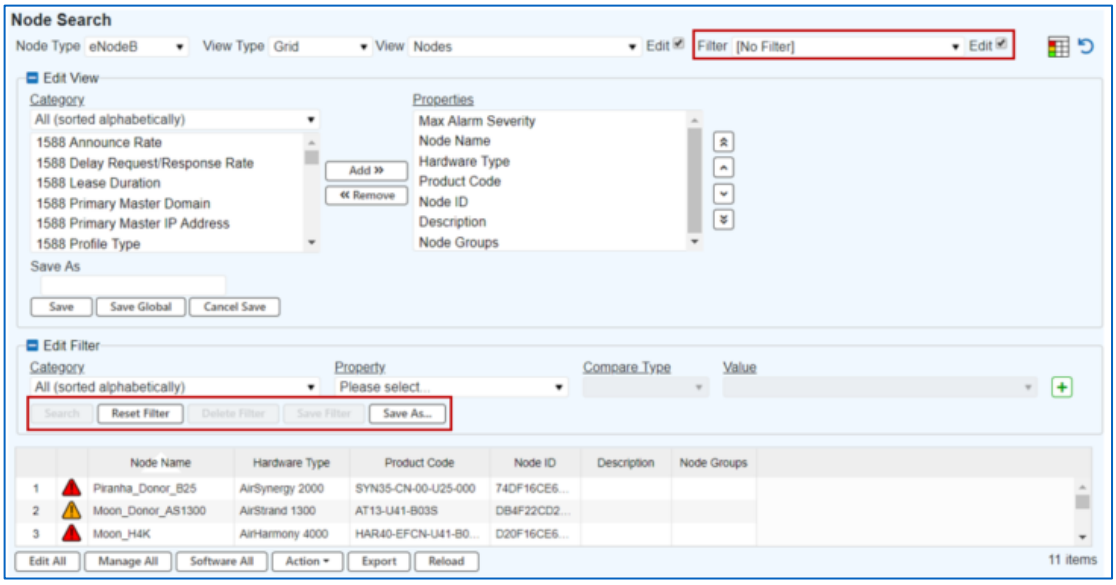


Table 9. Edit Filter Properties

Property	Description
Category	Specifies the property based on which you want to sort your search. **Note:** You can alphabetically sort the pre-populated categories by selecting **All (sorted alphabetically)** from the **Category** drop-down list.
Property	A list of properties associated with the selected category.
Compare Type	Enhances the filter criteria by offering the ability to select specific parameter values. For more information on compare types and their significance, see Table 10.
Value	A pre-populated list of values that are valid for the selected property.
	Clones the filter item. Use this option to add subsequent filters and refine the previous filters.
	Deletes the filter item.

3.7.2 Filter Compare Types

When you select the **Edit Filter** option, you can select a property to filter by, a compare type, and a value.

Compare types enhance the search process by offering the ability to select specific parameter values. Depending on what comparison you want to perform, select the compare type. Each compare type has a unique function that is designed to make your node search simple, easy, and effective.

Before using a compare type, it is important to understand its purpose.

Figure 28: Available Compare Types

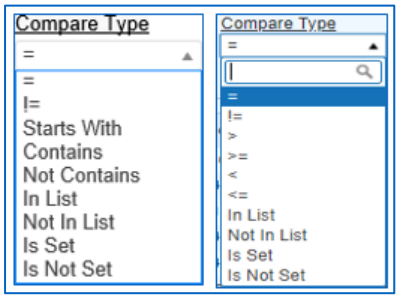


Table 10. Compare Type Function

Compare Type	Function
=	Returns a list of nodes where the selected property matches the set value.
!=	Returns a list of nodes where the selected property does not match the set value.
>	Returns a list of nodes where the selected property is greater than the set value.
>=	Returns a list of nodes where the selected property is greater than or equal to the set value.
<	Returns a list of nodes where the selected property is smaller than the set value.
<=	Returns a list of nodes where the selected property is smaller than or equal to the set value.
Starts with	Returns a list of nodes where the selected property starts with the substring that you specified in the **Value** field.
Contains	Returns the details of the nodes where the selected property contains the substring that you specified in the **Value** field.
Not Contains	Returns the details of the nodes where the selected property does not contain the substring that you specified in the **Value** field.
In List	Returns the details of the nodes where the selected property matches the values that you selected/typed/pasted using the **Set List** option. **Tip:** Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. **Note:** Instead of selecting the items, if you want to type or paste a list of values, after selecting the **Set List** button, click the **Advanced** button. This opens a new window where you can type or paste your items. When you are in the **Advanced** mode, click the **Basic** button to revert to the **Basic** mode.
Not in List	Returns the details of the nodes where the selected property does not match the values that you selected/typed/pasted using the **Set List** option. **Tip:** Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. **Note:** Instead of selecting the items, if you want to type or paste a list of values, after selecting the **Set List** button, click the **Advanced** button. This opens a new window where you can type or paste your items. When you are in the **Advanced** mode, click the **Basic** button to revert to the **Basic** mode.
Is Set	Returns the details of the nodes where the selected property is defined or set.
Is Not Set	Returns the details of the nodes where the selected property is not defined or set.

The list of applicable compare types varies depending on the selected **Category** and **Property**. For more information, see the following examples.

Examples:

Figure 29 shows the list of applicable compare types and values when **Category** = **Node** and **Property** = **Max Alarm Severity**.

Figure 29: Example 1 – Applicable Compare Types

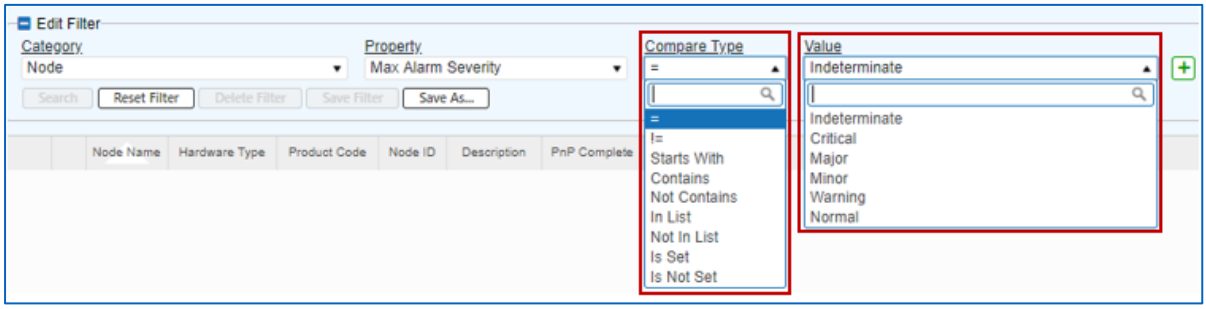
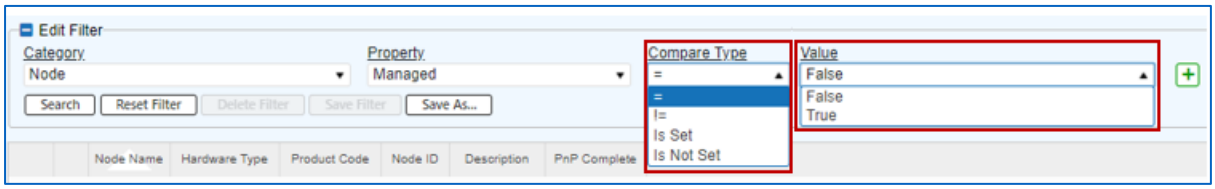


Figure 30 shows the list of applicable compare types and values when **Category** = **Node** and **Property** = **Managed**.

Figure 30: Example 2 – Applicable Compare Types

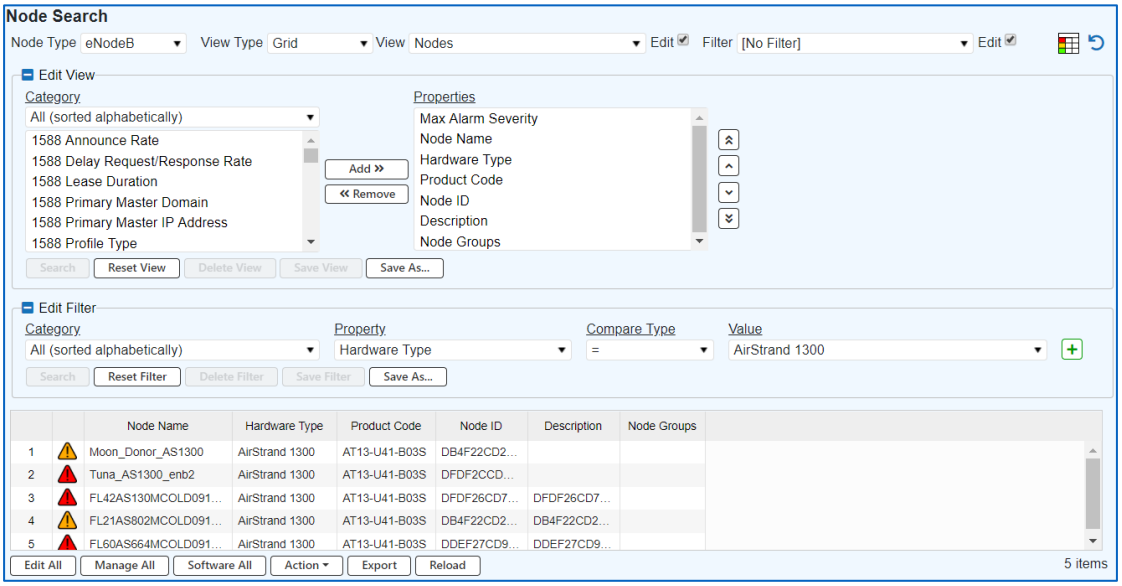


3.7.3 Node Search Examples

This section lists some scenarios where you can use this feature to make your node search simple and easy.

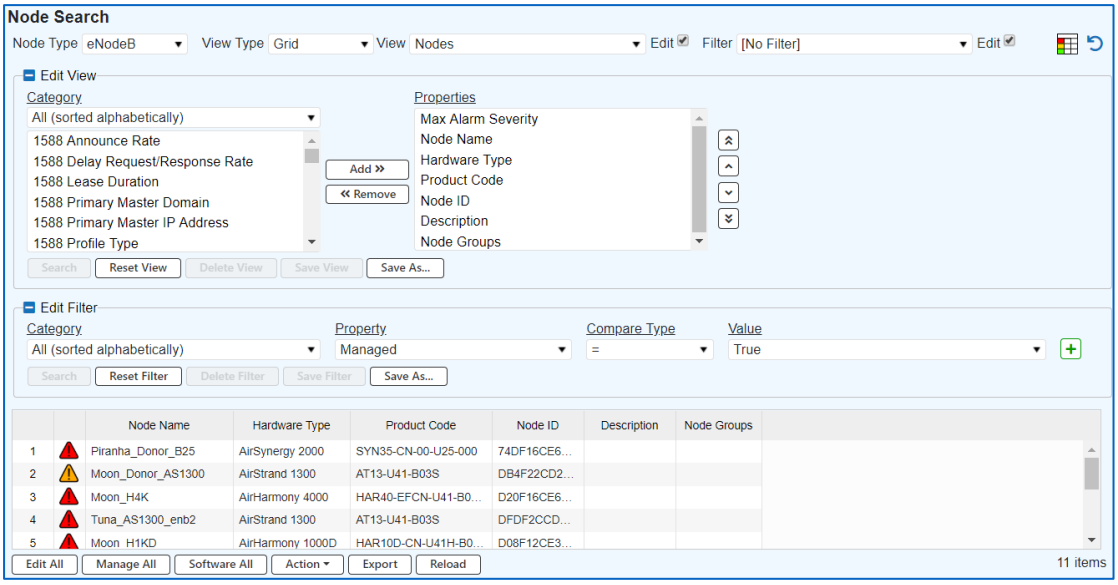
- **Case 1:** To find all eNodeB that have hardware type as AirStrand 1300.

Figure 31: Node Search – Case 1



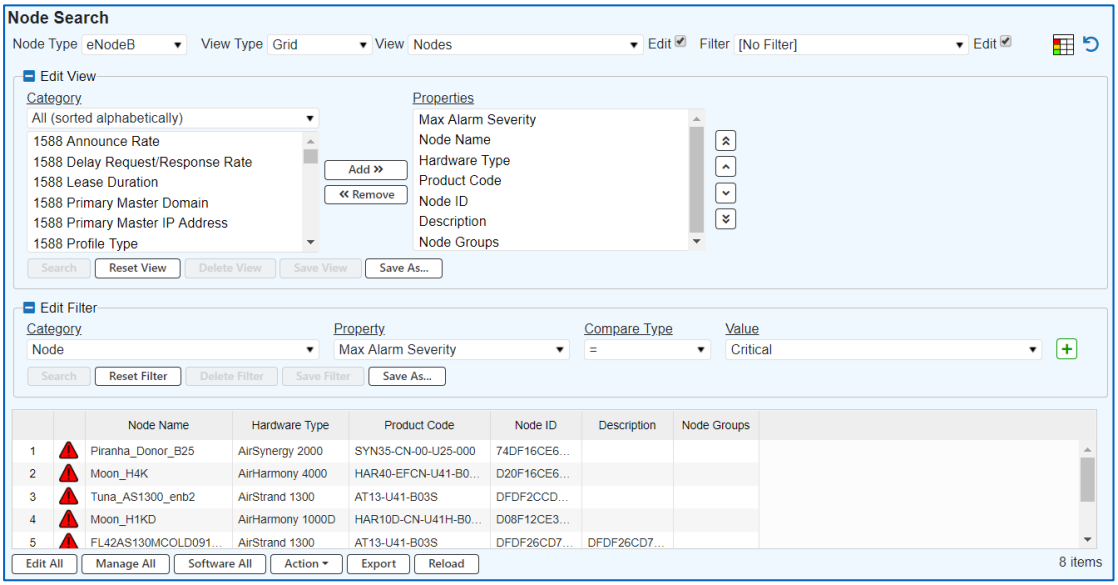
- **Case 2:** To find all eNodeBs that are Managed.

Figure 32: Node Search – Case 2



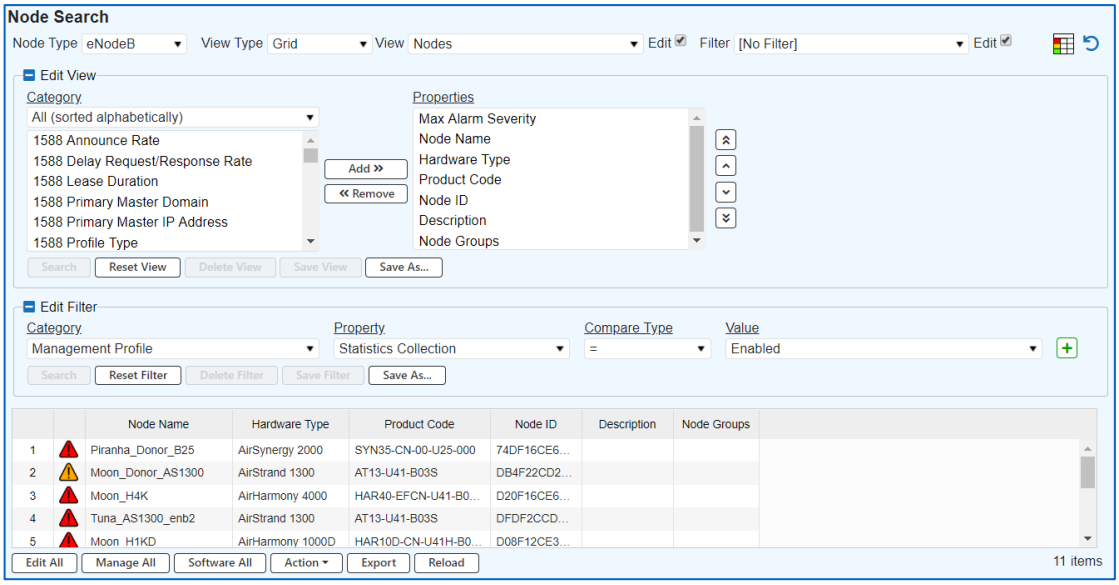
- **Case 3:** To find all the nodes whose Max Alarm Severity is Critical.

Figure 33: Node Search – Case 3



- **Case 4:** To find Management Profile whose Statistics Collection is Enabled.

Figure 34: Node Search – Case 4

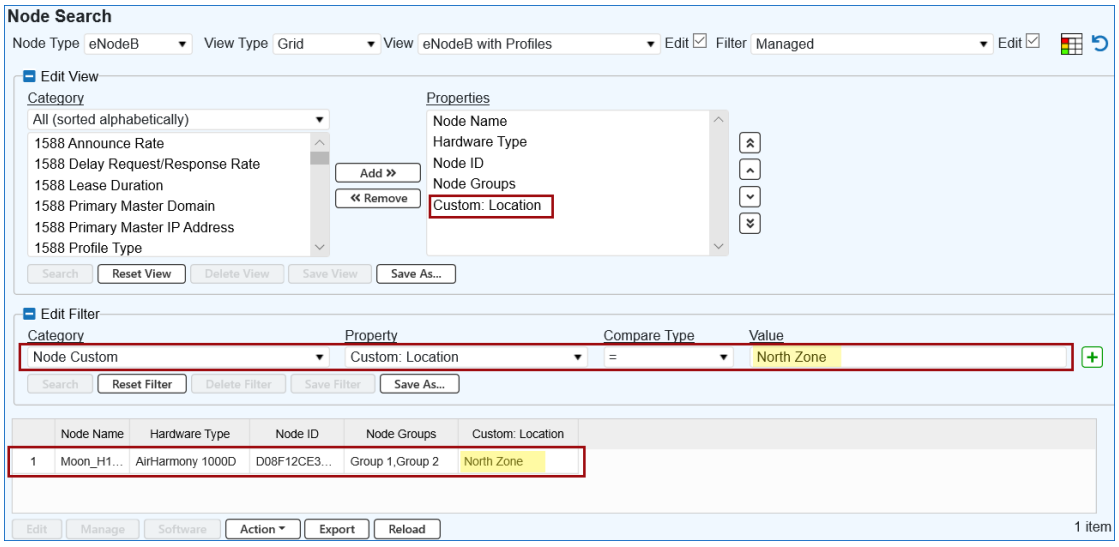


- **Case 5:** To find all nodes that have the specified custom property added to the **Node Properties** panel of the **Node Provision** page.

  For guidance on how to add custom node properties, see the *Netspan Administration Guide (ARD-D01018)*.

  Perform node search to filter out the nodes with the specified custom property value.

Figure 35: Searching for the Nodes with the Specified Custom Property Value

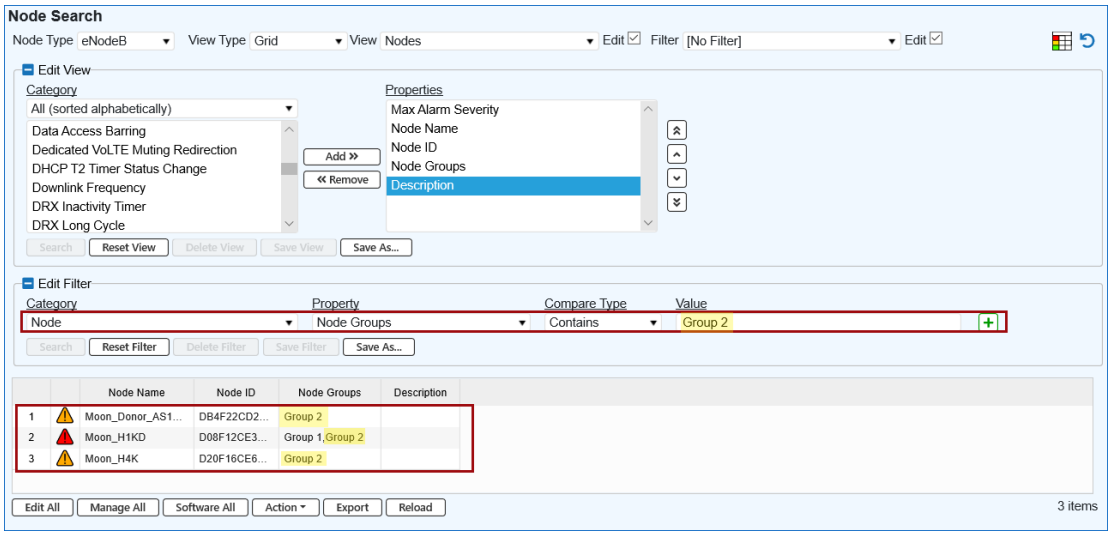


- **Case 6:** To find all nodes that belong to a specific node group.

  For guidance on node groups, see the *Netspan Administration Guide (ARD-D01018)*.

  Perform node search to filter out the nodes with the specified node group name.

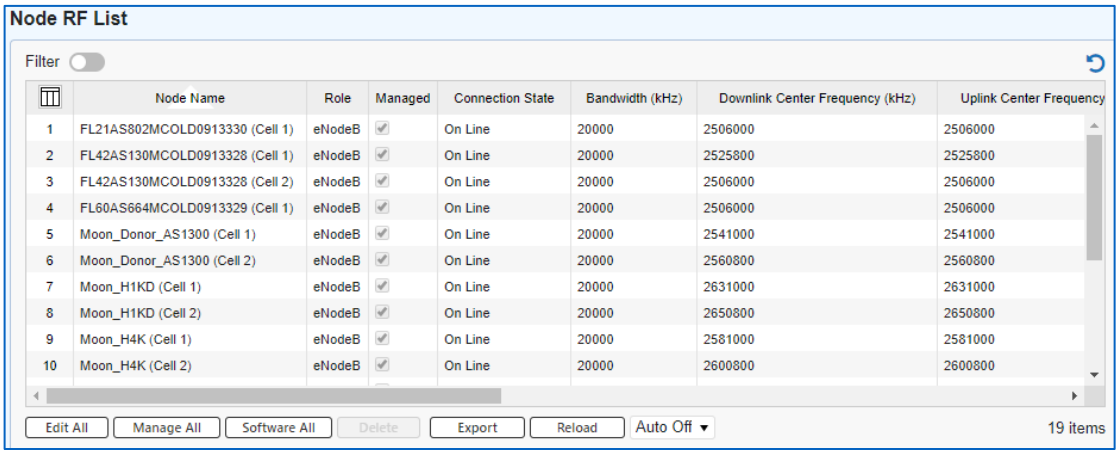
Figure 36: Searching for the Nodes Belonging to a Specific Node Group



3.8 Node RF

1. On the main Netspan menu, choose **Configuration Management** > **Node > Node RF**. This displays the **Node RF** screen, which shows a list of nodes.

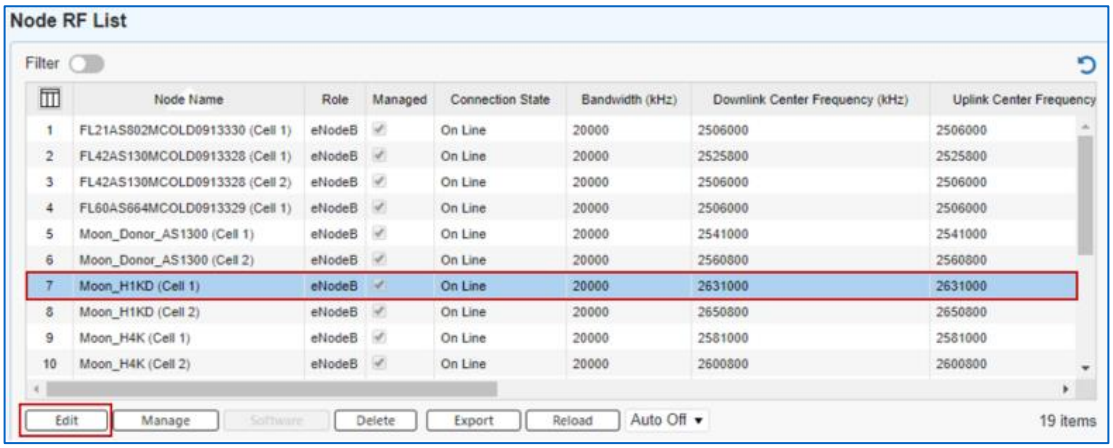
Figure 37: Node RF List



3.8.1 Editing a Node

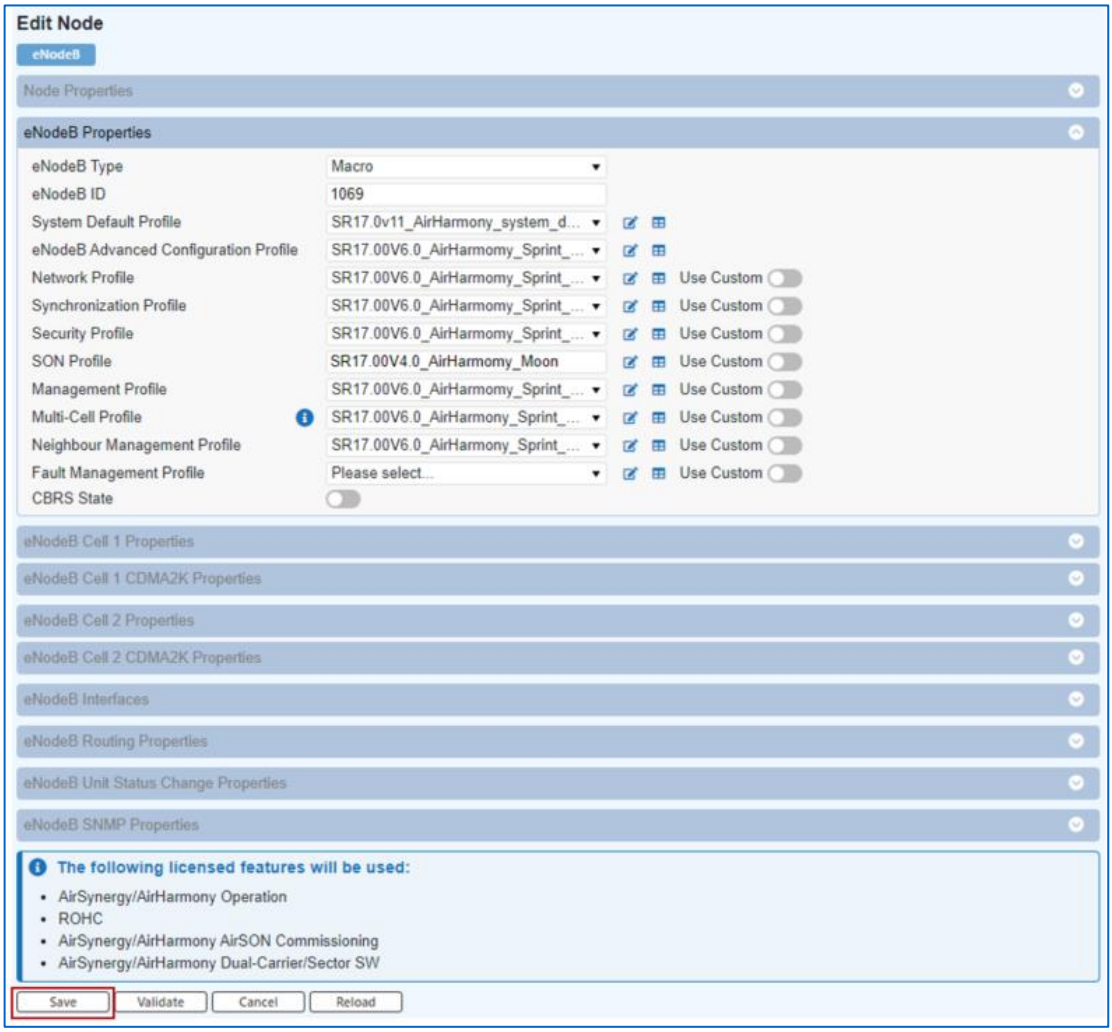
1. Select the node that you want to edit and click **Edit**.

Figure 38: Edit Node Screen



2. The **Edit Node** screen will be displayed. Make the changes and click **Save**.

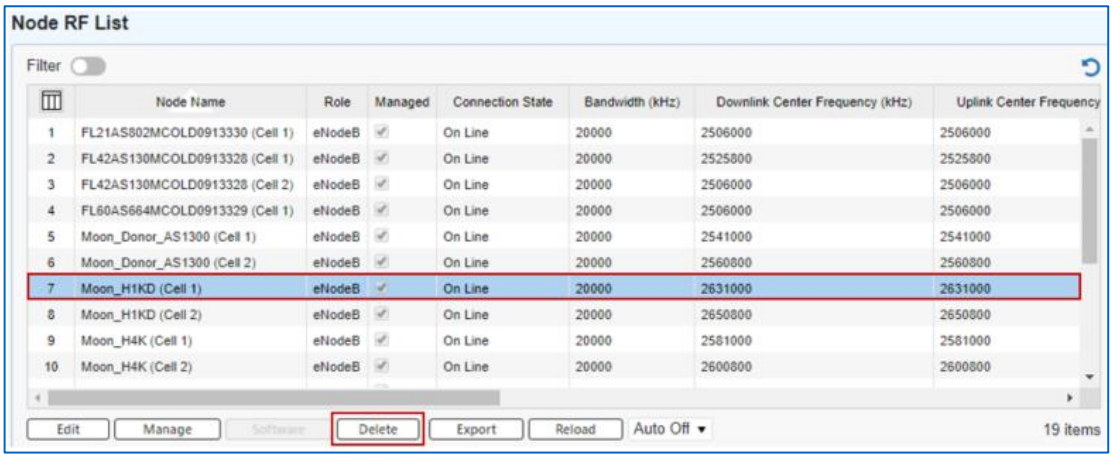
Figure 39: Edit Node Screen



3.8.2 Deleting a Node

1. Select the node that you want to delete and click **Delete**.

Figure 40: Deleting a Node



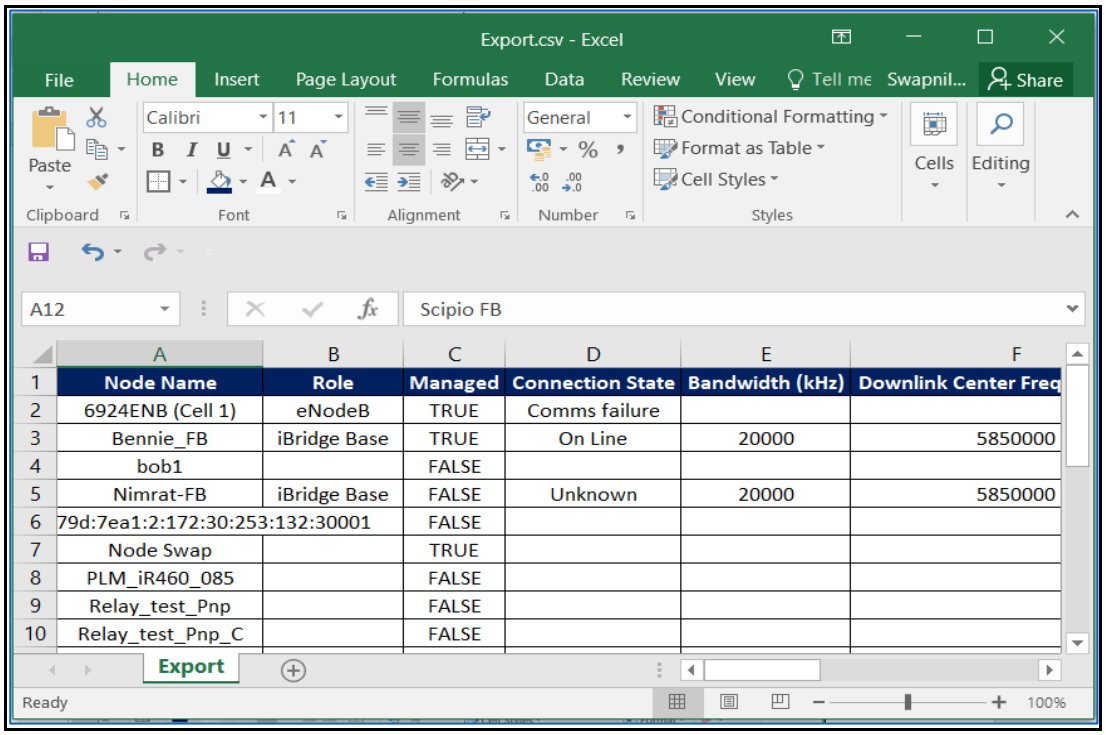
3.8.3 Exporting Nodes in Excel File

1. Click **Export** to export the nodes held in Netspan's database. Your browser will show a message asking whether you want to open or save Export.csv, the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 41: Export Excel File Message

2. If you choose **Open**, your machine will launch Excel and will display the exported file with details.

Figure 42: Excel File View



3. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 43: Export Confirmation Message

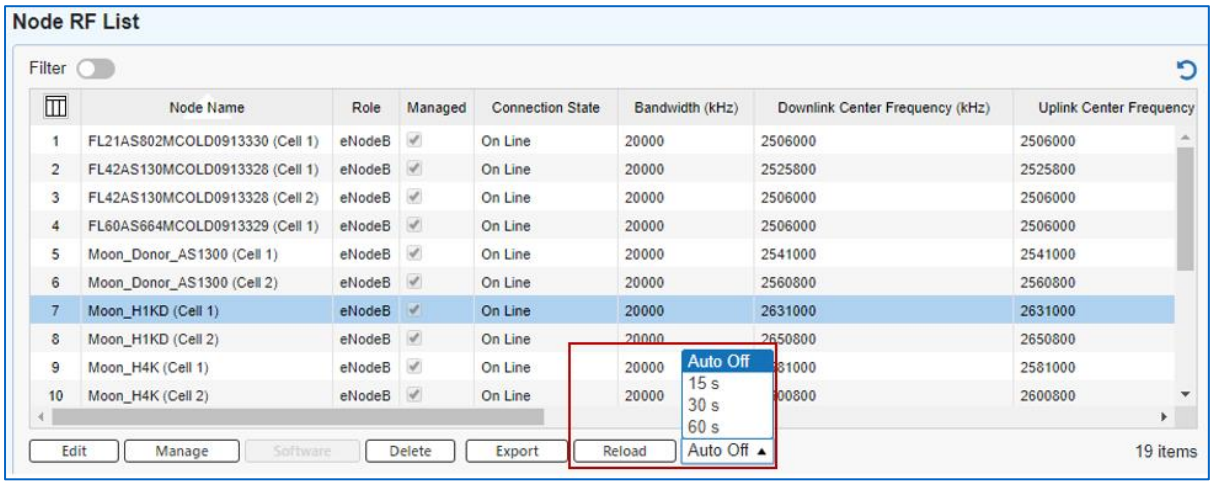
3.8.4 Reloading a Page

Clicking the **Reload** button on an active page prompts Netspan to retrieve real-time information from the node and update data on that page.

Note: The process for opening or saving the file is the same for **Export View** and **Export All**.

To refresh a page, click the **Reload** button.

Figure 44: Page Reload Options

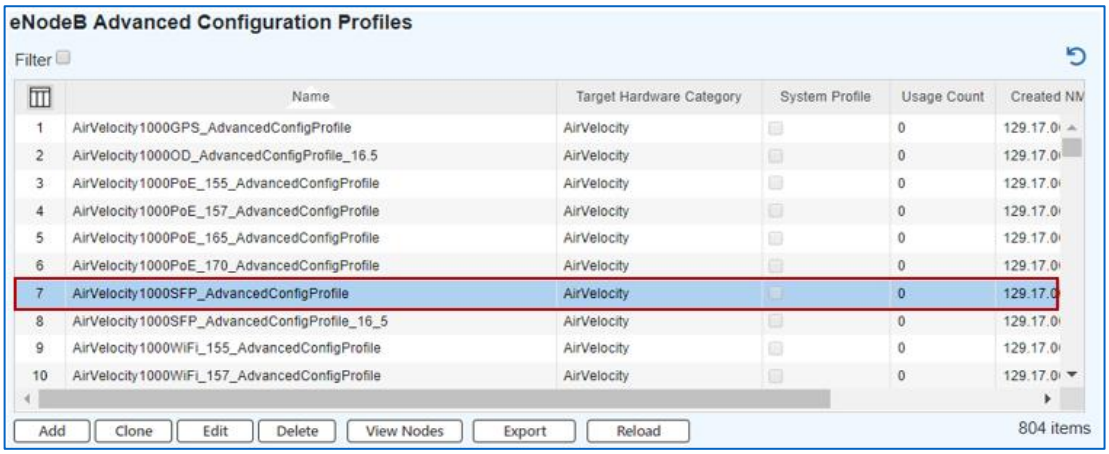


Tip: To enable automatic reload, select 15 s, 30 s, or 60 s from the drop-down list next to the **Reload** button.

3.9 Node Usage Count

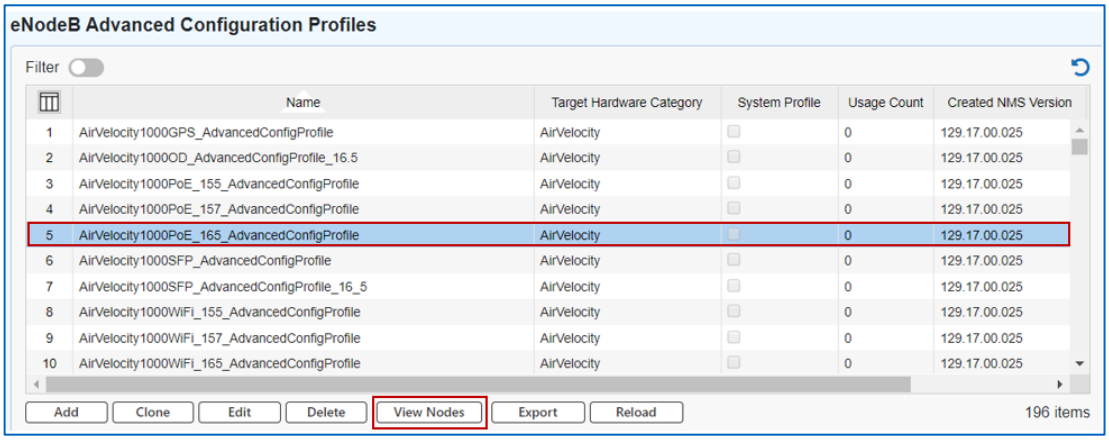
1. Go to **Node Profiles** and select the profile for which you want to view the nodes.

Figure 45: Selecting Profile



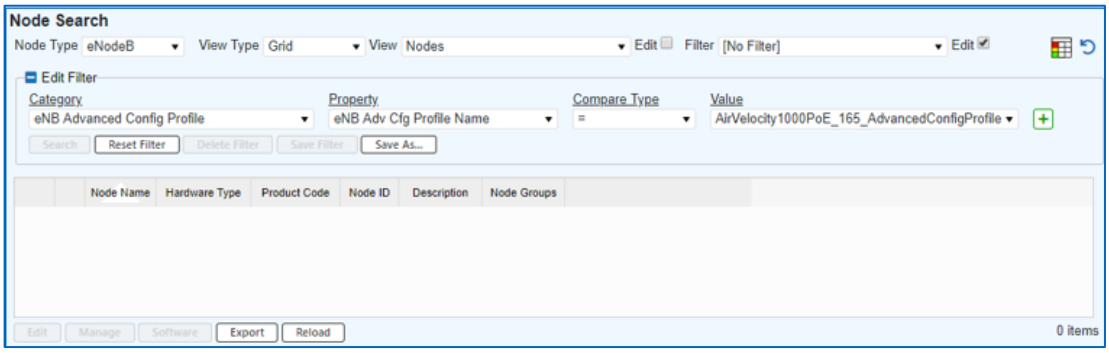
2. Click **View Nodes** to see the nodes using this profile.

Figure 46: Viewing Nodes



3. Netspan will redirect to **Node Search** page and will display all the nodes using this profile.

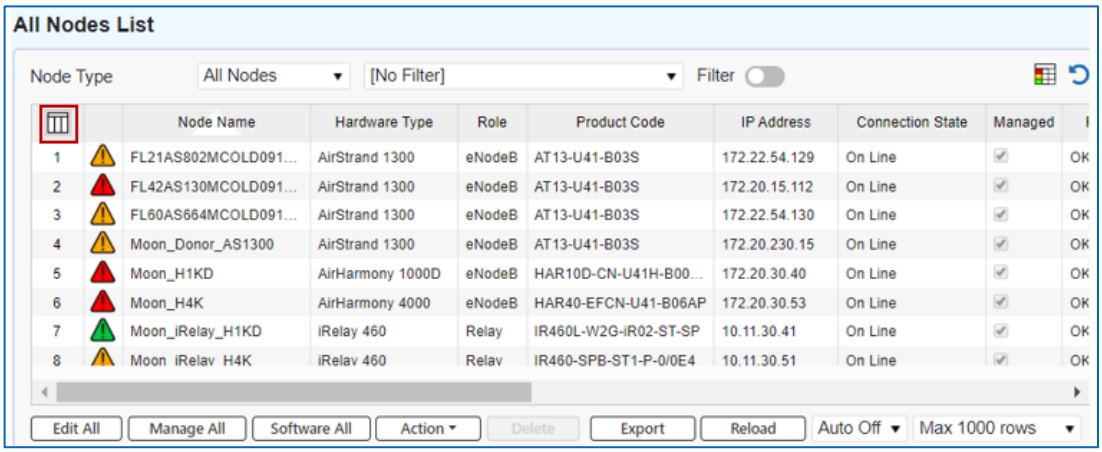
Figure 47: Node Search Page



3.10 Column View Editor

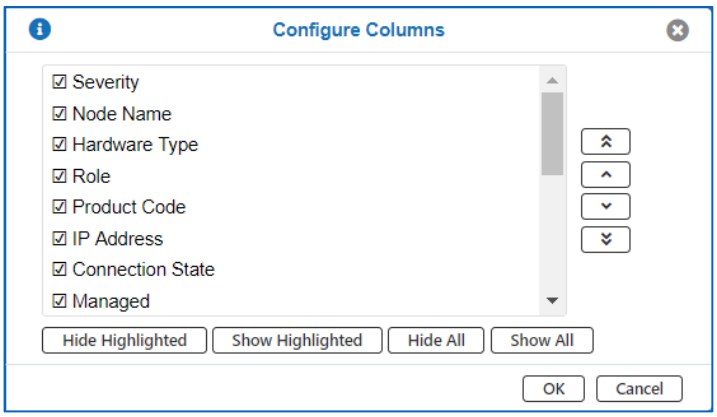
1. A view editor has been added to customize the column names user wants to view. Click on Configure Columns as shown below.

Figure 48: eNodeB List



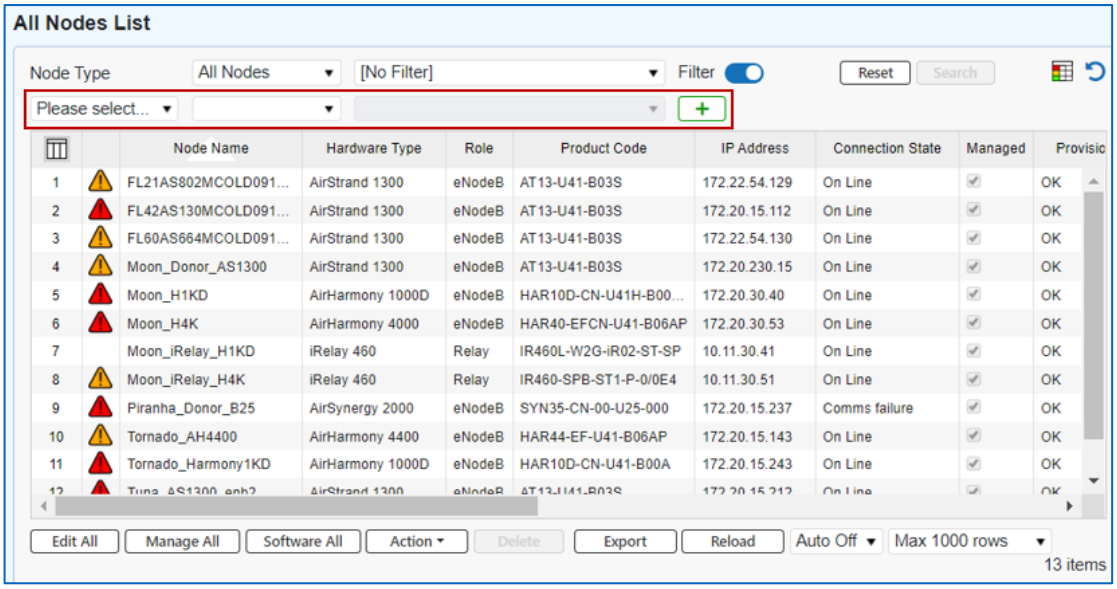
2. After clicking on Configure Columns, a popup screen will be displayed to customize fields for viewing.

Figure 49: Configure Columns



3. Additionally, the node list page has been enhanced with the filter feature that allows the user to search a node by using different filter conditions. Click **Filter** checkbox to view this feature.

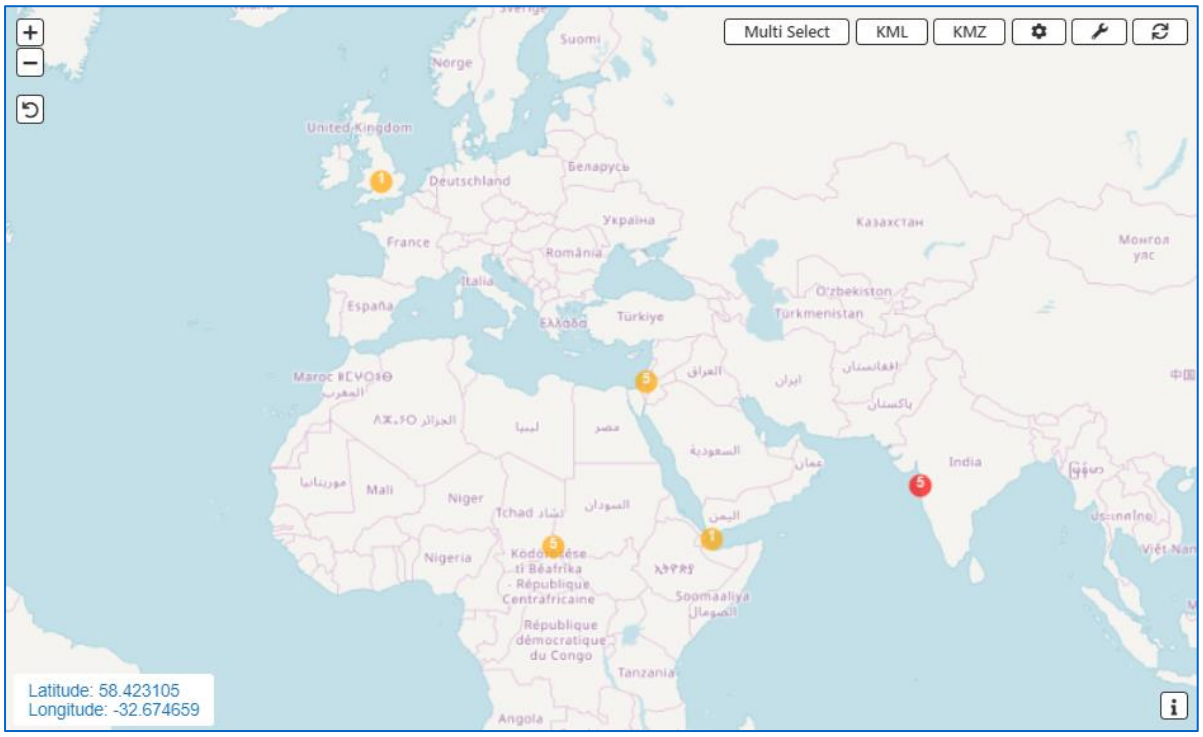
Figure 50: Node Filter Feature



3.11 Node Map

The node map provides a visual representation of the location of the nodes on a map. To view the node map, from the Netspan main menu, select **Configuration Management** > **Node** > **Node Map**.

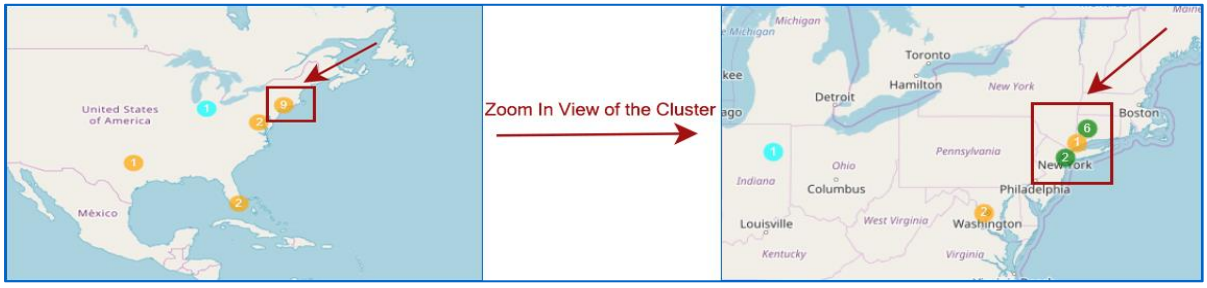
Figure 51: Node Map



When the nodes are very close to each other, they cluster into one map point. The number on a cluster indicates how many nodes it contains.

When you zoom into any of the cluster locations, the number on the cluster decreases and you begin to see individual nodes on the map. Zooming out of the map consolidates nodes into clusters again.

Figure 52: Node Clusters



The colour of a cluster is taken from the colour of the highest alarm severity for the nodes within that cluster.

3.11.1 Map Navigation

You can use the mouse or keyboard for panning and zooming the node map. The node map supports the following actions:

Using your mouse:

- Wheel the mouse forward to zoom in.
- Wheel the mouse backward to zoom out.

- Drag the mouse to move around.
- Shift + drag the mouse to zoom in to a specific area on your map.
- Double-click to zoom in.

Using your keyboard:

- Use the arrow keys to move around.
- Use 'Ctrl' + '+' key to zoom in.
- Use 'Ctrl' + '–' key to zoom out.

3.11.2 Zoom In and Zoom Out

Netspan allows you to reduce or enlarge the node map view. At the top left corner of the **Alarm Map** page:

- Click + to get a closer look at the nodes and links.
- Click – to zoom out and cover more area.

To increase or decrease the zoom value, keep clicking the **Zoom In** or **Zoom Out** button until you obtain the expected zoom level.

3.11.3 Fit to Extent

It sets the zoom and location of the map to accommodate all nodes. It gives you the ability to keep the map extent constant. To fit to extent, click the icon on your map.

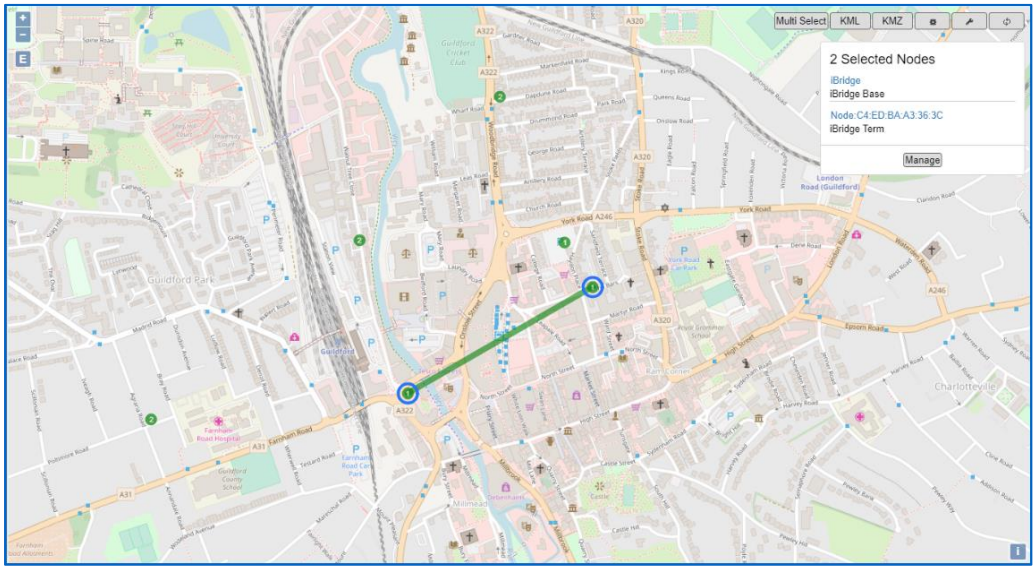
3.11.4 Saving Your Custom Map View

The node map saves any custom map settings you made before navigating to a different page or logging out from Netspan. When you reopen the node map, Netspan automatically applies your custom map settings that were in use when you last viewed the node map.

3.11.5 Internode Link Status

For node types where Netspan supports internode link status (for example, iBridge products with a base and a terminal) the map displays the links with a colour reflecting the link status.

Figure 53: Node Map – Internode Link Status



3.11.6 Selecting Nodes

The node map feature provides you an alternative to select multiple nodes and manage them easily, rather than doing it from the **All Nodes List** (**Configuration Management** > **Node** > **Node**). Compared to the standard way of selecting nodes from the **All Nodes List**, this advanced functionality can be more useful in situations where you want to select nodes from a specific location.

Note: Airspan recommends to use this feature to perform location-based node services.

Note: When you select a cluster, all nodes in that cluster are selected.

To select multiple nodes from the node map and manage them, you can use one of the following methods:

Method 1:

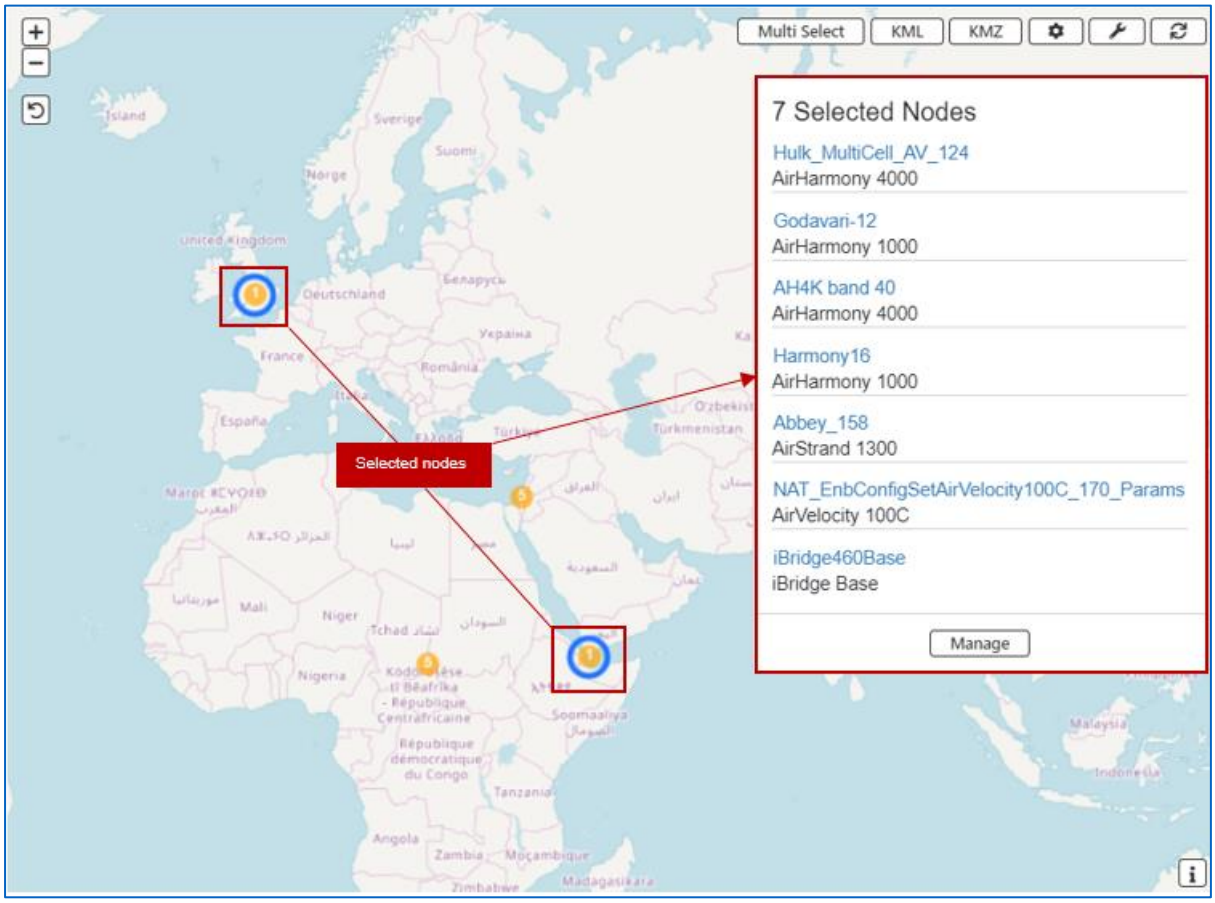
This method is ideal when you want to select specific nodes in a location. For example, you might want to exclude some nodes, but select others that are in the same location.

Table 11. Cursor Actions – Single Select

Purpose	Action
To select a single node or cluster	Click the node or cluster you want to select. A selected node/cluster is marked with a blue circle.
To select multiple nodes or clusters	Click to select one node or cluster first, and then **Ctrl-click** to select each additional node/cluster you want to select.
To clear the entire selection	Click anywhere on the map to deselect all selected nodes or clusters.
To deselect a node or cluster from the selection	**Ctrl-click** the node or cluster you want to deselect. This action allows you to deselect a node/cluster without disturbing the selection made to other nodes or clusters.

The **Selected Nodes** pop-up window appears automatically when at least one node or cluster is selected. This window contains the details of the selected nodes.

Figure 54: Selected Nodes



Method 2:

This method is optimal for situations where you want to select a collection of nodes or clusters in a location.

1. At the top right corner of the **Node Map** page, select **Multi Select**.

   Note: Adjust the zoom level to see the nodes or clusters you want to select.

2. When you select the Multi Select option on the map, to enhance affordance and usability, the mouse pointer changes to a hand cursor ( ).

3. Use this hand cursor to draw a polygon or an enclosed shape (with all the sides connected up) surrounding the nodes and clusters that you want to select.

Figure 55: Selecting Multiple Nodes – Example 1

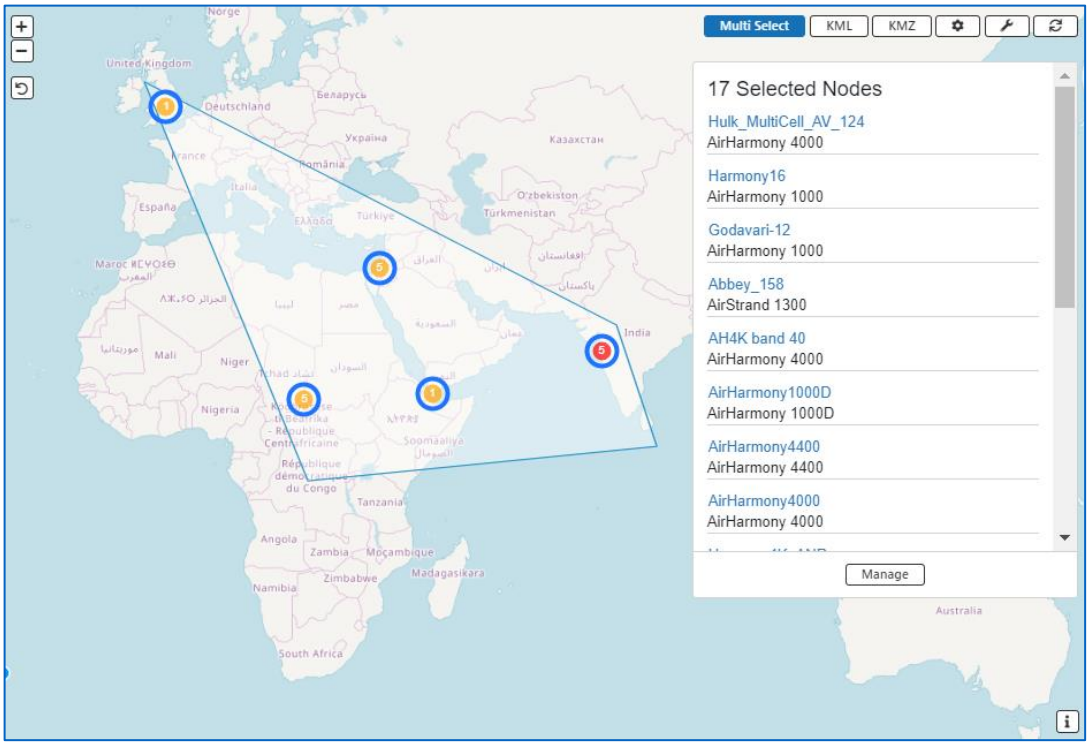
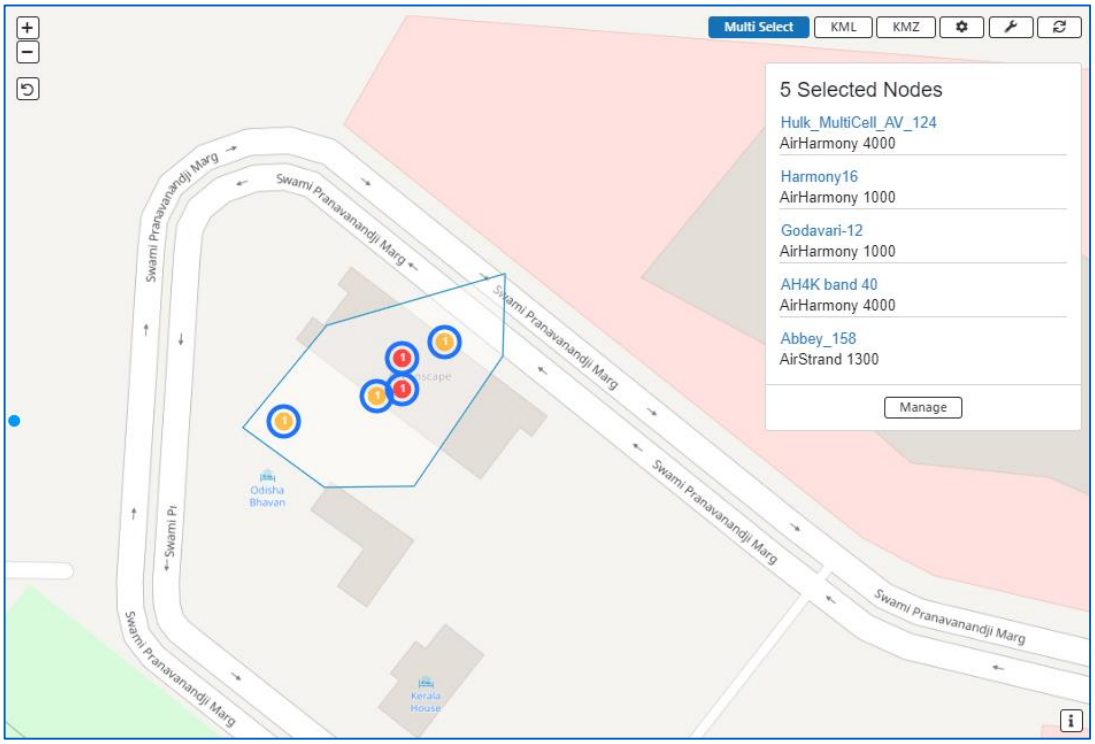


Figure 56: Selecting Multiple Nodes – Example 2



4. Perform the actions in Table 12 to make a polygon or an enclosed shape surrounding the nodes and clusters that you want to select.

Table 12. Cursor Actions – Multi Select

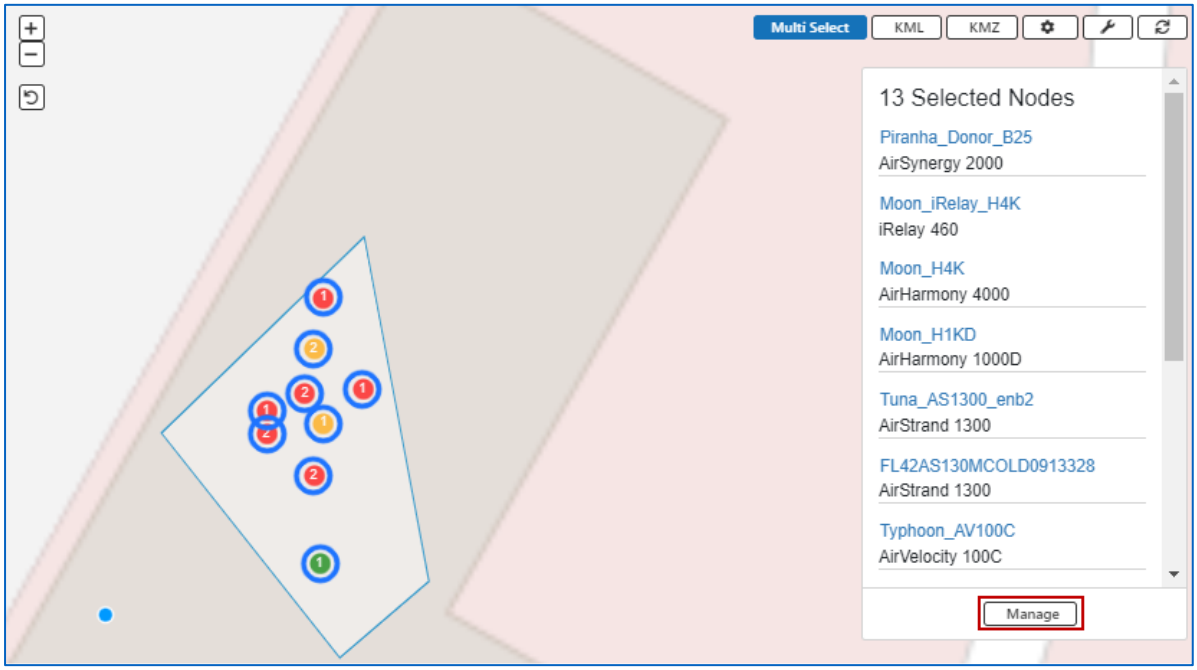
Action	Result
Single-click	Extends the selection area.
Double-click	Ends drawing the area and selects all nodes and clusters in it.
Ctrl-click + drag	Draws a frame to define an irregular area and selects the nodes and clusters within it. **Tip:** To resize the area and make alterations, single-click and drag the borders of the shape in the desired direction.

The selected nodes and clusters within the shape are marked with a blue circle. When you finish creating a polygon or drawing an irregular area, the **Selected Nodes** pop-up window appears. It contains the details of the selected nodes.

3.11.7 Managing Multiple Nodes Using Node Map

After selecting the nodes (see Selecting Nodes), click **Manage** at the bottom of the **Selected Nodes** pop-up window.

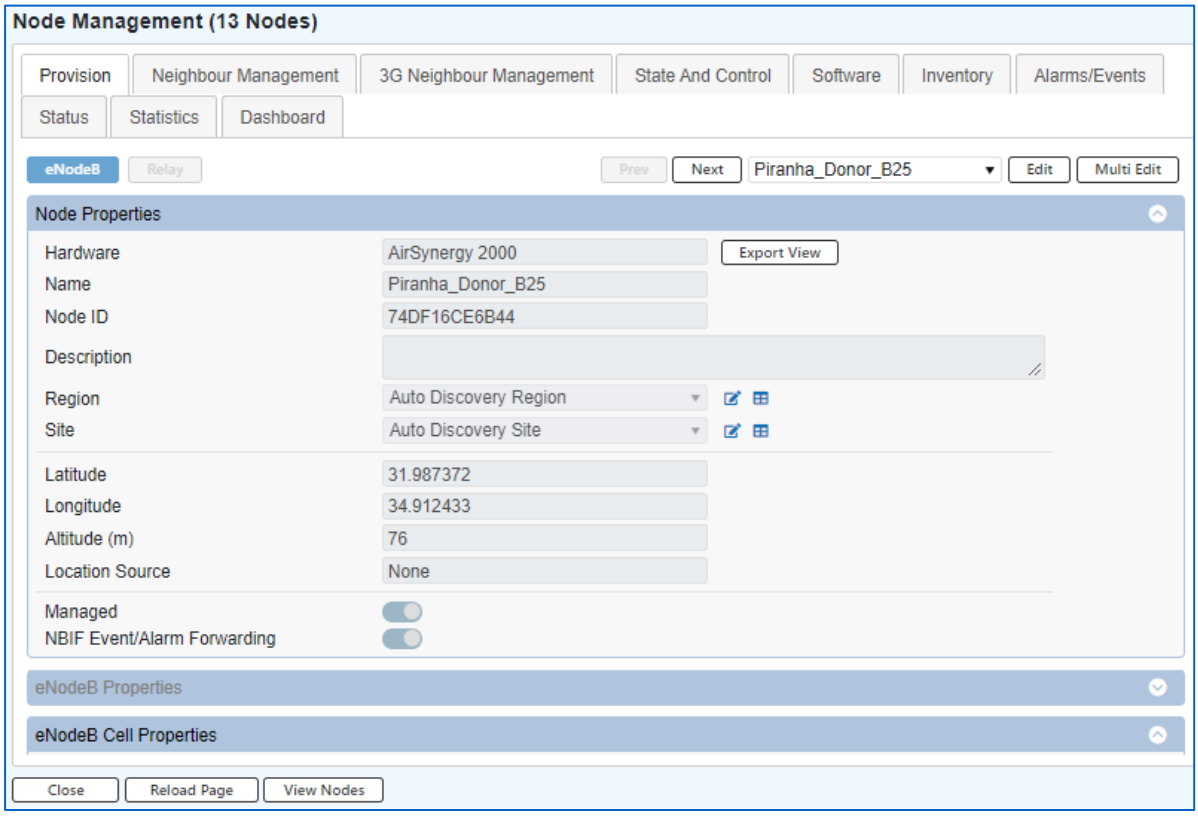
Figure 57: Manage Nodes Option



This action takes you to the **Multiple Node Management** page, which allows you to perform various management actions (for example, view alarms and events list, view status information and so on) on the selected nodes.

Figure 58 shows the **Node Management** page with various node management tabs that you can use for managing multiple nodes that you selected (see Figure 57) using the **Netspan Node Map** feature.

Figure 58: Multiple Node Management Page (Example)



3.11.8 Exporting Map View to External Maps

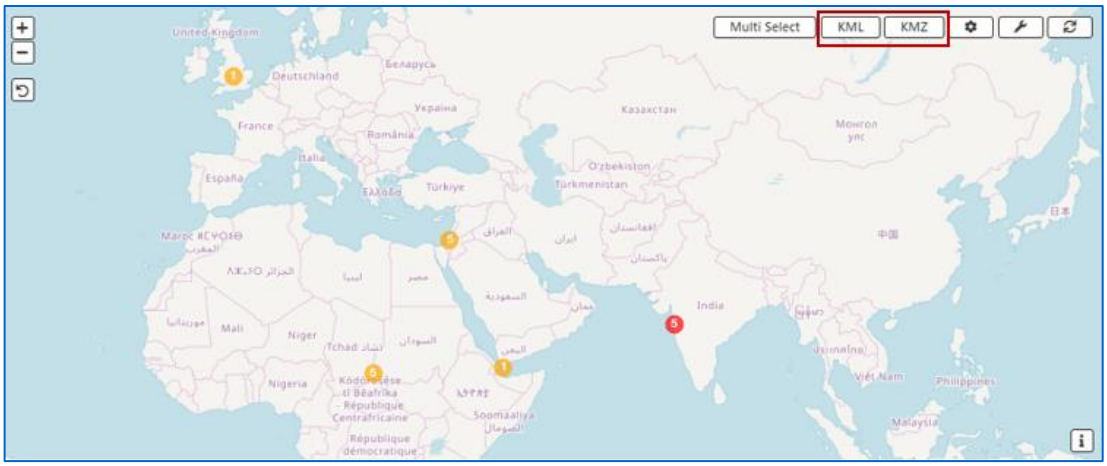
Netspan also supports *.kml* and *.kmz* file import and export. This feature allows customers to import and export map information to and from the external maps.

Note: To enable this feature, you need a suitable Netspan licence.

To export the map view:

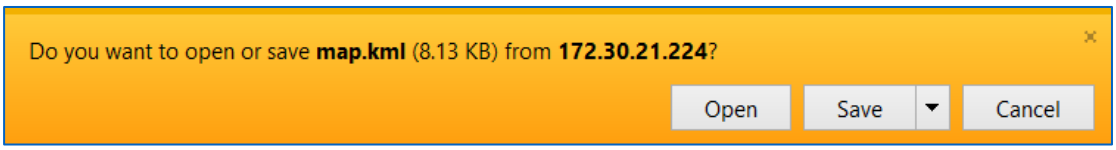
1. At the top right corner of the **Node Map** page, select **KML** or **KMZ**.

Figure 59: Selecting KML/KMZ



2. A message asking whether you want to open or save the exported file appears. Click **Open** or **Save** (as appropriate).

Figure 60: Export Excel File Message



- If you choose **Open**, your machine opens the saved map.
- If you choose **Save**, Netspan displays a confirmation message stating that the file has been downloaded.

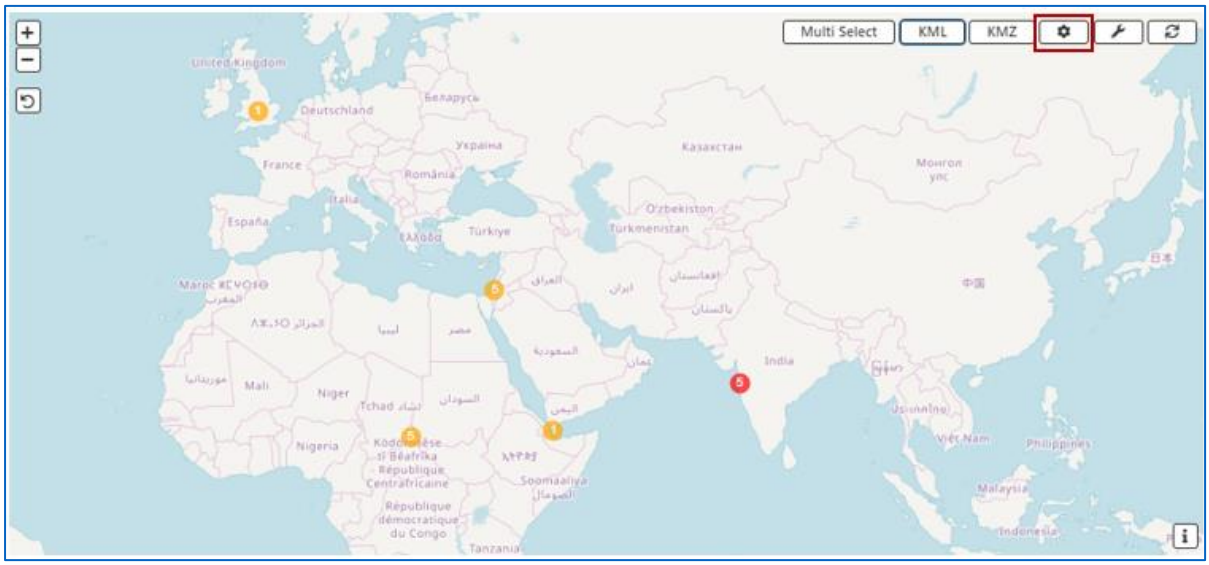
Figure 61: Export Confirmation Message

You can choose to open the saved file or to open the folder containing the saved file. For detailed description about how to import the map view, see Importing KML or KMZ Files.

3.11.9 Editing Global Map Configuration

Netspan allows you to edit the configuration of the map. To edit the map configuration, at the top right corner of the **Node Map** page, click the **Global Map Configuration** icon (⚙).

Figure 62: Editing Map Configuration



For instructions on editing the configuration of the map and importing KML or KMZ files, see Configuring Map and Importing KML or KMZ Files, respectively.

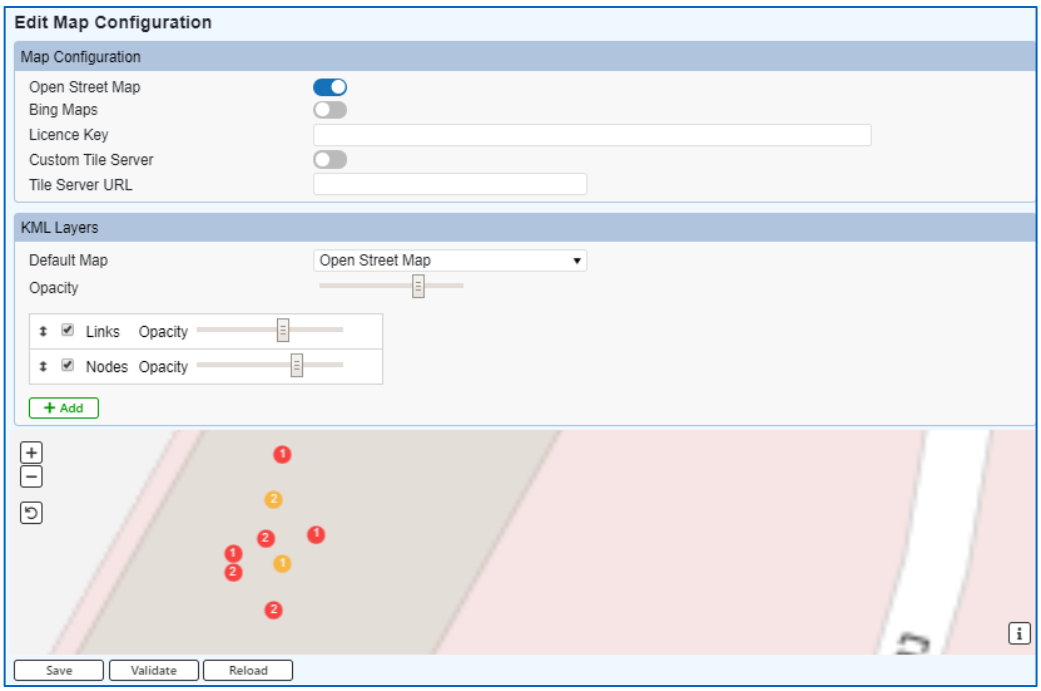
3.11.9.1 Configuring Map

Netspan supports the following third party map tools:

- **Open Street Maps:** *Open Street Maps* is a freeware; it does not require a license. By default, *Open Street Maps* is enabled. Click the ℹ icon on the map to see the OpenStreetMap **Copyright and Licence** details.
- **Bing Maps:** To enable the use of *Bing Maps*, purchase a licence from Microsoft.

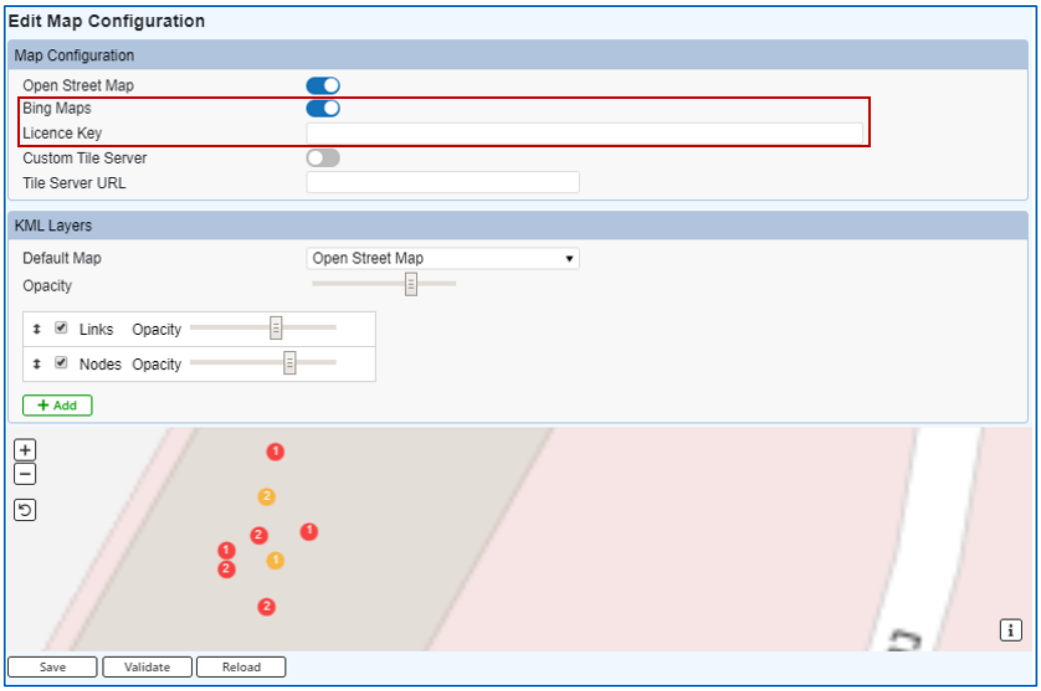
1. On the Netspan main menu, select **Server** > **Map Configuration**. The **Edit Map Configuration** page appears.

Figure 63: Editing Map Configuration



2. In the **Map Configuration** panel, check to enable the **Bing Maps** option, and then enter the licence key.

Figure 64: Selecting Bing Maps



3. Click **Save** to complete the procedure.

3.11.9.2 Importing KML or KMZ Files

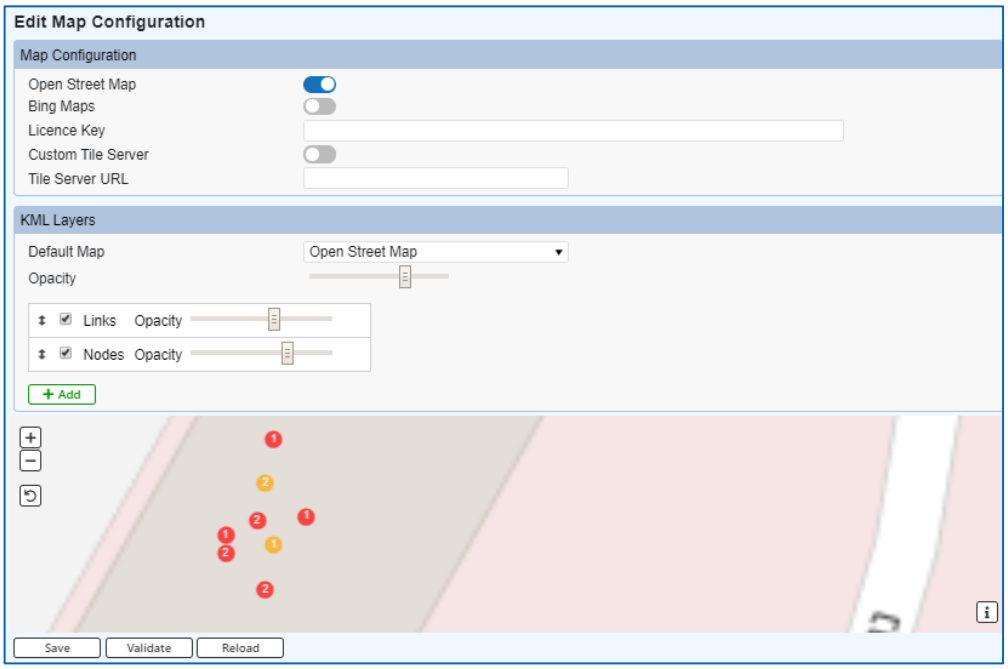
Netspan supports *.kml* and *.kmz* file import and export. This feature allows customers to import and export the map information to and from the external map tools.

To restrict the map to display locations of interest, you can create and import a customized KML or KMZ file.

To import KML or KMZ files:

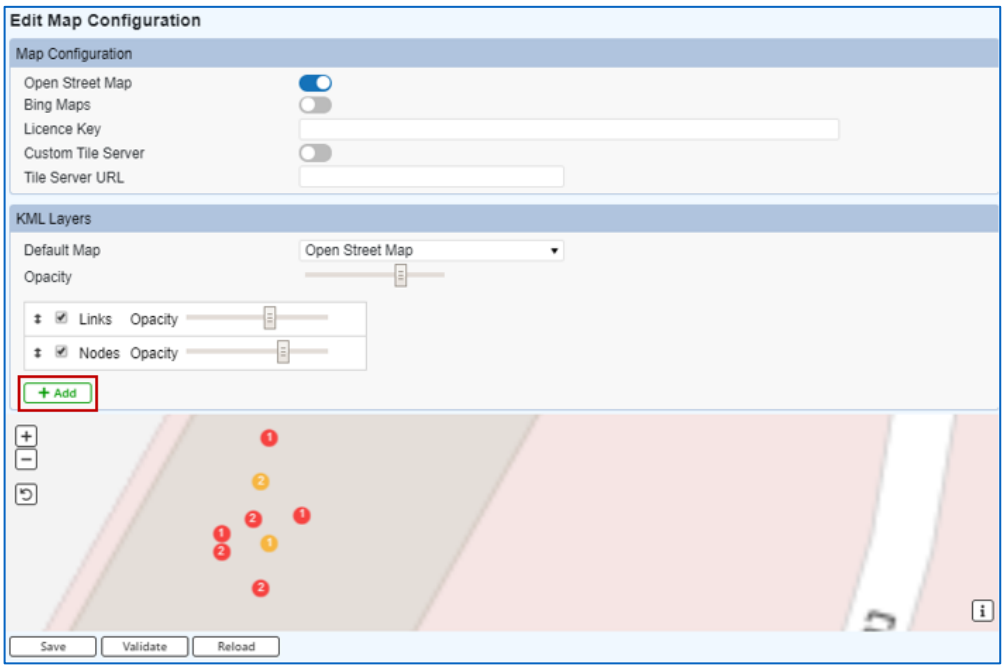
1. On the Netspan main menu, select **Server** > **Map Configuration**. The **Edit Map Configuration** page appears.

Figure 65: Edit Map Configuration Page



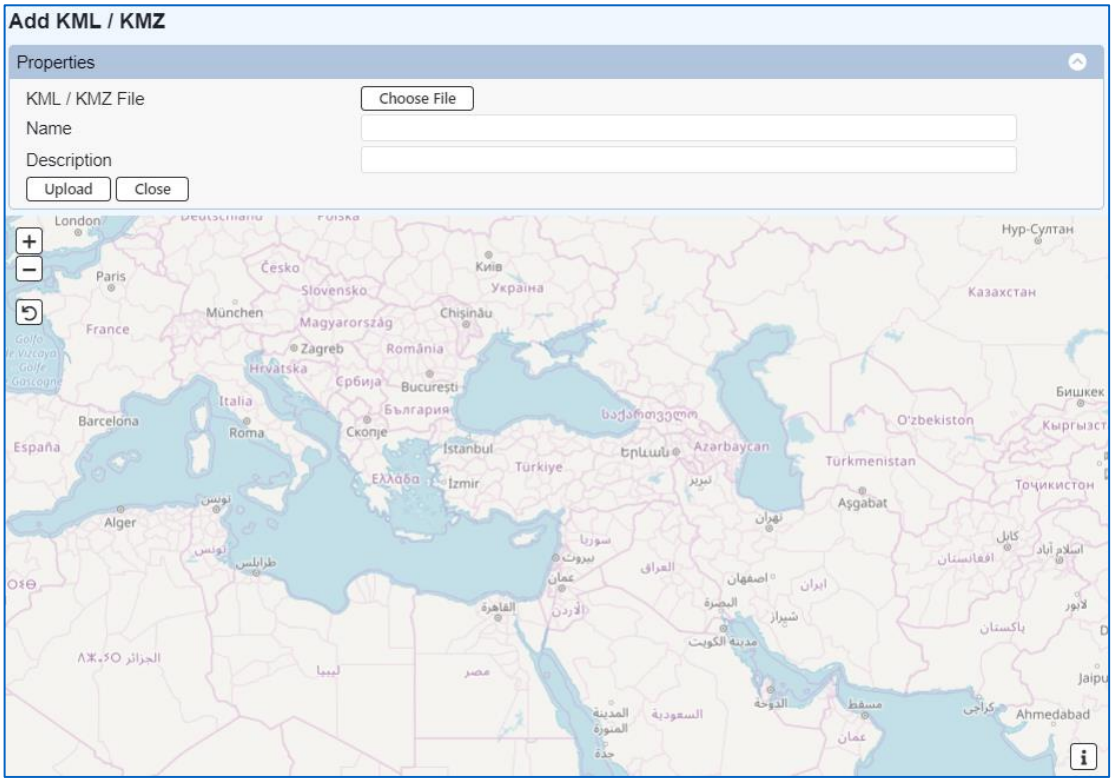
2. In the **KML Layers** panel, click **Add**.

Figure 66: Adding a KML or KMZ File



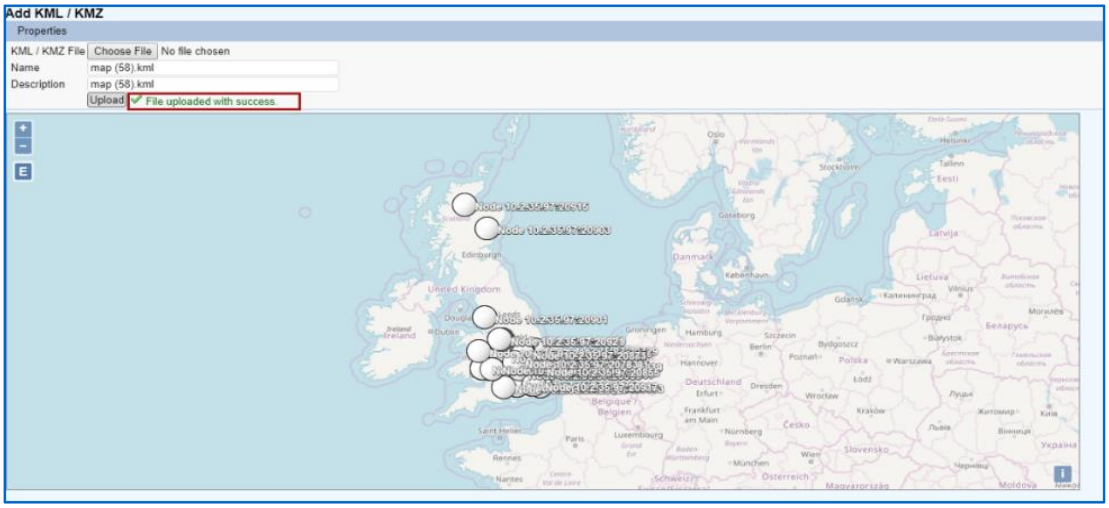
The **Add KML or KMZ** page appears.

Figure 67: Adding KML/KMZ



3. Browse to the KML or KMZ file. Specify a name for the file and add a short description.
4. Click **Upload** to complete the procedure.

Figure 68: Importing a KML or KMZ File (Example)

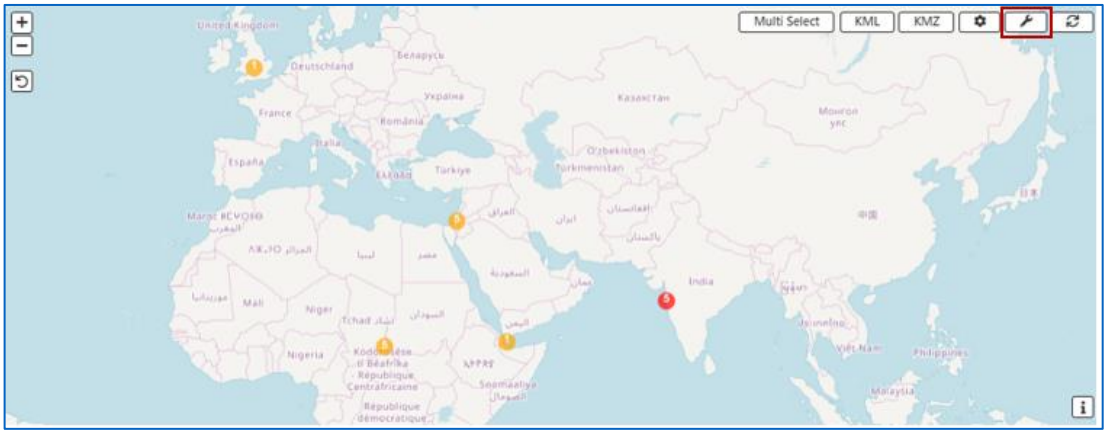


3.11.10 Adjusting Transparency

To adjust the transparency of the map, nodes, and alarms:

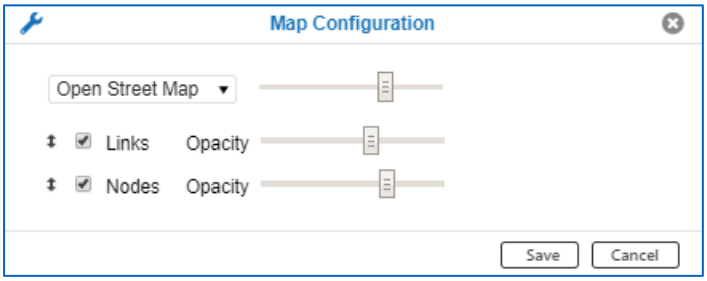
1. At the top right corner of the **Node Map** page, click the **Dialog Map Configuration** button.

Figure 69: Accessing Map Configuration



The **Map Configuration** pop-up window appears.

Figure 70: Map Configuration Window



2. From the **Map** drop-down list, select the map whose opacity you want to adjust. Table 13 lists the details of the available maps.

Figure 71: Setting Opacity

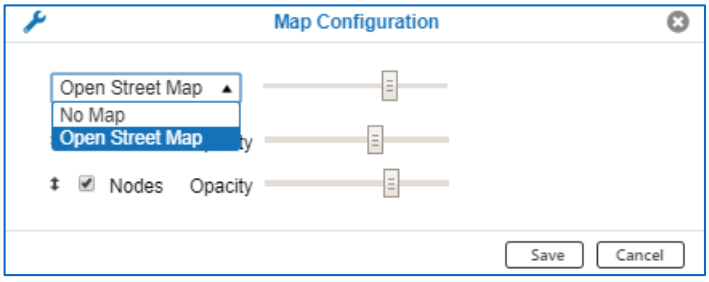
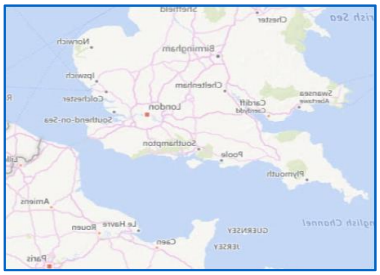


Table 13. Available Maps

Map Type	Description	Example
Open Street Map	A map of the world that is free to use under an open licence	
Bing Road Map	This map displays road imagery.	
Bing Aerial Map	This map displays aerial imagery	
Bing Hybrid Map	This map combines the advantages of *Bing Road Map* and *Bing Aerial Map.*	

3. After selecting the map, use the slider to set the preferred opacity for the map, links, and nodes.

   Note: The opacity of the map, links, and nodes can be set to a value between 0 and 10.

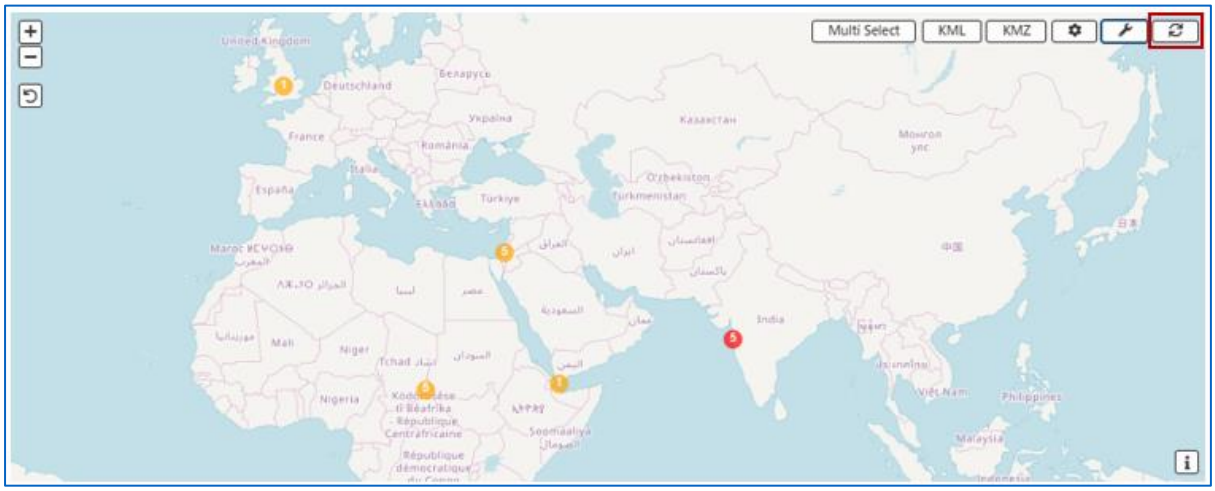
4. Click **Save** to apply the changes, and then click **Close** ( ).

3.11.11 Reloading the Node Map

To reload your map, click the **Reload** button at the top right corner of the **Node Map** page.

When you refresh the node map, it retrieves information on the latest changes in your network (if any) and refreshes your view to include those variations.

Figure 72: Reloading the Node Map



4 Provisioning

Provisioning is the process for setting the configuration parameters of a service profile, node profile, or node to enable it to operate.

Note: This chapter applies to the following Netspan managed nodes:

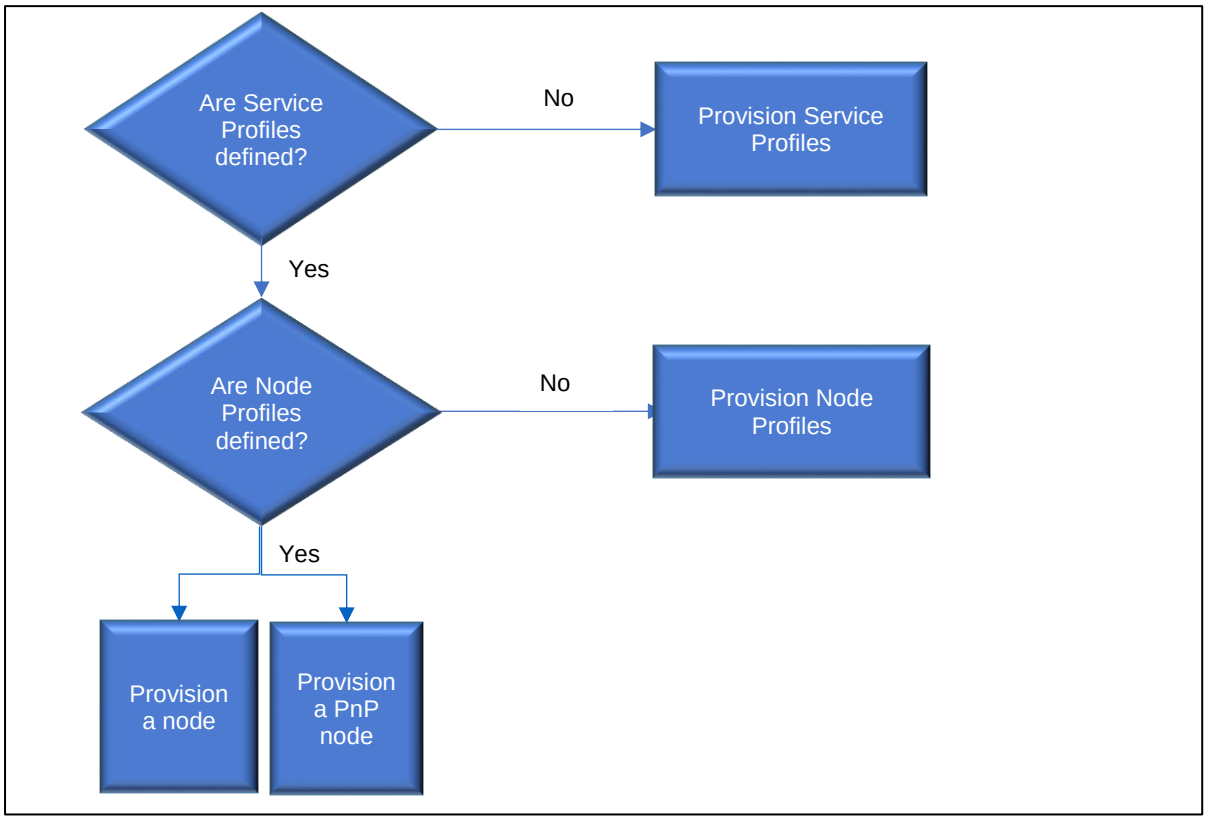
- eNodeB
- iBridge
- iRelay
- Relay eNodeB

Before a node can be provisioned, it first needs to be commissioned. This means it has its IP address, port number, and other details defined so that it can be discovered by Netspan and added to the network. This process is covered in How to Enable Discovery on a Node. Once a node has been commissioned it is available to be discovered by Netspan as described in How to Discover a Node in Netspan.

Note: This discovery process is not applicable to PnP nodes.

Once a node has been discovered and is available in your system, use the Netspan UI to provision the node ready for operation.

Figure 73: Provisioning Process



You can provision the nodes individually, by group or globally, where you define a single set of parameters and these are subsequently applied to any discovered node.

Note: Global provisioning is not applicable to iBridge, iRelay, or eNodeB nodes. As such, it is not covered in this document.

As well as using the UI to provision nodes, it is also possible to use the NBIF to send a set of parameters in an XML file over a SOAP interface to be applied to the node population. This provisioning method is not described here, as this document focuses on the operations you perform using the Netspan UI. For more details on the NBIF process, see *SYN-PSD-0027 Netspan NBIF Guide*.

This section describes how to:

4.1 How to Provision Node Profiles

A node profile is a set of parameters, which collectively forms a profile, available in Netspan for future selection to apply to a node such as: a group of parameters related to radio links, synchronization technology, security, etc.

The use of profiles increases the efficiency of node provisioning by enabling the selection of a set of pre-defined parameters rather than having to define each parameter individually, while minimizing the chances of having errors.

You need to define profiles to enable full configuration of a node. When a node is added or edited, it needs to have a variety of profiles selected from drop-down lists. The exact range of profiles that need to be defined depends on the nature of the node, i.e. whether it is eNodeB, iBridge, or iRelay. All these node types need to have profiles already defined in the system for selection when required. Table 14 provides a list of different profiles that need to be defined for each node type.

Table 14. Required Profiles by Node Type

Node Type	Profiles Required
eNodeB	• eNodeB Global Configuration • System Default • eNB Advanced Configuration Profiles • Fault Management Profiles • Management Profiles • Multi-Cell Profiles • Neighbour Management Profiles • Network Profiles • Security Profiles • SON Profiles • Synchronization Profiles • Call Trace Profiles • Cell Advanced Configuration Profiles • eMBMS Profiles • Mobility Profiles • Radio Profiles • Traffic Management Profiles
iBridge2	• Global Configuration • Base Management Profile • Term Management Profile • Alarm Profile • QoS Profile

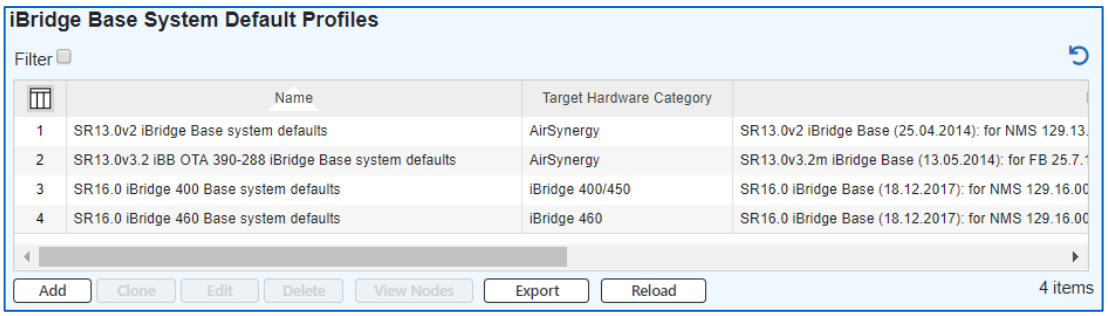
Node Type	Profiles Required
iBridge	• Base System Default • Base Management Profile • Base Radio Profile • Term System Default • Term Radio Profile
Relay	• Relay Global Configuration • Relay System Default • Relay Profile • Relay Advanced Profile
iBridge 440	• QoS Profile

All node profiles should be defined before you begin the process of using them to provision a node. The Netspan process flow is not designed to enable you to jump away from the node provisioning task to create or edit profiles in the middle of the process.

To provision a node profile:

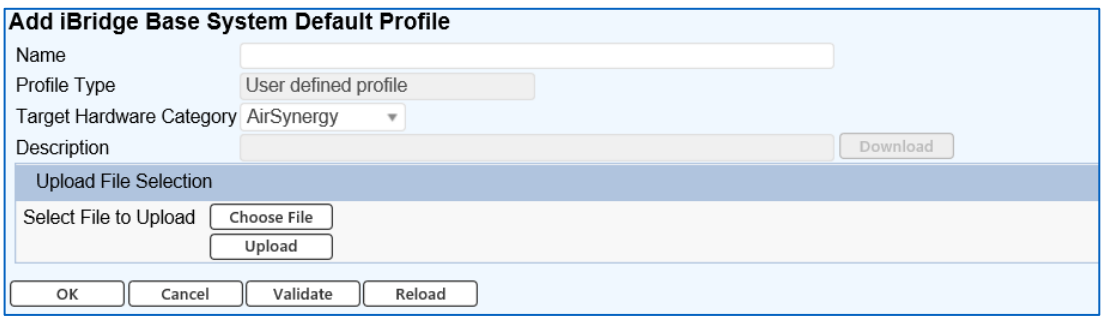
1. On the main Netspan menu, choose **Node Profiles** to expand the list of available node types. Each of these node types has its own set of profiles. Select the node type you require to expand the profile menu options and click on the profile type you want to provision. For example, **iBridge** > **Base System Default** or **eNodeB** > **Management Profiles**.

Figure 74: iBridge Base System Default Profiles Screen



2. This opens the **Profiles** screen, for the profile type you have selected, which displays a list of profiles already defined in your system.
3. To add a new profile, click **Add** at the bottom of the screen. This opens the Profile screen for your new profile. For more details on the parameters and description on each field, refer *ARD-D00741 Netspan Parameters Reference Guide*. The Reference Guide document describes all eNodeB and iBridge profile parameters you need to enter.

Figure 75: Add iBridge Base System Default Profile Screen



4. When you have finished creating your profile, click **OK** to commit your profile and return to the profiles list screen. Your new profile will be added to the list.

5. If you want to edit an existing profile rather than creating a new one, click on the required profile in the list and click **Edit**. This opens the profile screen for your selected profile with its parameters pre-populated. Change the details as required and click **OK** to commit your changes and return to the list of configured profiles.

   Note: Bear in mind that while it is possible for you to edit an existing node profile, it may already be active on many nodes, so any changes should be made with extreme caution.

6. With your profile created or edited, it will be now available for selection during the node provisioning process.

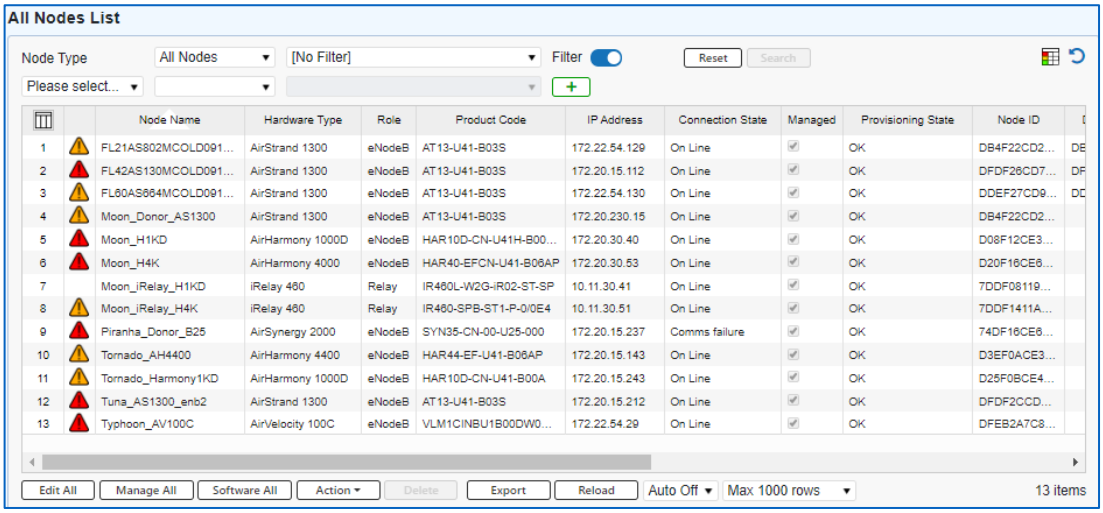
4.2 How to Provision a Node

A node can only be provisioned once it has been discovered in the network, meaning it is visible to Netspan. In order to discover nodes, see How to Discover a Node in Netspan. With the required node discovered, you are then able to provision it to enable it for service.

To provision a node:

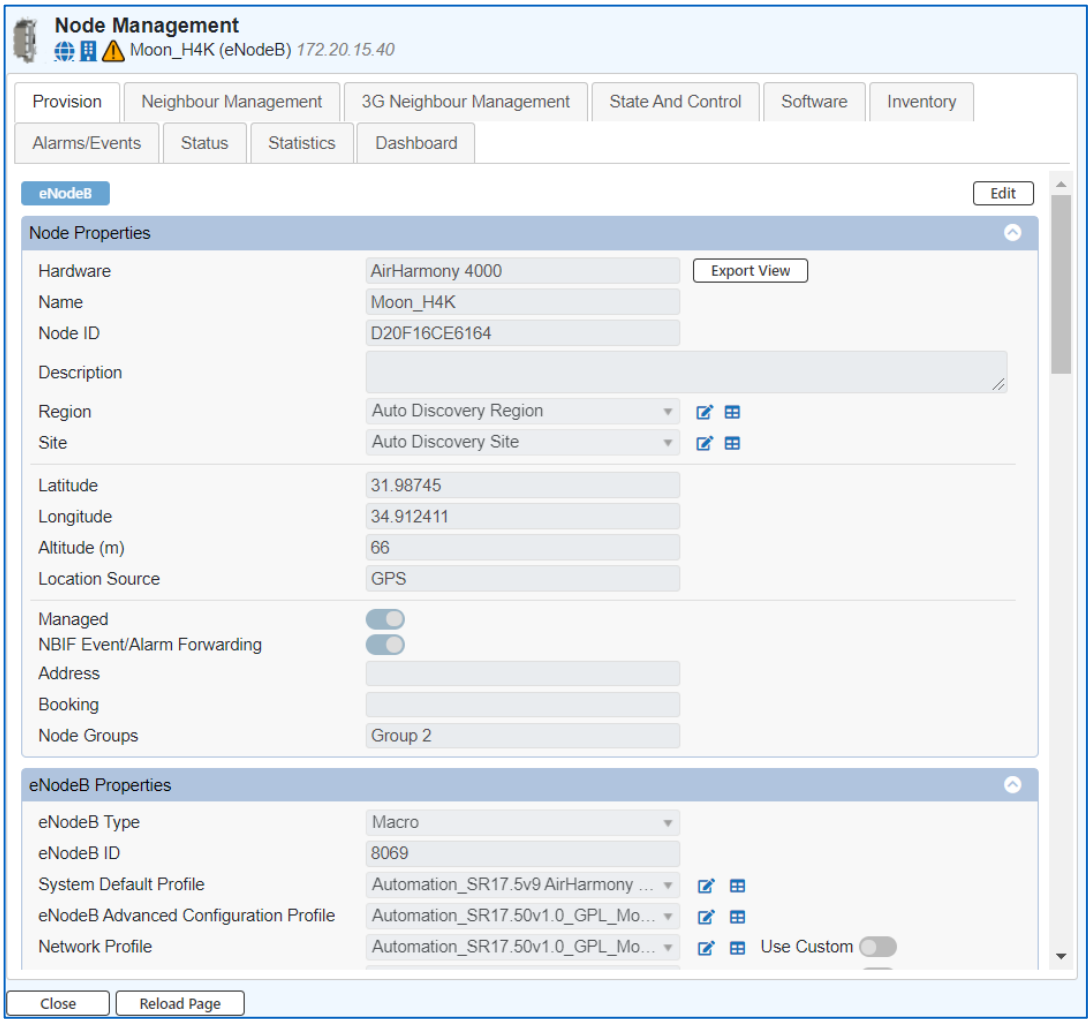
1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of nodes currently available in your system.

Figure 76: Node List Screen



2. Click on the node you want to provision and click **Manage**. This displays the **Provision** screen populated with the current details of your selected node.

Figure 77: Edit Node Screen



3. Change these details as required, refer ARD-D00741 Netspan Parameters Reference Guide to provide you with the information you need to complete the relevant fields.

> **Note:** The exact array of fields you will see and need to complete will vary depending on the type of the node you are provisioning.
>
> Netspan automatically applies appropriate filters to ensure that only node profiles applicable to your selected node type are available for selection on your node. For example, if you are provisioning an iBridge 460 node, you will only be able to choose from management profiles that are appropriate to iBridge 460.

4. Once you have completed the details you need, click OK to commit your changes and return to the Node List screen. Your newly provisioned node will now be shown in the list.

4.3 How to Provision a Plug & Play Node

A plug-and-play node is the one that is automatically added to the network. Netspan automatically discovers it and applies a pre-defined set of provisioning parameters to make it ready for operation, without the need for you to discover and provision the node manually through the Netspan UI.

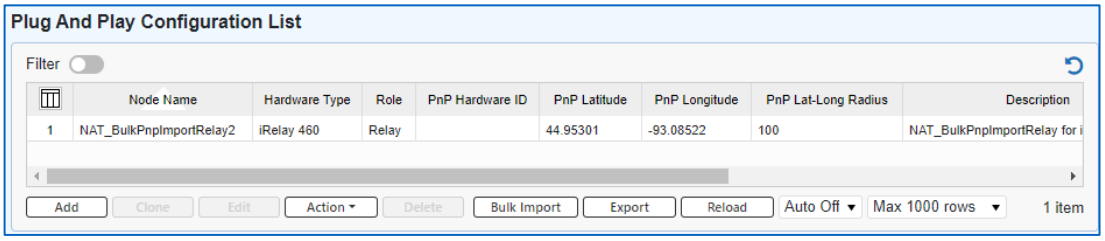
> **Note:** This section is applicable to eNodeB, iBridge2, iBridge NLOS, and iRelay only.

This is a different provisioning method from the manual process described in How to Provision a Node.

To provision a plug & play node:

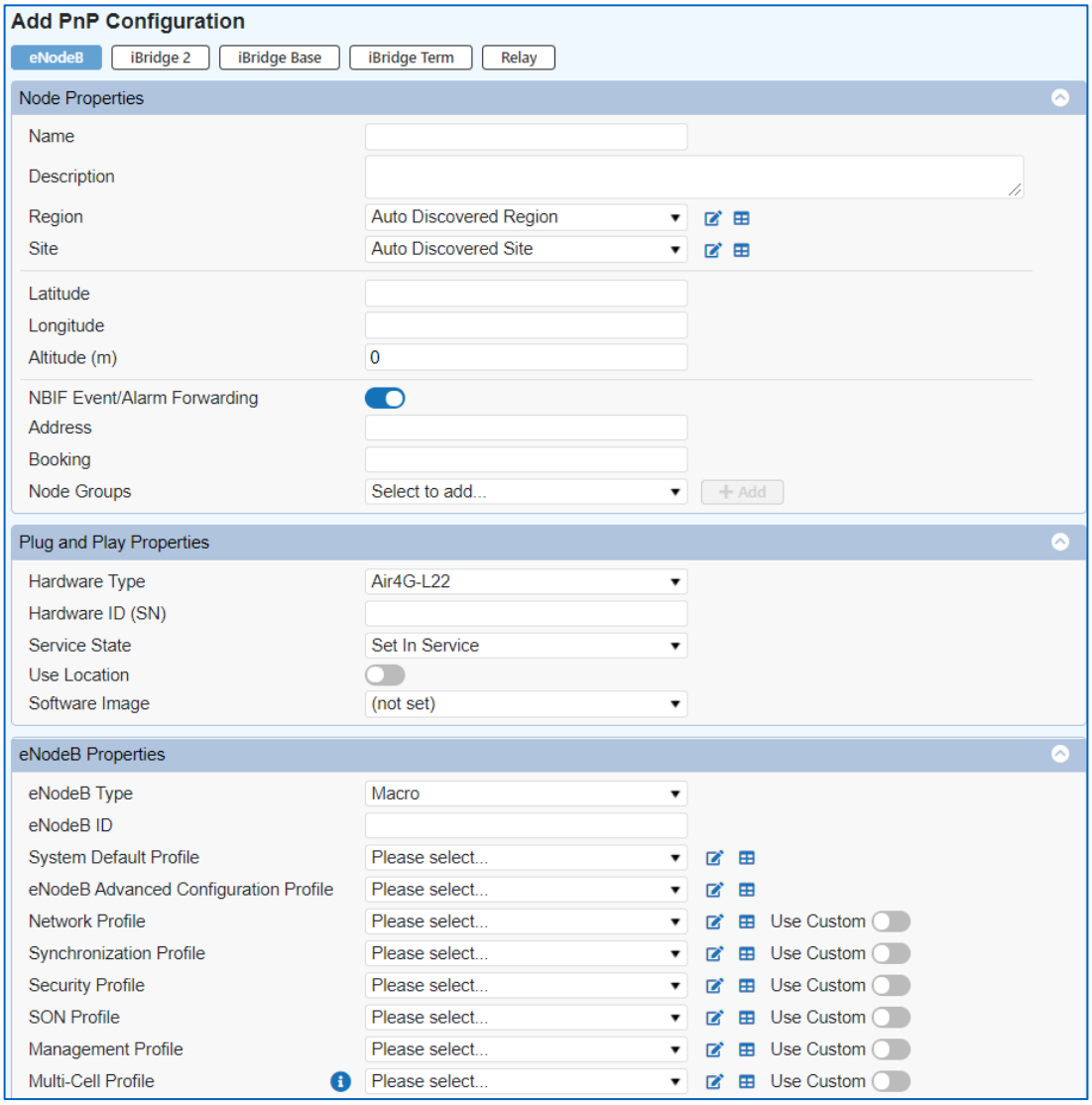
1. On the main Netspan menu, choose **Configuration Management** > **PnP** > **PnP Configuration**. The **Plug And Play Configuration List** screen will be displayed with a list of plug and play configurations that are currently available in your system.

Figure 78: Plug and Play Configuration List Screen



2. Click **Add** to create a configuration profile for a new node. The **Add PnP Configuration** screen will be displayed.

Figure 79: Add PnP Configuration Screen

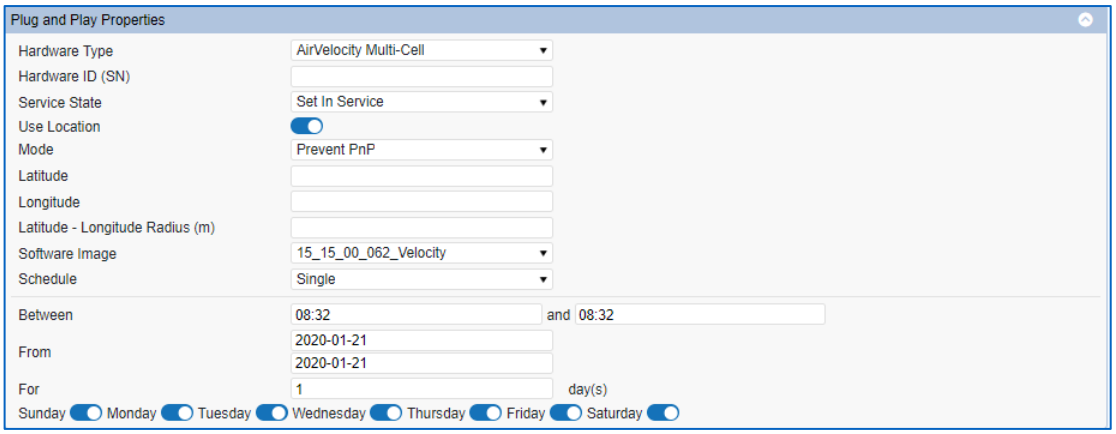


3. You can create PnP configuration profiles for the node types: **eNodeB**, **iBridge 2**, **iBridge Base**, **iBridge Term**, and **Relay**. Each node type has a button at the top of the screen. Click the one relevant to the node you are adding a profile to display appropriate fields.

Note: The parameters you need to define for each node type are not described in detail in this document. Instead, refer *ARD-D00741 Netspan Parameters Reference Guide* for a comprehensive explanation of the parameters you need to set and what you should enter in each field per node type.

4. In addition to the usual node parameters, the PnP Configuration screen also features a **Plug and Play Properties** panel, which contains the parameters you need to define to enable the plug and play discovery and provisioning process to take place. This Plug and Play Properties panel is common across all three node types.

Figure 80: Plug and Play Properties Panel



Enter values in each of these fields according to the descriptions in Table 15.

Table 15. Plug and Play Properties Parameters

Field	Description
Hardware Type	A drop-down list of the available hardware types for your node. The content of this list will vary depending on whether you are setting configuration for eNodeB, iBridge Base, iBridge Term, or iRelay node. Choose the hardware type applicable to your node. **This is a mandatory field.**
Hardware ID (SN)	At this stage, the node's IP address is not known to Netspan. Instead, node identification and discovery is based on the hardware ID. This is pre-configured on the node, so your entry here needs to match the hardware ID on the node. **This is a mandatory field.**
Service State	Allows you to configure the initial node operational status.
Use Location	Use location allows user to enter a location where the node is expected. When the checkbox is enabled, it provides Latitude Longitude of the expected location of the node.
Mode	This parameter is used to select Use Location modes for movement detection.
Latitude	Along with **Longitude**, this specifies the expected physical location of the node. This ensures that when the node is discovered, it is in the correct location and has not been moved outside the radius. This field is optional.
Longitude	Along with **Latitude**, this specifies the expected physical location of the node. This ensures that when the node is discovered, it is in the correct location and has not been moved outside the radius. This field is optional.
Latitude – Longitude Radius (m)	Enter a value, in meters, to allow for an element of variation from the latitude and longitude settings you specified for the node's location. This means that as long as the node is within the defined distance away from the specified location, it is still discovered without problems. This field is optional.

Field	Description
Software Image	There is no software preconfigured on the node, so you need to specify the software image to download on the node to make it operational once it has been discovered. The content of the list will vary depending on the type of the node you are defining. This field is optional.
Schedule	This parameter is available only if a Software image is selected.

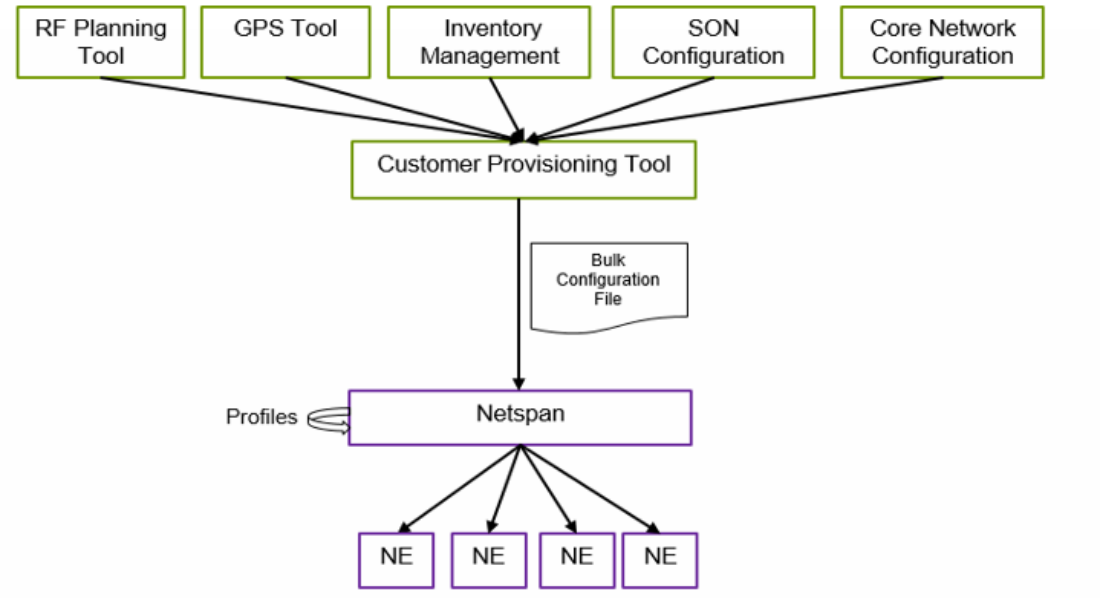
5. There are some aspects to the configuration of different node types that you should be aware of beyond the parameter descriptions provided in the *Netspan Parameters Reference Guide*.
6. iBridge bases and terminals are all manufactured as terminals. A base always has a physical wire connection, while a terminal is wireless. When Netspan receives an SNMP trap from a wired iBridge node, it knows to apply the base profile. When a trap is received from a wireless node, the terminal profile is applied.
7. When you have completed your PnP configuration, click **OK**. You will be returned to the **Plug and Play Configuration** List screen and your new configuration profile will now appear in the list.

4.4 Plug & Play Configuration Import

Netspan provides a mechanism to allow PnP bulk configuration (i.e. to import multiple eNodeB configurations into Netspan over its NBIF) using a bulk file.

Figure 81 shows Netspan accepting inputs from customer's provisioning tool.

Figure 81: PnP Bulk Configuration Implementation



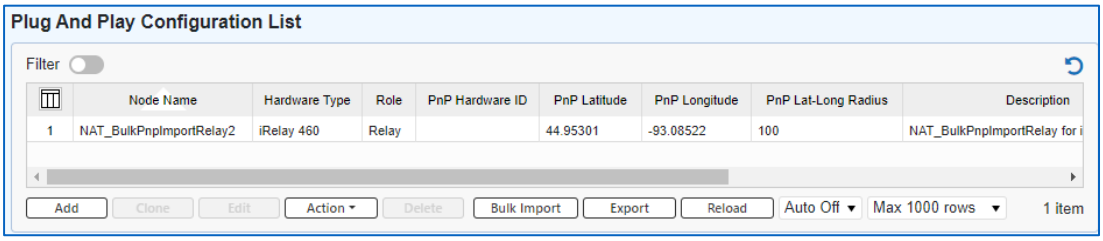
4.4.1 Bulk Configuration Access

Netspan creates a bulk configuration import module, which runs within Netspan. You can open or access this module using the **Bulk Import** button.

To access the **Plug and Play Configuration List** page:

1. Log in to Netspan.
2. On the Netspan main menu, select **Configuration Management > PnP > PnP Configuration**. The **Plug and Play Configuration List** page appears.

Figure 82: Plug and Play Configuration

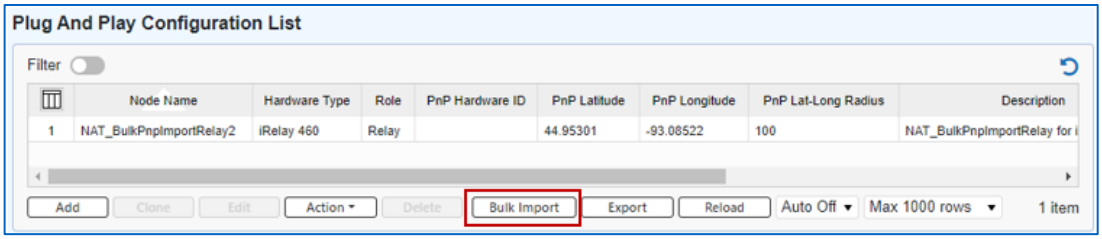


4.4.2 Bulk Configuration Module Options

To access the **Bulk Configuration** module options:

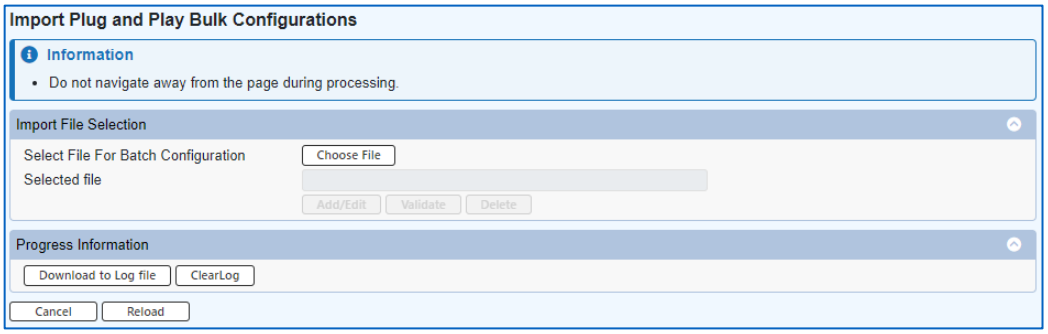
1. On the **Plug and Play Configuration List** page, click the **Bulk Import** button. The **Import Plug and Play Bulk Configurations** page appears. Alternatively, you can select **Configuration Management > PnP > PnP Configuration Bulk Import.**

Figure 83: Selecting Bulk Import



2. On the **Import Plug and Play Bulk Configurations** page, select the required option:
   - **Add/Edit:** Use this option to add nodes to the Netspan PnP node list or to update the parameters configured in a node within the PnP node list.
   - **Validate:** Use this option to validate the imported bulk configuration file intended for node addition, modification, or deletion.
   - **Delete:** Use this option to delete nodes from the PnP node list.
   - **Choose File:** Use this option to browse the file for batch configuration.
   - **Download To Log File:** Use this option to download the output log to a file.
   - **Clear Log:** Use this option to clear the log information.

Figure 84: Bulk Configuration Options



4.5 How to Manage LTE Neighbour List

Netspan provides a method to provision neighbours for Airspan eNodeBs. The neighbours can be any of the following:

- Airspan eNodeB
- 3rd party eNodeB

4.5.1 How to Manage a 3rd Party eNodeB

When adding neighbours for an Airspan eNodeB, you can also add 3rd party eNodeBs. However, prior to adding a 3rd party eNodeB as a neighbour, for Netspan to identify that eNodeB, you must add its details.

This section includes procedures for the following:

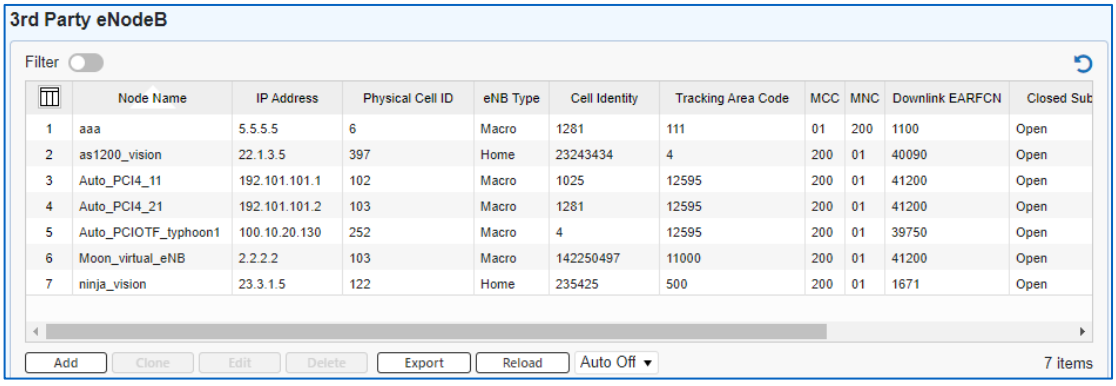
- Adding a 3rd Party eNodeB
- Cloning a 3rd Party eNodeB
- Editing Details of a 3rd Party eNodeB
- Deleting a 3rd Party eNodeB
- Moving a 3rd Party eNodeB Configured on Node to Netspan 3rd Party eNodeB List

4.5.1.1 Adding a 3rd Party eNodeB

To add a 3rd party eNodeB:

1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party eNodeB**. The **3rd Party eNodeB** page will be displayed.

Figure 85: 3rd Party eNodeB List



2. Click **Add**. The **Add 3rd Party eNodeB** page will be displayed.

3. In the **eNB Properties** panel enter the details of the eNodeB that you want to add, and then click on **Save**.

Figure 86: Adding a 3rd Party eNodeB

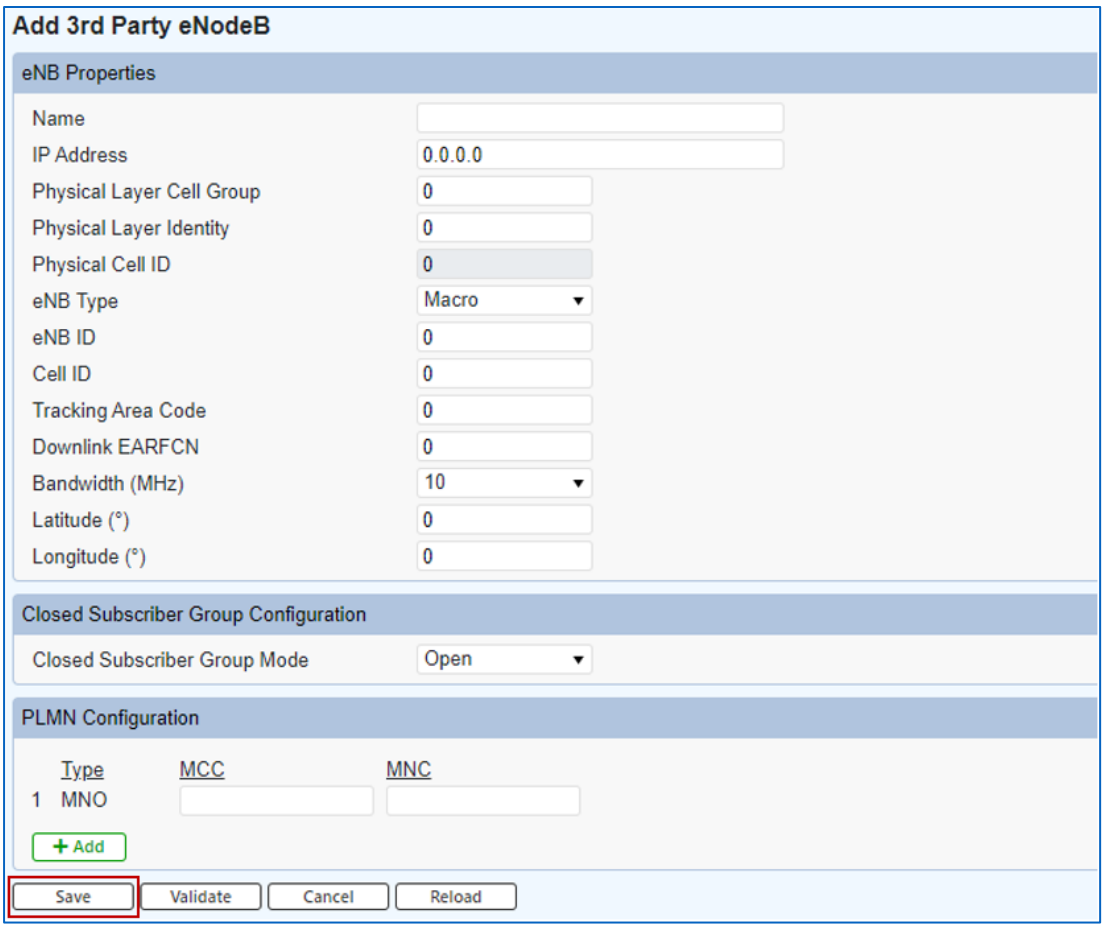


Table 16 lists the properties that you need to specify when adding a new 3rd party eNodeB.

Table 16. 3rd Party eNodeB Properties

Property	Description	Data Type	Range
Name	A user-friendly name for the 3rd party eNodeB.	String	2 to 64 characters (excluding '<' and '&')
IP Address	The IP address of 3rd party eNodeB's X2 control plane.	String	IPv4, IPv6
Physical Layer Cell Group	The Physical Layer Cell Group of the 3rd party eNodeB.	Integer	0 to 167
Physical Layer Identity	The Physical Layer Identity of the 3rd party eNodeB.	Integer	0 to 2
Physical Cell ID	The PCI of the 3rd party eNodeB. **Note:** Netspan automatically populates this value. The PCI of a 3rd party eNodeB is	Integer	0 to 503

Property	Description	Data Type	Range
	calculated using the following formula: PCI = (Physical Layer Group x 3) + Physical Layer Identity. This field is read only.		
eNB Type	The type of the 3rd party eNodeB.	String	Macro, Home
eNB ID	The 20-bit eNodeB ID of the 3rd party eNodeB. **Note:** This property applies to **Macro** eNodeBs only.	Integer	0 to 1048575
Cell ID	The 8-bit Cell ID of the 3rd party eNodeB. **Note:** This property applies to **Macro** eNodeBs only.	Integer	0 to 255
Tracking Area Code	The tracking area code of the 3rd party eNodeB.	Integer	0 to 65535
Downlink EARFCN	The downlink EARFCN of the 3rd party eNodeB.	Integer	0 to 46589
Bandwidth (MHz)	The bandwidth of the 3rd party eNodeB.	Integer	[1.4, 3, 5, 10, 15, 20] MHz
Latitude (°)	The latitude of the 3rd party eNodeB. **Note:** This is an optional property.	Decimal	-90 to 90
Longitude (°)	The longitude of the 3rd party eNodeB. **Note:** This is an optional property.	Decimal	-180 to 180
Closed Subscriber Group Configuration			
Closed Subscriber Group Mode	This parameter enables CSG Access Control Mode.	Enumerated	Open, Closed, Hybrid
PLMN Configuration			
Type	Specifies whether it is an MNO or an MVNO.	String	Not configurable
MCC	Specifies the mobile country code.	Integer	0 to 999
MNC	Specifies the mobile network code.	Integer	0 to 999

You can find the newly added eNodeB on the **3rd Party eNB** list.

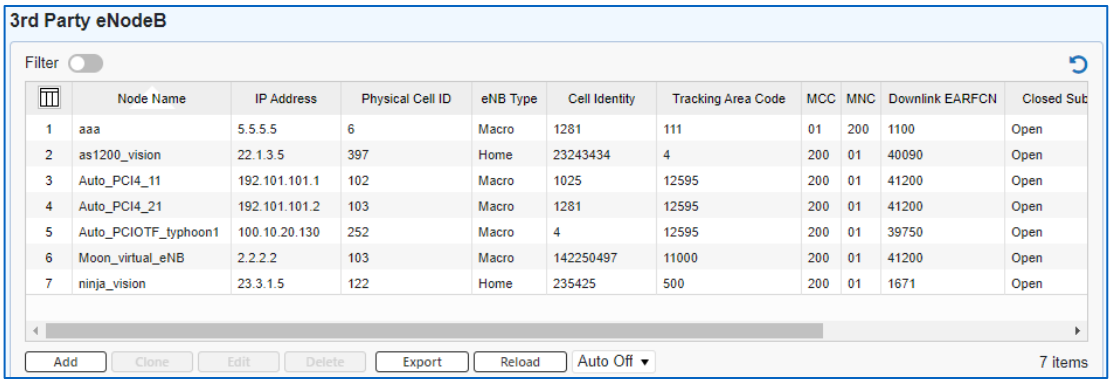
4.5.1.2 Cloning a 3rd Party eNodeB

The easiest way to add a new 3rd party eNodeB is to clone an existing 3rd party eNodeB and update it with the details of the new eNodeB that you want to add.

To clone an existing 3rd party eNodeB:

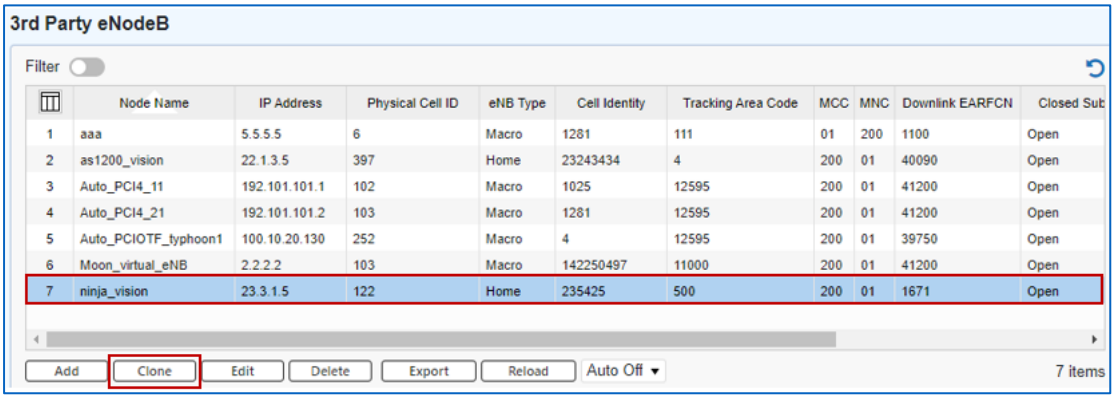
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party eNodeB**. The **3rd Party eNodeB** page will be displayed.

Figure 87: 3rd Party eNodeB List



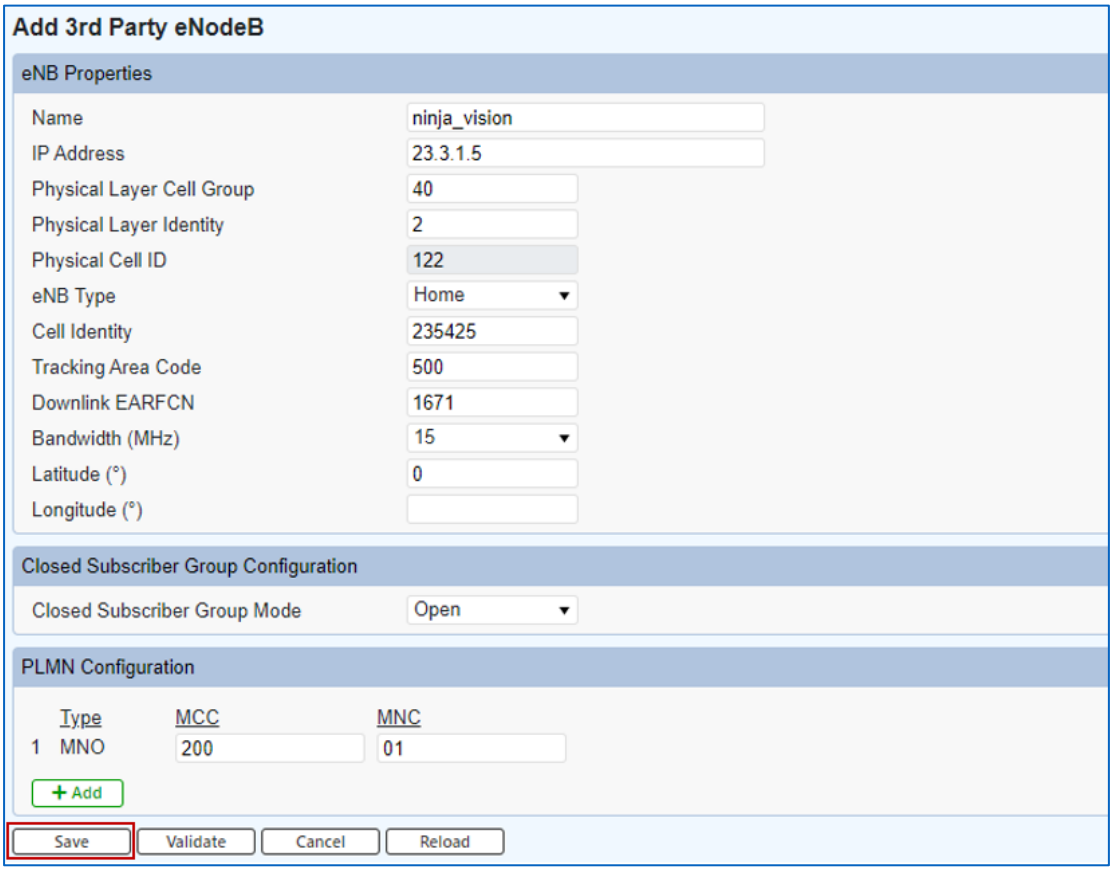
2. From the **3rd Party eNodeB** list, select the eNodeB that you want to clone and then click **Clone**.

Figure 88: Selecting an Existing eNodeB



3. On the Add 3rd Party eNodeB page make the required changes and then click **Save**. For more information on the 3rd Party eNodeB properties, see Table 16.

Figure 89: Cloning a 3rd Party eNodeB



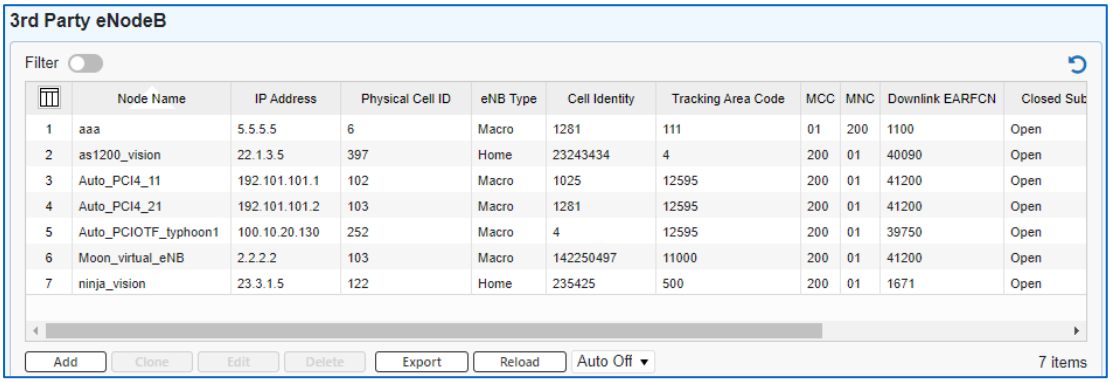
You can find the details of the newly added node on the **3rd Party eNodeB** list.

4.5.1.3 Editing Details of a 3rd Party eNodeB

To edit the details of a 3rd party eNodeB:

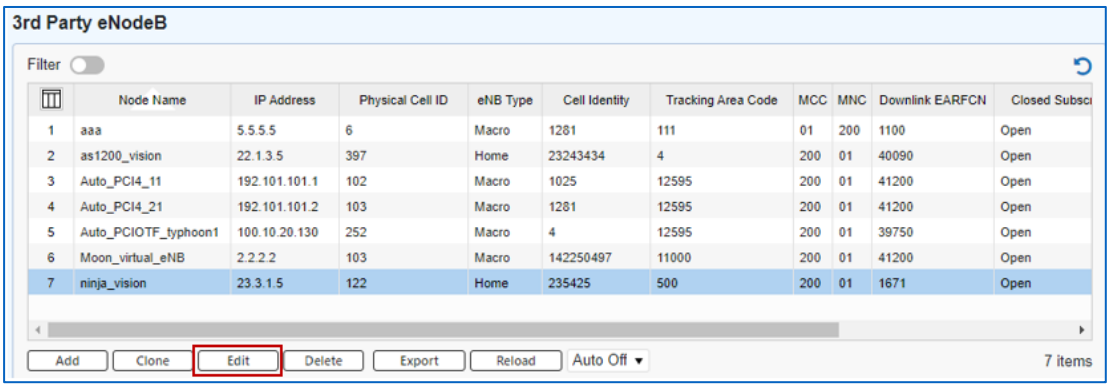
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party eNodeB**. The **3rd Party eNodeB** page will be displayed.

Figure 90: 3rd Party eNodeB List



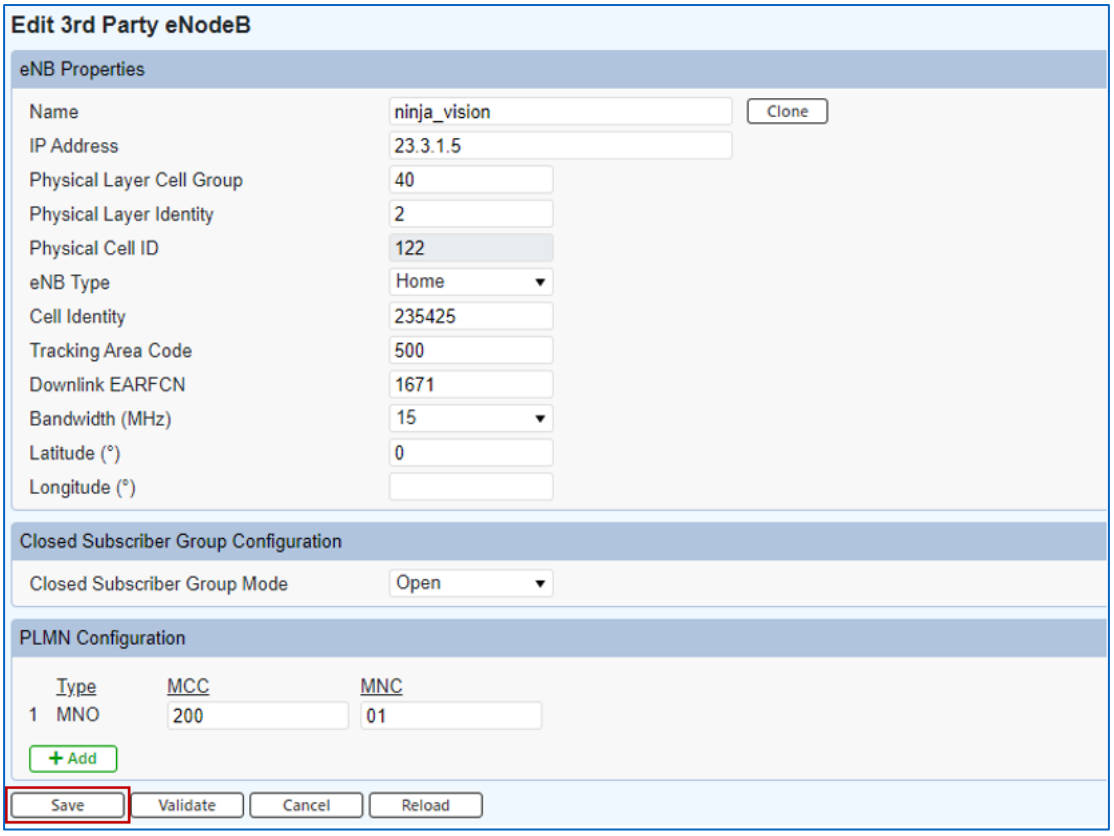
2. From the **3rd Party eNodeB** list select the node whose details you want to update and then click **Edit**.

Figure 91: Selecting the eNodeB



3. On the **Edit 3rd Party eNodeB** page make the required changes and then click **OK**. For more information on the 3rd Party eNodeB properties, see Table 16.

Figure 92: Editing the eNodeB Details

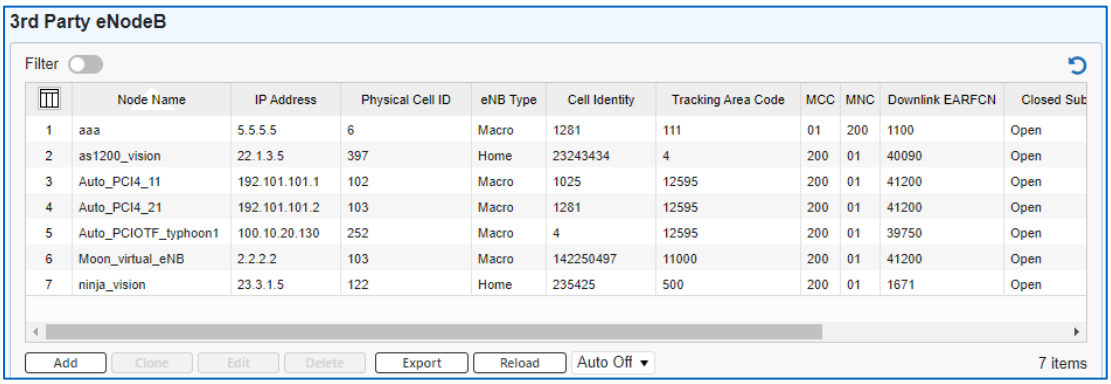


4.5.1.4 Deleting a 3rd Party eNodeB

To delete a 3rd party eNodeB:

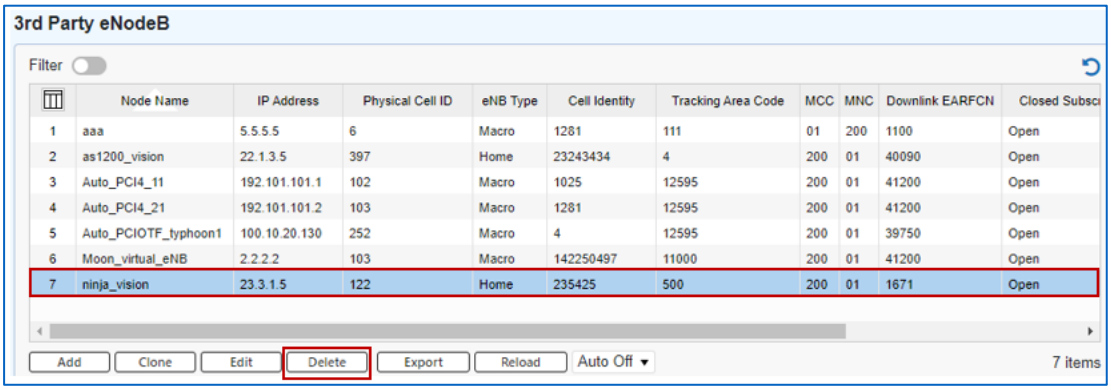
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party eNodeB**. The **3rd Party eNodeB** page will be displayed.

Figure 93: 3rd Party eNodeB List



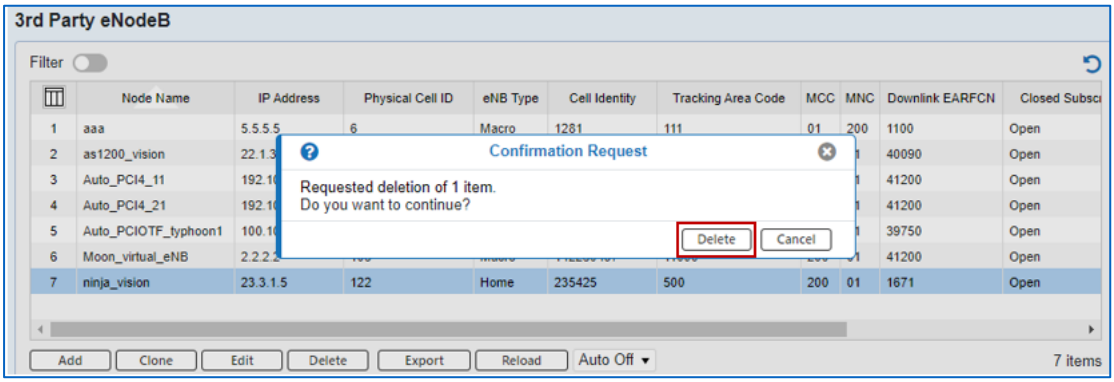
2. From the **3rd Party eNodeB** list select the eNodeB that you want to delete and then click **Delete**.

Figure 94: Selecting the eNodeB



3. A confirmation message box will be displayed, asking if you want to delete the selected eNodeB. Click **Delete**. The node will then be removed from the **3rd Party eNB** list.

Figure 95: Deleting the eNodeB



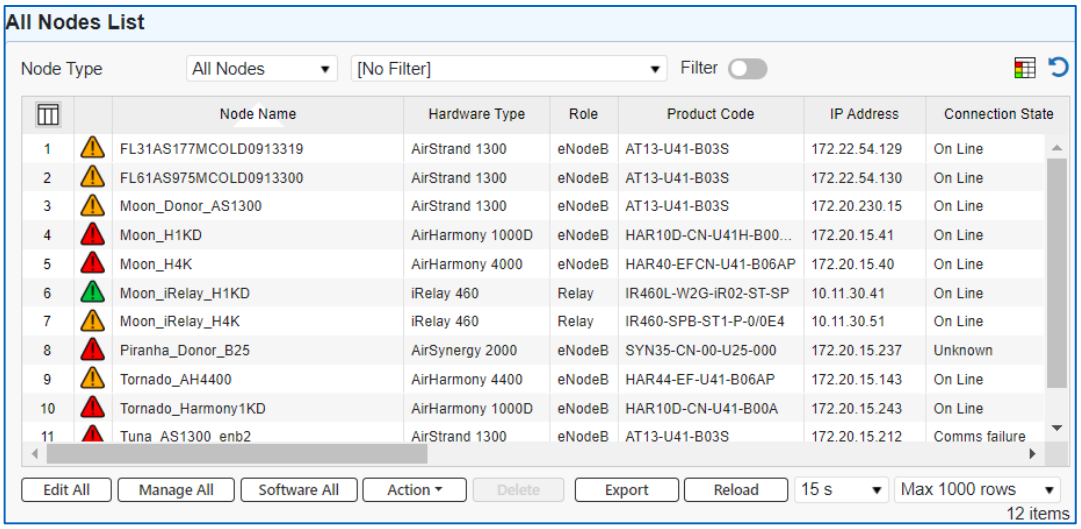
4.5.1.5 Moving a 3rd Party eNodeB Configured on Node to Netspan 3rd Party eNodeB List

You can add a 3rd party eNodeB, configured on a node, to the Netspan neighbour list and thereby to the 3rd party eNodeB list. You can perform this process only when ANR is set to **Disabled** or **HO Measurement Based**.

To add a 3rd party eNodeB to a 3rd party eNodeB list:

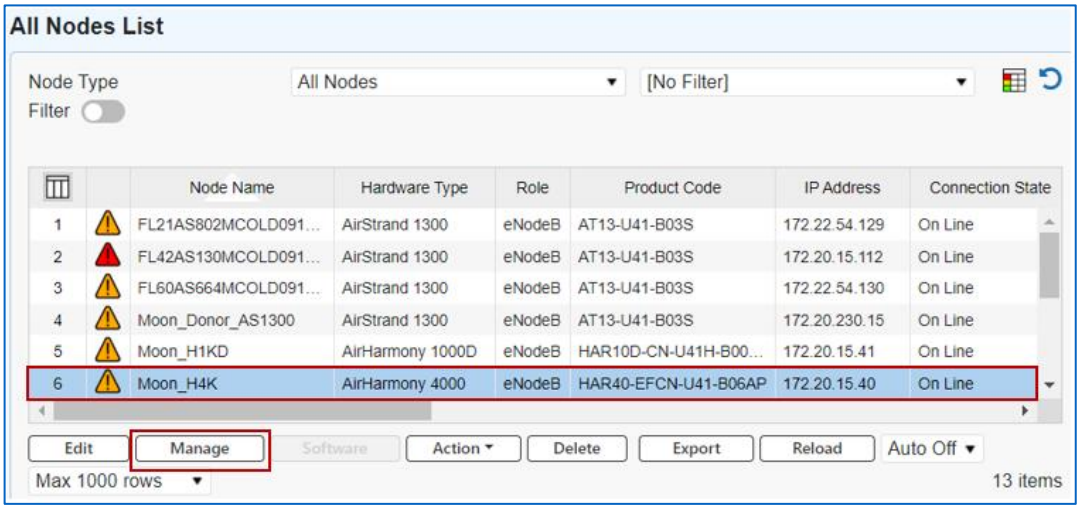
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all the currently configured nodes will appear.
2. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 96: eNodeB List



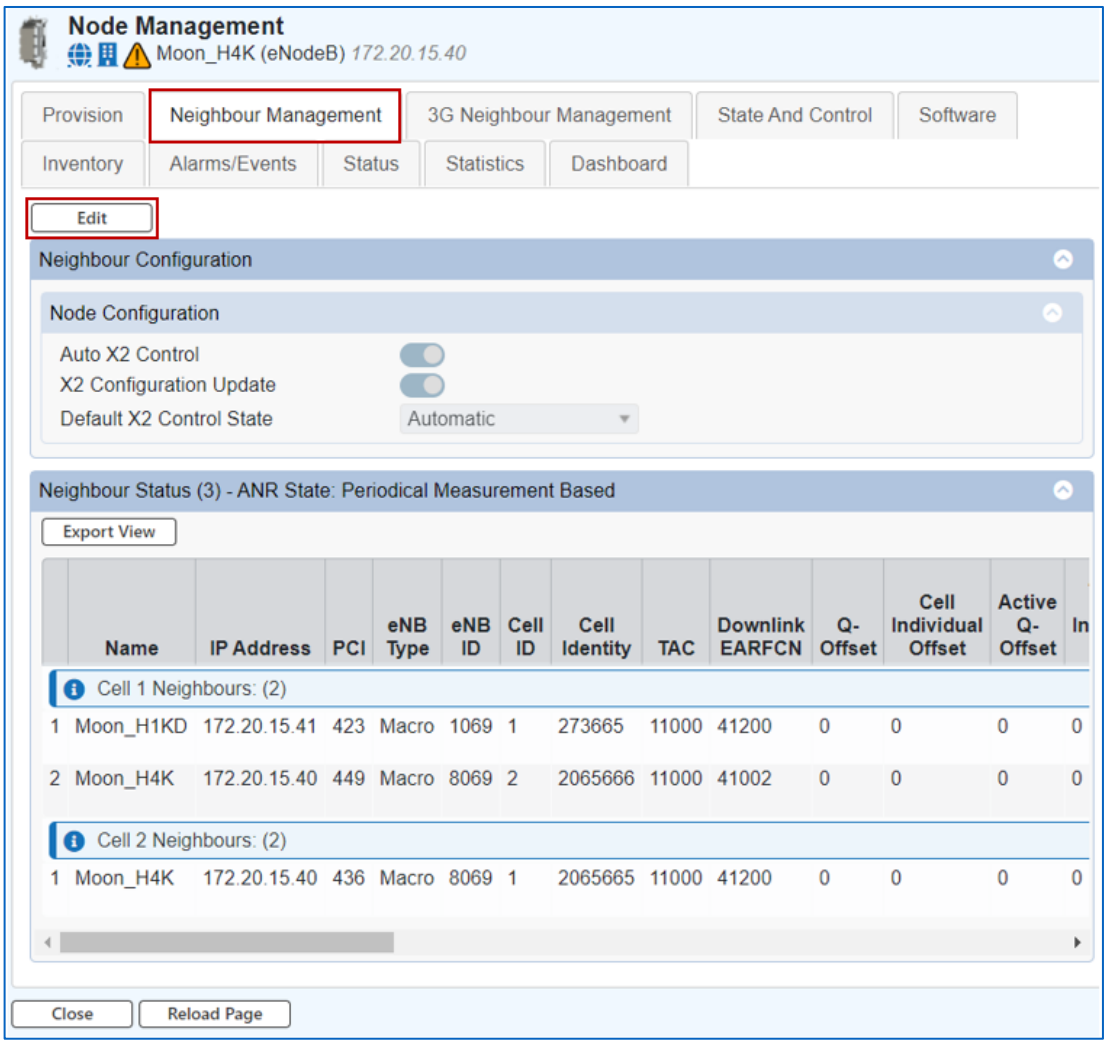
3. Select the eNodeB whose neighbor configuration you want to update and then click **Manage**.

Figure 97: Selecting the Node



4. On the **Node Management** page select the **Neighbour Management** tab. Click **Edit** to enable the edit mode.

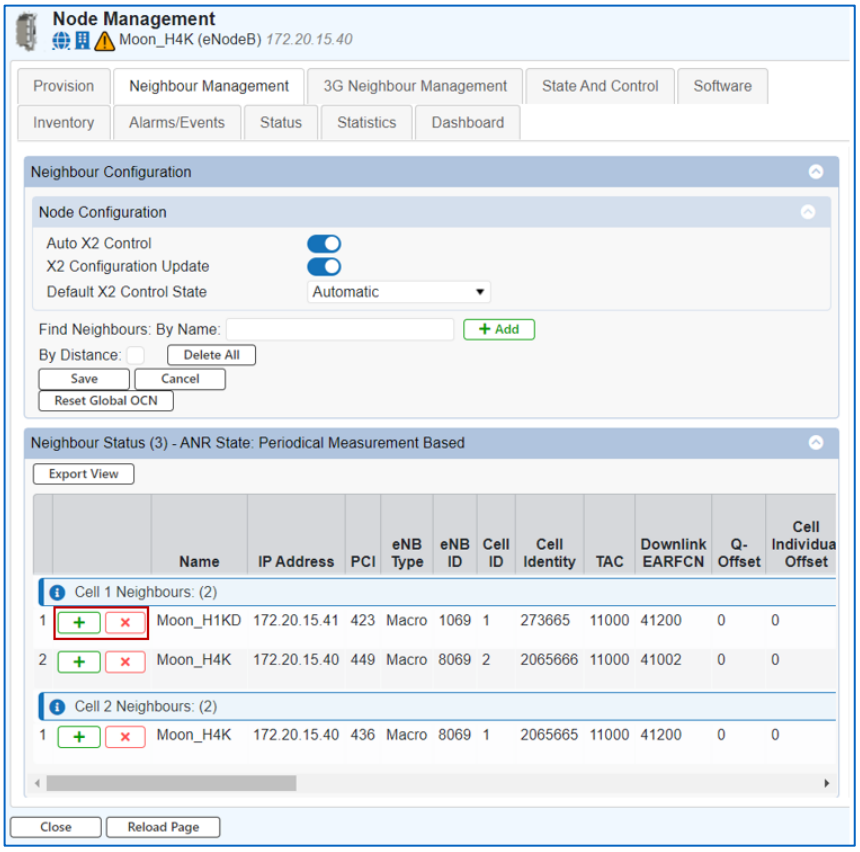
Figure 98: Neighbour Management Tab



On the **Neighbour Status** panel, if the name of a node is displayed as N/A, then it denotes that Netspan does not have that node on the eNodeB or 3rd Party eNodeB list. To add this node to the 3rd Party eNodeB list, perform steps 5 through 8.

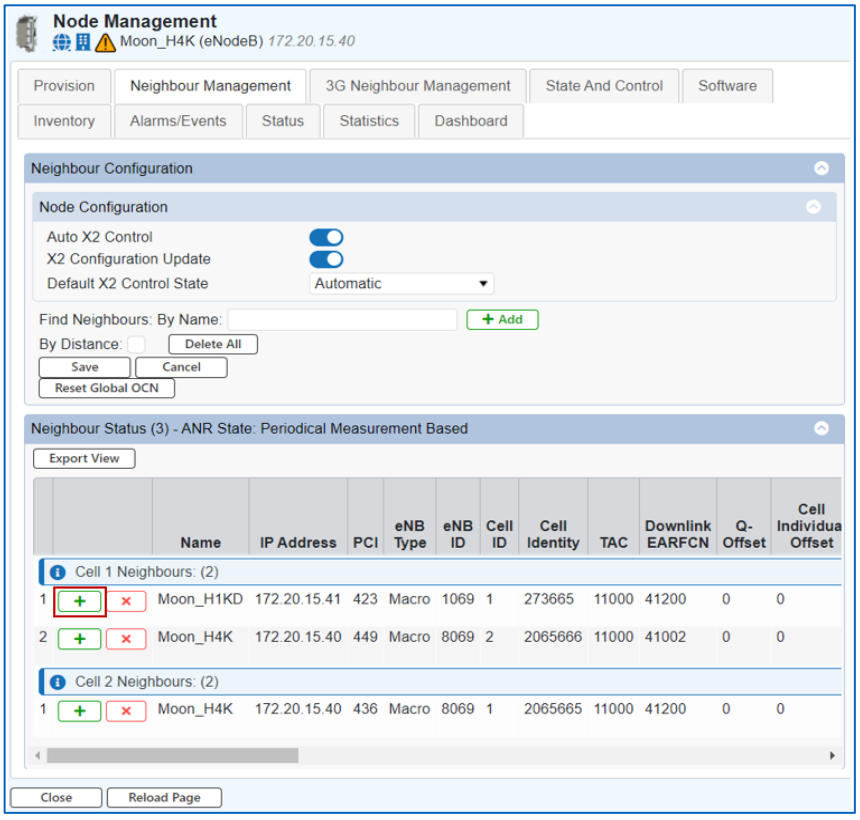
5. When this check box is selected, an add (✚) button and a delete (✕) button will appear adjacent to each node name that is present in the node neighbor list (that is, on the **Neighbour Status** panel) unless it is already listed on the **Neighbour Configuration** panel.

Figure 99: Unknown Nodes



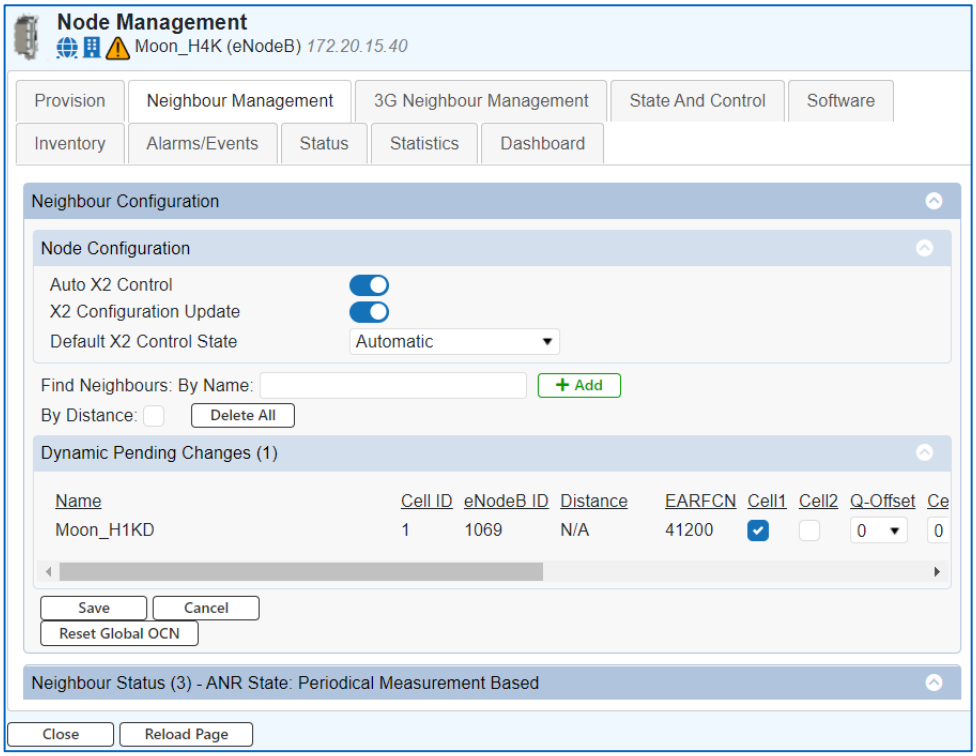
6. Click add (+) to move the required **N/A** node from the **Neighbour Status** panel to the **Neighbour Configuration** panel.

Figure 100: Neighbour Status Panel - Moving a Node to the Netspan Neighbour List



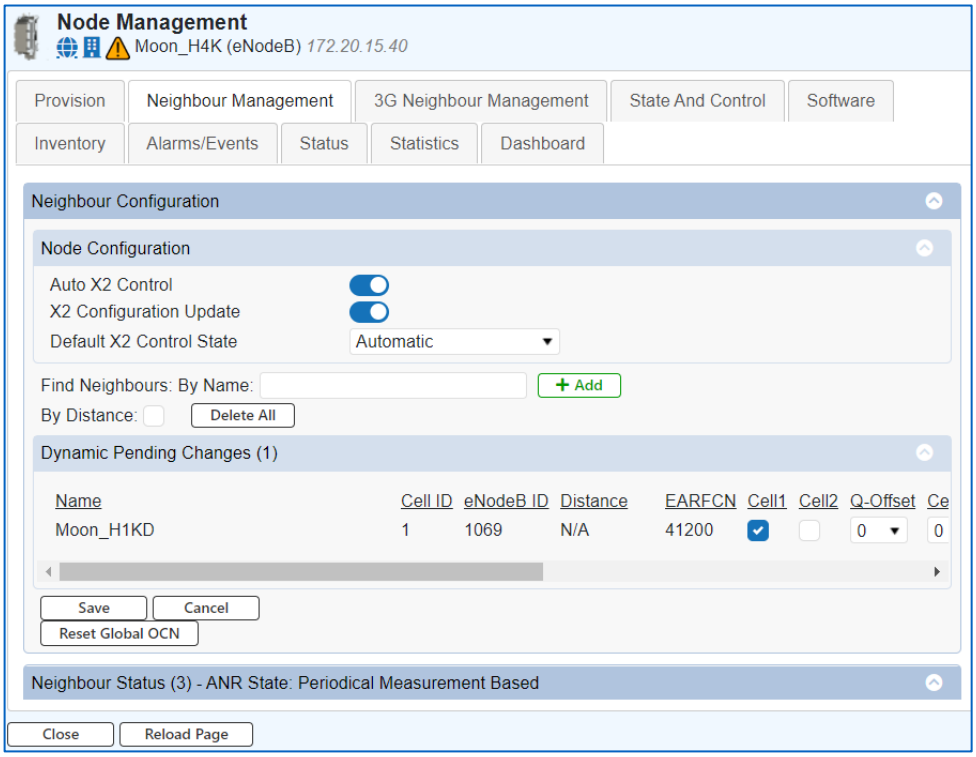
This action will move the node you tried to add to **Neighbour Configuration** panel.

Figure 101: Moving a Node to the Neighbour Configuration Panel (Example)



7. Click **Save** to apply the change. Netspan will retrieve the details from the node and add this 3rd Party eNodeB to the 3rd Party eNodeB list.

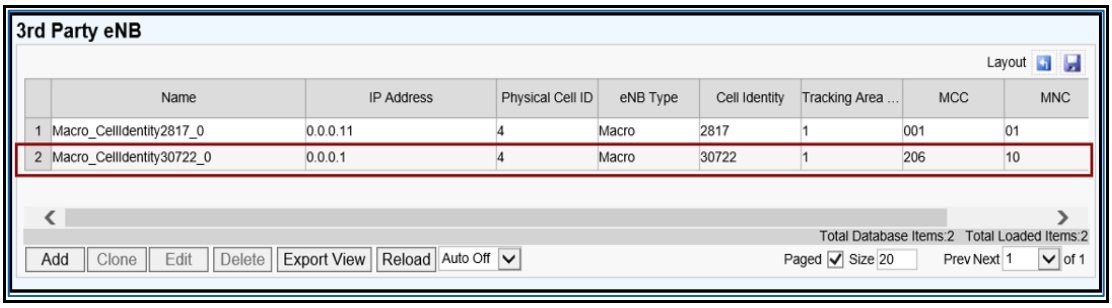
Figure 102: Adding a 3rd Party eNodeB (Example)



8. To view the 3rd Party eNodeB list, select **Configuration Management** > **Node** > **3rd Party eNB** on the main Netspan menu. Now you can find the details of the newly added 3rd party eNodeB here.

Note: This screenshot below is just an example. A similar screen will be displayed after the node is added in the 3rd Party eNodeB list.

Figure 103: 3rd Party eNodeB List (Example)



4.5.2 How to Manage a 3rd Party UTRAN Cell

This section includes procedures for the following:

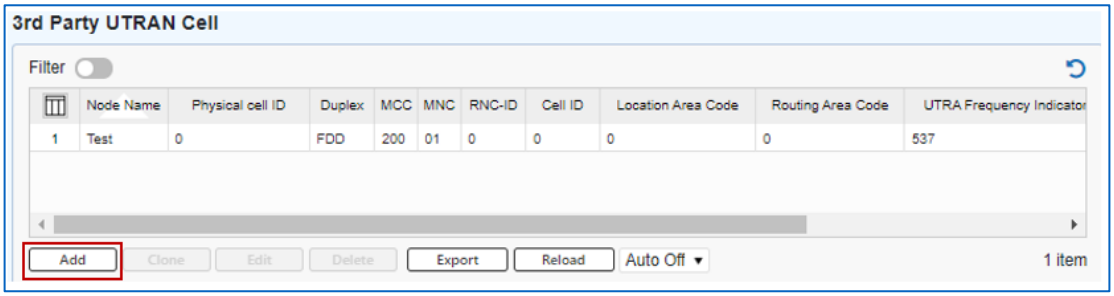
- Adding a 3rd Party UTRAN Cell Node
- Cloning a 3rd Party UTRAN Cell
- Editing Details of a 3rd Party UTRAN Cell Node
- Deleting a 3rd Party UTRAN Cell Node

4.5.2.1 Adding a 3rd Party UTRAN Cell Node

To add a 3rd Party UTRAN Cell Node:

1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party UTRAN Cell**. The **3rd Party UTRAN Cell** page will be displayed. Click **Add**, the **Add 3rd Party UTRAN Cell** page will be displayed.

Figure 104: 3rd Party UTRAN Cell List



2. In the **UTRAN Cell Properties** panel enter the details of the node that you want to add, and then click on **Save**.

Figure 105: Adding a 3rd Party UTRAN Cell Node

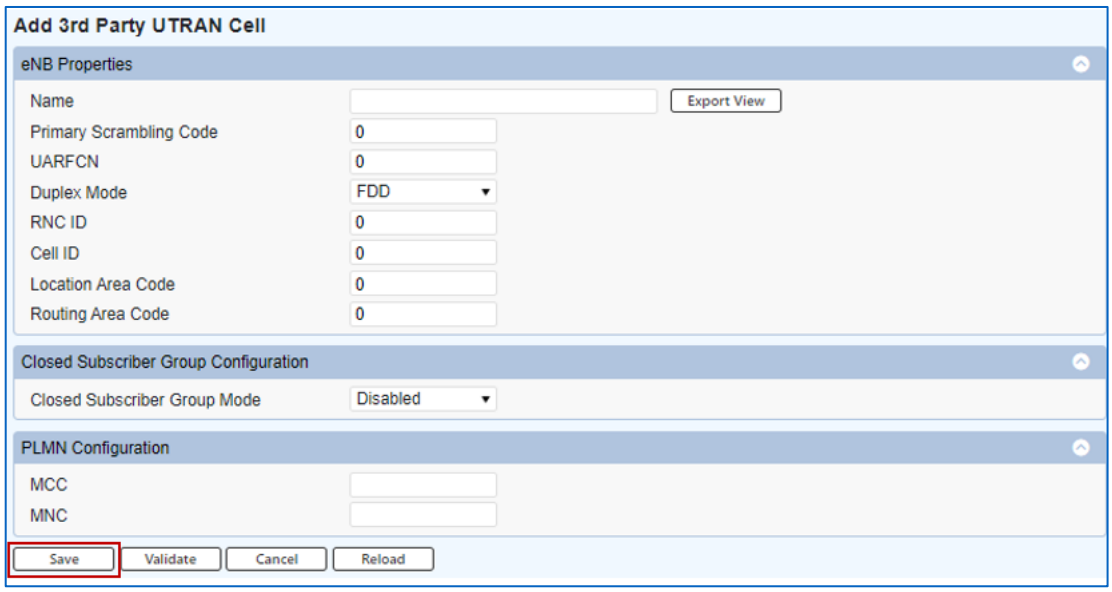


Table 17. 3rd Party UTRAN Cell Properties

Property	Description	Data Type	Range
Name	Node Name.	String	2 to 64 unicode characters (excluding '<', '&', and leading or trailing spaces)
Primary Scrambling Code	Physical cell identity for UMTS (3G) cells.	Integer	0 to 511
UARFCN	UMTS (3G) frequency descriptor.	Integer	0 to 16383
Duplex Mode	Duplex mode indicator. In UMTS releases, there is a different PCI range and measurement related encoding for FDD & TDD cells.	Enumerated	FDD, TDD
RNC ID	Identity of the 3G Radio network subsystem. 12 MSBs of Global UTRAN cell identity (manually, up to 16 bit value may be configured e.g. Extended RNC ID)	Integer	0 to 65535
Cell ID	Full cell identity as measured by the UE when fetching CGI.	Bit String (28)	0 to 268435455
Location Area Code	A fixed length code identifying the location area within a PLMN.	Bit String (16)	0 to 65535

Property	Description	Data Type	Range
Routing Area Code	The RAC identity read from broadcast information - not mandatory.	Bit String (8)	0 to 255
Closed Subscriber Group Configuration			
Closed Subscriber Group Mode	This parameter enables CSG Access Control Mode.	Enumerated	Enabled, Disabled
Closed Subscriber Group ID	Unique identifier within the scope of the PLMN which identifies a Closed Subscriber Group in the PLMN.	Integer	0 to 134217727
PLMN Configuration			
MCC	Specifies the mobile country code.	Integer	0 to 999
MNC	Specifies the mobile network code.	Integer	0 to 999

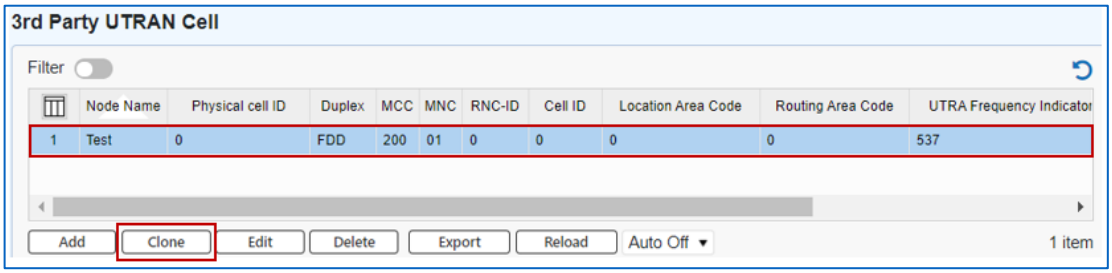
4.5.2.2 Cloning a 3rd Party UTRAN Cell

The easiest way to add a new 3rd Party UTRAN Cell node is to clone an existing 3rd party eNodeB and update it with the details of the new node that you want to add.

To clone an existing 3rd Party UTRAN Cell node:

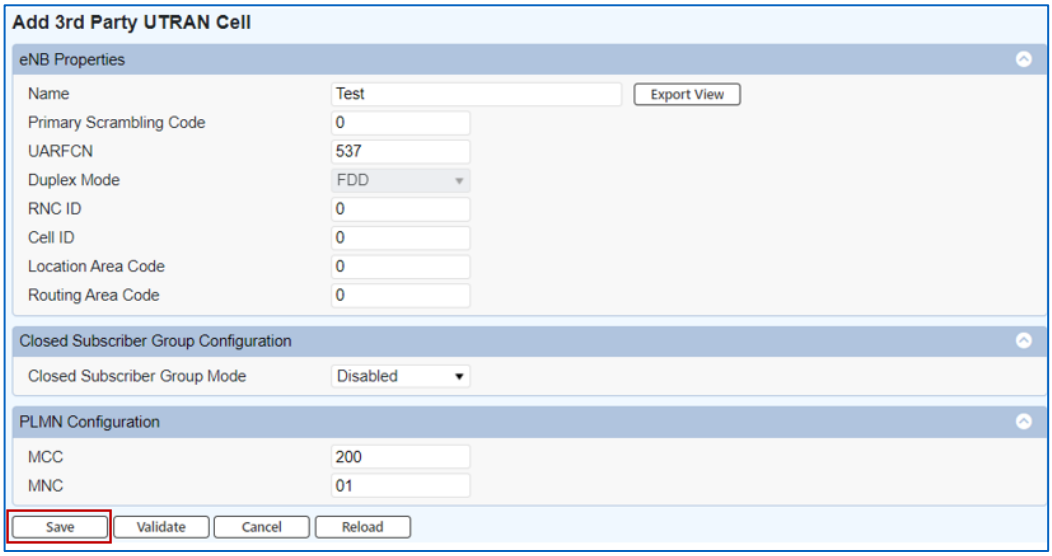
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party UTRAN Cell**. The **3rd Party UTRAN Cell** page will be displayed. Select the node that you want to clone and then click **Clone.**

Figure 106: 3rd Party UTRAN Cell List



2. On the **Add 3rd Party UTRAN Cell** page make the required changes and then click **Save**.

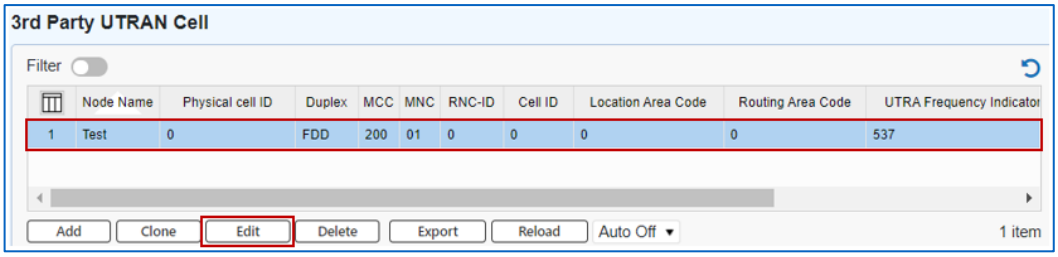
Figure 107: Cloning a 3rd Party UTRAN Cell Node



4.5.2.3 Editing Details of a 3rd Party UTRAN Cell Node

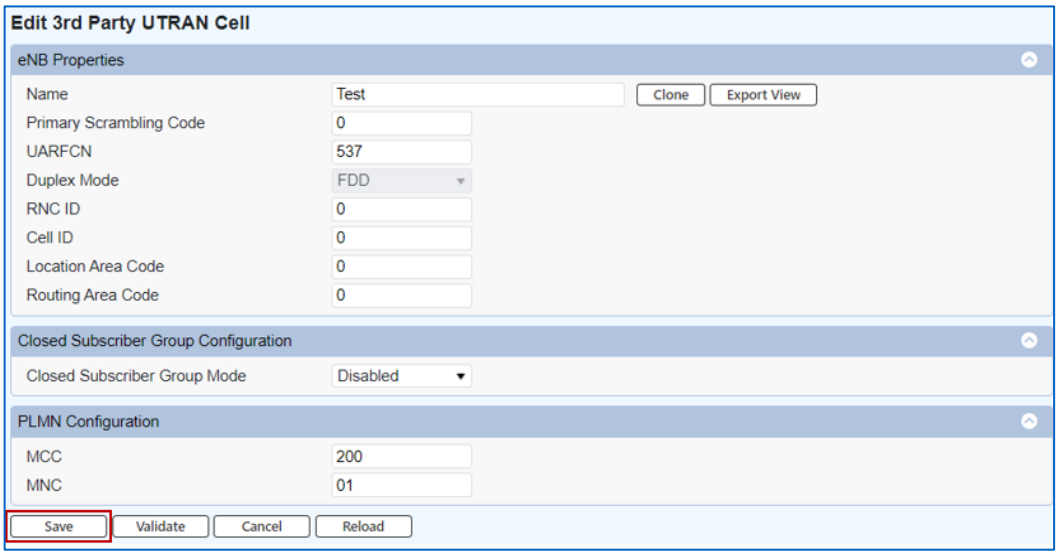
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party UTRAN Cell**. The **3rd Party UTRAN Cell** page will be displayed. Select the node whose details you want to update and then click **Edit.**

Figure 108: 3rd Party UTRAN Cell List



2. On the **Edit 3rd Party UTRAN Cell** node page make the required changes and then click **Save.**

Figure 109: Editing 3rd Party UTRAN Cell Node Details

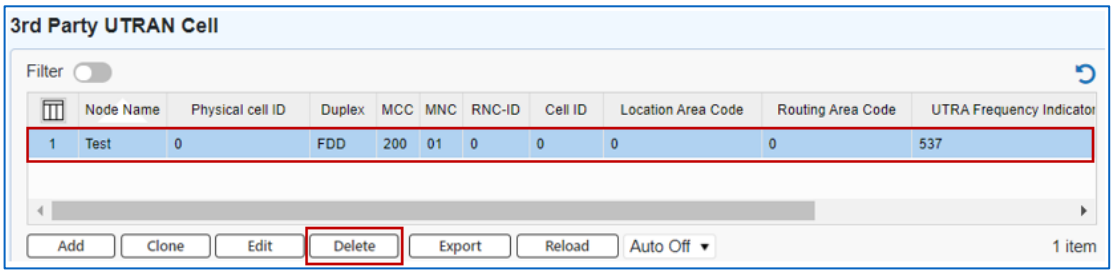


4.5.2.4 Deleting a 3rd Party UTRAN Cell Node

To delete a 3rd Party UTRAN Cell Node:

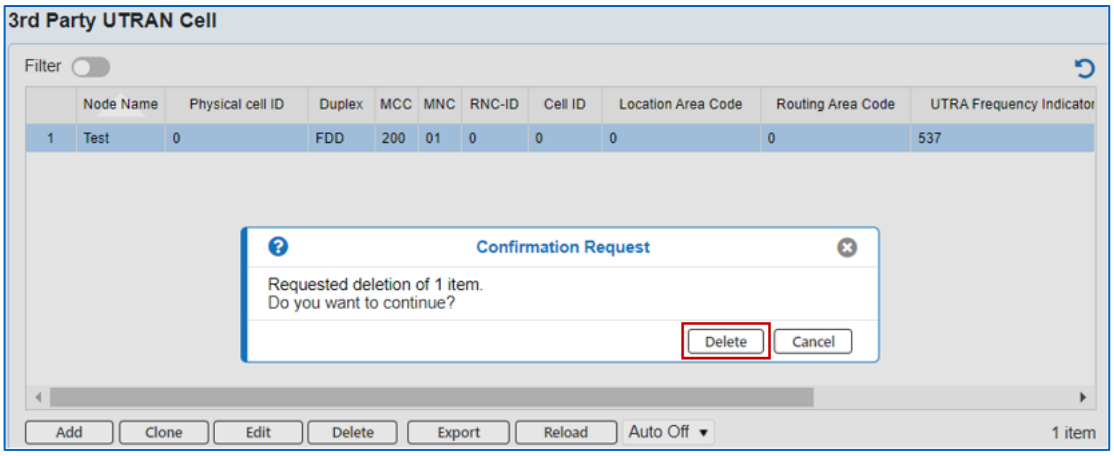
1. On the Netspan main menu, select **Configuration Management** > **Node** > **3rd Party UTRAN Cell**. The **3rd Party UTRAN Cell** page will be displayed. Select the node which you want to delete and then click **Delete.**

Figure 110: 3rd Party UTRAN Cell List



2. A confirmation message box will be displayed, asking if you want to delete the selected eNodeB. Click **Delete**. The node will then be removed from the 3rd Party UTRAN Cell Node list.

Figure 111: Deleting 3rd Party UTRAN Cell Node



4.5.3 How to Manage Neighbours

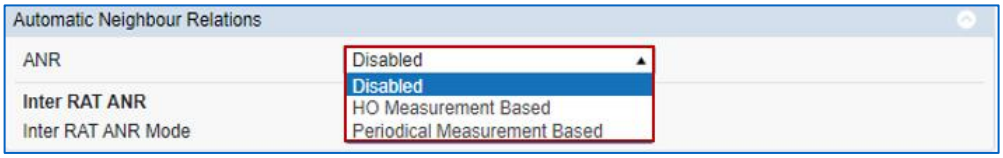
Note: This section applies to 3rd party and Airspan eNodeBs only.

4.5.4 Configuring ANR on SON Profile

While provisioning a SON profile, you can set ANR to one of the following states:

- Disabled
- HO Measurement Based
- Periodical Measurement Based

Figure 112: ANR Options

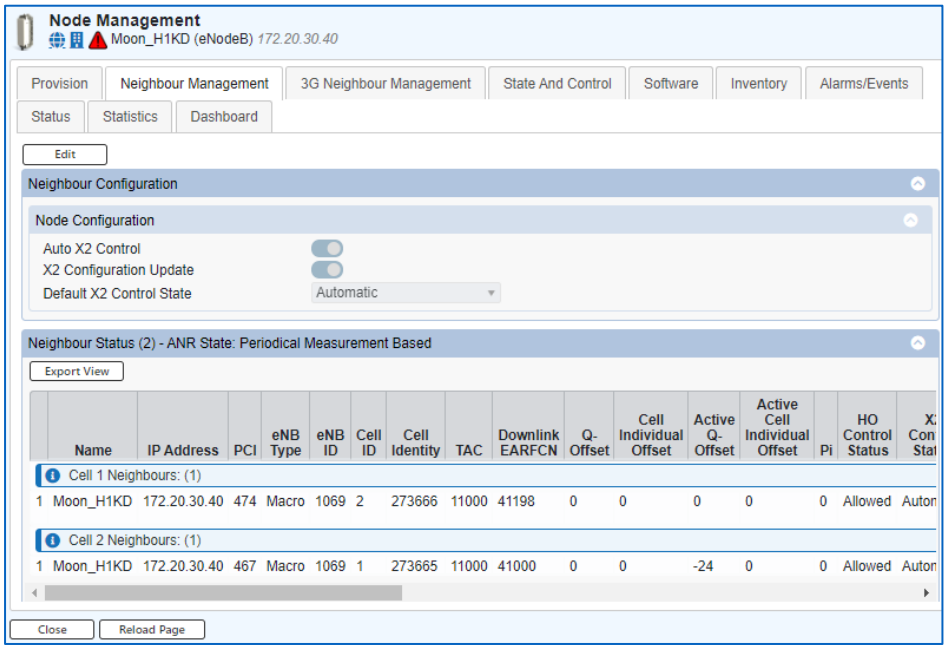


For more information on how to provision a node profile, see How to Provision Node Profiles.

You can manually configure neighbours through Netspan only when ANR is set to **Disabled** or **HO Measurement Based**. For instructions on how to manually configure a neighbour using Netspan, see How to Add a Static (White - Listed) Neighbour and How to Add a Non-Static Neighbour.

Note: You **cannot** manually configure neighbours through Netspan when ANR is set to **Periodical Measurement Based.**

Figure 113: ANR State: Periodical Measurement Based



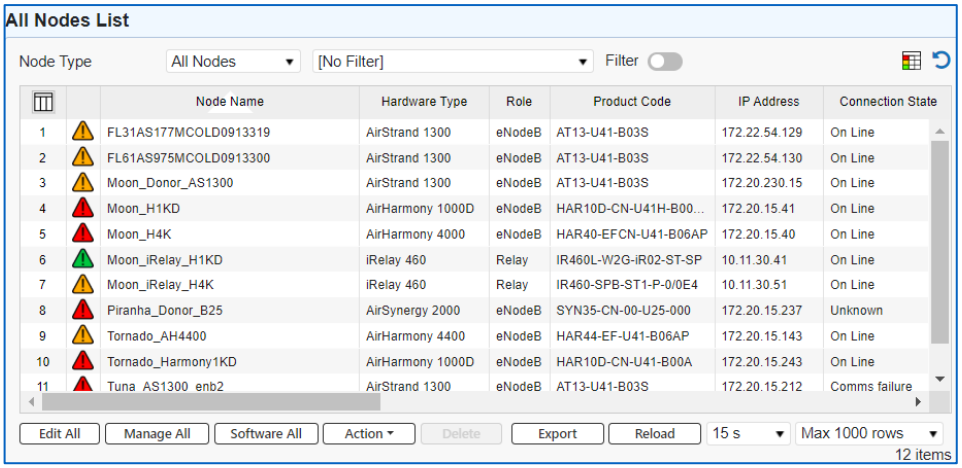
4.5.4.1.1 How to Add a Static (White - Listed) Neighbour

Note: You can add neighbours for an eNodeB only if that eNodeB has ANR *Disabled* or *HO Measurement Based* SON profile.

To add static neighbours:

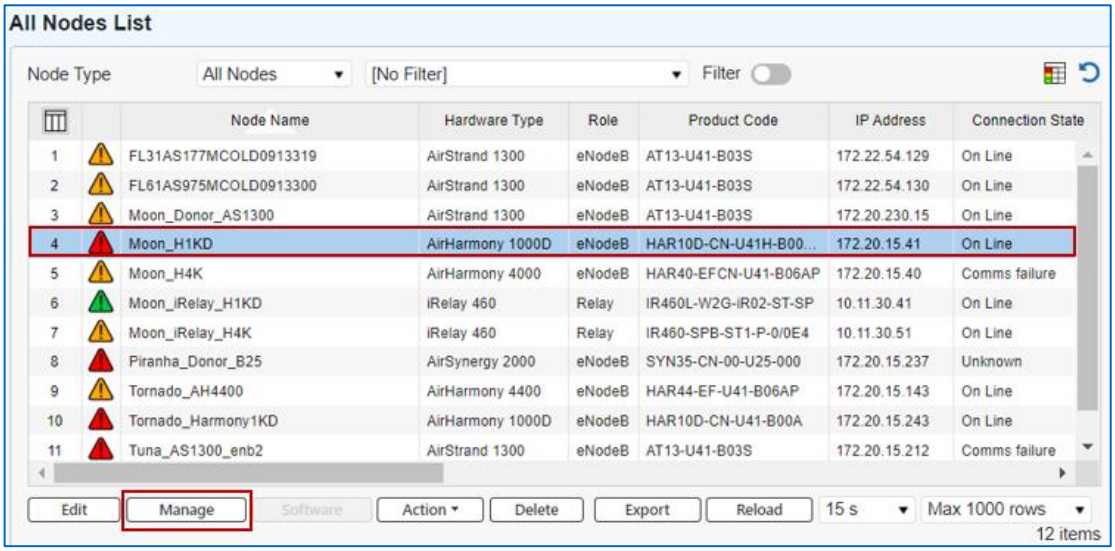
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all currently configured nodes will appear. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 114: eNodeB List



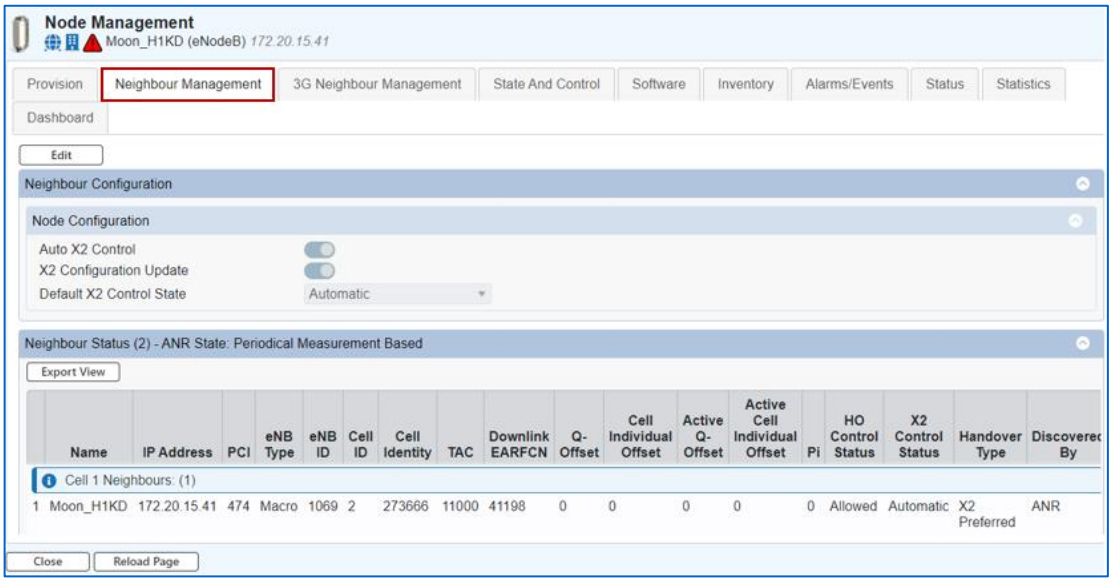
2. Select the eNodeB for which you want to add neighbours and then click **Manage**.

Figure 115: Selecting the Node



3. On the **Node Management** page select the **Neighbour Management** tab.

Figure 116: Neighbour Management Tab



The **Neighbour Management** tab includes the following panels:

- **Node Configuration** - allows you to configure Auto X2 Control, X2 Configuration Update, and Default X2 Control State.

  Note: **Default X2 Control State** is used as default **X2 Control State** for any new neighbours added manually.

- **Neighbour Configuration (x)** - where x denotes the number of eNodeBs configured as neighbours for the selected node in Netspan.

  Note: This panel does not appear when ANR is set to **Periodical Measurement Based**.

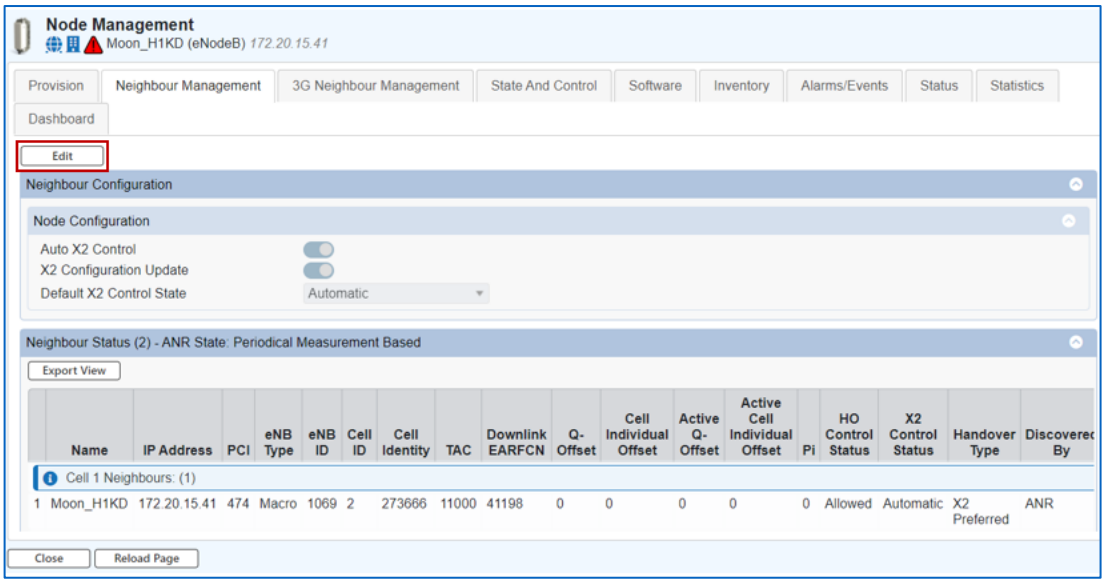
- **Neighbour Status (x)** - where x denotes the number of eNodeBs configured as neighbours (for the selected node) on the equipment. Netspan automatically refreshes the list of neighbour nodes periodically.

For more information on the parameters that you view under each panel see *ARD-D00741 Netspan Parameters Reference Guide*.

4. Click **Edit** to enable the edit mode.

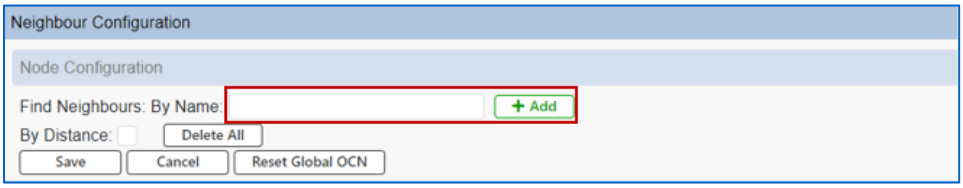
> **Note:** This check box does not appear when ANR is set to **Periodical Measurement Based**.

Figure 117: Allowing Edit



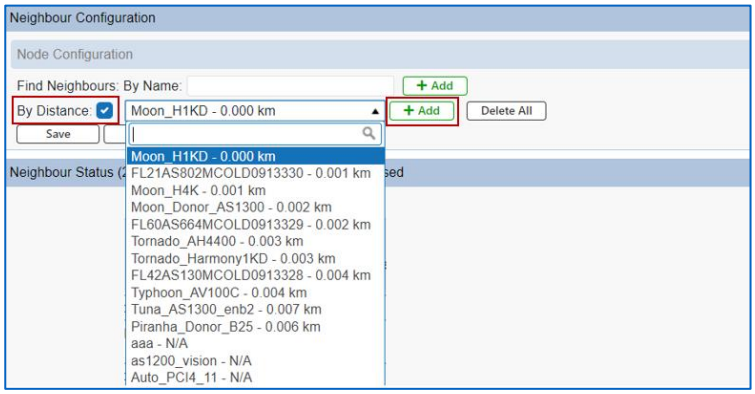
5. In the **Neighbour Configuration** panel, to add neighbours, do one of the following:
   - Search for specific neighbours by adding their names:
     a. Add the name of the node that you want to add to the **By Name** box and then click (+ Add) to list it on the **Neighbours** list.

Figure 118: Adding a Neighbour by Name



   - Search for neighbours by distance:
     a. Select the **By Distance** check box. Then, Netspan displays a drop-down list containing the names of all the neighbour nodes.
     b. From the **By Distance** drop-down list, select the node that you want to add as a neighbour, and then click (+ Add) to list it on the **Neighbours** list.

Figure 119: Adding a Neighbour by Distance



6. Once you have completed the process of adding a neighbour manually, you can find the details of that neighbour on the **Neighbour Configuration** panel.

Figure 120: Adding a Neighbour

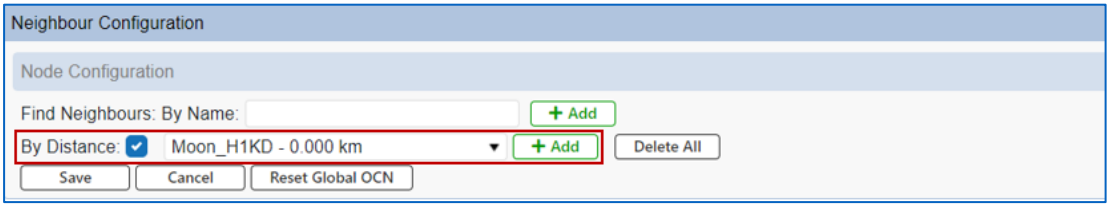
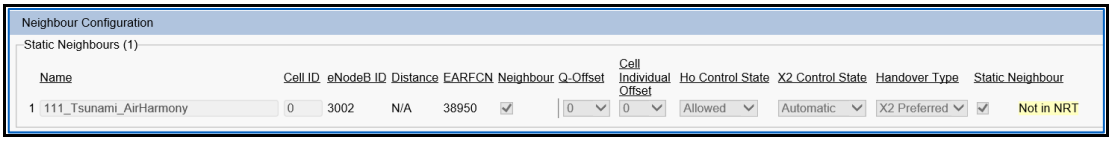


Figure 121: Updated Neighbour List (Example)



By default, all the manually added neighbours are static neighbours. For a manually added neighbour, you can find that the **Static Neighbour** check box is automatically selected.

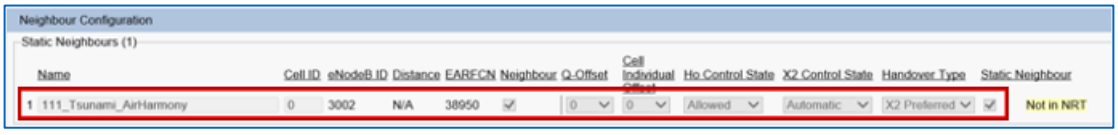
7. Click **OK**.

4.5.4.1.2 How to Add a Non-Static Neighbour

Note: You can add neighbours for an eNodeB only if that eNodeB has an ANR *Disabled* or *HO Measurement Based* SON profile.

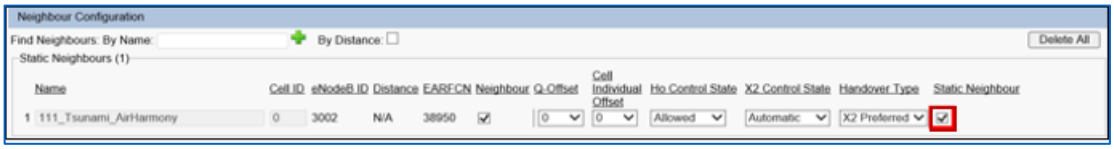
1. Perform steps 1 through 6 listed in How to Add a Static (White - Listed) Neighbour.
2. Once you have completed the process of adding a neighbour manually, you can find the details of that neighbour on the **Neighbours** panel.

Figure 122: Neighbour Details (Example)



By default, all the manually added neighbours are static neighbours. To change the state of a neighbour eNodeB from static to non-static, deselect the **Static Neighbour** check box.

Figure 123: Non-Static Neighbour (Example)



3. Click **OK**.

> **Note:** ANR might remove a non-static neighbour during its operation.

4.5.5 How to View Neighbour List

> **Note:** This section applies to 3rd party and Airspan eNodeBs only.

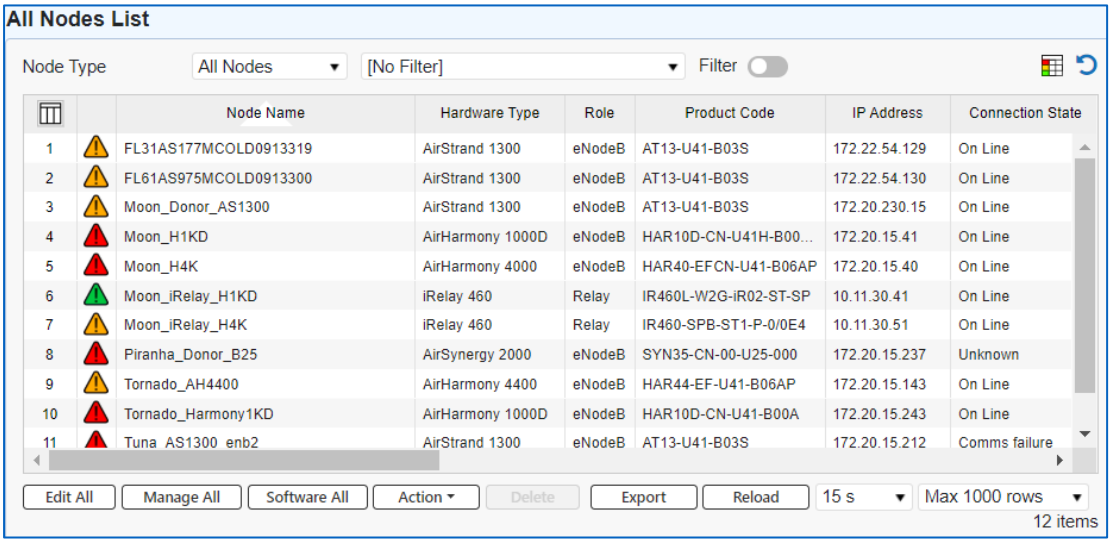
This section includes procedures for the following:

- Viewing Neighbour List
- How to Delete a Neighbour from Netspan Neighbour List
- How to Move a Neighbour Configured on Node to Netspan Neighbour List
- How to Delete a Neighbour Configured on Node

4.5.5.1 Viewing Neighbour List

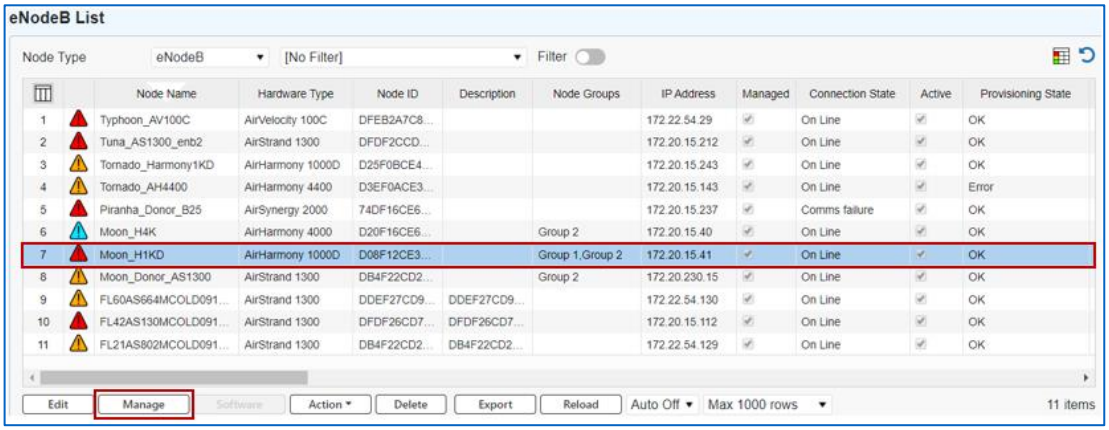
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all currently configured nodes will appear. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 124: eNodeB List



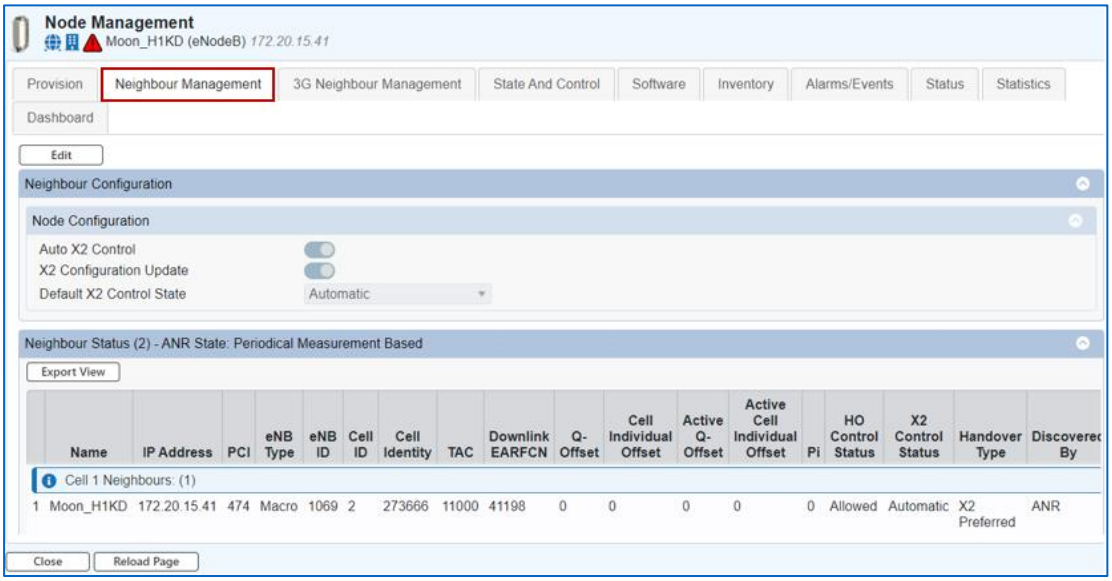
2. Select the eNodeB whose neighbours you want to view, and then click **Manage**.

Figure 125: Selecting a Node



3. On the **Node Management** page, you can view the list of neighbours on the **Neighbour Configuration** panel.

Figure 126: Neighbour List

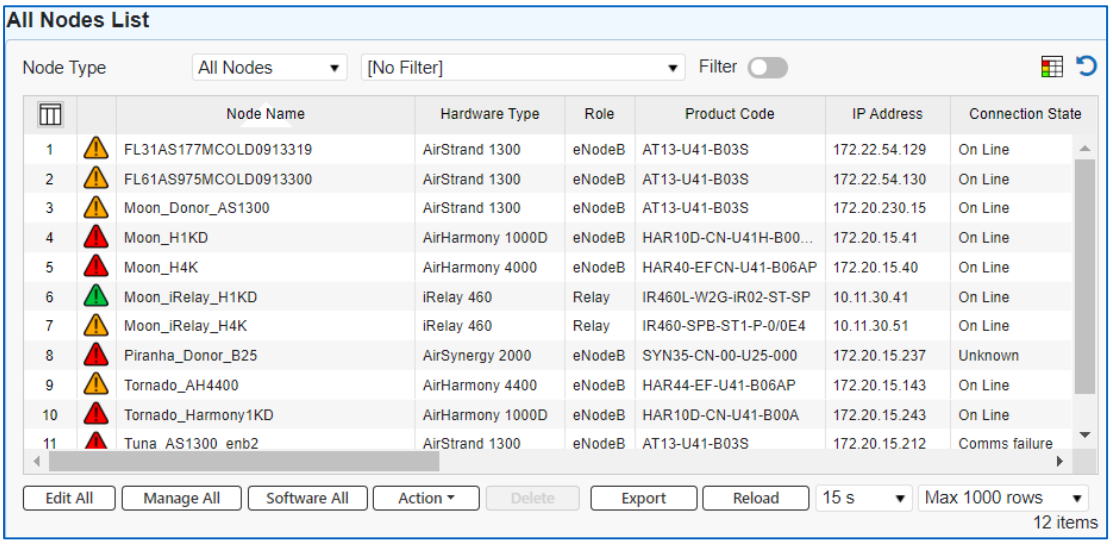


4. After reviewing the details click **Close** to return to the **eNodeB List** screen.

4.5.5.2 How to Delete a Neighbour from Netspan Neighbour List

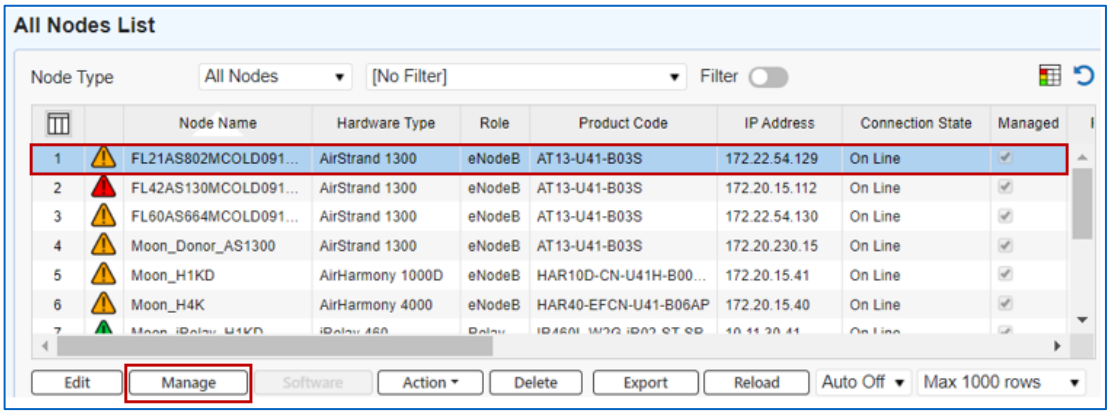
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all currently configured nodes will appear. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 127: eNodeB List



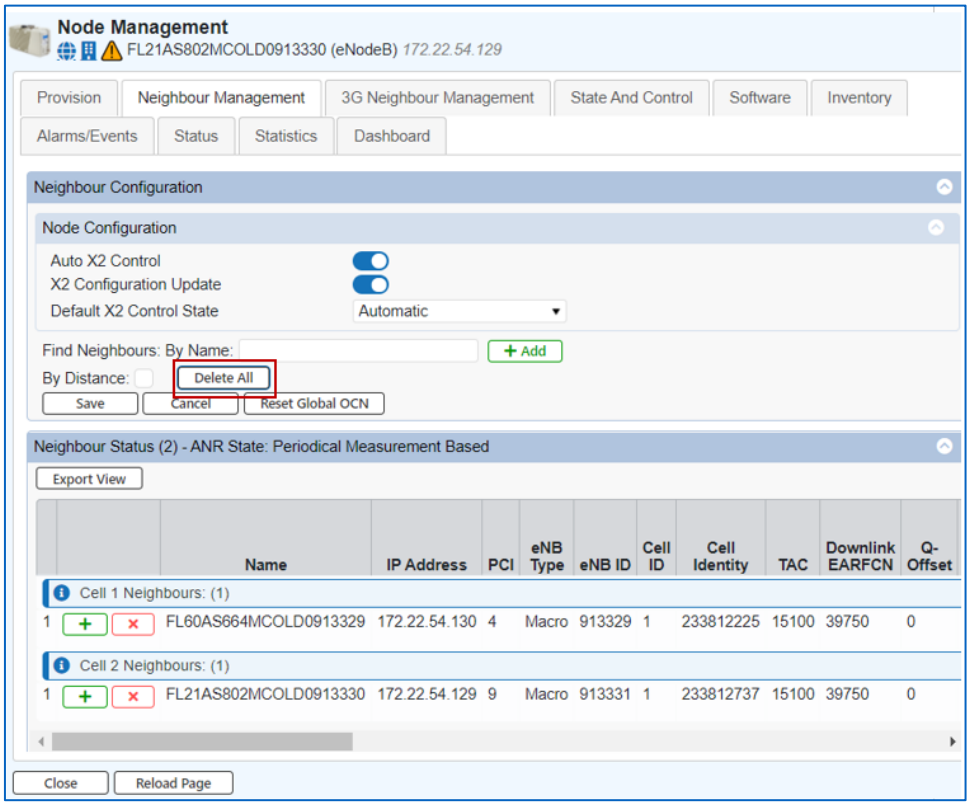
2. Select the eNodeB whose neighbour you want to delete and then click **Manage**.

Figure 128: Selecting a Node



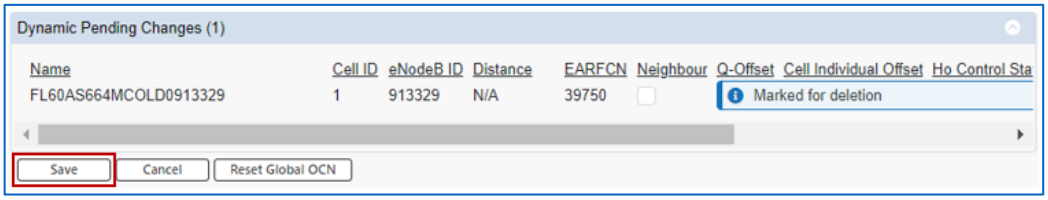
3. Click **Edit** to enable the edit mode. When you click the **Edit** button, a **Delete All** button appears on the **Neighbour Configuration** panel.
   - To delete all nodes listed in the Netspan neighbour list:
     a. Click the Delete All button to mark all nodes for deletion.
     b. Click Save to confirm deletion.

Figure 129: Deleting All Neighbour Nodes



- To delete specific nodes, click ( ). Then click Save to confirm the node marked for deletion.

Figure 130: Deleting Specific Neighbour Nodes



The selected nodes will be removed from the list.

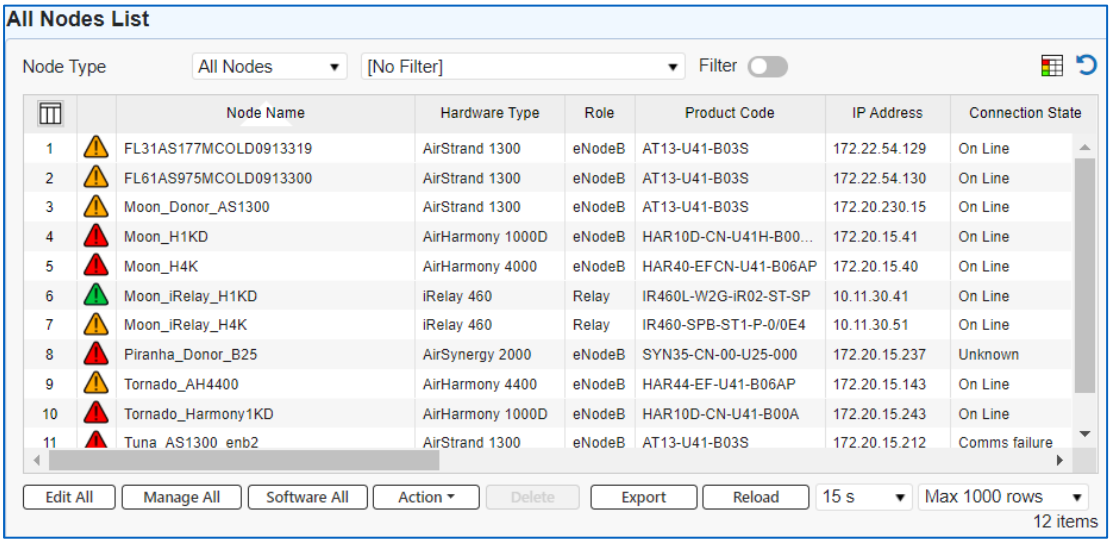
4.5.5.3 How to Move a Neighbour Configured on Node to Netspan Neighbour List

Neighbours configured on the nodes, but not added to the neighbour list of Netspan, appear on the **Node Status** panel. On certain occasions, you might need to update the details of a neighbour configured on the node. In such cases, first you need to move them to the Netspan neighbour list, and then make the required changes.

To move a node to the Netspan neighbour list:

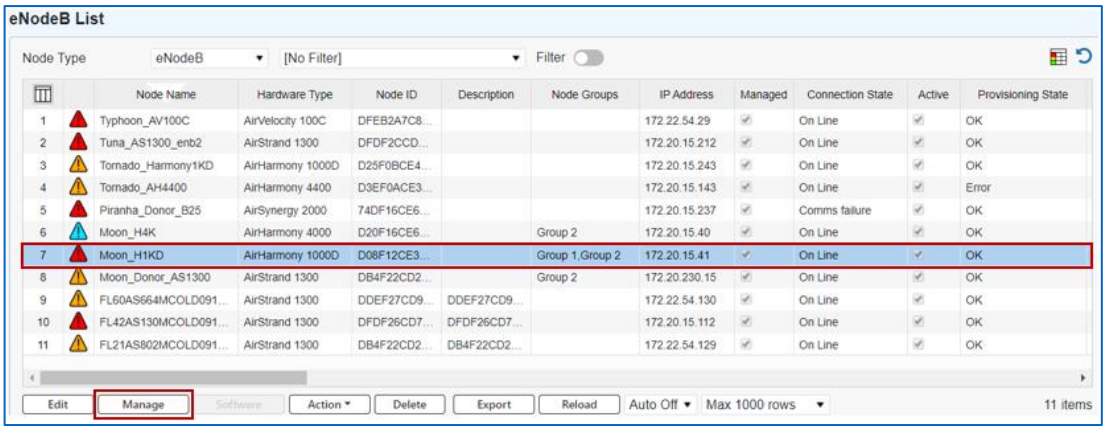
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all currently configured nodes will appear. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 131: eNodeB List



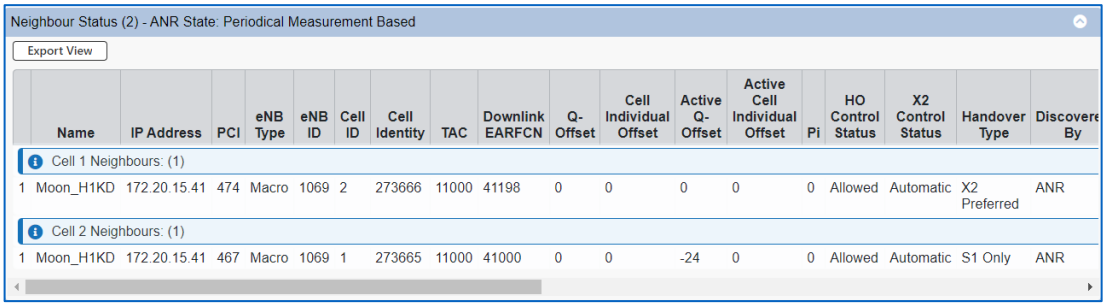
2. Select the eNodeB whose neighbor configuration you want to update and then click **Manage**.

Figure 132: Selecting a Node



3. On the **Node** Management page, you can find the details of the neighbours that are configured on the node under the **Neighbour Status** panel.

Figure 133: Neighbour Status Panel (Example)

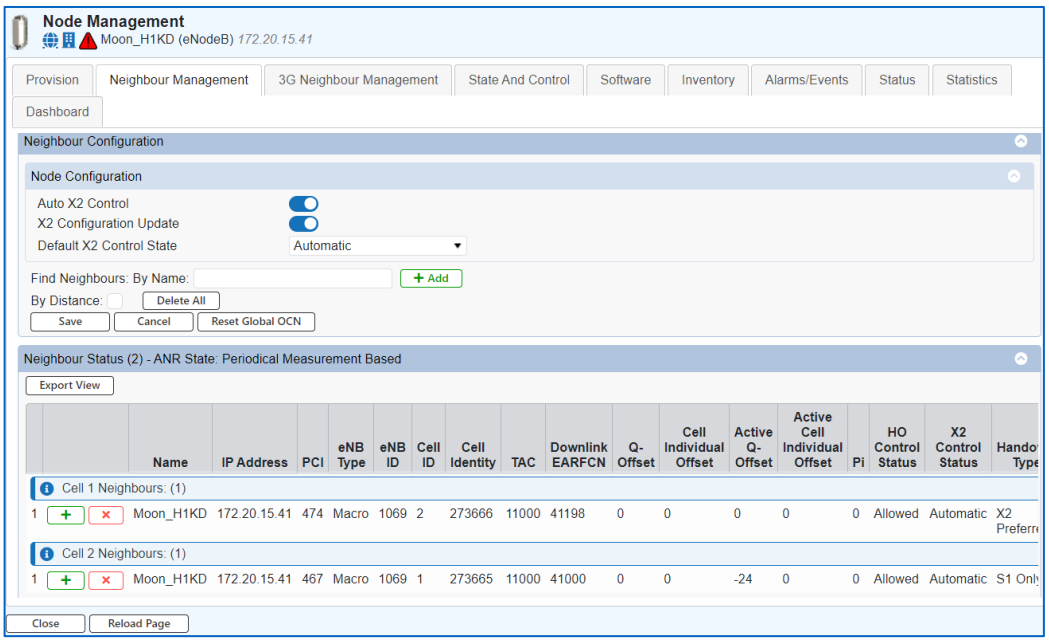


Note: Netspan retrieves the information shown on the **Neighbour Status** panel from the node.

4. Click **Edit** to enable the edit mode. When you click Edit, an add (+) button and a delete (×) button will appear adjacent to each node name that is present in the node neighbor list (that is, on the **Neighbour Status** panel), unless it is already listed on the **Neighbour Configuration** panel.

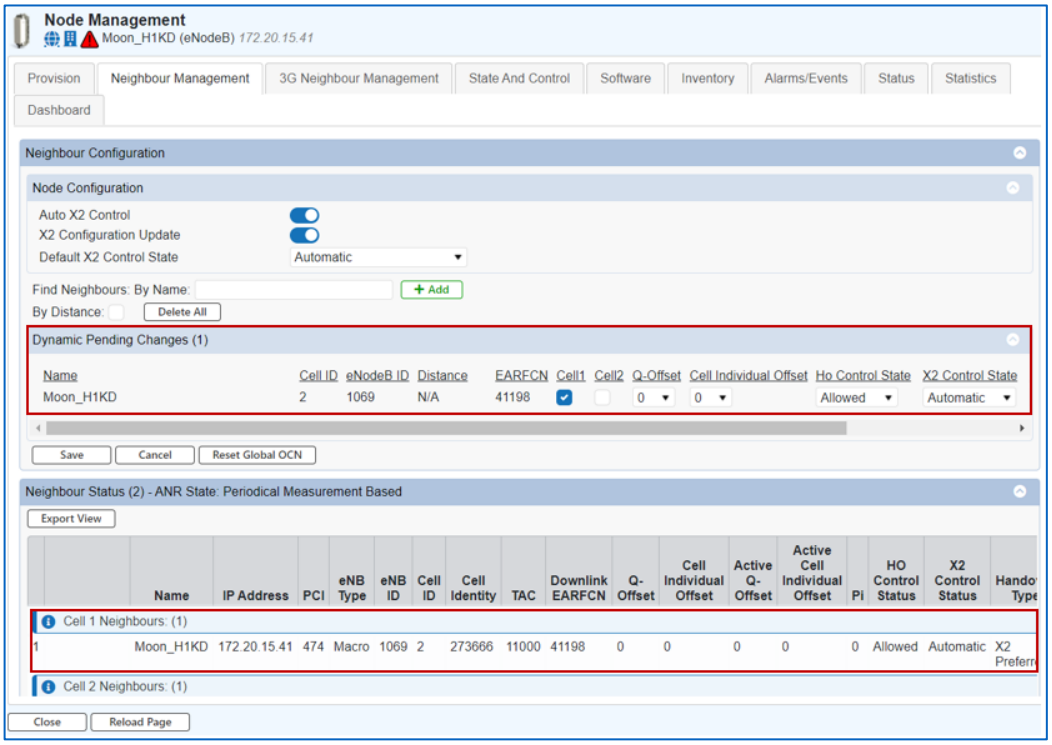
5. Click add (+) to move a node from the **Neighbour Status** panel to the **Neighbour Configuration** panel.

Figure 134: Neighbour Status Panel - Moving a Node to Netspan Neighbour List (Example)



6. This action will move the node you tried to add to the **Neighbour Configuration** panel.

Figure 135: Moving a Node to Neighbour Configuration Panel (Example)



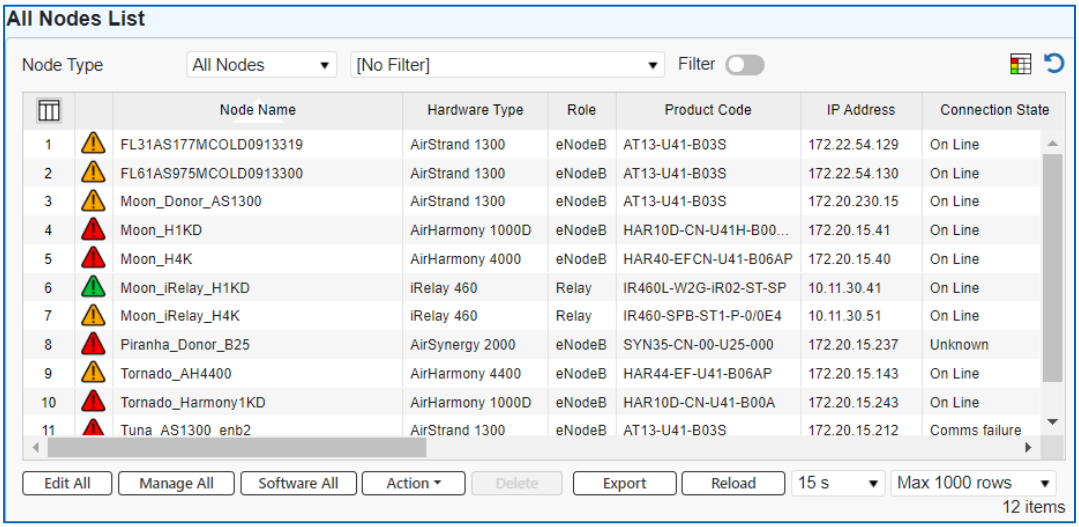
7. Click **Save** to apply the change.

4.5.5.4 How to Delete a Neighbour Configured on Node

If you want to remove a neighbour node that is configured on the node but not added to the Netspan Neighbour list, perform the following.

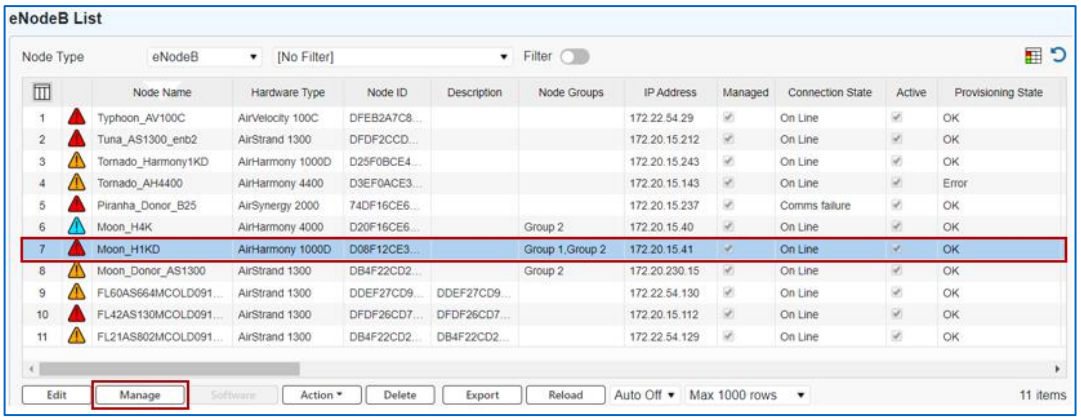
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of the currently configured nodes will appear. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeB will be displayed.

Figure 136: eNodeB List



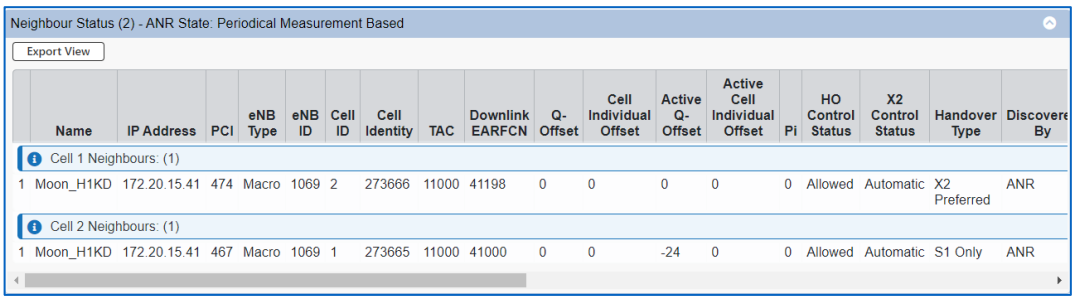
2. Select the eNodeB whose neighbour you want to delete and then click **Manage**.

Figure 137: Selecting a Node



3. On the **Neighbour Management** tab, you can find the details of the neighbours that are configured on the node under the **Neighbour Status** panel.

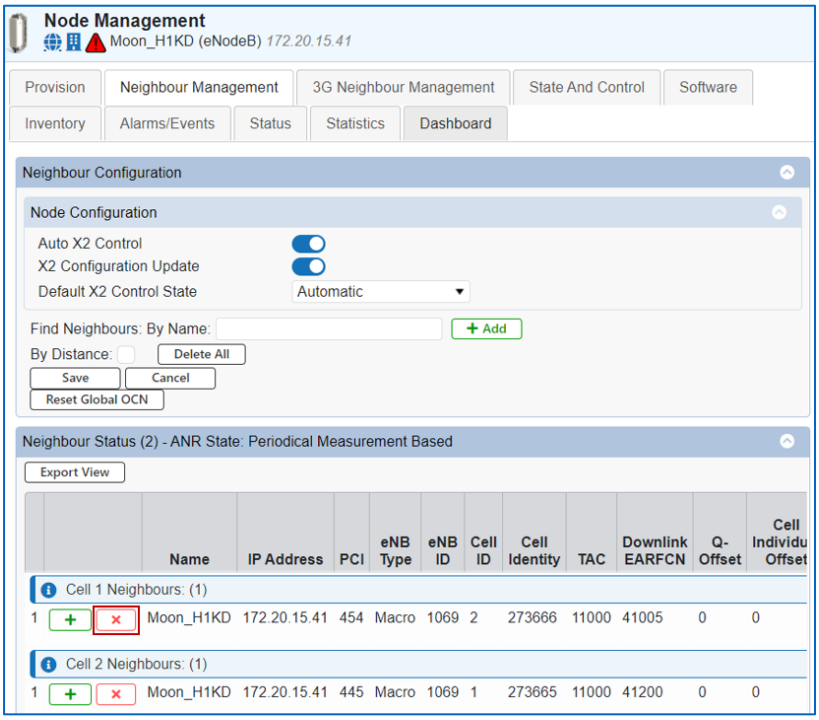
Figure 138: Neighbour Status Panel - Neighbour Nodes Configured on a Node (Example)



Note: Netspan retrieves the information shown on the **Neighbour Status** panel from the node.

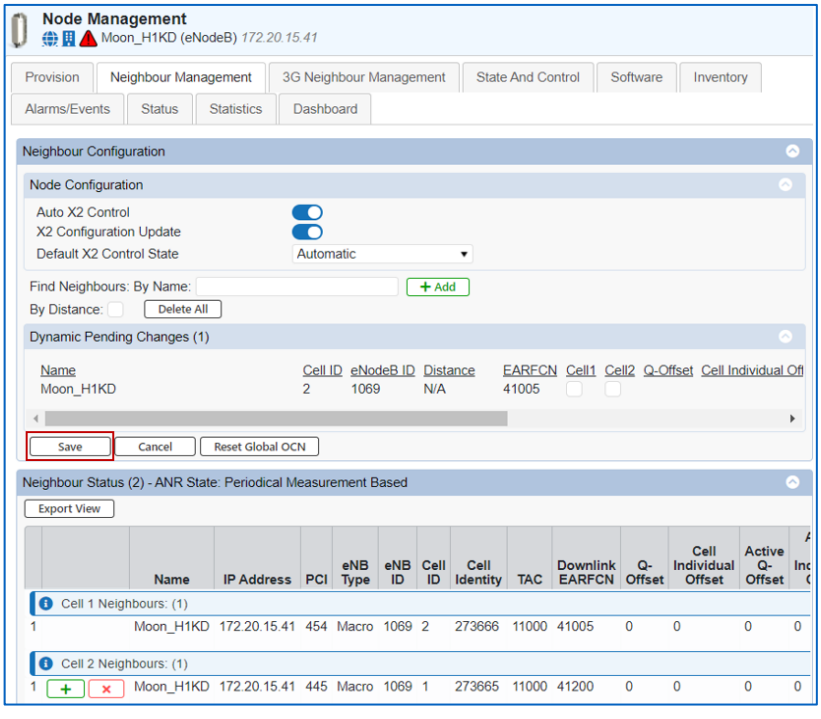
4. Click **Edit** to enable the edit mode. When you click Edit, an add (+) button and a delete (×) button will appear adjacent to each node name that is present in the node neighbor list (that is on the **Neighbour Status** panel), unless it is already listed on the **Neighbour Configuration** panel. To delete a node from the list, click the delete (×) button.

Figure 139: Deleting a Node - Neighbour Status Panel (Example)



5. This action will move the node you tried to delete from **Neighbour Configuration** panel and mark it for deletion.

Figure 140: Marking a Node for Deletion (Example)



6. Click **Save** to confirm deletion.

4.5.6 How to Blacklist a Neighbour

Note: This section applies to 3rd party and Airspan eNodeBs only.

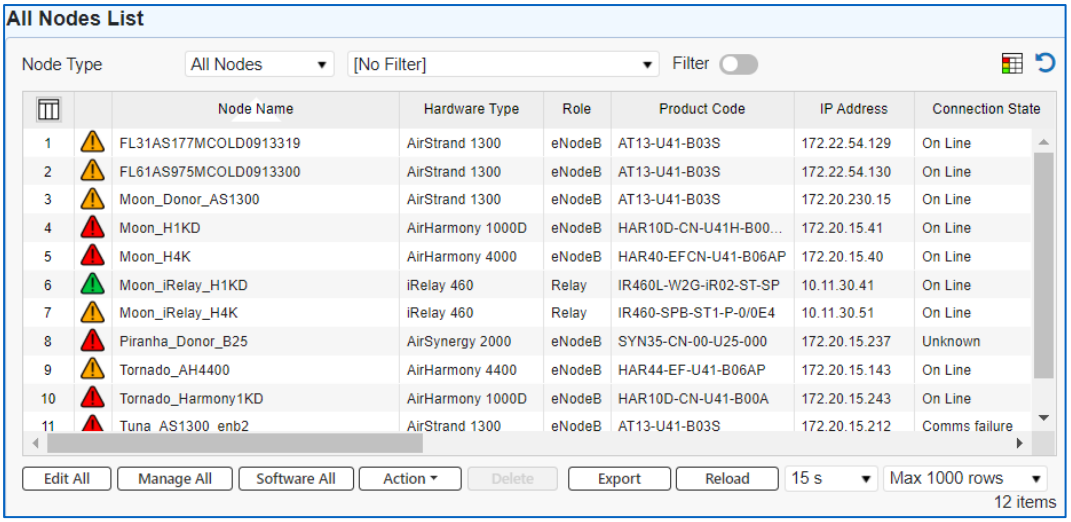
Depending on the uplink and downlink signal quality and the measurement result from a UE, an eNodeB might initiate handing over of UEs to other eNodeBs in the **Neighbours** list. Blacklisting is the process of preventing a source eNodeB from handing over its UEs to specific neighbour eNodeBs.

On some occasions (for example, when you want to use an eNodeB exclusively for specific UEs) you will have to prevent an eNodeB from handing over its UEs to specific neighbour eNodeBs. You can accomplish this by blacklisting the neighbour eNodeBs to which you do not want a source eNodeB to handover its UEs.

To blacklist a neighbour:

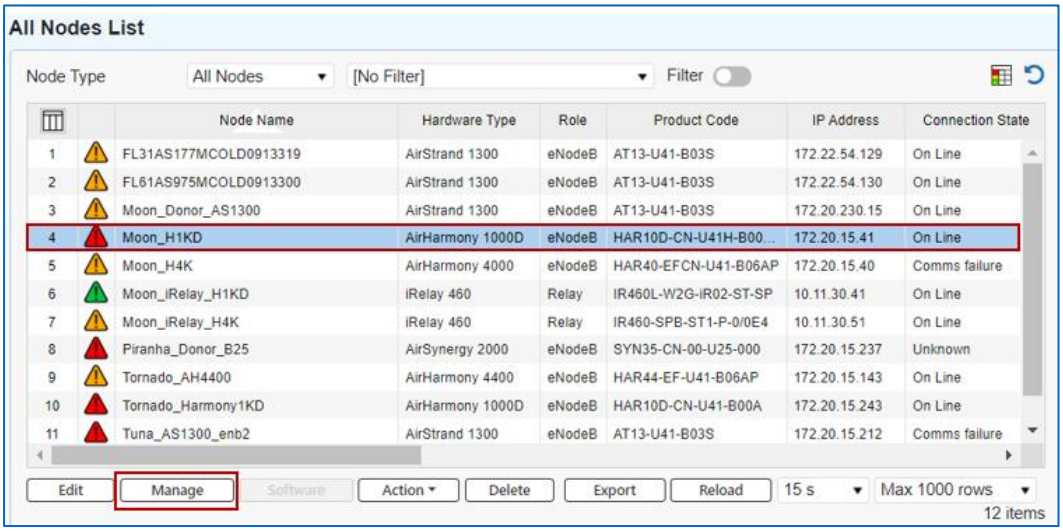
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. A node list showing the details of all currently configured nodes appears. In the **Node Type** drop-down box select **eNodeB**. An eNodeB list showing the details of all currently configured eNodeBs appears.

Figure 141: eNodeB List



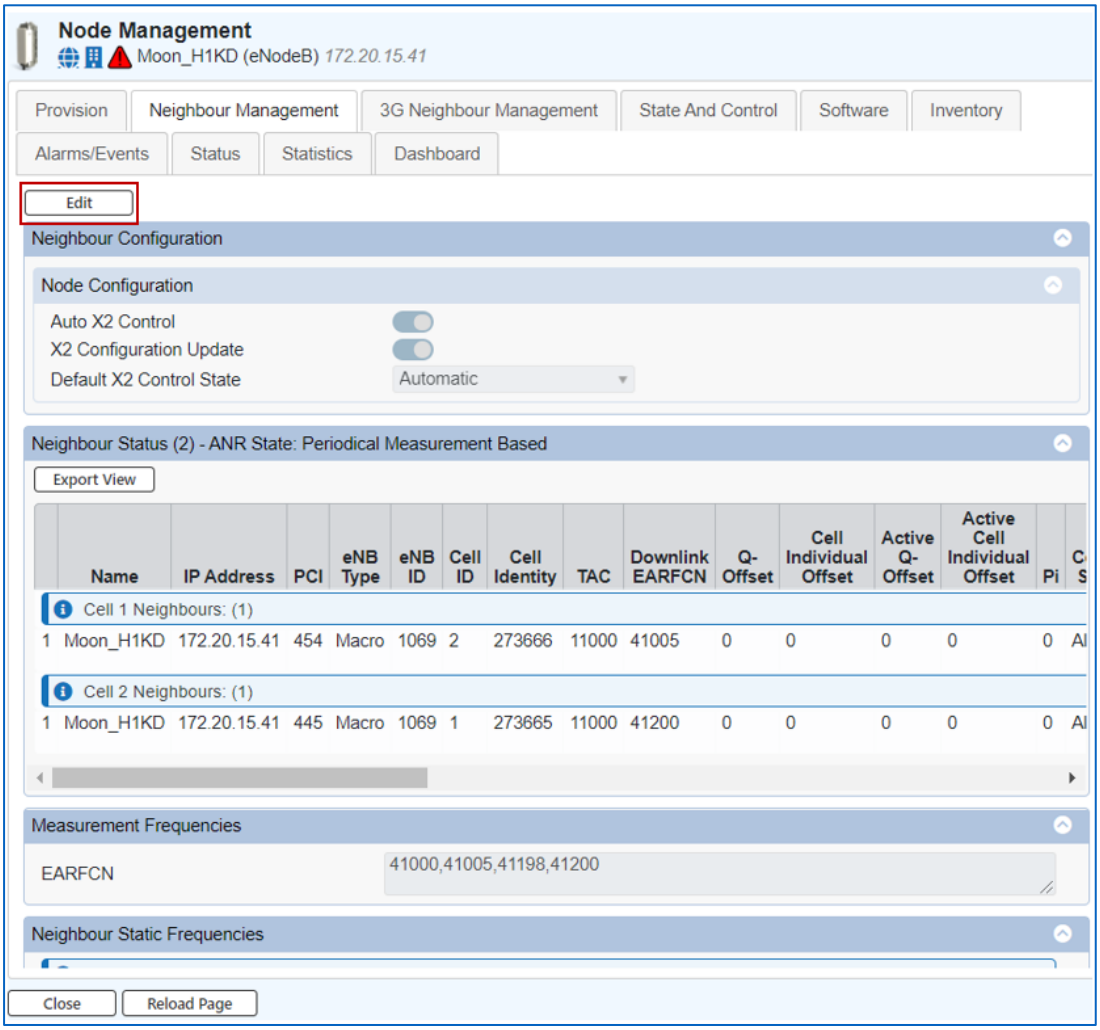
2. Select the eNodeB whose neighbour you want to blacklist, and then click **Manage**.

Figure 142: Selecting a Node



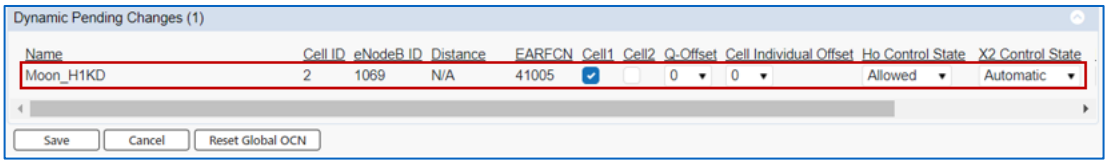
3. Select the **Allow Edit** check box to enable the edit mode.

Figure 143: Allowing Edit



4. On the **Neighbour Management** tab, under Neighbour Status panel, click (+) to edit the neighbour that you want to blacklist. Then, under Dynamic Pending Changes, set **Ho Control State** to **Prohibited** and **X2 Control State** to **Not Allowed** for the neighbour that you want to blacklist.

Figure 144: Blacklisting a Neighbour



5. Click **Save** to apply the change.

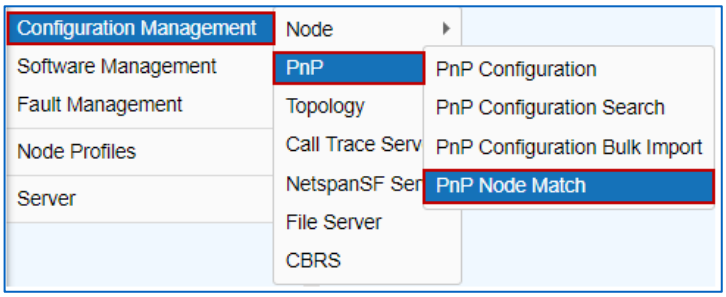
Note: To retain a neighbour in the **blacklisted** state and to prevent ANR from unlearning the properties of that neighbor, during the process of blacklisting a neighbour, you must select the **Static Neighbour** check box.

4.5.7 PnP Node Match

If the hardware ID is not configured and multiple nodes match a location in Netspan PnP configuration, then the user can manually select one node at a time and match it with an appropriate PnP configuration.

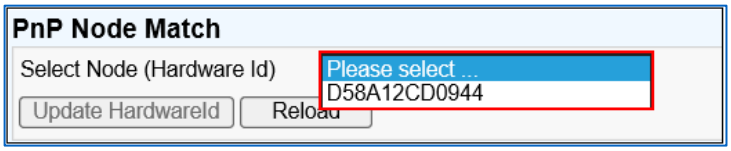
1. On the Netspan main menu, select **Configuration Management** > **PnP** > **PnP Node Match**.

Figure 145: PnP Node Match



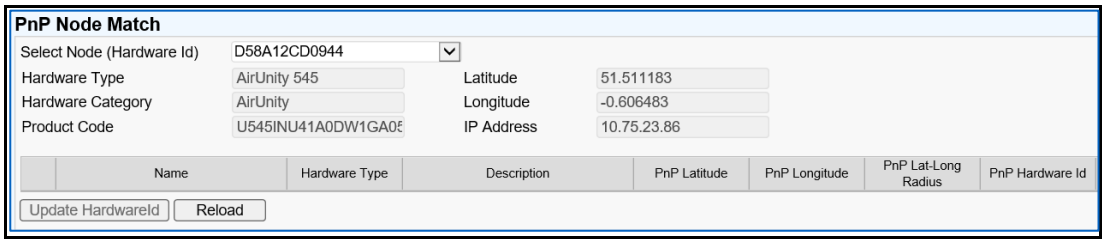
2. Select a node from the drop-down option.

Figure 146: Node selection



3. A screen will be displayed with details about the selected node. Once the user has selected the mismatched Hardware ID, a list of matching PnP configuration will be displayed and the user can select the desired PnP configuration and insert the Hardware ID using the 'Update Hardware ID' option.

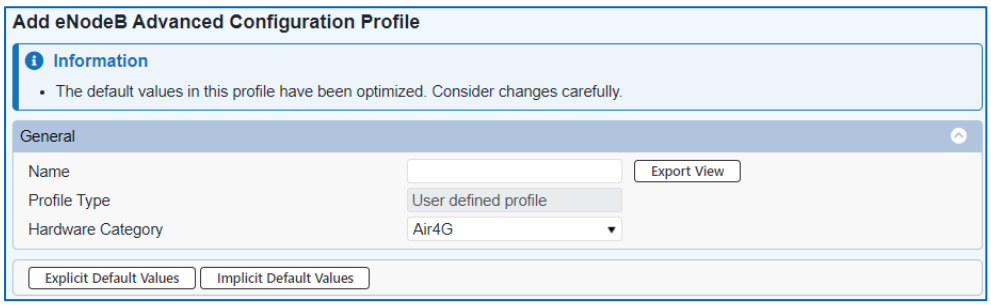
Figure 147: PnP Node Match details



4.6 Profile Management

The two eNodeB profiles: eNB Advanced Configuration Profile and Cell Advanced Configuration Profile, provide you with the option to select explicit and implicit values for the parameters. The function of these buttons is explained below.

Figure 148: Explicit/Implicit Buttons



Explicit Default Values

This button coverts all the unticked properties to ticked properties and displays the Netspan default values. The user can set a new value to this property, if required. An exclamation mark will be displayed if this default value changes. Once you click on the OK button, the values of all the properties will be saved for the selected profile and will be retained even after Netspan Upgrade. An exclamation mark will be displayed, if the default value changes after Netspan Upgrade.

Implicit Default Values

This button converts all the ticked properties to unticked properties only if their value equals to the default value. The properties, whose default values have changed after Netspan upgrade, will remain ticked and an exclamation mark will be displayed, indicating the default value set in Netspan.

4.7 Re-allocating PCI

On certain occasions, for example, when there is a PCI violation or conflict, you might need to invoke the Auto-PCI algorithm manually to re-allocate the PCI of the cells of a node.

Netspan allows users to manually perform PCI re-allocation on Auto-PCI enabled nodes. You may choose to re-allocate the PCI of a specific cell or all cells on the selected node. Netspan displays the status of the PCI re-allocation.

Note: To perform the procedure detailed in this section, the node that you select for re-allocating the PCI must be online.

To re-allocate the PCI of the cells of a node, do the following (in the given order):

1. Verifying the Auto-PCI Configuration
2. Re-allocating the PCI

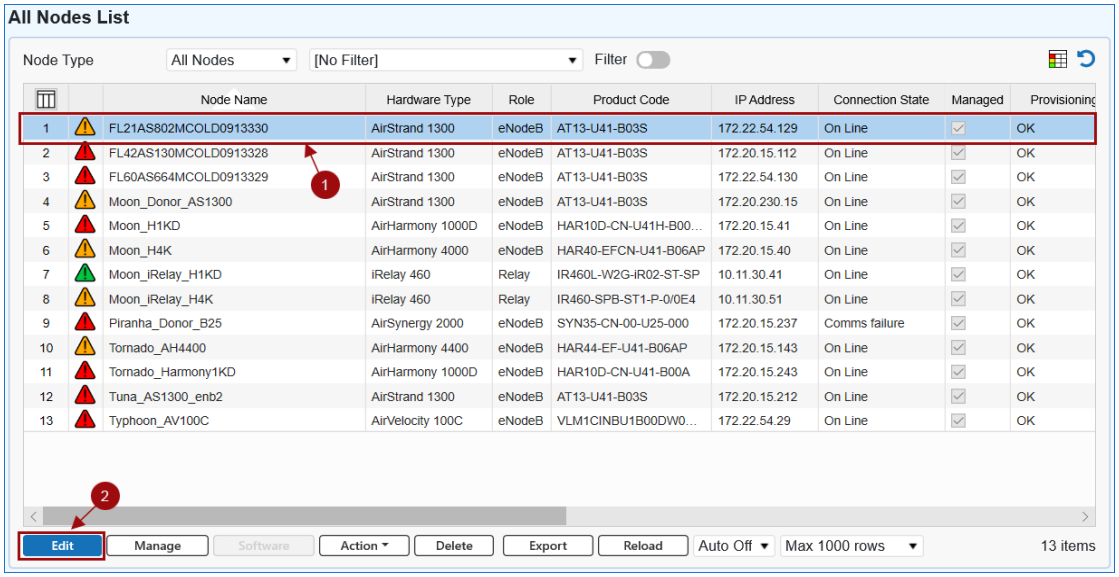
4.7.1 Verifying the Auto-PCI Configuration

Note: You can manually re-allocate PCI of the cells of an Auto-PCI enabled node.

To verify if **Auto PCI** is enabled in the SON profile:

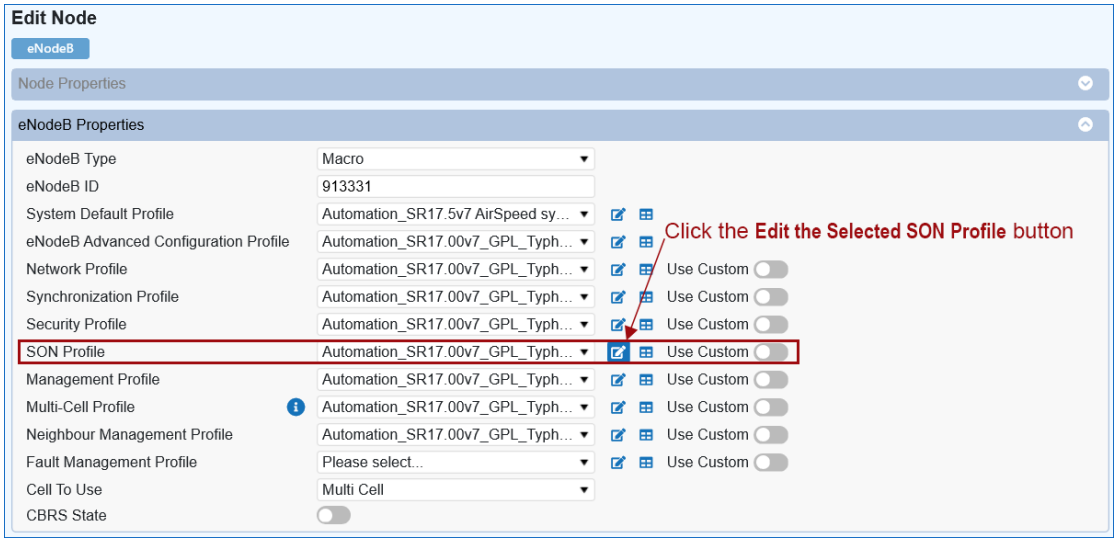
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. The **All Nodes List** appears.
2. Select the node that requires a change in cell PCI, and then click **Edit**.

Figure 149: All Nodes List – Selecting the Node



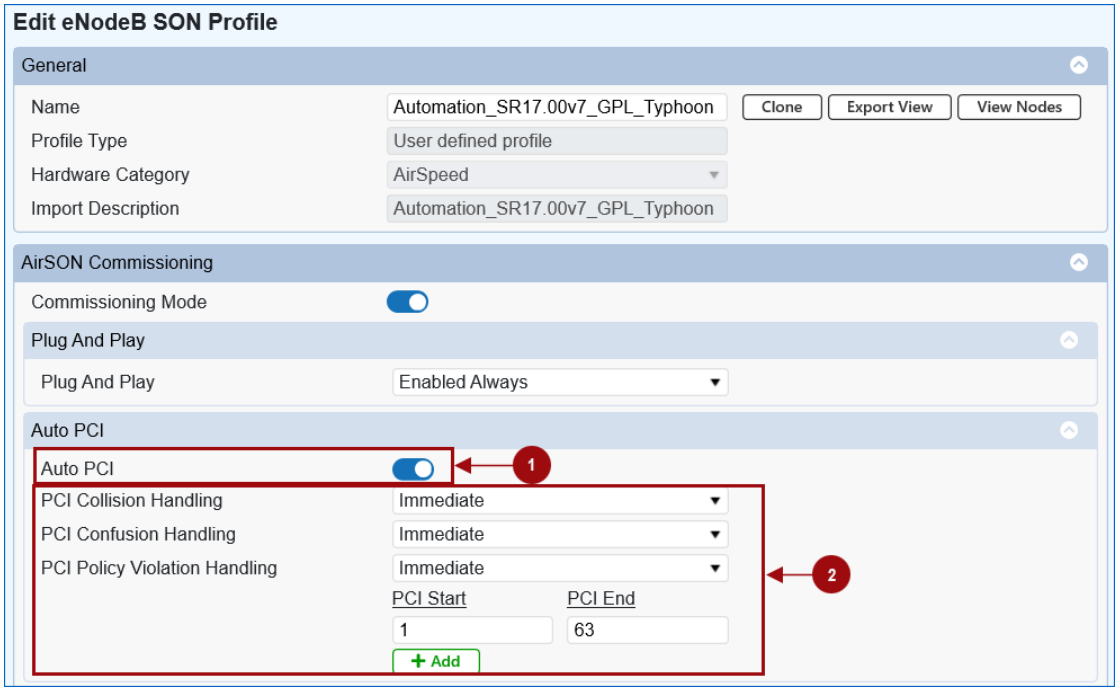
3. Click the **Edit the Selected SON Profile** button in the **eNodeB Properties** panel.

Figure 150: Opening the SON Profile of the Selected Node



4. Confirm that **Auto PCI** is enabled and the related parameters are configured appropriately in the SON profile. For more information on these parameters, see the *Netspan Parameters Reference Guide (ARD-D00741)*.

Figure 151: Verifying the Auto PCI Configuration

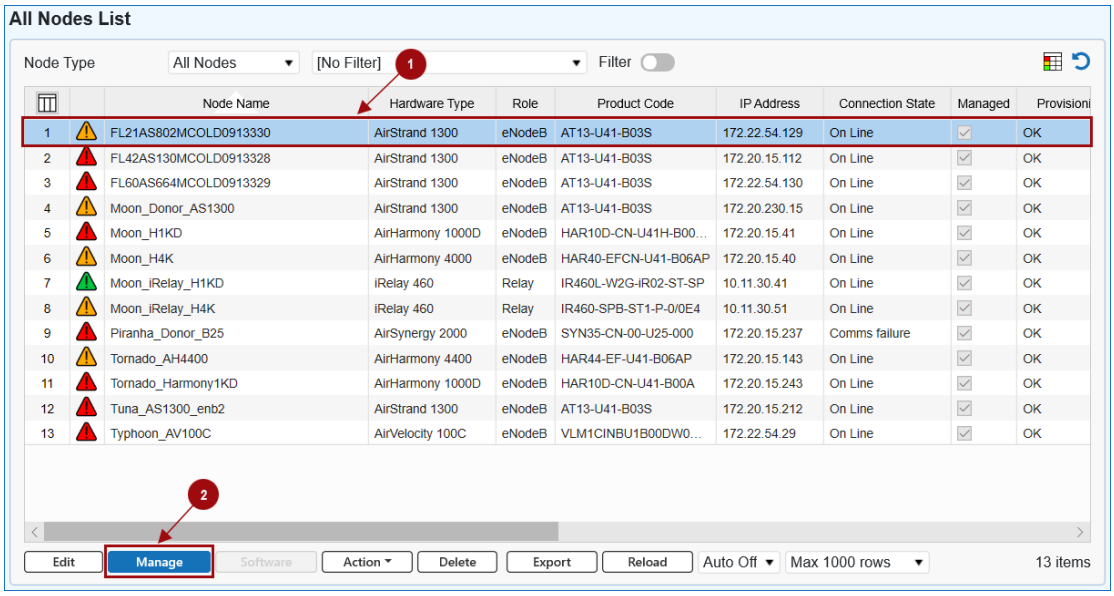


4.7.2 Re-allocating the PCI

To manually re-allocate the PCI of the cells of an Auto-PCI enabled node:

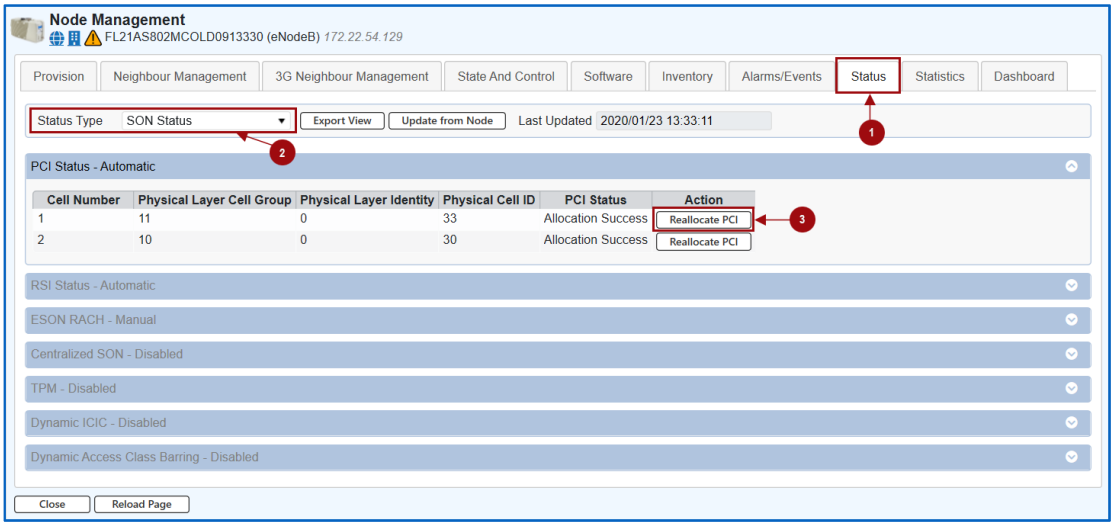
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. The **All Nodes List** appears.
2. Select the node whose cell PCI you want to change, and then click **Manage**.

Figure 152: All Nodes List – Selecting the Node



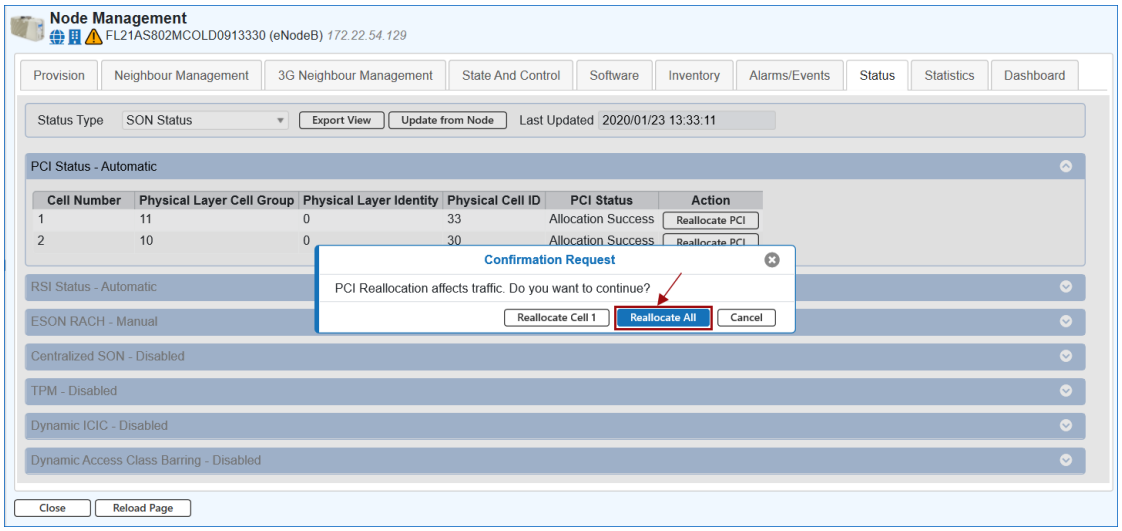
3. Select the **Status** tab, and then from the **Status Type** drop-down list, select **SON Status**.
4. Click the **Reallocate PCI** button in the **Action** column of the cell that requires a change in PCI.

Figure 153: Status Tab – SON Status



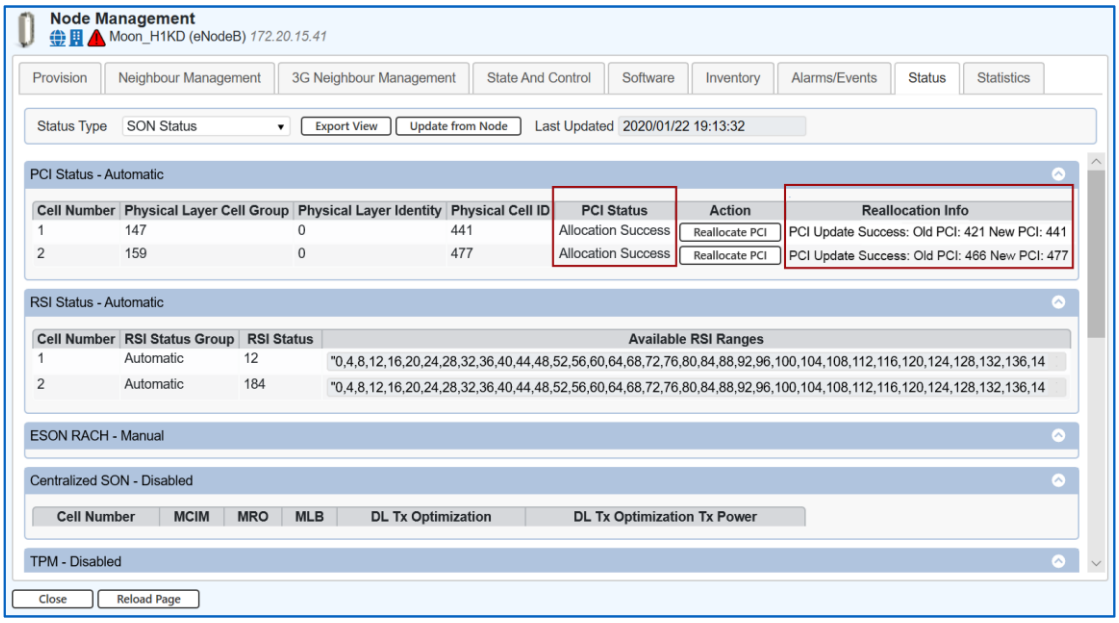
5. In the succeeding **Confirmation Request** window:
   - Click the **Reallocate Cell Number** button if you only want to re-allocate that cell's PCI.
   - Click the **Reallocate All** button if you want to re-allocate the PCI of all cells of that node.

Figure 154: Confirmation Request – Re-allocating the Cell PCI



After trying to allocate a new PCI to the cells, Netspan reports the PCI re-allocation status in the **Reallocation Info** field indicating whether your attempt was successful or not. The **PCI Status** field of each cell reports the status of your most recent attempt.

Figure 155: PCI Re-allocation Status



5 Configuration Management

This sections describes:

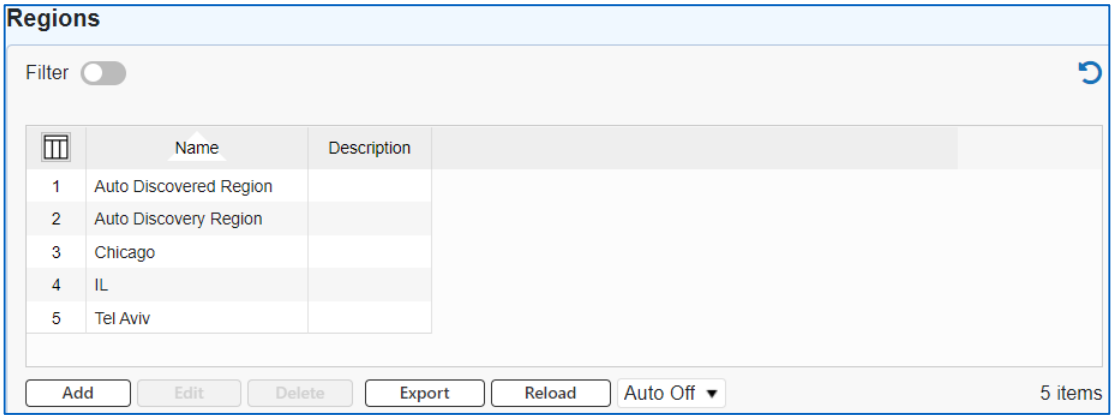
- Topology
- File Servers

5.1 Topology

5.1.1 Regions

1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Regions**. The **Regions** page will be displayed.

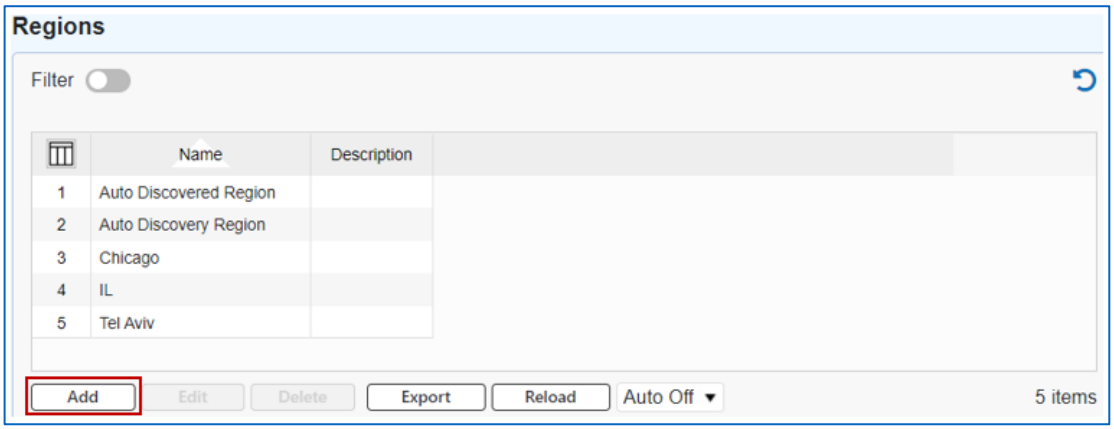
Figure 156: Regions



5.1.1.1 Add Regions

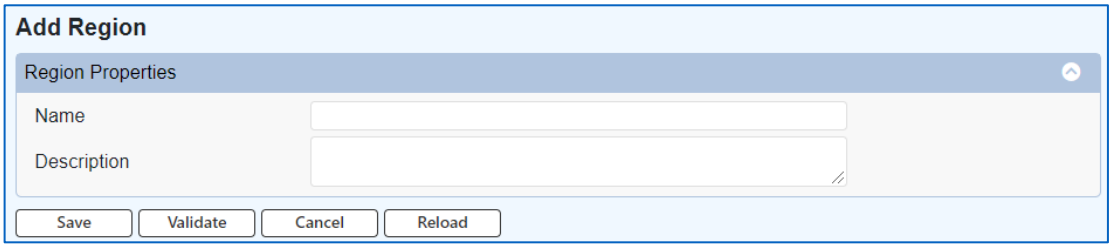
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Regions**. The **Regions** page will be displayed. Click **Add** to add new region.

Figure 157: Adding Region



2. Enter the **Name** and **Description** and click **Save**.

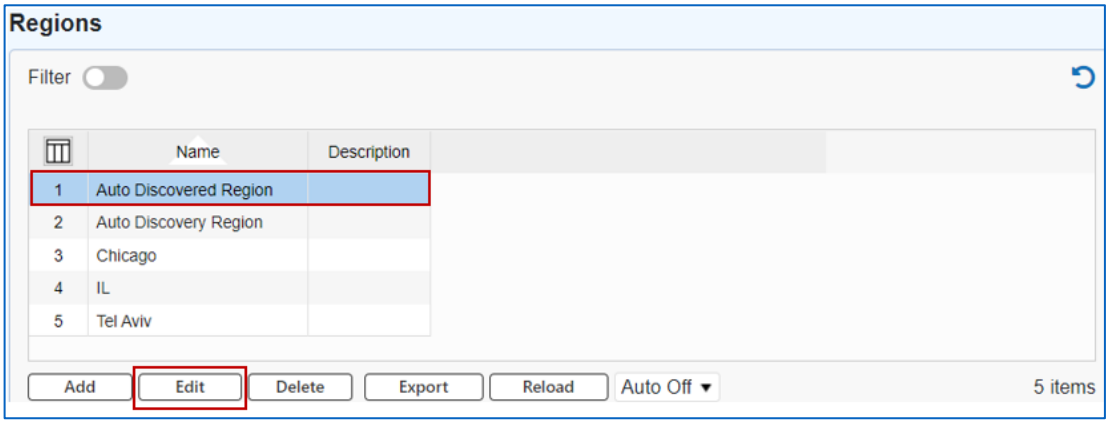
Figure 158: Adding Region



5.1.1.2 Editing a Region

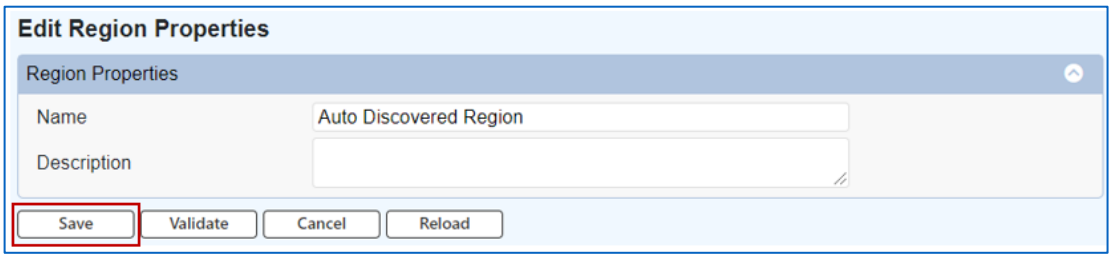
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Regions**. The **Regions** page will be displayed. Select the region you want to edit and click **Edit**.

Figure 159: Editing Region



2. Make the necessary changes and click **OK**.

Figure 160: Editing a Region



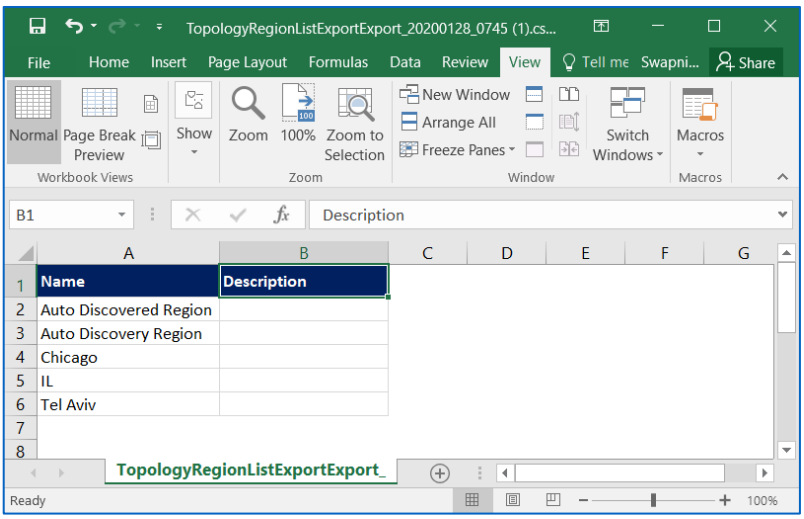
5.1.1.3 Exporting Regions

1. Click **Export** to export just the **Regions** you can currently see. Your browser will show a message asking if you want to open or save Export.csv the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 161: Export Excel File Message

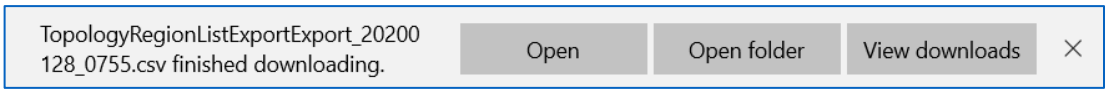
2. If you choose **Open**, your machine will launch an Excel file and will display the exported file with details.

Figure 162: Excel File View



3. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 163: Export Confirmation Message



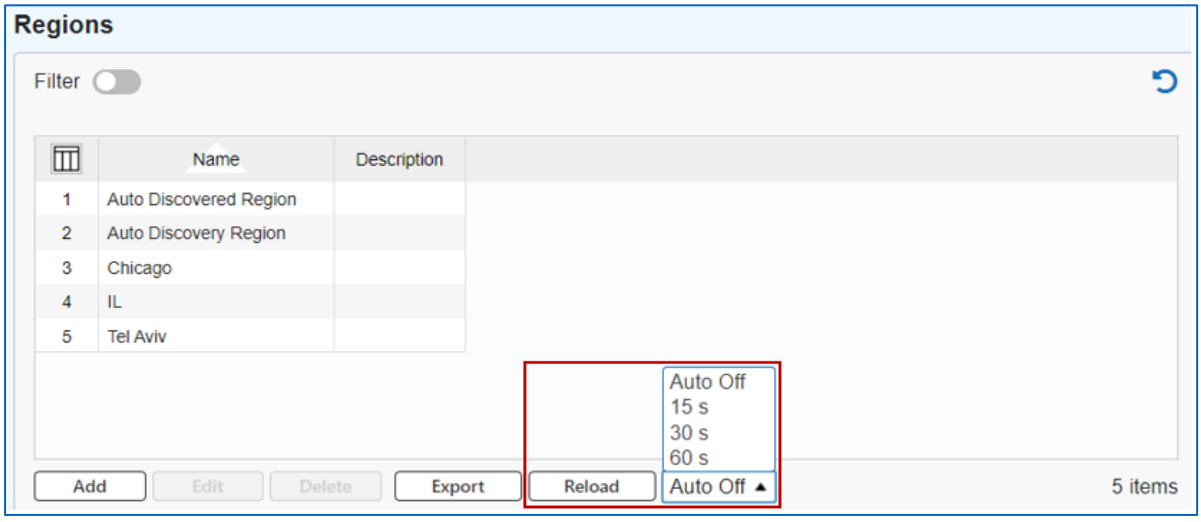
5.1.1.4 Reloading a Page

Clicking the **Reload** button on an active page prompts Netspan to retrieve real-time information from the node and update data on that page.

Note: The process for opening or saving the file is the same for **Export**.

To refresh a page, click the **Reload** button.

Figure 164: Page Reload Options

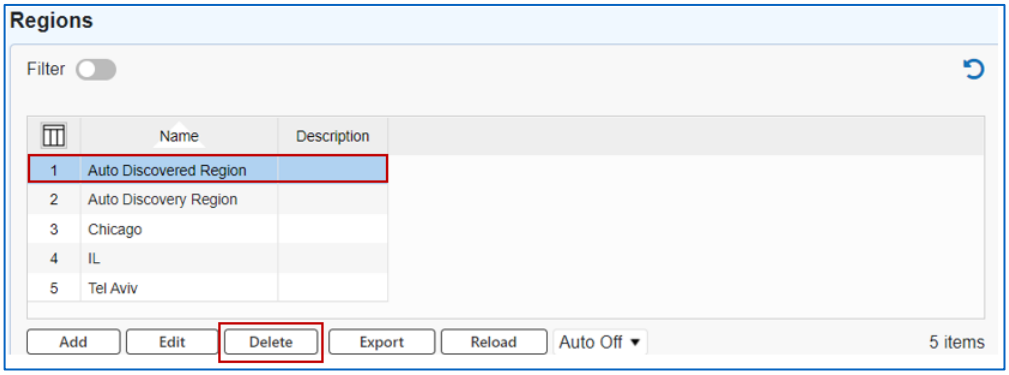


Tip: To enable automatic reload, select 15 s, 30 s, or 60 s from the drop-down list next to the **Reload** button.

5.1.1.5 Deleting a Region

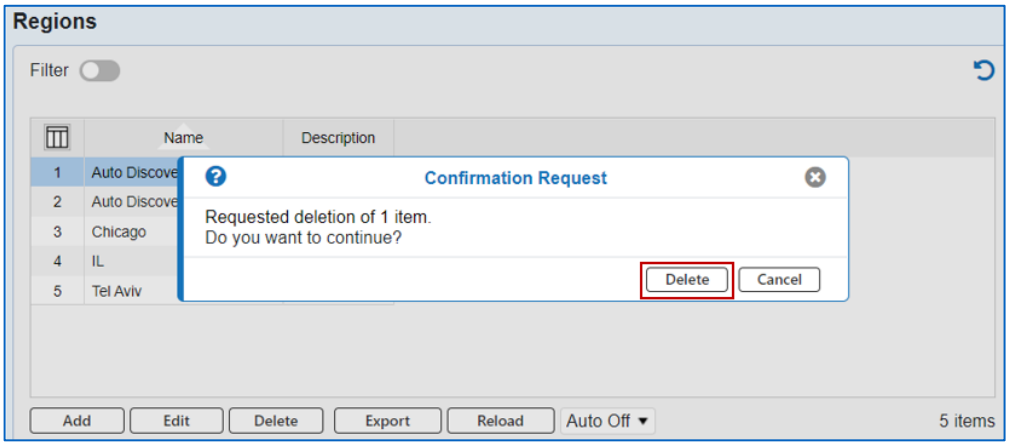
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Regions**. The **Regions** page will be displayed. Select the region you want to delete and click **Delete**.

Figure 165: Deleting a Region



2. A confirmation message box will be displayed, asking if you want to delete the selected **Region**. Click **Delete**. The **Region** will then be removed from the list.

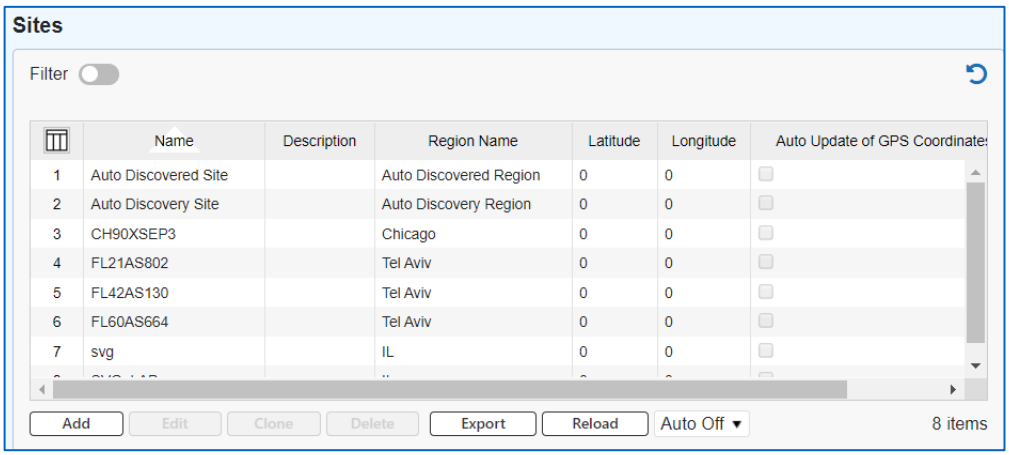
Figure 166: Deleting a Region



5.1.2 Sites

1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Sites**. The **Sites** page will be displayed.

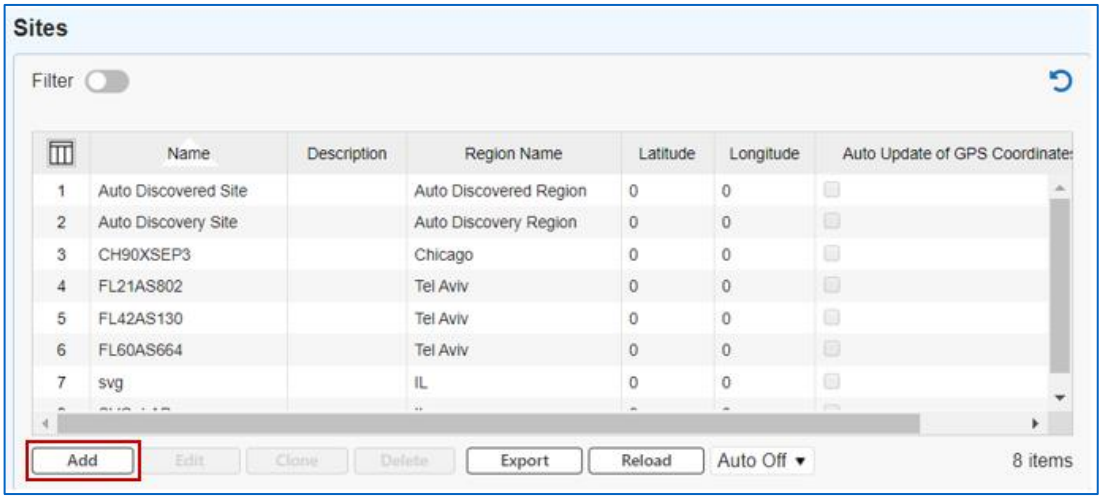
Figure 167: Sites



5.1.2.1 Adding Sites

1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Sites**. The **Sites** page will be displayed. Click **Add** to add a new site.

Figure 168: Adding a Site



2. Enter the necessary details and click **Save**.

Figure 169: Adding Site Details

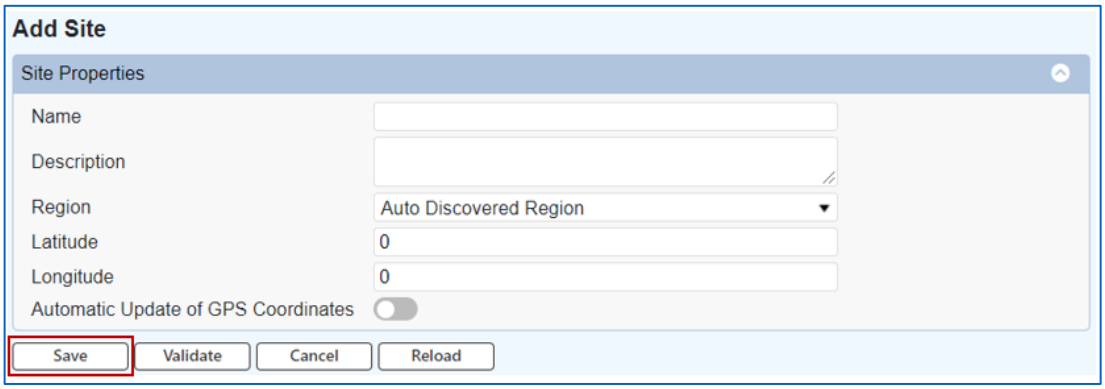


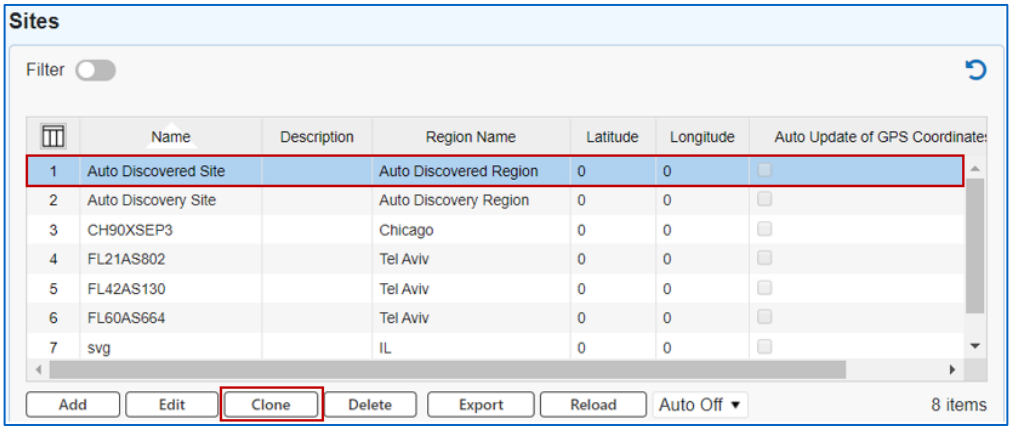
Table 18. Site Details

Field	Description
Name	Specifies the site name, which should contain 2 to 64 unicode characters (excluding '<', '&', and leading or trailing spaces).
Description	Specifies the site description, which should contain 0 to 128 unicode characters (excluding '<', '&', and leading or trailing spaces).
Region	Specifies the region defined in Netspan.
Latitude	This property is used for identifying the physical location of the unit.
Longitude	This property is used for identifying the physical location of the unit.
Automatic Update of GPS Coordinates Enabled	You can enable the automatic update of GPS coordinates by clicking on this checkbox.

5.1.2.2 Cloning a Site

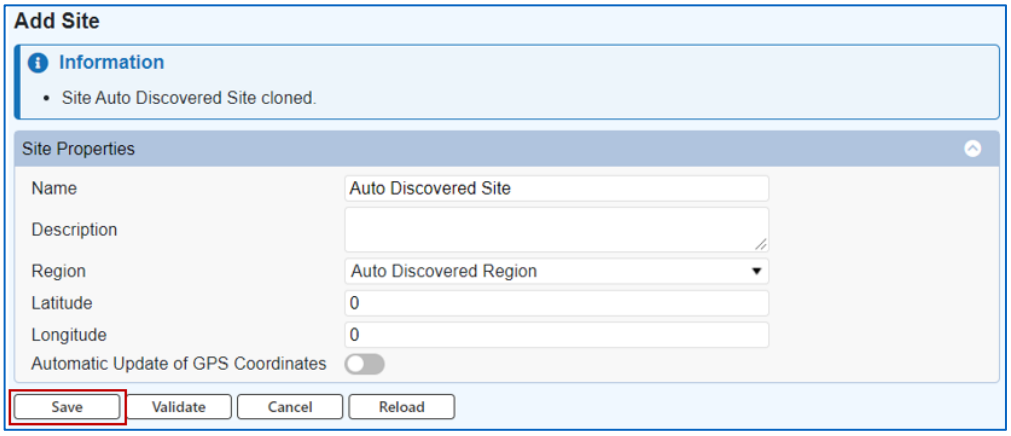
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Sites**. The **Sites** page will be displayed. Select the site that you want to clone and then click on **Clone**.

Figure 170: Cloning a Site



2. On the **Add Site** page enter the required details and click **Save**.

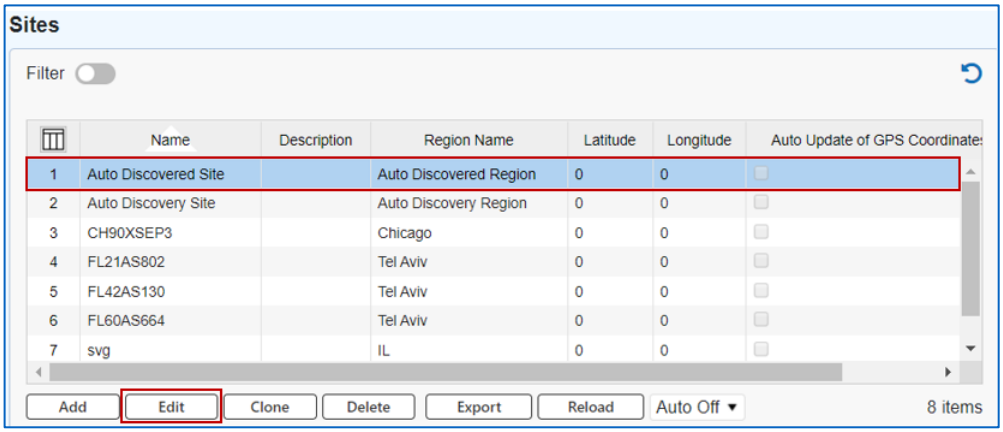
Figure 171: Adding Site Details



5.1.2.3 Editing a Site

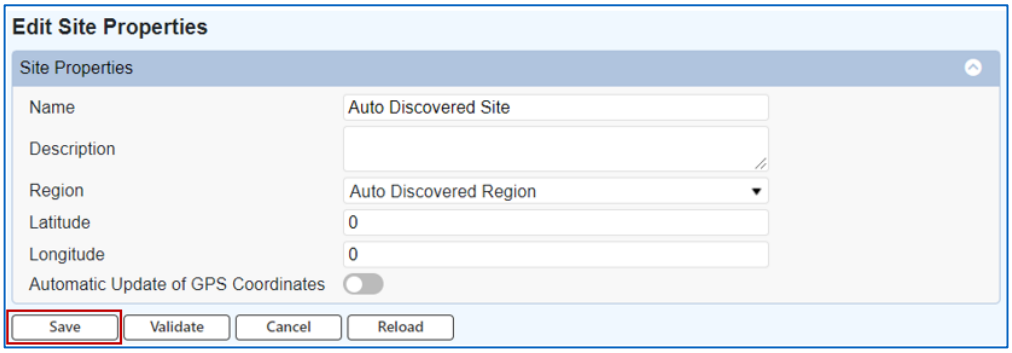
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Sites**. The **Sites** page will be displayed. Select the site that you want to edit and then click on **Edit**.

Figure 172: Editing a Site



2. On the **Edit Site Properties** page make the changes and click **Save**.

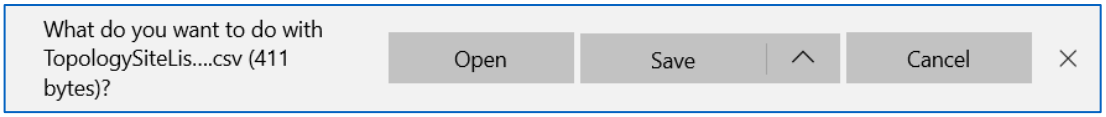
Figure 173: Editing Site Properties



5.1.2.4 Exporting Sites in Excel Format

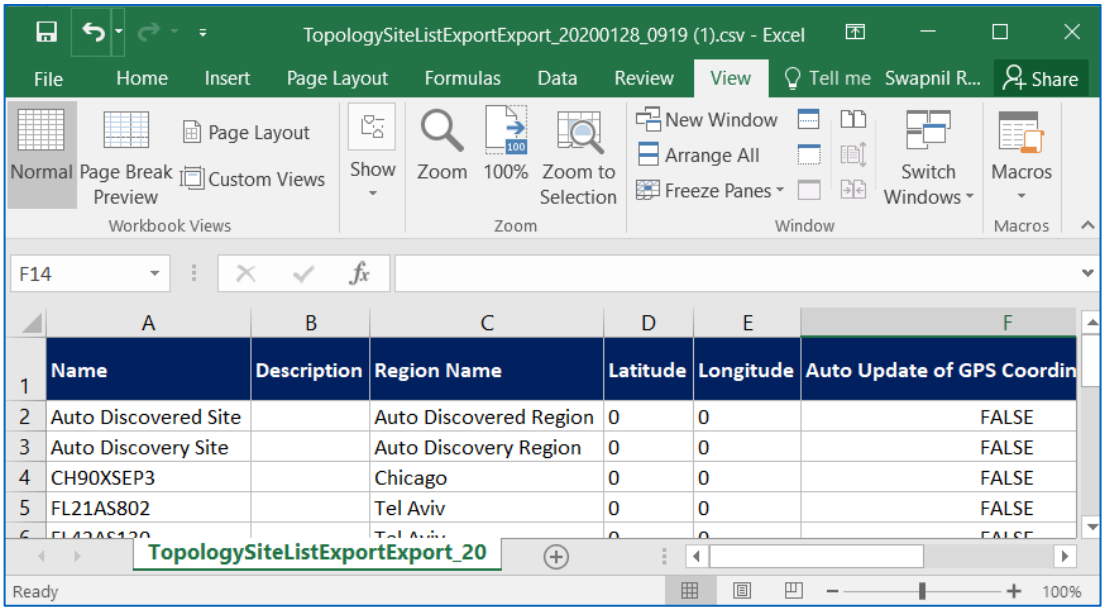
1. Click **Export All** to export all the **Sites** held in Netspan's database. Your browser will show a message asking if you want to open or save Export.csv the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 174: Export Excel File Message



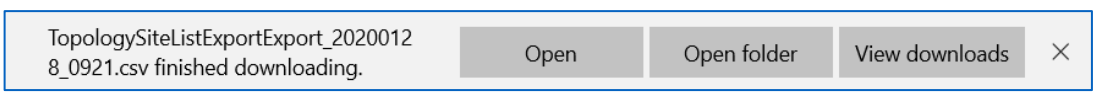
2. If you choose **Open**, your machine will launch an Excel file and will display the exported file with details.

Figure 175: Excel File View



3. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 176: Export Confirmation Message



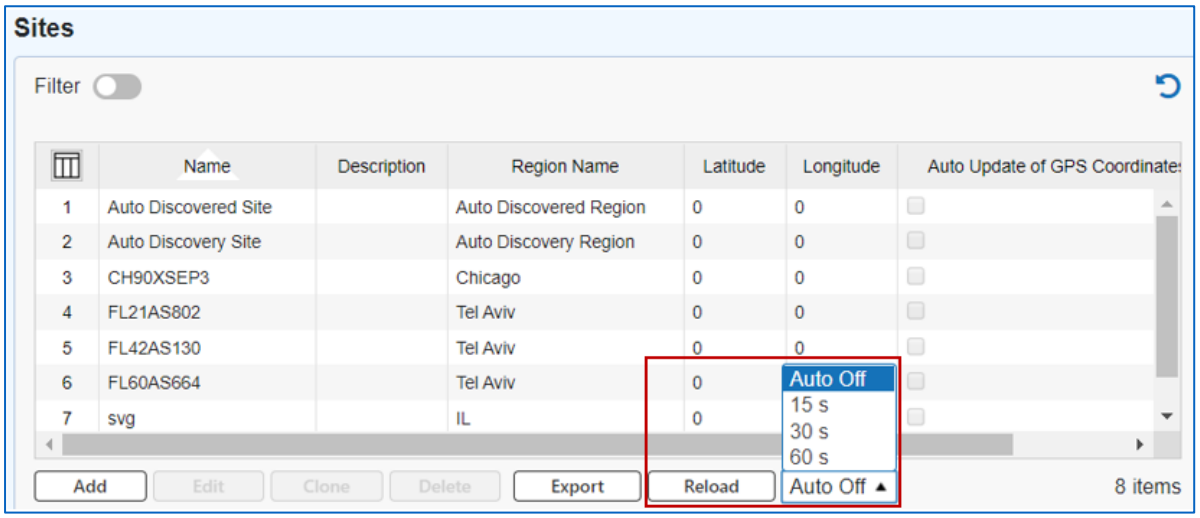
5.1.2.5 Reloading a Page

Clicking the **Reload** button on an active page prompts Netspan to retrieve real-time information from the node and update data on that page.

Note: The process for opening or saving the file is the same for **Export All**.

To refresh a page, click the **Reload** button.

Figure 177: Page Reload Options

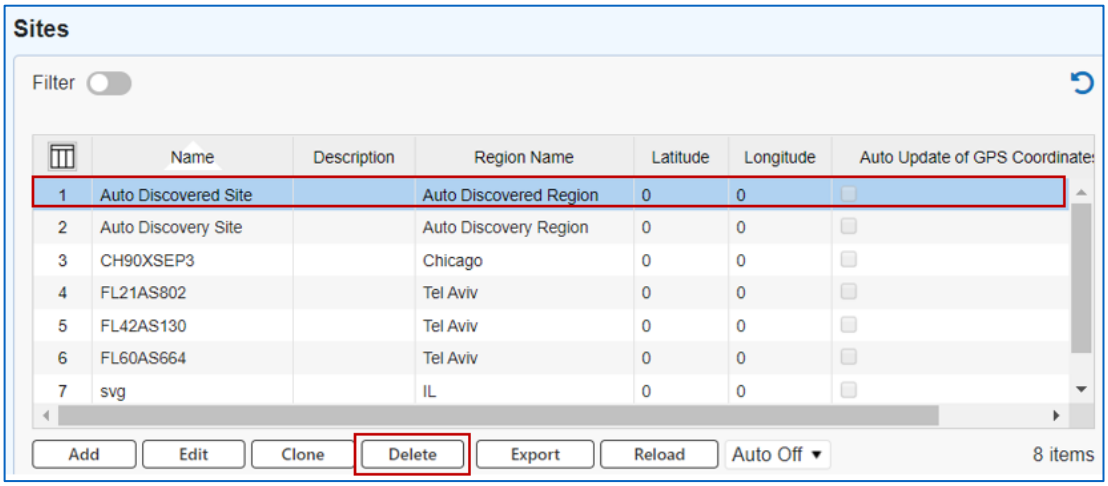


Tip: To enable automatic reload, select 15 s, 30 s, or 60 s from the drop-down list next to the **Reload** button.

5.1.2.6 Deleting a Site

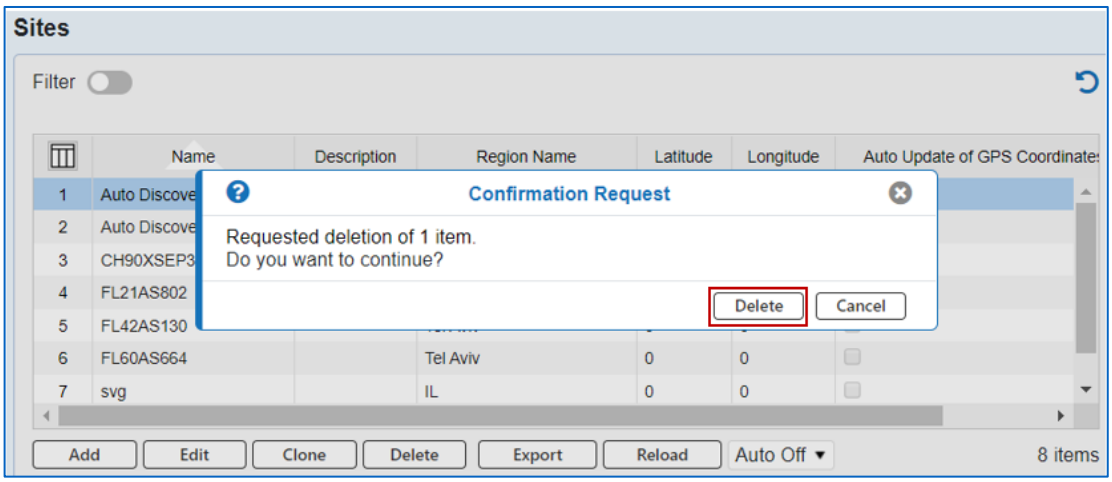
1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Sites**. The **Sites** page will be displayed. Select the site that you want to delete and then click on **Delete**.

Figure 178: Deleting a Site



2. A confirmation message box will be displayed, asking if you want to delete the selected **Site**. Click **Delete**. The **Site** will then be removed from the list.

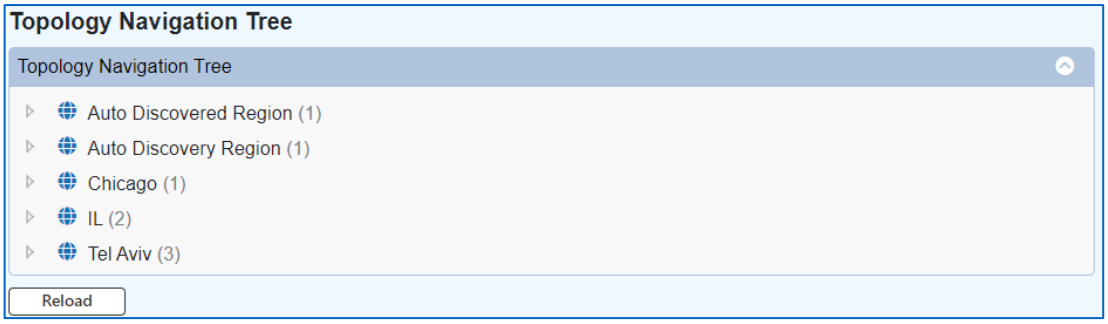
Figure 179: Deleting a Site



5.1.3 Tree

1. On the Netspan main menu, select **Configuration Management** > **Topology** > **Tree** to view the **Topology Navigation Tree**.

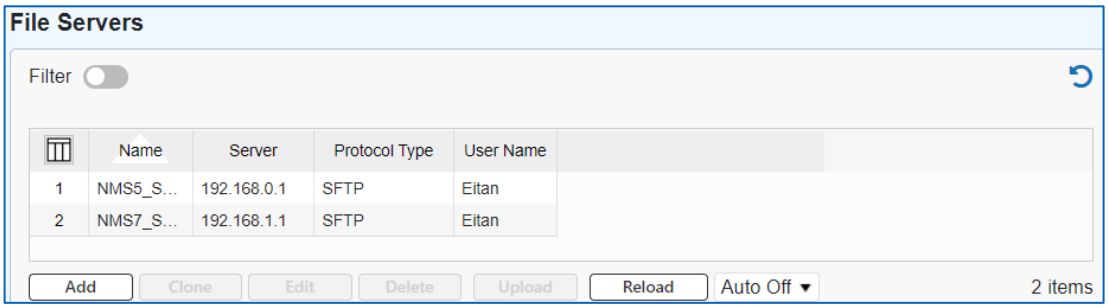
Figure 180: Topology Navigation Tree



5.2 File Servers

1. On the Netspan main menu, select **Configuration Management** > **File Servers.** A **File Servers** page will be displayed.

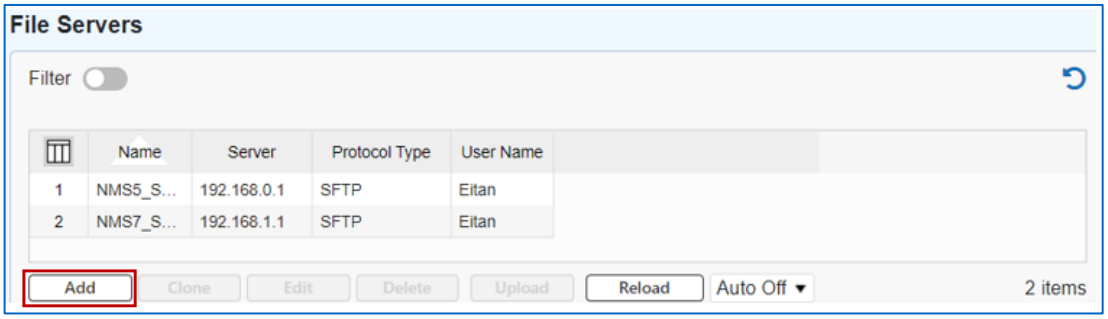
Figure 181: File Servers List



5.2.1 Adding a File Server

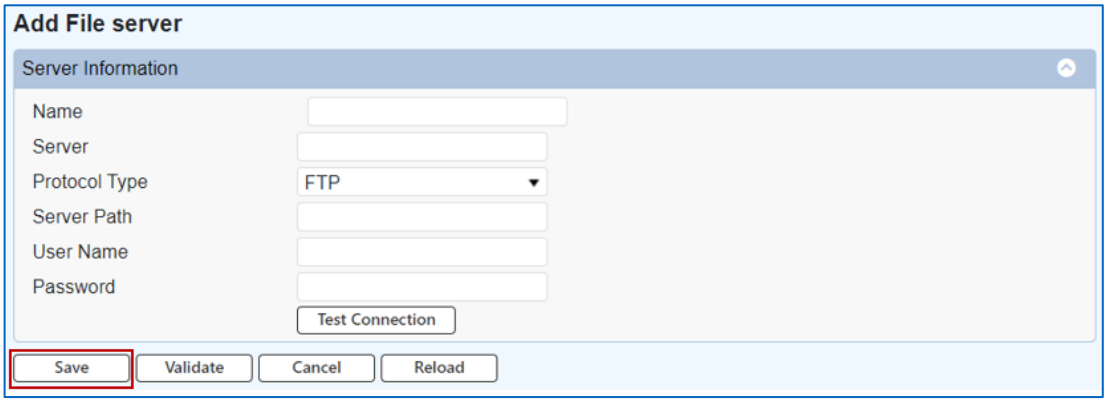
1. On the Netspan main menu, select **Configuration Management** > **File Server.** A **File Servers** page will be displayed. Click **Add** to add a new server.

Figure 182: Adding a File Server



2. On the **Add File/Node Server** page enter the necessary details and click **Save**.

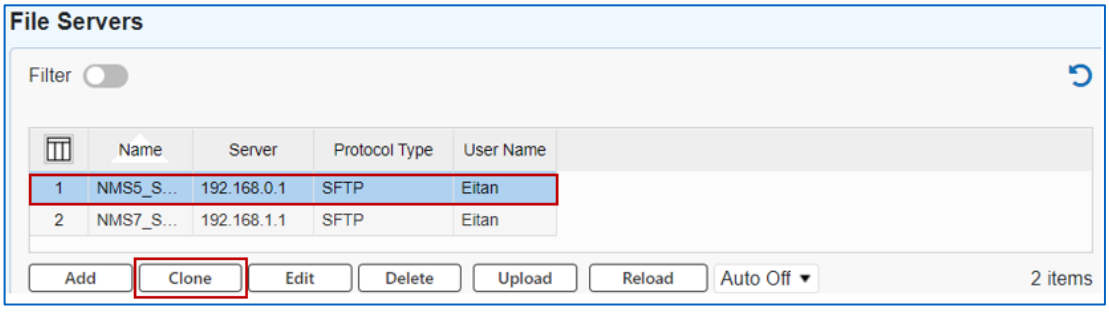
Figure 183: Adding File/Node Server Details



5.2.2 Cloning a File Server

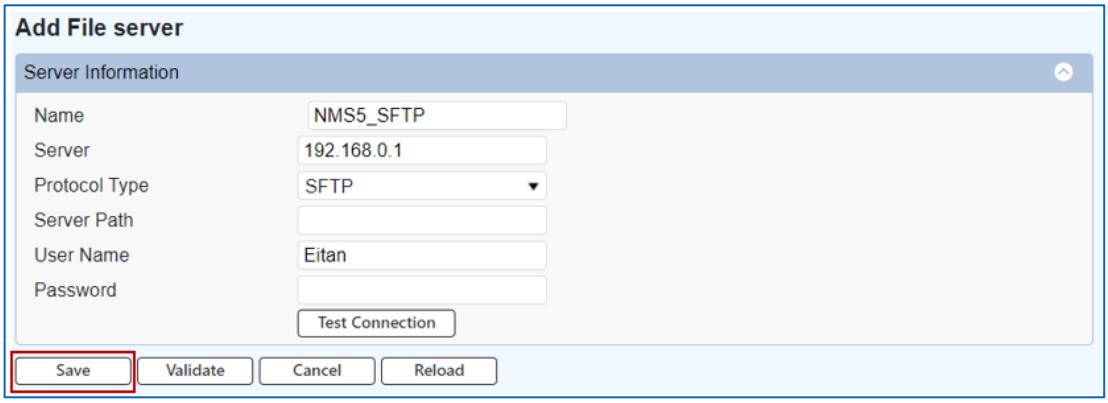
1. On the Netspan main menu, select **Configuration Management** > **File Server.** A **File Servers** page will be displayed. Select the server that you want to clone and then click **Clone**.

Figure 184: Cloning a Server



2. On the **Add File/Node Server** enter the details and click **Save**.

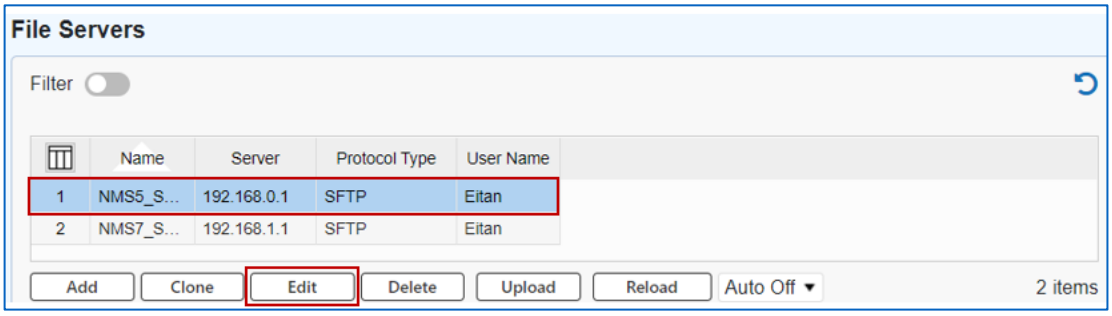
Figure 185: Adding File/Node Server Details



5.2.3 Editing a File Server

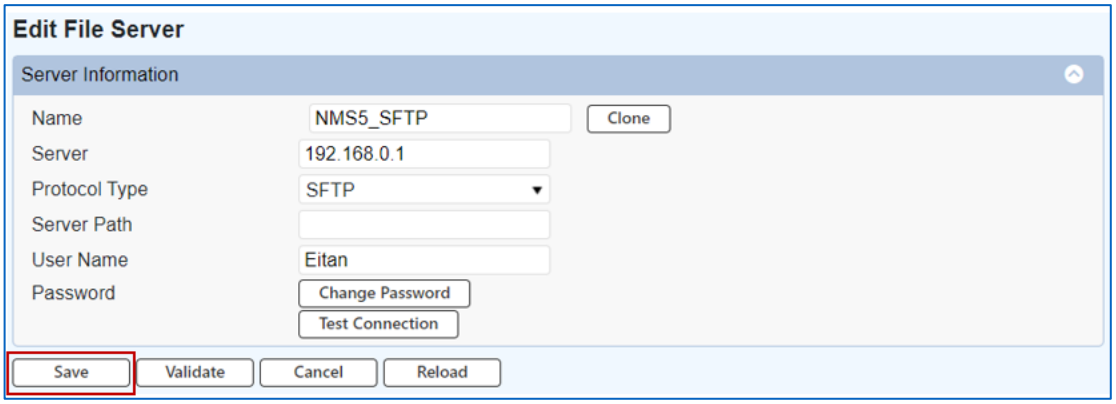
1. On the Netspan main menu, select **Configuration Management** > **File Server.** A **File Servers** page will be displayed. Select the server that you want to edit and then click **Edit**.

Figure 186: Editing a File Server



2. On the **Edit File/Node Server** page enter the details and click **Save**.

Figure 187: Editing a File/Node Server



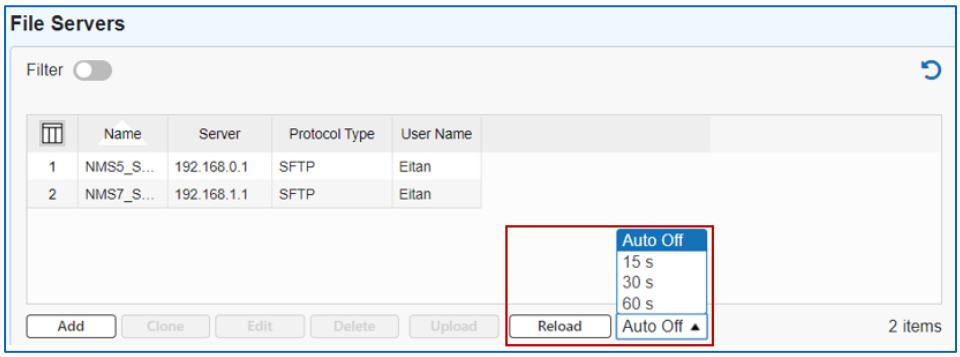
5.2.4 Reloading a Page

Clicking the **Reload** button on an active page prompts Netspan to retrieve real-time information from the node and update data on that page.

Note: The process for opening or saving the file is the same for **Export**.

To refresh a page, click the **Reload** button.

Figure 188: Page Reload Options

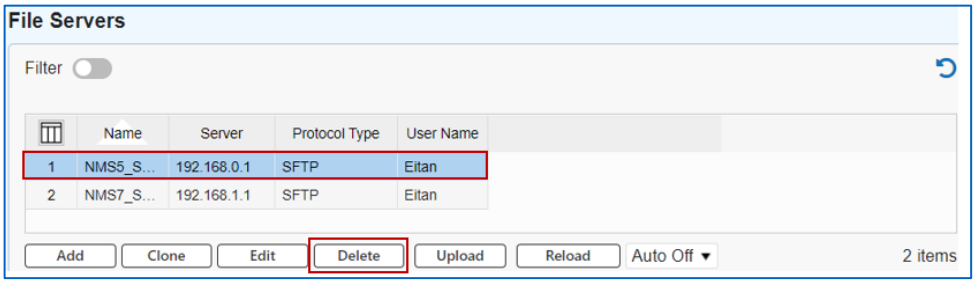


Tip: To enable automatic reload, select 15 s, 30 s, or 60 s from the drop-down list next to the **Reload** button.

5.2.5 Deleting a File Server

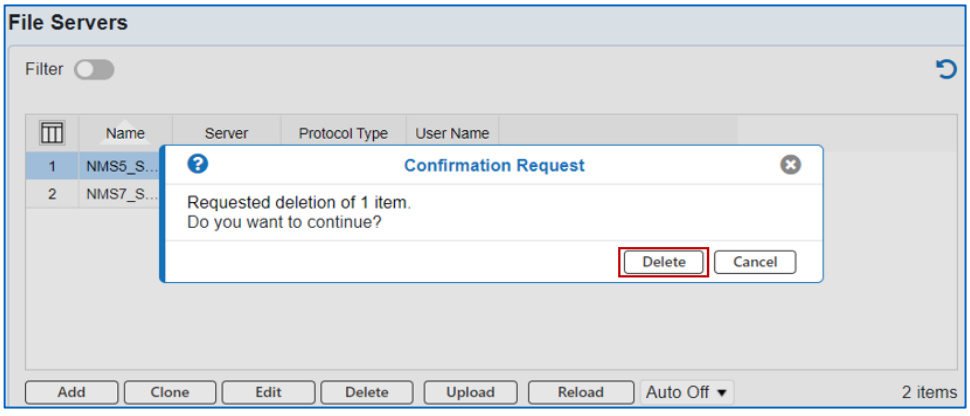
1. On the Netspan main menu, select **Configuration Management** > **File Server.** A **File Servers** page will be displayed. Select the server that you want to delete and then click **Delete**.

Figure 189: Deleting a File Server



2. A confirmation message box will be displayed, asking if you want to delete the selected **File Server**. Click **Delete**. The **File Server** will then be removed from the list.

Figure 190: Deleting a File Server



6 Software Upgrade

This section describes how to perform software upgrades across Netspan network.

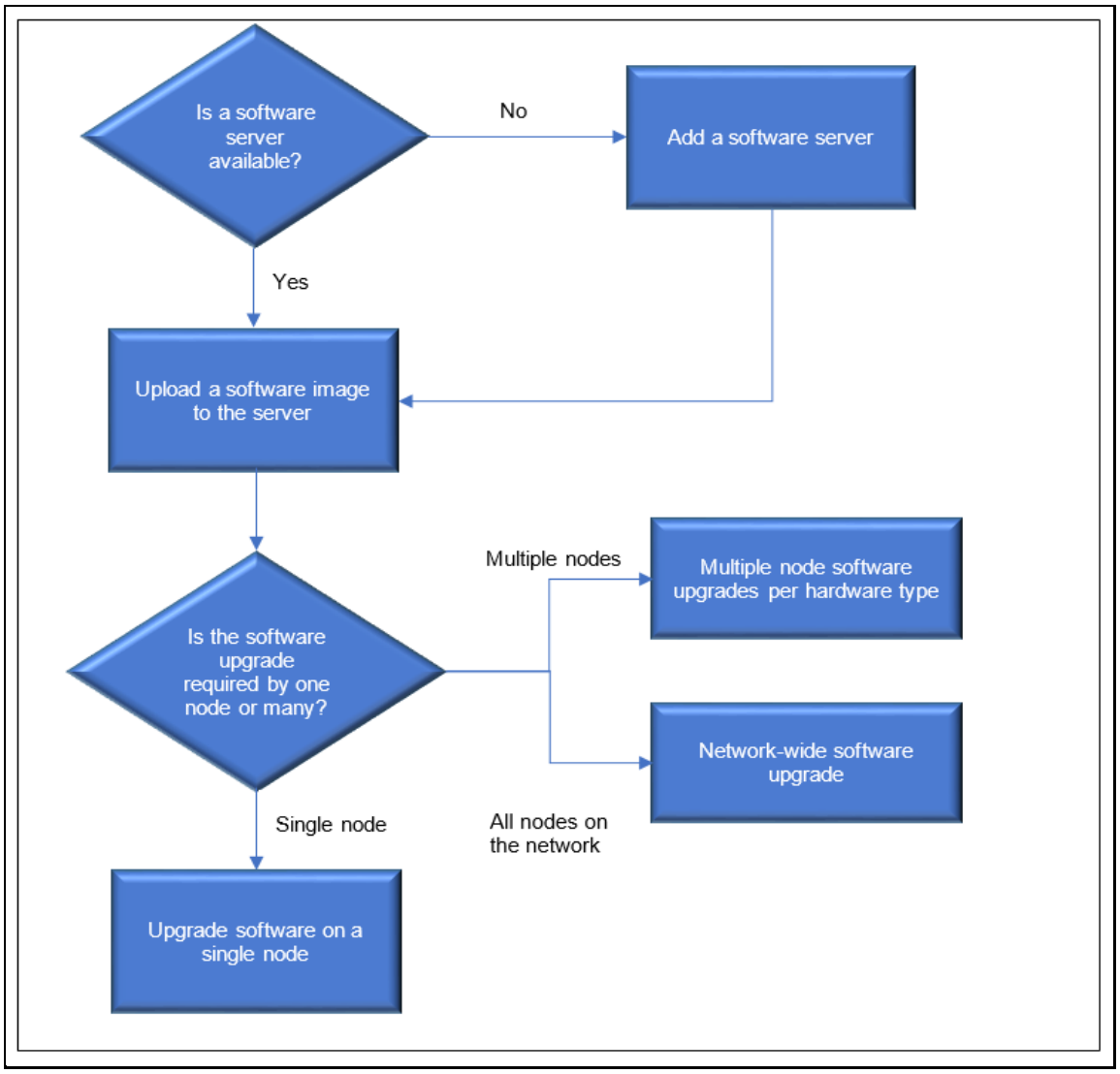
Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

The software installed on each node is accessed from one of the pool of software servers, all of which are configured and updated using Netspan. Because of this, in order to upgrade the software installed on the nodes in the network, it is first necessary to make the latest software available on these servers.

The full process flow to enable you to upgrade the software on a node is illustrated below. Each step in this process has a corresponding sub-section in this document.

Figure 191: Software Upgrade Process



This chapter covers the following topics:

6.1 How to Add a Software Server

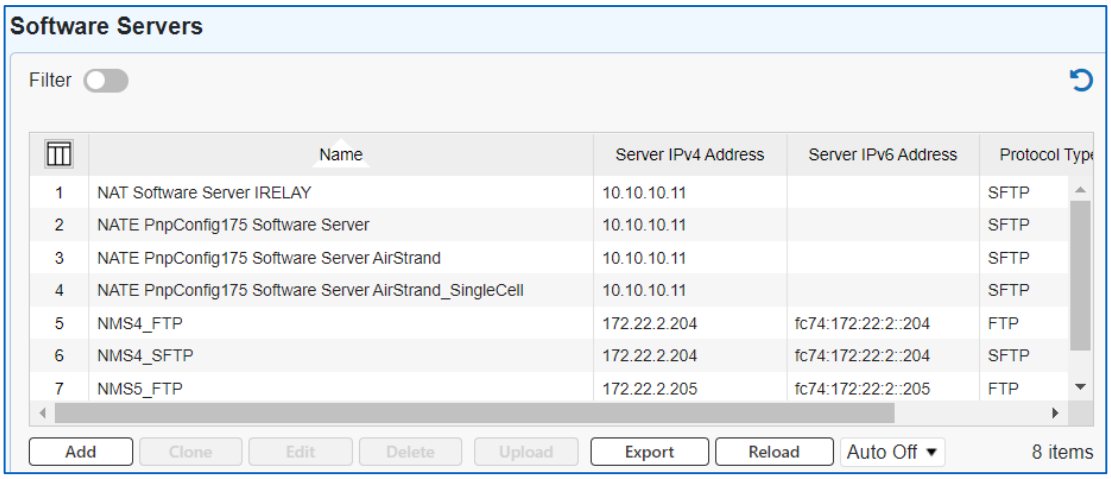
Netspan provides the ability to add and manage a network of software servers on which the software images are stored and are then installed on the node population. This section explains the process for adding a new software server to Netspan.

Note: The software server for node software does not have to reside on the Netspan server.

To add a software server to Netspan:

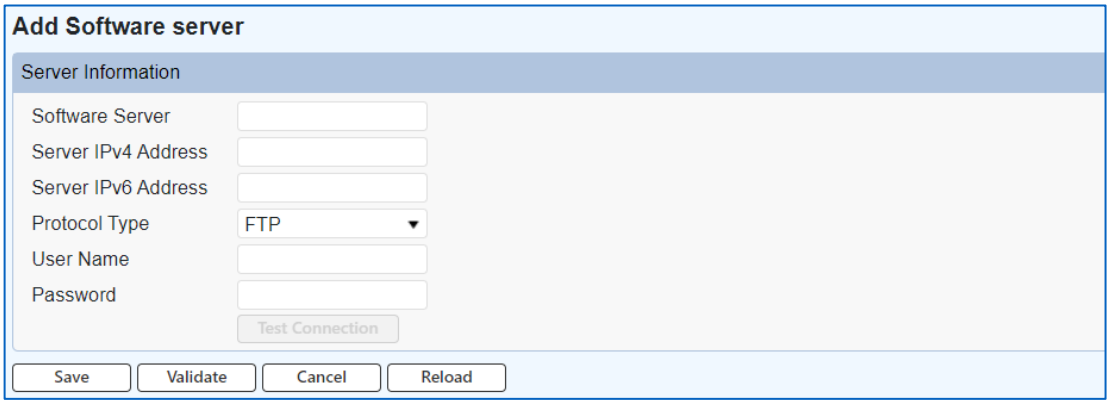
1. Login to Netspan using an account with administrator privileges.
2. On the main Netspan menu, choose **Software Management** > **Software Servers**. The **Software Servers** screen will be displayed, showing a list of the currently configured software servers.

Figure 192: Software Servers List Screen



3. Click **Add** at the bottom of the screen. This opens the **Add Software Server** screen.

Figure 193: Add Software Server Screen



4. In the **Server Information** panel, enter the details of the software server you are adding. For more information on the configuration parameters, see Table 19.

Table 19. Add Software Server Configuration Parameters

Parameter	Description
Software Server	The name of the software server you will be adding as it is to be displayed in Netspan.
Server IPv4 Address	The network address of the software server you will be adding.
Server IPv6 Address	The network address of the software server you will be adding.
Protocol Type	The file transfer protocol type to be used by the server to provide software to the nodes: FTP, TFTP, or SFTP. **Note**: The protocol type TFTP does not require a User Name and Password to be defined and only provides minimal security.
User Name	The user name to log into the server. Required for protocol types of FTP and SFTP, hidden for TFTP.
Password	The password to log into the server. Required for protocol types of FTP and SFTP, hidden for TFTP.

5. When you have added your details, click **Test Connection** to ensure that the connection to the software server is established successfully. A message indicating the result of the test is shown next to the button.
6. Click **Save** to commit your changes and close the Add Software Server screen.

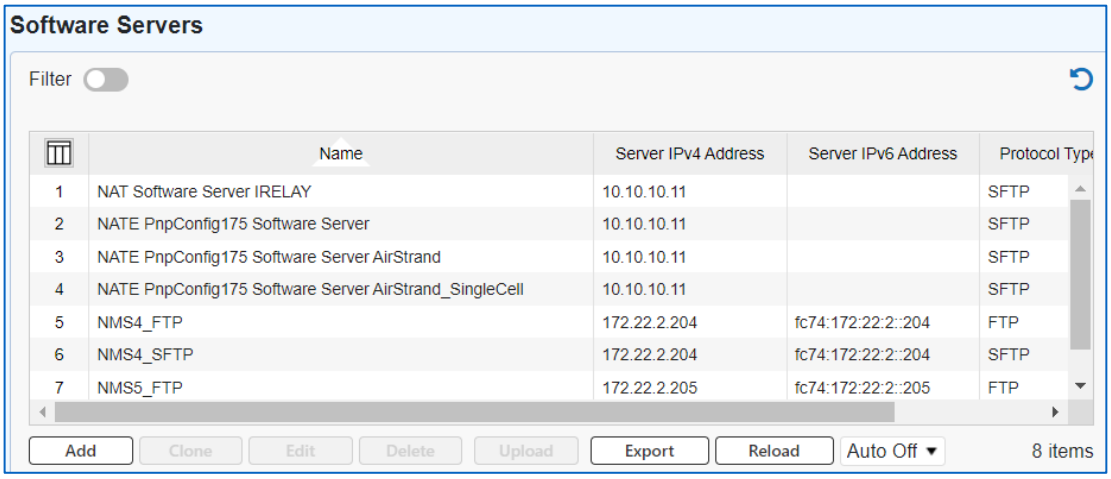
6.2 How to Upload a Node Software Image

You will need to update the software installed on the node population as features will be added and the software evolves. This is done by uploading a new software image to a software server which can then be accessed by, and installed on, the nodes.

To upload a node software image to a software server:

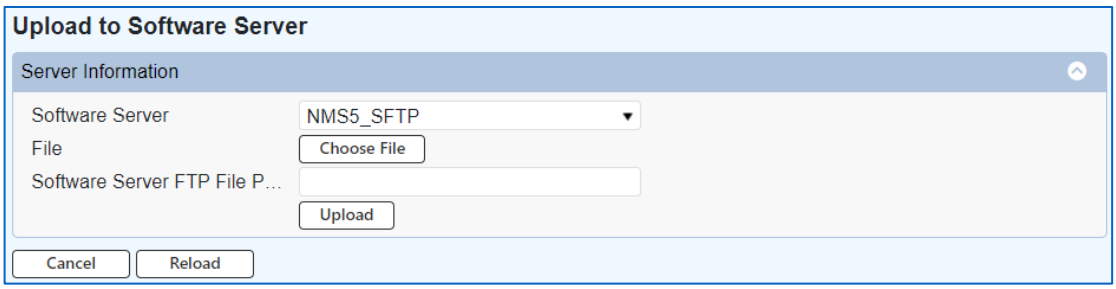
1. Login to Netspan using an account with administrator privileges.
2. Ensure that an appropriate server is available to store your software image by choosing the **Software Management** > **Software Servers** menu option. The **Software Servers** screen will be displayed with a list of currently configured software servers. Check whether the server you need appears in this list. If not, add a server to the network using the process described in How to Add a Software Server.

Figure 194: Software Servers List Screen



3. On the main Netspan menu, choose **Software Management** > **Software Server Upload**. The **Upload to Software Server** screen will be displayed.

Figure 195: Upload to Software Server Screen



4. Use this screen to specify the server for uploading the software image and to select an appropriate software image that needs to be uploaded. A full description of the fields you need to complete is provided in Table 20.

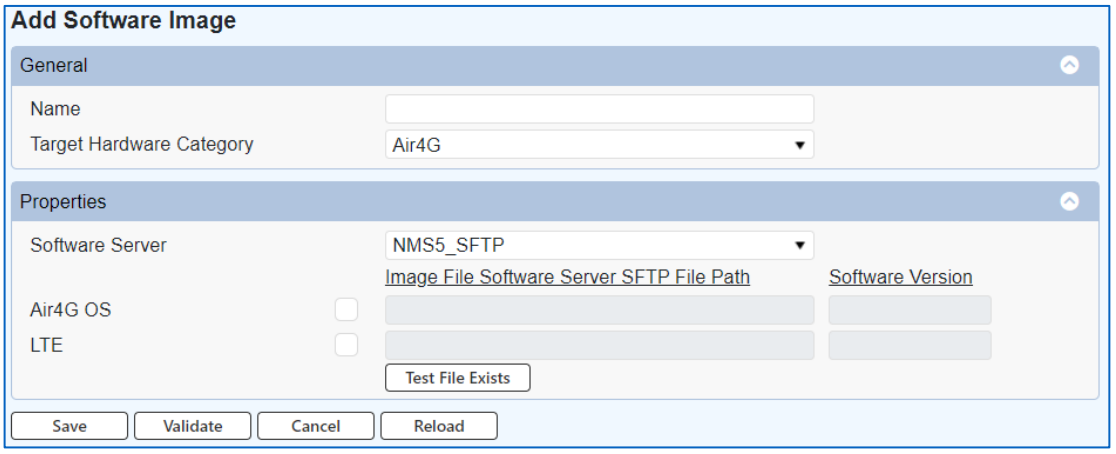
Note: Where iRelay node software is a .zip archive, Netspan will extract the archive contents and upload these to the software server. The archive file itself will not be uploaded.

Table 20. Upload to Software Server Configuration Parameters

Parameter	Description
Software Server	Choose software server for uploading the software image. A drop-down list is provided, containing all software servers currently configured in your system.
Software	Select software image you want to upload. Click **Browse** to open a standard Windows browse dialog, which enables you to find the relevant file on your local machine or network that you want to upload.
Software Server FTP File Path	The file name and path as it is seen on the software server.

5. Click **Upload** to execute the file upload action.
6. Then, on the main Netspan menu, choose **Software Management** > **Software Images**. The **Software Images** screen will be displayed. Add your uploaded software to the available software images list so that it can be accessed by the nodes.
7. Click **Add** at the bottom of the screen. This opens the **Add Software Image** screen.

Figure 196: Add Software Image Screen



8. Use this screen to define the properties of the software image as you want them to be displayed on the Software Images screen. A full description of the fields you need to complete is provided in Table 21.

Table 21. Add Software Image Configuration Parameters

Parameter	Description
Name	The software image name that is displayed when selecting the software from the node.
Target Hardware Category	A drop-down list of available hardware types configured in the system. Select the type of node that the software image is intended for, such as *AirSynergy 2000*. Your selection here determines which fields are displayed in the **Properties** panel as each hardware category has specific requirements.
Properties	
Software Server	Select the software server where the software image is held. **Note:** This field is not shown for target hardware category of **iBridge 440**.
Software File	Click **Browse** to navigate to the software image file to upload. **Note**: This field is only shown for target hardware category of **iBridge 440**.
Image Type	A list of available software image types in the system. Choose one appropriate to your software image. **Note:** This field is only shown for target hardware category of **AirUnity** and **AirSpeed-Relay**.
Image File Software Server FTP File Path	Automatically populated by Netspan. This is the name of the actual software file as loaded onto the software server in the form *enodeb.<version>.tar.bz2*. **Note:** Where iRelay node software is a '**.zip**' archive, use the archive filename with '**.manifest**' file extension in place of '**.zip**'.
Software Version	Automatically populated by Netspan. This is the version number of the software image.
Intended Software Mode	A drop-down list of the available modes for the software image. Select the one appropriate to your upload. **Note**: This field is only shown for target hardware categories of **iBridge 460**. For all other categories, the field is hidden.

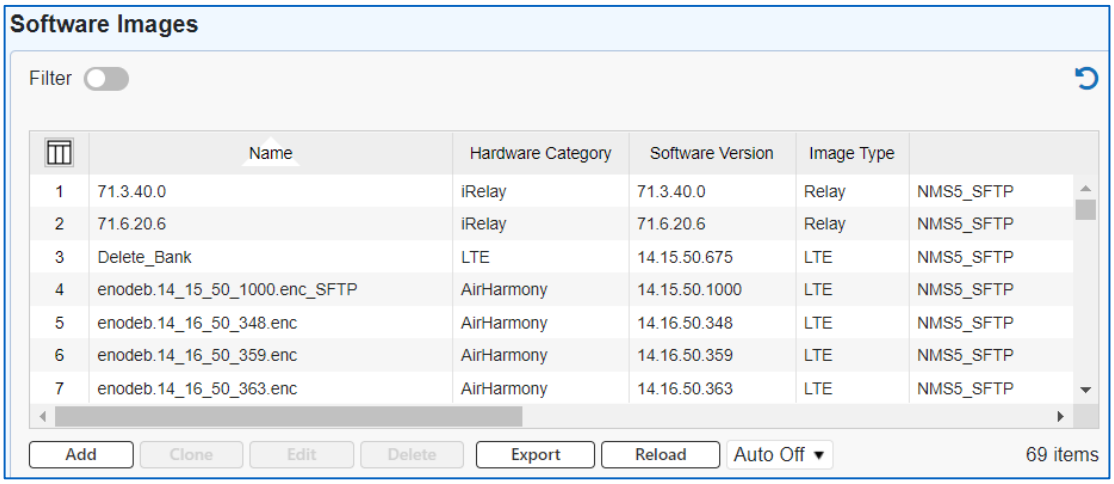
9. Click **Test File Exists** to verify that the software image file can be identified on the server and that it is available for use. If this test is successful, click **OK** to commit the image information.
10. When saving your software image, Netspan verifies that the version is correct. Click **Yes** to confirm and close the message.

6.3 How to Delete a Node Software Image

To delete a node software image from a software server:

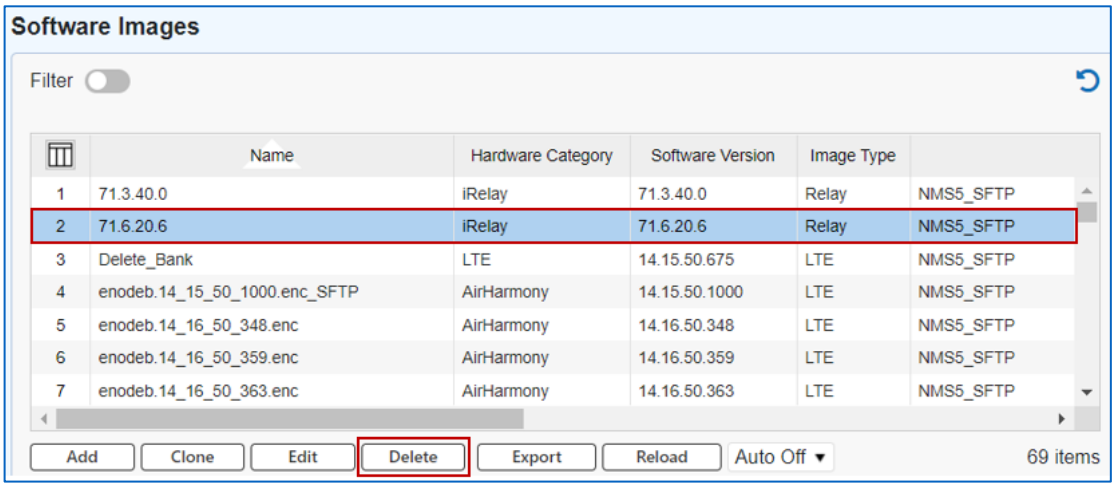
1. On the main Netspan menu, choose **Software Management** > **Software Images**. The **Software Images** screen will be displayed.

Figure 197: Software Images



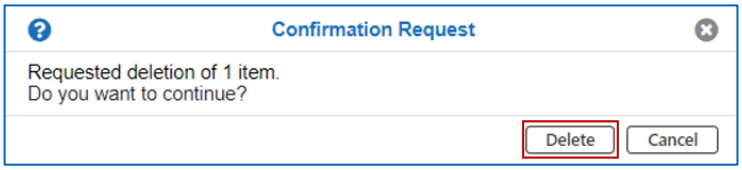
2. Select the Software Image that you want to delete and click **Delete**.

Figure 198: Deleting a Software Image



3. A **Confirmation Request** pop-up screen will be displayed asking for your confirmation. Click **Delete** to delete the selected software image.

Figure 199: Deleting a Software Image



6.4 How to Upgrade the Software on a Node

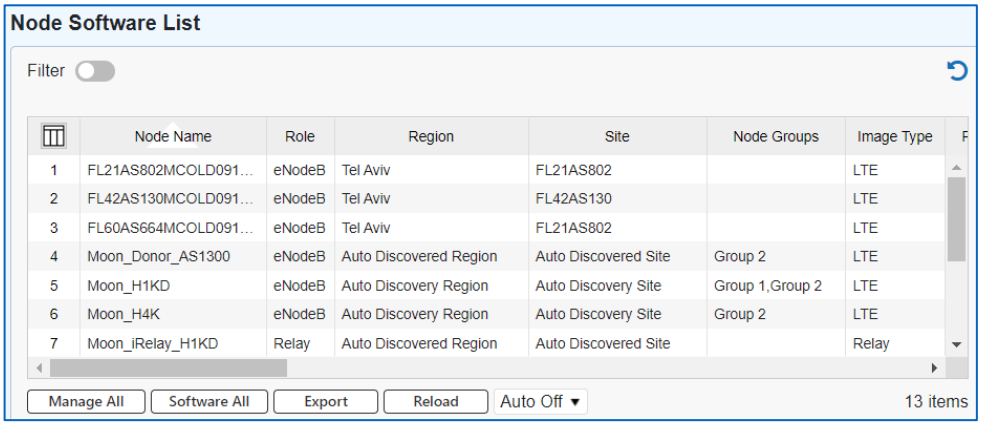
When a new software becomes available for a node, it needs to be uploaded to software server before it can be accessed (see How to Upload a Node Software Image for a description of how to do this). Once it is stored on a server, you can use Netspan to install the new software image on the node(s) of your choice.

In a full Netspan deployment, it is likely that you would want to install the software on a single node first and then roll it out to multiple nodes once performance has been verified.

To upgrade the software on a node:

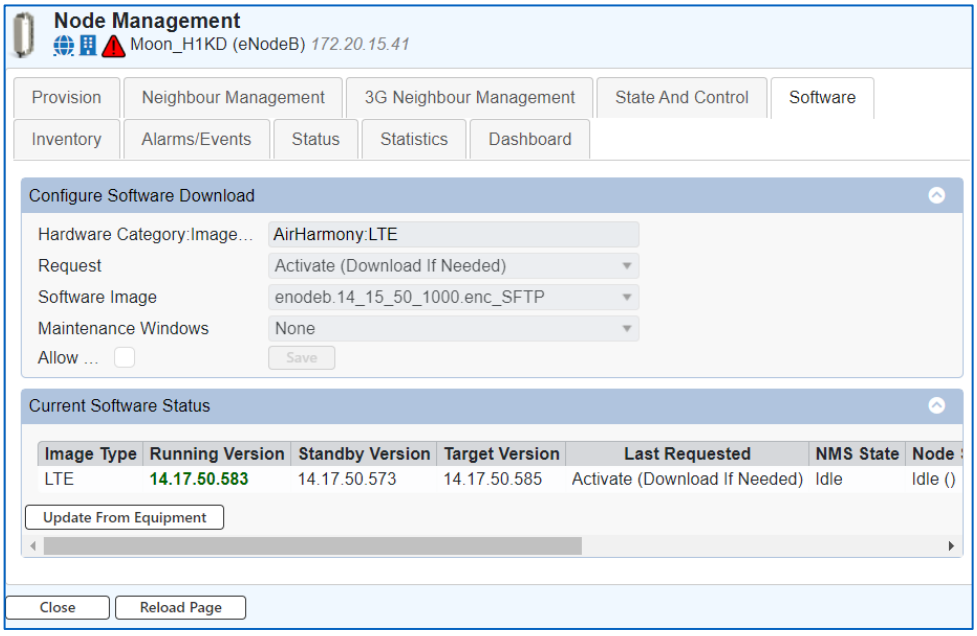
1. Login to Netspan using an account with administrator privileges.
2. On the main Netspan menu, choose **Software Management** > **Node Software**. The **Node Software** screen will be displayed with a list of nodes currently available in Netspan along with their current software status.

Figure 200: Node Software Screen



3. In the **Node Name** column, click on the node that you want to upgrade. Click **Manage** at the bottom of the screen to display the details of that particular node on the **Node Management** screen.
4. Select the **Software** tab for your chosen node. This shows details of the software that is currently running on the node as well as enabling you to download new software.

Figure 201: Node Management Screen



5. In the **Configure Software Download** area click on the **Allow Edit** checkbox. This enables the fields on the screen which are otherwise read only.
6. You can now specify the new software to install. See Table 22 for a full description of the fields that you need to complete.

Table 22. Configure Software Download Parameters

Parameter	Description
Hardware Category:Image Type(s)	A read only field populated by Netspan. This shows the hardware category and image types that are applicable to your selected node.
Request	Choose your required action from the available list. **Idle** – no activity has been requested. **Download only** – the software to be activated manually at a later date using the Activate option is downloaded to the storage bank. Download and activate are kept as separate steps to control when service outages occur, as the process of activating a software change causes a service outage. **Note:** this option is not available if you are upgrading an iBridge 440 node. **Activate (Download If Needed)** – the software is downloaded to the storage bank and is then applied without further user intervention. There will be no further warnings before the node is updated with the new software. This is service affecting. **Abort** – cancels the currently running process.
Software Image	A drop-down list of applicable software images currently available in Netspan will be populated according to your selection in the **Software Type** field. Choose the one you want to install on the node.
Maintenance Windows	If selected, this option enables you to specify when you would like the software download to run and to be activated, by providing additional date, time and duration fields; see the description of the **Run between** fields for details. When **Single** is selected, **Activation** happens immediately after software download. When Both is selected, **SW Download** and **Activation** can be scheduled separately. If left clear, the download and/or activation takes place immediately.
Between	Only shown if Maintenance Windows is selected as **Single/Both**. Enables you to define a start time, end time, date, and duration for the download. This option is provided for situations where you have defined service windows in which you carry out network maintenance and upgrades.
Allow Edit	Clicking on this checkbox allows the user to perform software upgrade.

7. Click **Save** to begin the software upgrade.
8. The **Current Software Status** table displays information regarding the currently installed software on your selected node and also shows the progress of the upgrade. Netspan operates on a ‘dual bank’ principle, where a node can have two software versions. One that is installed and currently active and a second that is downloaded and ready for an upgrade. The fields in this table are described below.

Note: This information is not available immediately after adding a node (unless that node is online). It is populated by the NMS Software Service by polling the node.

Table 23. Current Software Status Table Description

Heading	Description
Image Type	The type of the software image currently installed on the node such as: LTE, AirSynergy, iBridge 440, etc.
Running Version	The current software version running on the node.
Standby Version	A secondary version of the software that has been downloaded on the node, but which is not currently active. This could be either an older software version that remains available as a backup or a newer version that has been downloaded but not yet applied.
Target Version	The latest software version to be downloaded on the node. If this download has been activated, then the Target Version is the same as the Running Version.
Last Requested	The last software download action requested on the node.
NMS State	The current state of the NMS. This will be idle unless a download is in progress, an activation of a new download is pending, or an activation is in progress.
Node State	The current state of the node. This will be idle unless a download is in progress.
Last Updated	The date and time when the current software status information was last updated from the node.
Software Activation	The data at which Netspan first detected that software version was running on the node.
Running Version Checksum	The data integrity checksum for the software version currently running in the node.

9. Table 24 shows an example of how the software status information would be displayed during the process of upgrading from software version 5.6.7.8 to 9.10.11.12.

Table 24. Example Current Software Status Table during an Upgrade

Image Type	Running Version	Standby Version	Target Version	Last Requested	NMS State	Node State	Last Updated	Software Activation	Running Version Checksum
1. Before the latest software image is downloaded, the node is running software version 5.6.7.8 with version 1.2.3.4 available as a back-up.									
LTE	5.6.7.8	1.2.3.4		Idle	Idle	Idle ()	Last update from node to Netspan.		
2. Software version 9.10.11.12 is chosen with a request of **Activate (Download If Needed)**. The **Target Version** field is updated with the new software version, and the download is currently in progress as reflected by the status of both the **NMS** and the **Node**.									
LTE	5.6.7.8	1.2.3.4	9.10.11.12	Activate (Download If Needed)	Download in Progress	Downloading (0-99% downloaded)	Last update from node to Netspan.		
3. The software download is complete, so the **Node State** field returns to **Idle** and the **NMS State** moves to **Activate pending** as the software now needs to be activated. The **Standby Version** field is updated to show the version of the newly downloaded software that is waiting to be activated on the node.									

Image Type	Running Version	Standby Version	Target Version	Last Requested	NMS State	Node State	Last Updated	Software Activation	Running Version Checksum
LTE	5.6.7.8	9.10.11.12	9.10.11.12	Activate (Download If Needed)	Activate pending	Idle (100% downloaded)	Last update from node to Netspan.		
4. The newly downloaded software is activated, as seen in the **NMS State** field.									
LTE	5.6.7.8	9.10.11.12	9.10.11.12	Activate (Download If Needed)	Activate in progress	Idle (100% downloaded)	Last update from node to Netspan.		
5. The software activation is complete, so the **Running Version** field updates to show the new software version running on the node. The **Standby Version** is now the previous running software version which is still available on the node if required, and the **NMS State** returns to Idle.									
LTE	9.10.11.12	5.6.7.8	9.10.11.12	Activate (Download If Needed)	Idle	Idle ()	Last update from node to Netspan.		

10. Once the upgrade is complete, the **Running Version** field in the Current Software Status table shows the updated software version.

6.5 How to Upgrade Multiple Nodes per Hardware Type

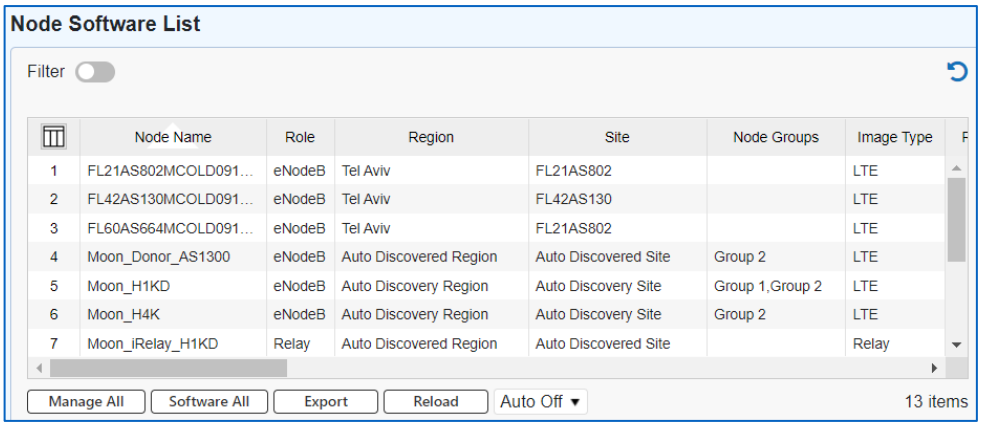
Where a network has multiple nodes running on the same hardware type, Netspan provides you with the ability to upgrade the software on all of these nodes simultaneously rather than having to upgrade them individually as described in How to Upgrade the Software on a Node.

In full Netspan deployment, it is likely that you would want to install the software on a single node first and then roll it out to multiple nodes once performance has been verified.

To upgrade multiple nodes per hardware type:

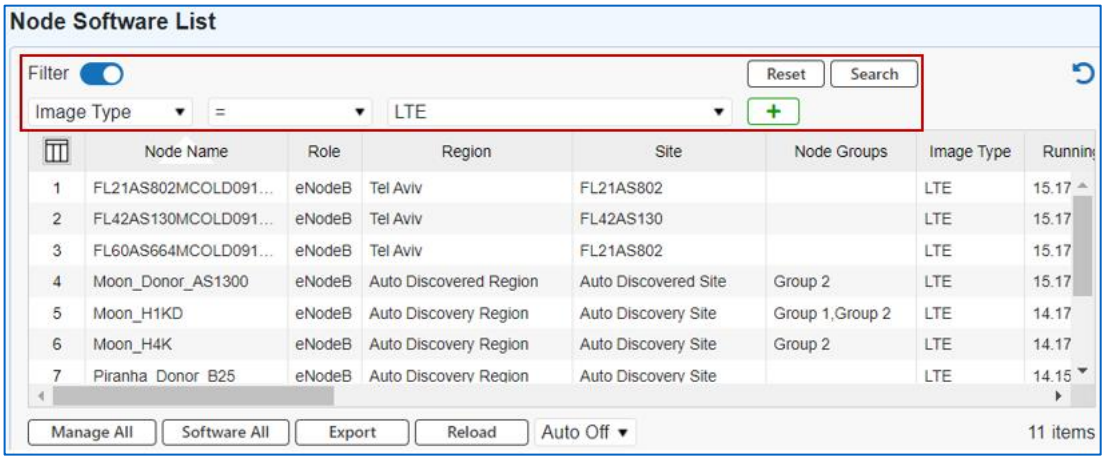
1. Login to Netspan using an account with administrator privileges.
2. On the main Netspan menu, choose **Software Management** > **Node Software**. The **Node Software** screen will be displayed with a list of all nodes currently available in Netspan along with their current software status.

Figure 202: Node Software Screen



3. Click on the Filter toggle button, select **Image Type** from the drop-down list, select **LTE** from the drop-down list, and click **Search**. The list of nodes is automatically filtered based on your selected criteria.

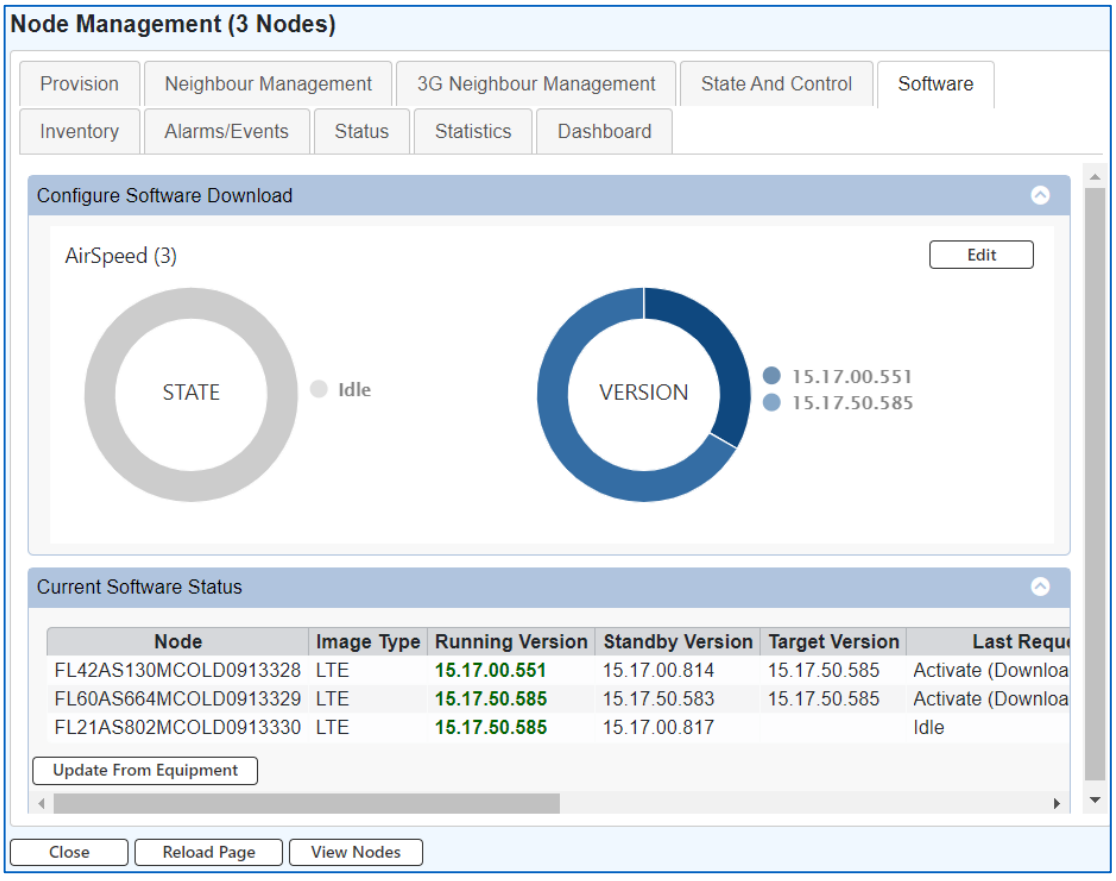
Figure 203: Filtered Node Software Screen



4. In the resulting filtered list of nodes, select all the nodes that you want to upgrade as a batch (up to 1000) by using **Shift + click**. Click **Manage** at the bottom of the screen to display the details of your selected nodes on the **Node Management** screen.

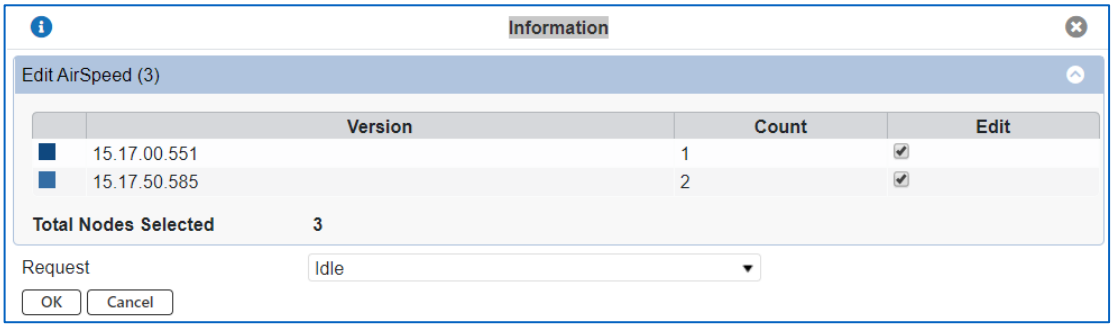
5. Select the **Software** tab for your chosen nodes. This shows details of the software that is currently running on the nodes as well as enabling you to download new software.

Figure 204: Multiple Node Management Screen



6. In the **Configure Software Download** area, click **Edit**. This will open the Edit Node screen.

Figure 205: Edit Node Screen



7. You can now specify the new software to install. See Table 25 or a full description of the fields that you need to complete.

Table 25. Configure Software Download Parameters

Parameter	Description
Request	Choose your required action from the available list. **Idle** – no activity has been requested. **Download Only** – the software to be activated manually at a later date using the Activate option is downloaded to the storage bank. Download and activate are kept as separate steps to control when service outages occur, as the process of activating a software change causes a service outage. **Note:** this option is not available if you are upgrading an iBridge 440 node. **Activate (Download If Needed)** – the software is downloaded to the storage bank and is then applied without further user intervention. There will be no further warnings before the nodes are updated with the new software. This is service affecting. **Abort** – cancels the currently running process.
Software Image	A drop-down list of applicable software images currently available in Netspan will be populated according to your selection in the **Software Type** field. Choose the one you want to install on the nodes.
Between	Enables you to define a start time, end time, date, and duration for the download. This option is provided for situations where you have defined service windows in which you carry out network maintenance and upgrades.
Maintenance Window	If selected, this option enables you to specify when you would like the software download to run and to be activated, by providing additional date, time and duration fields; see the description of the **Run between** fields for details. When **Single** is selected, **Activation** happens immediately after software download. When Both is selected, **SW Download** and **Activation** can be scheduled separately. If left clear, the download and/or activation takes place immediately.
Edit	Clicking on this button allows you to edit the node settings.

Note: This information is not available immediately after adding a node (unless that node is online). It is populated by the NMS Software Service by polling the node.

Table 26. Current Software Status Table Description

Heading	Description
Node	Name of the node.
Image Type	The type of the software image currently installed on the node such as LTE, AirSynergy, iBridge 440, etc.
Running Version	The current software version running on the node.
Standby Version	A secondary version of the software that has been downloaded on the node, but which is not currently active. This could be either an older software version that remains available as a backup or a newer version that has been downloaded but not yet applied.
Target Version	The latest software version to be downloaded on the node. If this download has been activated, then the Target Version is the same as the Running Version.
Last Requested	The last software download action requested on the node.
NMS State	The current state of the NMS. This will be idle unless a download is in progress, an activation of a new download is pending, or an activation is in progress.
Node State	The current state of the node. This will be idle unless a download is in progress.
Last Updated	The date and time when the current software status information was last updated from the node.
Software Activation	The data at which Netspan first detected that software version was running on the node.
Running Version Checksum	The data integrity checksum for the software version currently running in the node.

8. Table 27 shows an example of how the software status information would be displayed during the process of upgrading from software version 5.6.7.8 to 9.10.11.12.

Table 27. Example Current Software Status Table During an Upgrade

Image Type	Running Version	Standby Version	Target Version	Last Requested	NMS State	Node State	Last Updated	Software Activation	Running Version Checksum
LTE	14.14.00.010	14.14.00.9		Idle	Idle pending	Idle ()	2017-04-13 15:34:41	N/A	N/A
LTE	15.15.10.171	15.15.10.158	15.15.10.171	Activate (Download if Needed)	Activate failed	Idle ()	2017-12-28 01:24:42	N/A	N/A

9. Once the upgrade is complete, the **Running Version** Checksum field in the Current Software Status table will show the updated software version.

6.5.1 How to Perform a Network-Wide Upgrade

Netspan provides you with the ability to upgrade the software on all of these nodes in your network simultaneously, rather than having to upgrade them individually as described in How to Upgrade the Software on a Node.

In full Netspan deployment, it is likely that you would want to install the software on a single node first, and then roll it out across all the nodes in your network once performance has been verified.

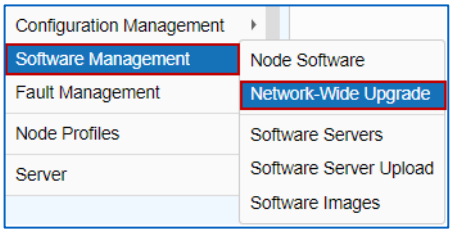
With little input from the operator, this feature will benefit you with the following:

- All units are upgraded at once
- Upgrade is automatic

To perform a network-wide upgrade:

1. Choose **Software Management > Network-Wide Upgrade** menu option.

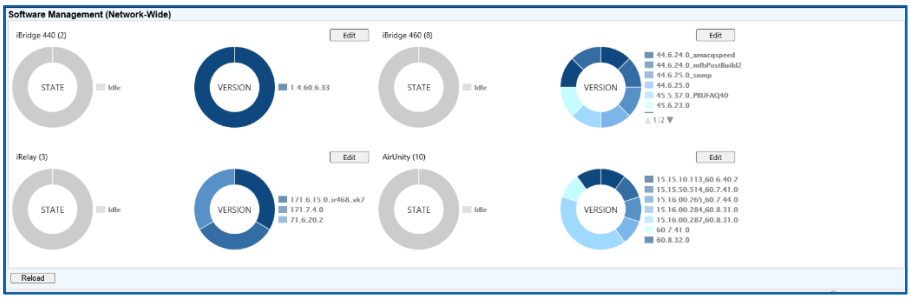
Figure 206: Network-Wide Upgrade Menu Option



This will open a **dashboard** containing the hardware types currently available on your network, including a graphical representation showing the state of the nodes and the count of the number of nodes in each category.

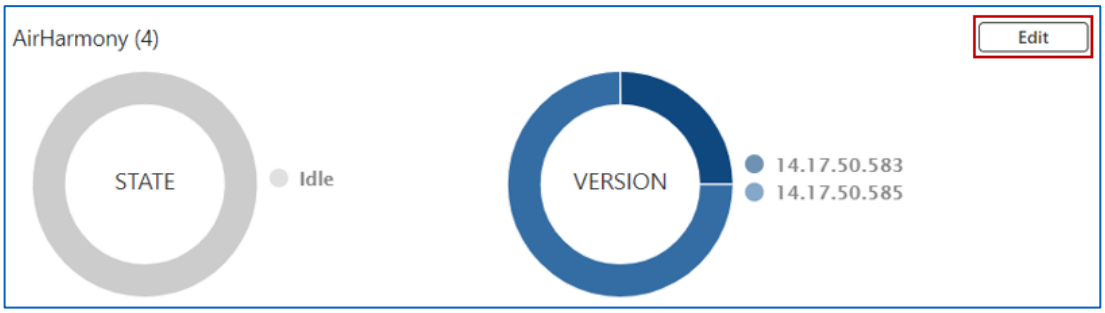
The grid view is now replaced with a dashboard to enable faster analysis. Viewing these representations (for each hardware type) as a dashboard enables you to perform a quick analysis and understand what software is running in the network.

Figure 207: Software Management (Network-Wide Upgrade) Screen



For each hardware category, there is an **Edit** button, which enables you to start the batch software upgrade process.

Figure 208: Software Management (Network-Wide Upgrade) - Edit Button



2. Click the **Edit** button applicable to the hardware type whose network-wide software upgrade you want to perform. An *Edit* pop-up window displaying the details listed in Table 28 appears.

Figure 209: Network-Wide Upgrade - Edit Window

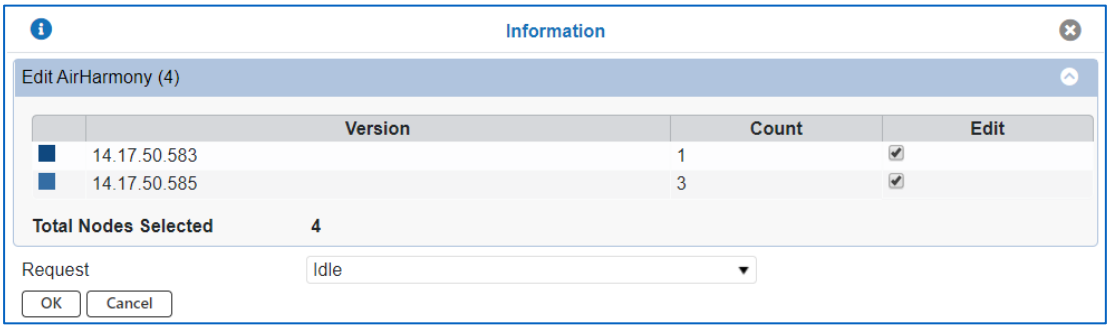


Table 28. Network-Wide Upgrade - Edit Window Properties

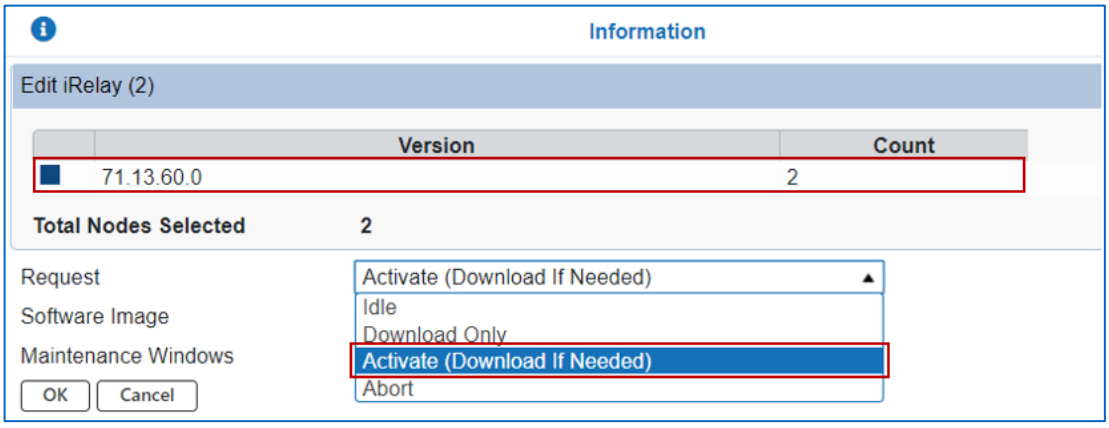
Property	Description
Version	Shows the existing software image on the selected nodes.
Count	Specifies the number of nodes running a specific software version.
Edit	Select this checkbox if you want to perform a network-wide upgrade for that batch of nodes.
Request	Make one of the following selections in this field to define what action you want to perform: **Idle** – no activity has been requested. **Download Only**– the software to be activated manually (at a later date using the **Activate** option) is downloaded to the storage bank immediately if the **Configure Maintenance Windows** is set to **None**. When **Single** is selected, you can schedule **SW Download**. The download and activate actions are kept as separate steps to control when service outages occur because the process of activating a software change might cause a service outage. **Note:** this option is not available if you are upgrading an iBridge 440 node. **Activate (Download If Needed)** – the software is downloaded to the storage bank and is then applied without further user intervention if the **Configure Maintenance Windows** is set to **None**. When **Single** is selected, **Activation** happens immediately after software download. You can schedule the software download. When **Both** is selected, **SW Download** and **Activation** can be scheduled separately. There will be no further warnings before the nodes are updated with the new software. This is service affecting. **Abort** – cancels the currently running process.
Software Image	A drop-down list of applicable software images currently available in Netspan will be populated according to your selection in the **Software Type** field. Choose the one you want to install on the nodes.
Maintenance Windows	Appears only when **Request** is set to **Download Only** or **Activate (Download If Needed)**.

	If selected, this option enables you to specify when you would like the software download to run and to be activated, by providing additional date, time and duration fields; see the description of the **Between** field for details. When **Request** is set to **Download Only:** • Select **Single** to schedule the software download process. • Select **None** for the download process to take place immediately. When **Request** is set to **Activate (Download If Needed)**: • Select **Single** to schedule the software download process. • Select **Both** to separately schedule the software download and activation processes. • Select **None** for the software activation process to take place immediately.
Between	Enables you to define a start time, end time, date, and duration for the download. This option is provided for situations where you have defined service windows in which you carry out network maintenance and upgrades.
OK	Click this button to progress with the selected request.
Cancel	Click this button to cancel the selected request.

3. To continue with the network-wide upgrade process, in the **Edit** pop-up window, select the **Edit** checkbox of the software version that you want to upgrade.

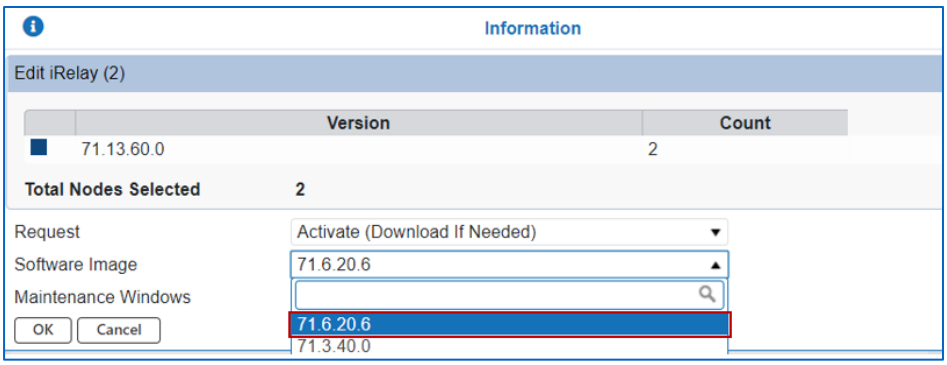
   In the given example, the software version `71.13.60.0` is upgraded to `71.6.20.6` with the **Request** set to (**Activate Download If Needed**).

Figure 210: Enabling the Edit Checkbox (Example)



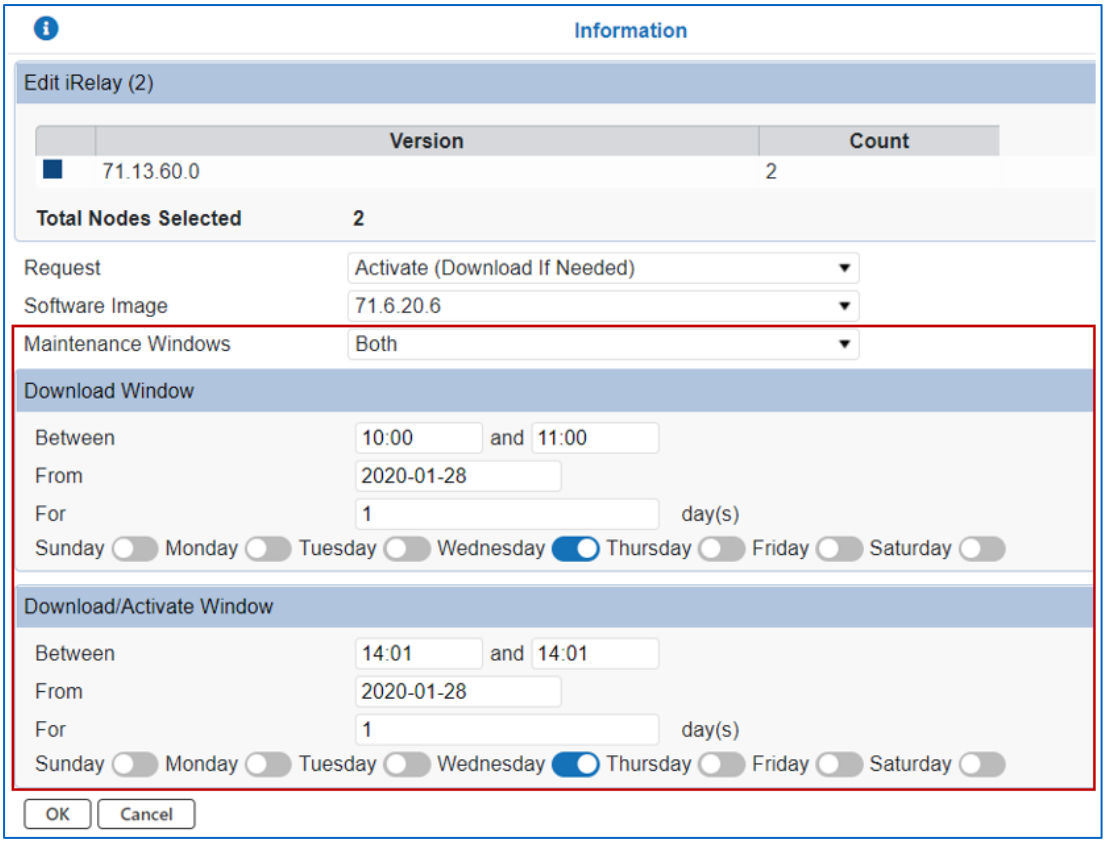
From the **Software Image** drop-down list, choose the software image that you want to apply to the selected batch of nodes.

Figure 211: Selecting the Software Image (Example)



You may schedule the activation process if you want it to take place later at a designated time, for example, if you want software upgrade to take place during periods of low network use.

Figure 212: Scheduling Software Upgrade

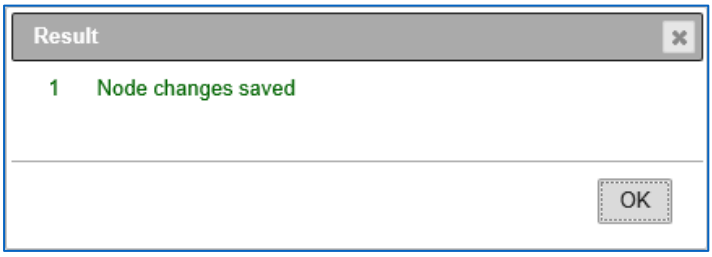


If the **Configure Maintenance Windows** is set to **None**, there will be no further warnings before the software upgrade takes place, so it is important that you are aware that your actions here will be service affecting

For more information on other options that you can choose from the **Request** drop-down list, see Table 28.

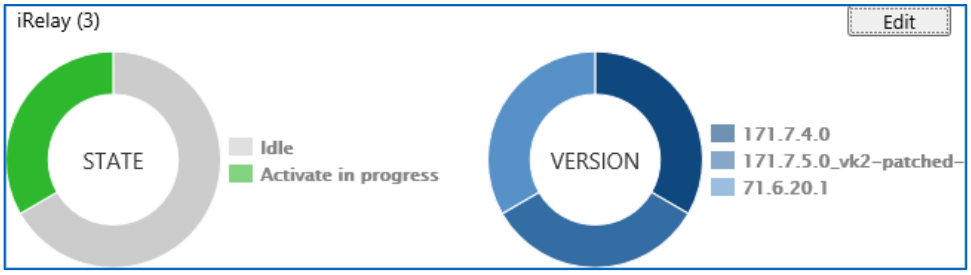
4. Click **OK** to initiate your request.
5. In the **Result** pop-up window, click **OK**.

Figure 213: Result Window (Example)



Once the upgrade has been initiated, the dashboard shows the progress by changing the **State** of the nodes that were selected for upgrade from **Idle** to **Activate in progress**. The green segment of the graphical representation indicates the upgrade progress. The faded grey segment represents the nodes that were **not selected** for the batch upgrade.

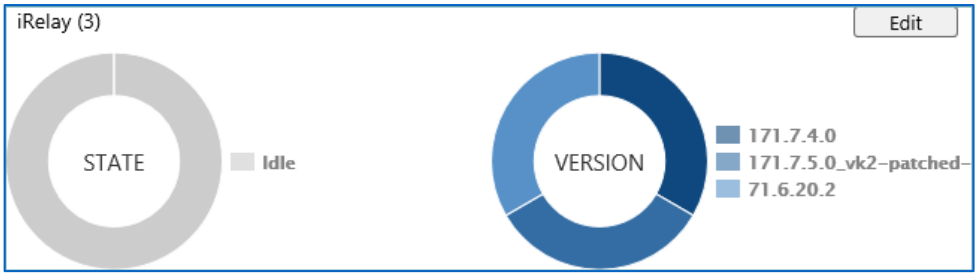
Figure 214: State - Activate in Progress (Example)



During the upgrade process, the dashboard displays status information on your software upgrade request, detailing how many nodes of your selected population are pending, in progress, have completed, or failed the download and/or activation process.

After completing the software upgrade process, the **State** changes back to **Idle** to denote that there are no pending requests.

Figure 215: Upgrade Complete (Example)



You also have the option to use the **Node Search** feature to filter a list of nodes which are running a specific software, and then perform a network-wide software upgrade. For more information on how to perform this search, see Node Search.

7 Alarm Management

On the Active and Historical Alarms screens of the Netspan UI, you will be able to view details of the network and the equipment alarms that are both currently active and that have been either cleared or in existence for long enough to now be granted historical status.

Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

An alarm in Netspan indicates the presence of a fault condition on either the Netspan server or any piece of node equipment. The raising and clearing of alarms is triggered by an associated Netspan event, where an event is a notification indicating the occurrence of a condition on the Netspan server or on the node equipment.

Not all events raise alarms, but only those that notify of fault conditions. Depending on the severity of the event, Netspan raises an alarm until the underlying condition is cleared. Resolving a fault in the network clears the associated alarm, but an event remains until it is cleared from the Netspan event buffer.

Occurrences of alarms are written to the Netspan database and their details are displayed in the UI. This section explains how you can view and manage alarms using the Netspan's UI, covering:

- How to View Active Alarms
- How to View Historical Alarms
- How to Acknowledge Alarms
- How to Delete Alarms
- How to Edit Alarms
- How to Export Alarms View into an Excel File
- How to Understand Alarm Details
- How to View and Edit Alarm Types
- How to View Alarm Timeline Graph

Note: In addition to the alarm management functionality described in this section, Netspan also provides you with the ability to view a geographical map of the nodes that have reported alarm conditions and a colour-coded timeline of the alarms that have been raised on the node population over an adjustable time period. These two features are not included here, but are explained in detail in *ARD-D01018 Netspan Administration Guide*.

7.1 How to View Active Alarms

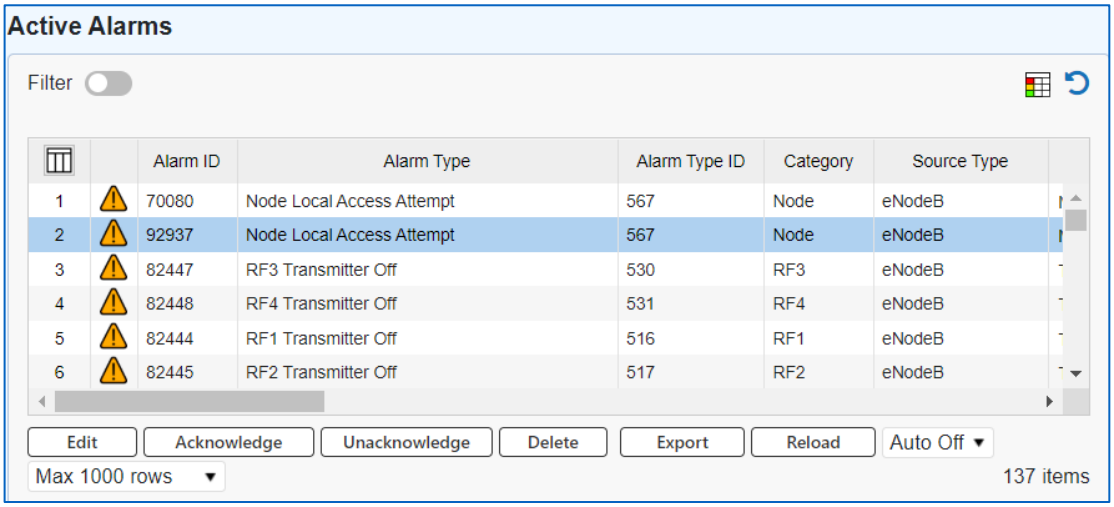
When an alarm is triggered on a node, the details of that alarm are logged and displayed in the Netspan UI. You can view active and How to View Historical Alarms in the UI to see full details of problems that have occurred so that you can take appropriate action if it is required.

Active alarms include all the alarms that are currently in your network, reported to Netspan, and are stored in the database.

To view an active alarm:

1. Choose **Fault Management** > **Active Alarms** menu option. This will open a **List** screen, containing the alarms currently active on your network's nodes.

Figure 216: Active Alarms List Screen



2. It is possible that there could be hundreds of alarms live in your system, so Netspan provides you with a **Filter** field which enables you to reduce the list of alarms to just those you are interested in. The available filters are:

Table 29. Active Alarm Search Filters

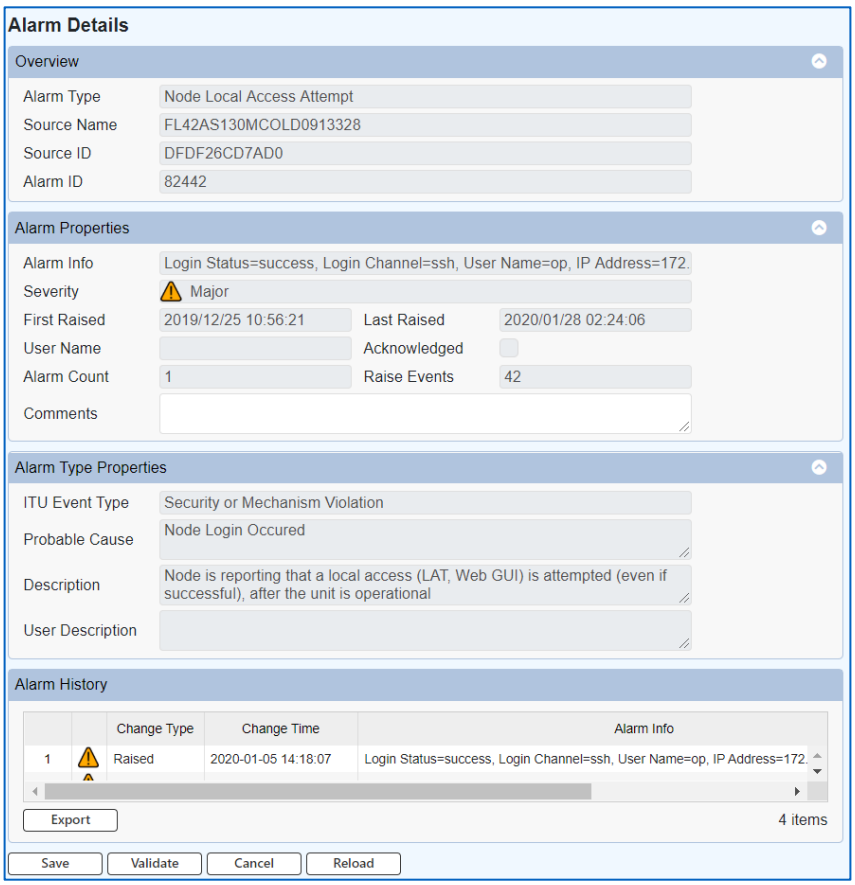
Filter	Description
Severity	Displays the alarms that match your specified severity level.
Cleared	Displays the time (YYYY-MM-DD HH:MM:SS) when the alarm was cancelled.
Alarm ID	Displays the alarm that matches the alarm ID of a specific alarm.
Alarm Type	Displays the alarms that match your specified alarm type.
Alarm Type ID	Displays the alarms that match your specified alarm type.
Category	Displays the alarms that match your specified category.
Source Type	Displays the alarms that match your specified source type.
Source Name	Displays the alarms that math your specified source name (node name) and condition.
Unique ID	Displays the alarms that match your specified Unique ID of the alarm.
Alarm Info	Displays the alarms that match the specified alarm info.
Ack	Displays the alarms that match the condition.

Filter	Description
User	Displays the user that matches the condition. If the alarm is not ack or cancelled the user is blank.
Last Acknowledged	Displays the last acknowledged alarms matching the date and time and condition.
Alarm Count	Displays the alarms that are received with same alarm ID and matching the condition.
First Raised	Displays the alarms that match the first date and time on which the alarm was raised and a condition.
Last Raise Event	Displays the alarms that match the last date and time the alarm was raised and a condition.
Last Cleared	Displays the last time the alarm was cleared.
MAC Address	Displays the MAC address of the source node.
Last Changed	Displays the Last Changed Alarms based on a specific Date Search.

3. Netspan also enables you to search for specific keywords or phrases in the list of active alarms. To enable this functionality, click the **Filter** toggle button, select the filter type from the drop-down option, select an appropriate option from the adjacent drop-down option, and click on **Search**.

4. Once you have filtered the list of alarms, double click the one you want to investigate in detail. The **Alarm Details** screen will be displayed, providing you with extensive information on the nature of the alarm, including the node on which the alarm was raised, the unique alarm ID, its severity level, when it was raised, and so on.

Figure 217: Active Alarm Details Screen



Note: For an explanation of what may have caused a particular type of alarm and the recommended actions to clear it, see *ARD-D00742 Netspan Alarms and Events Reference Guide*.

Table 30 lists details of all the fields displayed on the **Alarm Details** screen.

Table 30. Alarm Properties and Descriptions

Property	Description
Alarm Type	Specifies the type of the alarm.
Source Name	Specifies the name of the managed element on which the alarm is raised.
Source ID	Specifies the ID of the managed element on which the alarm is raised.
Alarm ID	Specifies the ID of the selected alarm. **Note:** Netspan generates a unique alarm ID for every new alarm.
Alarm Properties	
Alarm Info	Provides information on the selected alarm.
Severity	Specifies the current severity level of the alarm.
Acknowledged	If selected, it indicates that a specific user is investigating that alarm.
User Name	Specifies the name of the user who acknowledged the alarm (if the alarm is acknowledged).
First Raised	Specifies the date and time on which the alarm was first raised.
Last Raised	Specifies the date and time on which the alarm was last raised.
Alarm Count	Specifies the number of times the alarm changed from cleared to raised state.
Raise Events	Specifies the number of events raised for the selected alarm.
Comments	Shows any user-defined comments related to the instance of the alarm.
Alarm Type Properties	
ITU Event Type	Specifies the ITU event type of the alarm.
Probable Cause	Lists the possible causes that triggered the alarm.
Description	Provides a description of the alarm.
User Description	Displays any descriptions that users have added to the alarm.
Alarm History	
Lists the history of the alarm status changes.	

5. Click **Save** to close the Alarm Details screen and return to the Active Alarms List screen.

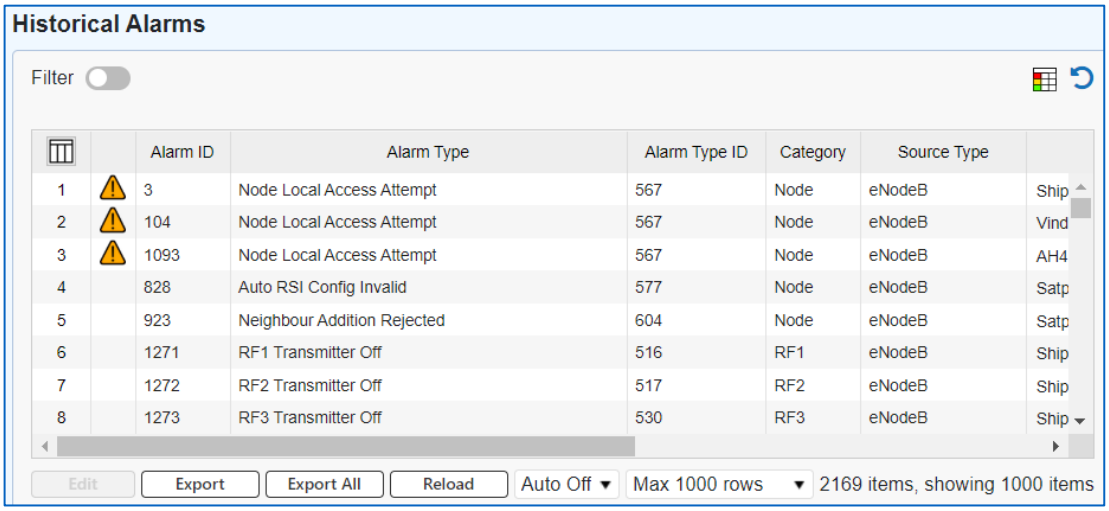
7.2 How to View Historical Alarms

When an alarm is triggered on a node, the details of that alarm are logged and displayed in the Netspan UI. After a configurable period of time, most alarm types will be cleared automatically which moves them from the status of ‘active’ to ‘historical’. You can view How to View Active Alarms and historic alarms in the UI to see full details of problems that have occurred so that you can take appropriate action if required.

To view an historical alarm:

1. Choose **Fault Management** > **Historical Alarms** menu option. This will open a **List** screen containing the historical alarms which were previously active on your system.

Figure 218: Historical Alarms List Screen



2. It is possible that there could be hundreds or even thousands of historical alarms in your system, so Netspan provides you with a **Filter** field which enables you to reduce the list of alarms to just those you are interested in. The available filters are:

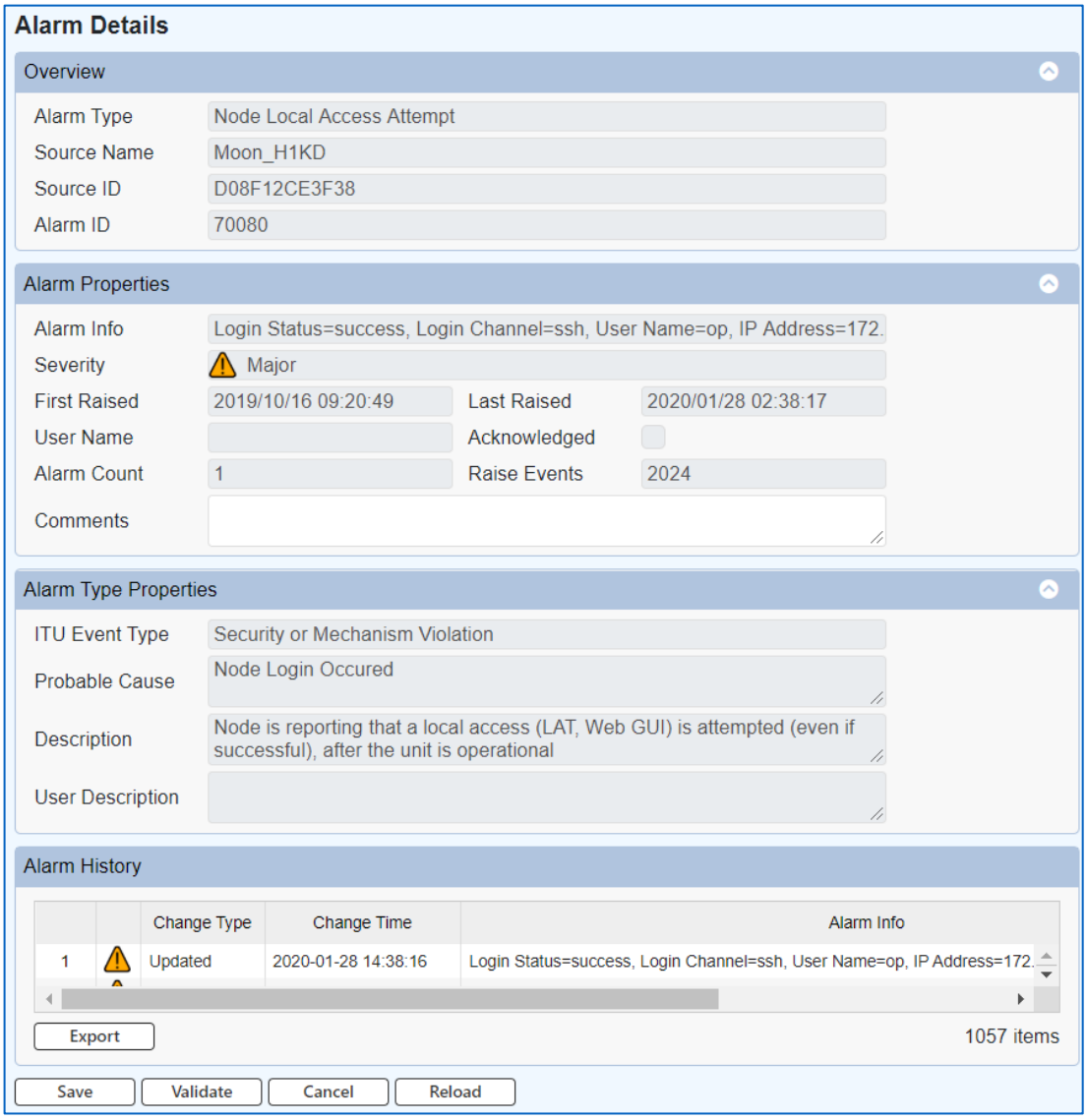
Table 31. Historical Alarm Search Filters

Filter	Description
Severity	Displays the alarms that match your specified severity level.
Alarm ID	Displays the Alarm that matches the Alarm ID of a specific alarm.
Alarm Type	Displays the alarms that match your specified alarm type.
Alarm Type ID	Displays the alarms that match your specified alarm type.
Category	Displays the alarms that match your specified category.
Source Type	Displays the alarms that match your specified source type.
Source Name	Displays the alarms that match your specified source name (node name) and condition.
MAC Address	Displays the MAC address of the source node.
Last Changed	Displays the Last Changed Alarms based on a specific Date Search.

3. Netspan also enables you to search for specific keywords or phrases in the list of historical alarms. To enable this functionality, click the Filter toggle button, select the filter type from the drop-down option, select an appropriate option from the adjacent drop-down option, and click on **Search**.

4. Once you have filtered the list of alarms, double click the one you want to investigate in more detail. The **Alarm Details** screen will be shown which provides you with extensive information on the nature of the alarm, including the node on which the alarm was raised, the unique alarm ID, its severity level, when it was raised, and so on.

Figure 219: Alarm Details Screen



Note: For an explanation of what may have caused a particular type of alarm and the recommended actions to clear it, see *ARD-D00742 Netspan Alarms and Events Reference Guide*.

Table 32 lists the details of all the fields that you can find on the **Edit Alarm** page.

Table 32. Alarm Properties and Descriptions

Property	Description
Alarm Type	Specifies the type of the alarm.
Source Name	Specifies the name of the managed element on which the alarm is raised.
Source ID	Specifies the ID of the managed element on which the alarm is raised.
Alarm ID	Specifies the ID of the selected alarm. **Note:** Netspan generates a unique alarm ID for every new alarm.
Alarm Properties	
Alarm Info	Provides information on the selected alarm.

Property	Description
Severity	Specifies the current severity level of the alarm.
Acknowledged	If selected, it indicates that a specific user is investigating that alarm.
User Name	Specifies the name of the user who acknowledged the alarm (if the alarm is acknowledged).
First Raised	Specifies the date and time on which the alarm was first raised.
Last Raised	Specifies the date and time on which the alarm was last raised.
Alarm Count	Specifies the number of times the alarm changed from cleared to raised state.
Raise Events	Specifies the number of events raised for the selected alarm.
Comments	Shows any user-defined comments related to the instance of the alarm.
Alarm Type Properties	
ITU Event Type	Specifies the ITU event type of the alarm.
Probable Cause	Lists the possible causes that triggered the alarm.
Description	Provides a description of the alarm.
User Description	Displays any descriptions that users have added to the alarm.
Alarm History	
Lists the history of the alarm status changes.	

5. Click **Save** to close the Alarm Details screen and return to the Historical Alarms List screen.

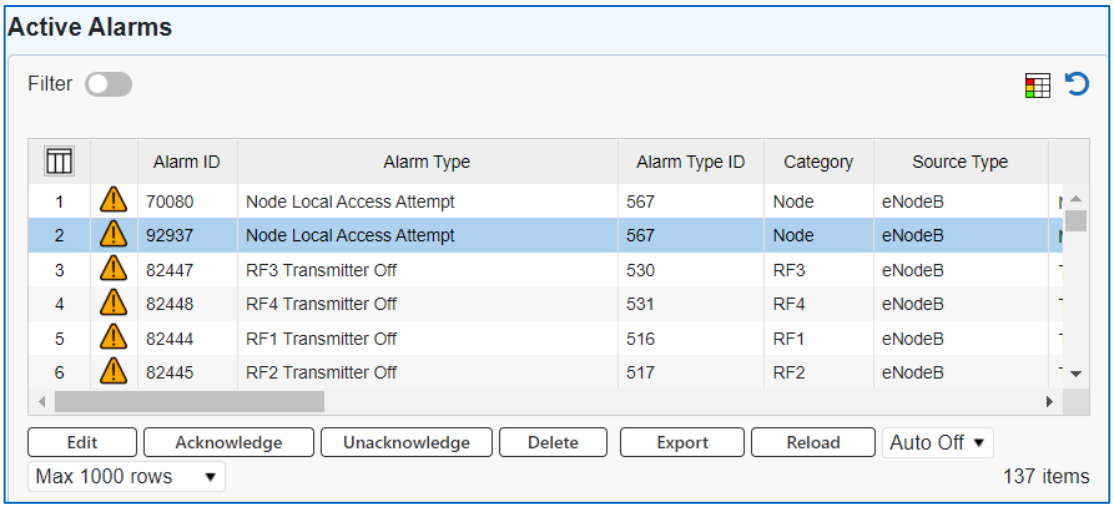
7.3 How to Acknowledge Alarms

An acknowledged alarm indicates that a specific user is investigating that alarm. Any user can acknowledge an alarm.

To acknowledge an alarm:

1. Choose **Fault Management** > **Active Alarms** menu option. This will open a **List** screen containing the alarms currently active on your network's nodes.

Figure 220: Active Alarms List Screen



2. Select the alarm that you want to acknowledge. The **Acknowledge** button will be enabled at the bottom of the screen when you select an alarm.

> **Note:** You can acknowledge multiple alarms simultaneously by using **Ctrl + click** to select multiple alarms or **Shift + click** to select an array.

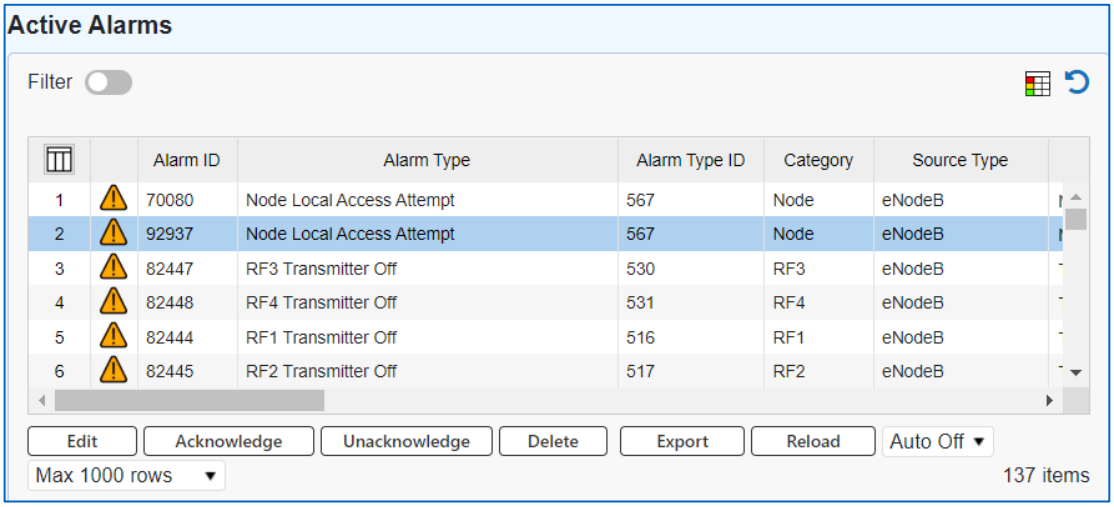
3. Click the **Acknowledge** button. The checkbox in the **Ack** column for your alarm will be selected, indicating that the alarm has been acknowledged.

An unacknowledged alarm indicates that the user who initially acknowledged the alarm is no longer investigating that alarm. Alarms can only be unacknowledged by an administrator or by the user who acknowledged the alarm.

To unacknowledge an alarm:

1. Choose **Fault Management** > **Active Alarms** menu option. This will open a **List** screen containing the alarms currently active on your network's nodes.

Figure 221: Active Alarms List Screen



2. Select the alarm that you want to unacknowledge. Alarms that are currently acknowledged are identified by having the checkboxes in the **Ack** column selected. The **Unacknowledge** button will be enabled at the bottom of the screen when you select an alarm.

> **Note:** You can unacknowledge multiple alarms simultaneously by using **Ctrl + click** to select multiple alarms or **Shift + click** to select an array.

3. Click the **Unacknowledge** button. The checkbox in the **Ack** column for your alarm is now cleared, indicating that the alarm is no longer acknowledged.

7.4 How to Delete Alarms

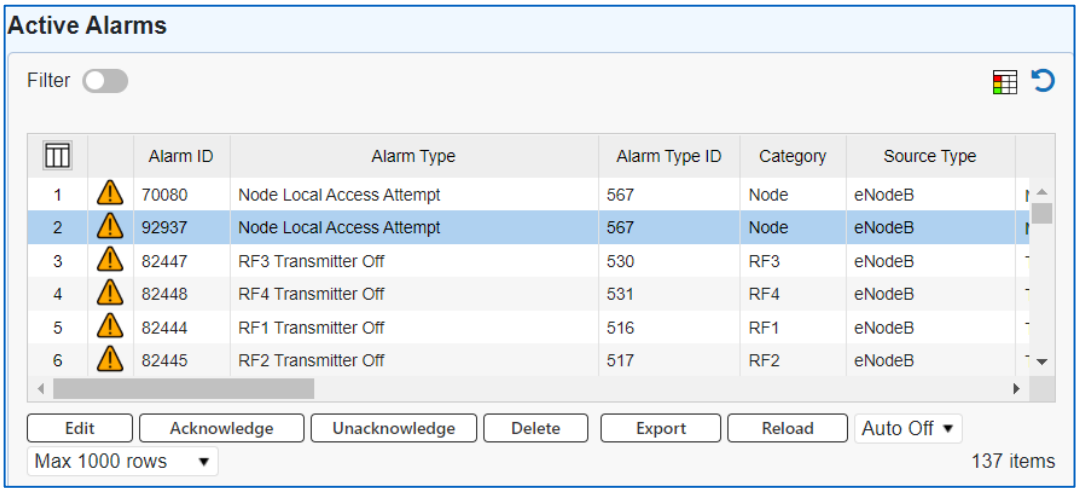
You can delete alarms through the Netspan UI so that they no longer appear in the list of active alarms. You might want to do this if, for example, you would rather remove alarms that are generated as part of the normal operation of nodes in your network so that it will be easier to see the alarms being raised by genuine problems or fault conditions.

> **Note:** Airspan recommends that you do not delete an active alarm without identifying the root cause and resolving the fault. Otherwise, the alarm might recur.

To delete an active alarm:

1. Choose **Fault Management > Active Alarms** menu option. This will open a **List** screen containing the alarms currently active on your network's nodes.

Figure 222: Active Alarms List Screen



2. Select the alarm that you want to delete. The **Delete** button will be enabled at the bottom of the screen when you select an alarm.

> **Note:** You can delete multiple alarms simultaneously by using **Ctrl + click** to select multiple alarms or **Shift + click** to select an array.

3. Click the **Delete** button. Your selected alarms will be removed from the active alarms list.
4. To view deleted alarms, go to the **Historical Alarms** page. This lists all historic alarms, both deleted and active. For further instructions, see How to View Historical Alarms.

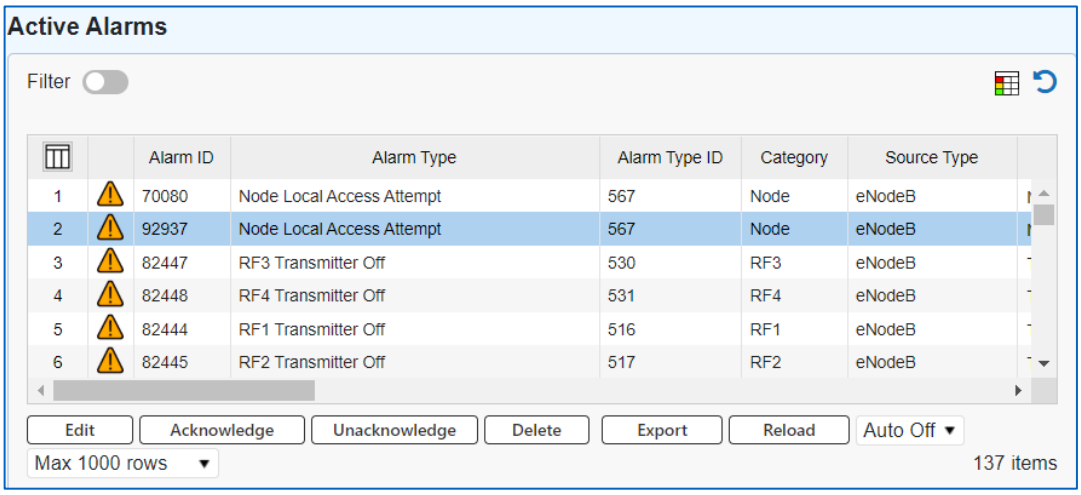
7.5 How to Edit Alarms

When you are working with alarms, you have the option of editing the alarm's details to leave your own comments on the particular instance of an alarm. You can add comments to either active or historical alarms.

To edit the details of an alarm:

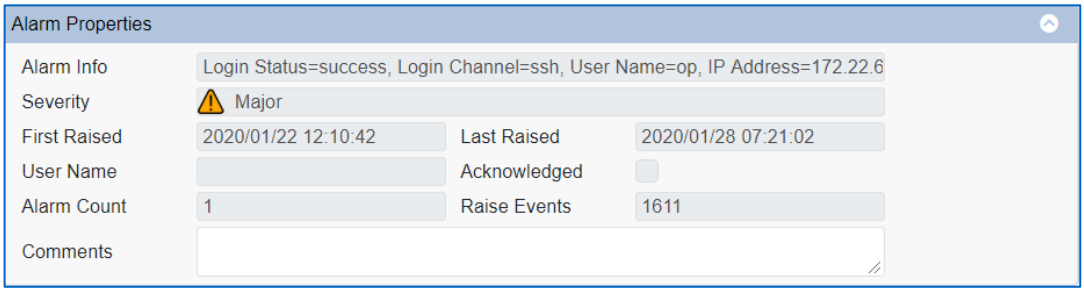
1. Choose Fault **Management > Active Alarms** menu option. This will open a **List** screen containing the alarms currently active on your network's nodes.

Figure 223: Active Alarms List Screen



2. Filter the alarms list if required using the **Filter** field as described in How to View Active Alarms and select the alarm for which you want to add comments.
3. Either click the **Edit** button or double click the selected alarm to open the **Alarm Details** screen. One of the panels displayed on this screen has the title **Alarm Properties**.

Figure 224: Alarm Properties Panel



4. While most of the fields are read only as the information is pre-populated, click in the **Comments** text field and enter specific comments you have for this instance of the alarm.
5. Click **Save**. Your edits will be saved and you will be returned to the Active Alarms List screen.

> **Note:** To add a comment to an historical alarm, the process is exactly the same, but choose **Fault Management** > **Historical Alarms** menu option in step 1.

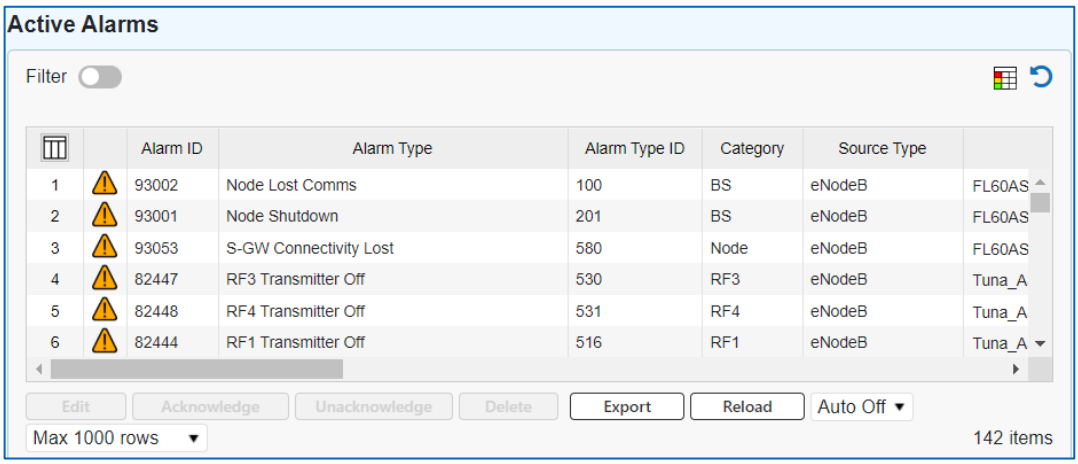
7.6 How to Export Alarms View into an Excel File

When you are working with alarms in Netspan, you have the option of either viewing various alarm details in the Netspan UI or you can export them as an Excel file to your machine so that you can examine, sort, and interrogate them as you please. This applies to both active and historical alarms.

To export the alarms view into an Excel file:

1. Choose **Fault Management** > **Active Alarms** menu option. This will open a **List** screen containing the alarms currently active on your network's nodes.

Figure 225: Active Alarms List Screen

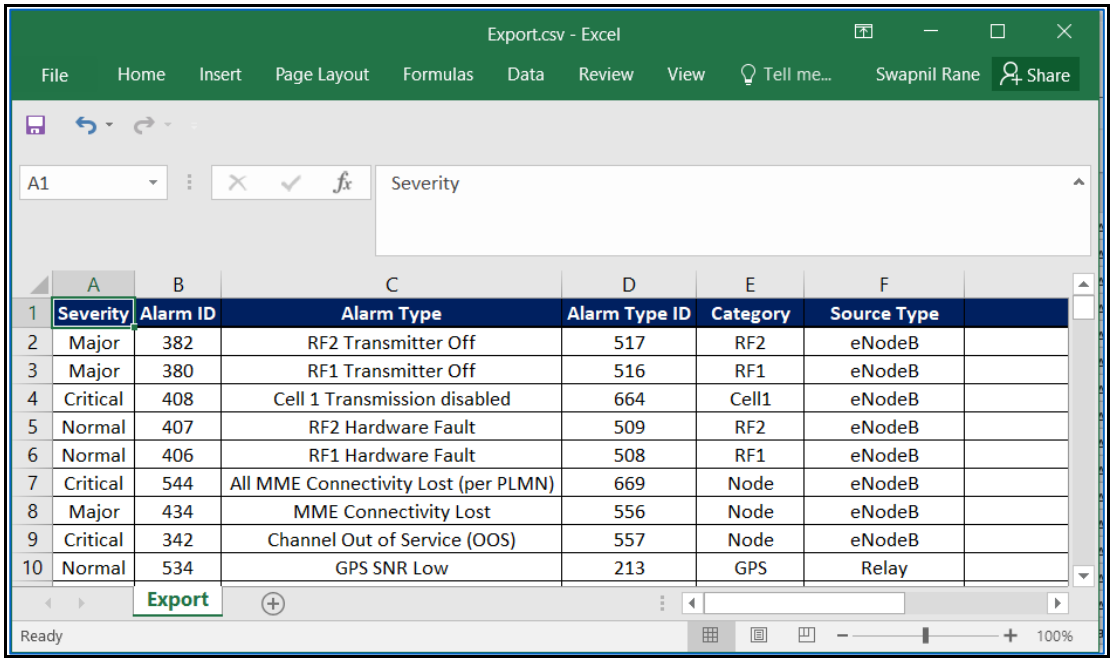


2. Click **Export** to export the alarms held in Netspan's database. Your browser will show a message asking whether you want to open or save Export.csv, the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 226: Export Excel File Message

3. If you choose **Open**, your machine will launch Excel and will display the exported file of alarm details.

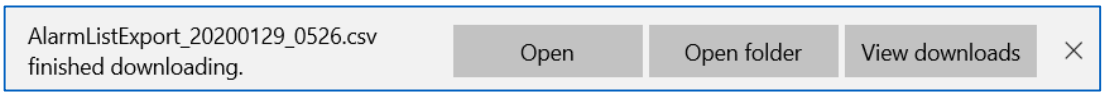
Figure 227: Excel File View



	A	B	C	D	E	F
1	Severity	Alarm ID	Alarm Type	Alarm Type ID	Category	Source Type
2	Major	382	RF2 Transmitter Off	517	RF2	eNodeB
3	Major	380	RF1 Transmitter Off	516	RF1	eNodeB
4	Critical	408	Cell 1 Transmission disabled	664	Cell1	eNodeB
5	Normal	407	RF2 Hardware Fault	509	RF2	eNodeB
6	Normal	406	RF1 Hardware Fault	508	RF1	eNodeB
7	Critical	544	All MME Connectivity Lost (per PLMN)	669	Node	eNodeB
8	Major	434	MME Connectivity Lost	556	Node	eNodeB
9	Critical	342	Channel Out of Service (OOS)	557	Node	eNodeB
10	Normal	534	GPS SNR Low	213	GPS	Relay

4. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 228: Export Confirmation Message



From here, you can **Open** the exported file, **Open folder** which will display a Browse dialog open at the exported file's location, or **View downloads** which will open the View Downloads dialog in which you can open the exported file or go to its downloaded location.

Note: To export alarms view for historical alarms, the process is exactly the same, but choose **Fault Management** > **Historical Alarms** menu option in step 1.

7.7 How to Understand Alarm Details

When you open the alarms list screen, either for active or historical alarms, the Netspan UI will display range of details about the alarms in tabular format. The information shown in this table is described in Table 33.

Table 33. Alarm List Screen Information

Filter	Description
Severity	Displays the alarms that match your specified severity level.
Cleared	Displays the time (YYYY-MM-DD HH:MM:SS) when the alarm was cancelled.
Alarm ID	Displays the alarm that matches the alarm ID of a specific alarm.
Alarm Type	Displays the alarms that match your specified alarm type.
Alarm Type ID	Displays the alarms that match your specified alarm type.

Filter	Description
Category	Displays the alarms that match your specified category.
Source Type	Displays the alarms that match your specified source type.
Source Name	Displays the alarms that math your specified source name (node name) and condition.
Unique ID	Displays the alarms that match your specified Unique ID of the alarm.
Alarm Info	Displays the alarms that match the specified alarm info.
Ack	Displays the alarms that match the condition.
User	Displays the user that matches the condition. If the alarm is not ack or cancelled the user is blank.
Last Acknowledged	Displays the last acknowledged alarms matching the date and time and condition.
Alarm Count	Displays the alarms that are received with same alarm ID and matching the condition.
First Raised	Displays the alarms that match the first date and time on which the alarm was raised and a condition.
Last Raise Event	Displays the alarms that match the last date and time the alarm was raised and a condition.
Last Cleared	Displays the last time the alarm was cleared.
MAC Address	Displays the MAC address of the source node.
Last Changed	Displays the Last Changed Alarms based on a specific Date Search.

As explained in Table 33, included on the alarm list screen is a colour-coded icon indicating the severity of each alarm. Table 34 explains the severity levels and associated icon colours of the alarms in Netspan.

Table 34. Alarm Severity Levels

Severity	Color	Icon	Description
Critical	Red		Indicates a critical condition.
Major	Orange		Indicates that there is a high risk of loss of service.
Minor	Yellow		Indicates that there is a partial risk of loss of service. **Note:** Perform corrective actions to avoid a more severe service-affecting fault.
Warning	Cyan		Signifies the presence of a warning condition. **Note:** Perform corrective actions to avoid a more severe service-affecting fault.
Normal	Green		Indicates that the alarm is cleared.
Indeterminate	Magenta		Indicates that the cause of the Alarm cannot be determined at this time (or the node is in maintenance mode).

From the alarm list screen, double click on any individual alarm to see further information relating to that particular alarm. This will open the **Alarm Details** screen.

The information shown on the Alarm Details screen for any individual alarm is described in detail in How to View Active Alarms.

7.8 How to View and Edit Alarm Types

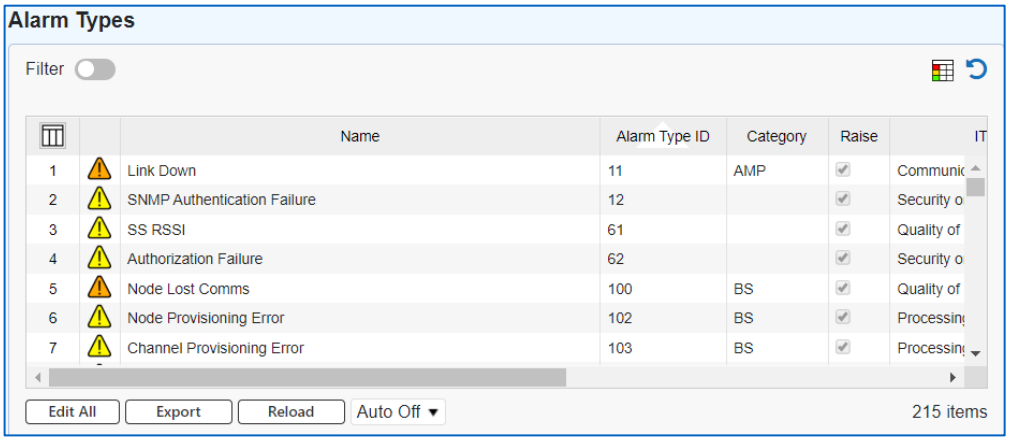
When you are working with alarms, Netspan enables you to view and, to an extent, edit the alarm types present in the system. You cannot add or remove alarm types, but you can see the details of each and change some of the parameters if required.

Note: For a full list of the alarm types configured in a particular software release of Netspan, see *ARD-D00742 Netspan Alarms and Events Reference Guide*.

To view and edit alarm types:

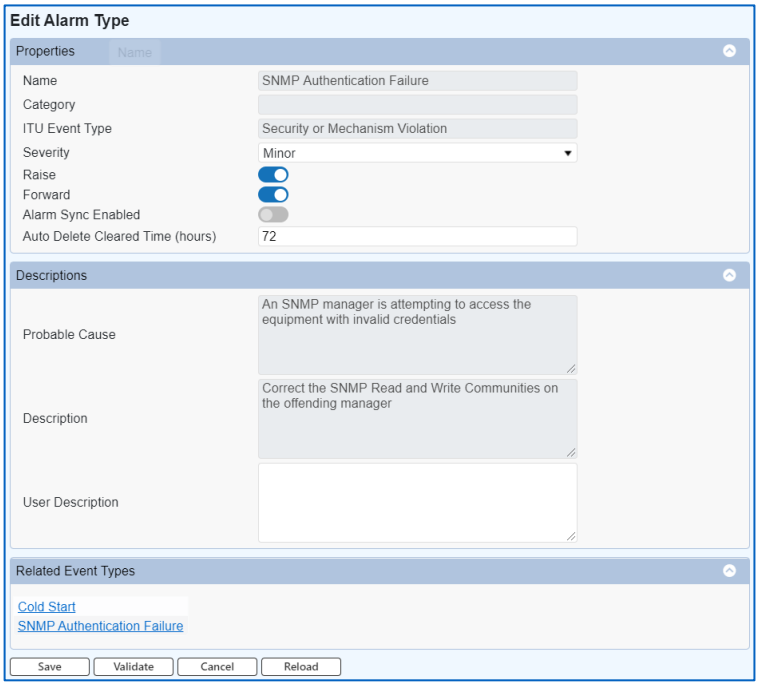
1. Choose **Fault Management** > **Alarm Types** menu option. This will open a **List** screen containing all alarm types currently configured in Netspan.

Figure 229: Alarm Types List Screen



2. While the list screen will be read only for you to see the details of the currently configured alarm types, you can drill down into individual alarm type details. Either double click an alarm type in the list or select it and click **Edit** to open the **Edit Alarm Type** screen for your selected type.

Figure 230. Edit Alarm Type Screen



3. Table 35 explains the fields present on this screen which are read only and which you can edit.

Table 35. Fields on the Edit Alarm Type Screen

Field	Description
Properties	
Name	Provides the name of the alarm type (read only).
Category	Specifies the category of the alarm type (read only).
ITU Event Type	Specifies the ITU event type of the alarm type (read only).
Severity	Specifies the default severity level of the alarm type. Can be changed by making a selection from the drop-down list if required.
Raise	Specifies whether the alarm type can be raised in your Netspan instance or not. Select the checkbox for the alarm type to be raised, clear it to disable the alarm so this type cannot be raised in your system.
Forward	Specifies whether this alarm type is forwarded by NBIF (if the NBIF alarm forwarding is configured). Select the checkbox for the alarm type to be forwarded, clear it to disable forwarding.
Alarm Sync Enabled	Specifies whether alarm synchronization is enabled for the alarm type (read only).
Auto Delete Cleared Time (hours)	Specifies the number of hours after which a cleared alarm of this type will be deleted automatically. Can be changed if required.
Descriptions	
Probable Cause	Lists the possible causes that could trigger an instance of this alarm type (read only).
Description	Provides the description of the alarm type (read only).
User Description	Use this field to add your own description of the alarm type.
Related Event Types	
Lists the event types linked to the selected alarm type.	

4. Once you have completed your edits, click **OK** to close the screen and return to the list of Alarm Types.

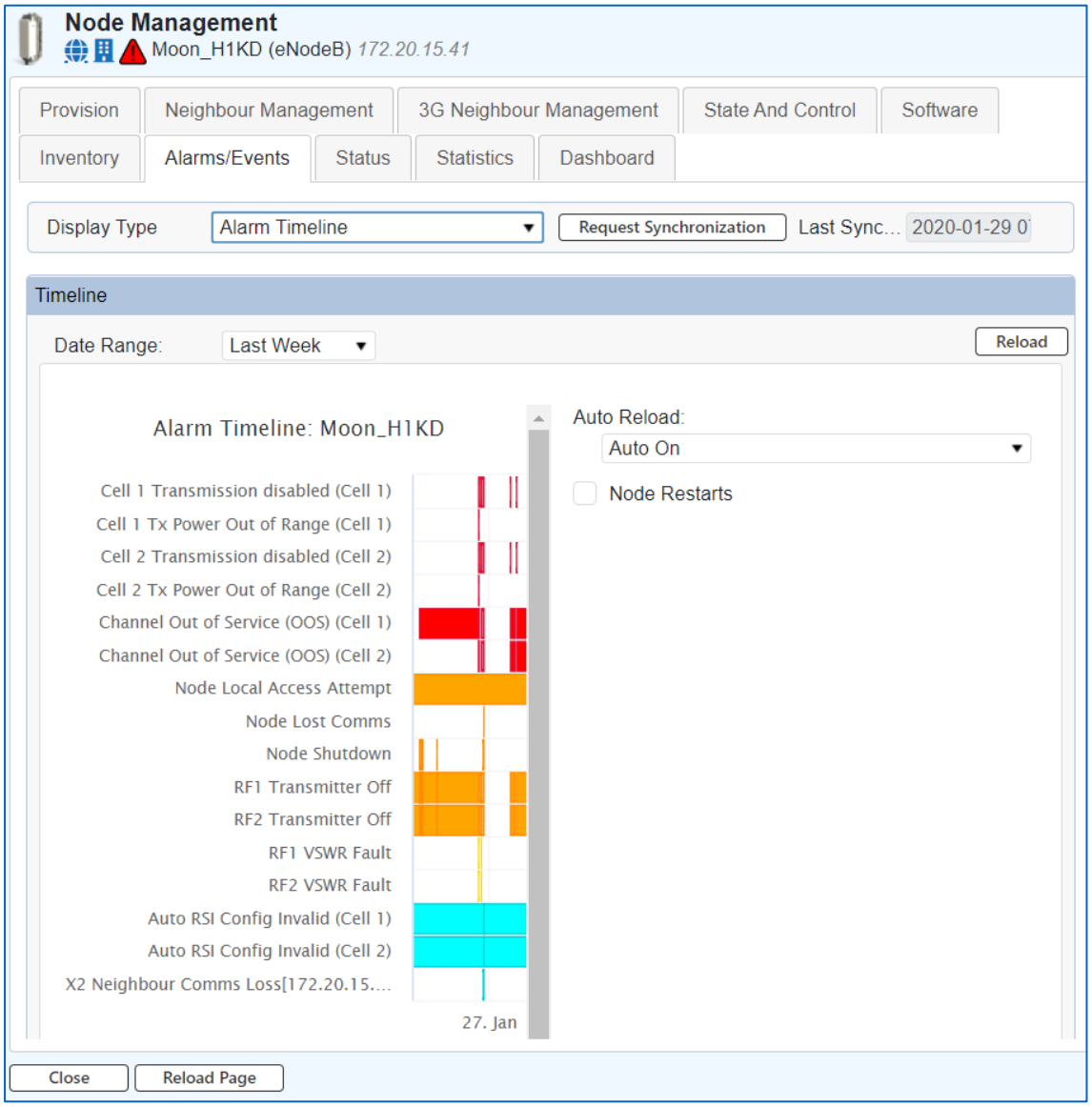
7.9 How to View Alarm Timeline Graph

Netspan provides a timeline view of the alarms in a graphical format to assist the overall management of the network.

Note: To enable this feature, you need a suitable Netspan license - *Graphical Performance Management Licence*.

To view the Alarm Timeline graph, on the Netspan main menu, select **Configuration Management** > **Node** > **Node**. Select the node for which you want to view the timeline and click on **Manage**. Go to the **Alarms/Events** tab and select **Display Type** as **Alarm Timeline** from the drop-down option available to view **Node Alarm Timeline.**

Figure 231: Alarm Timeline Graph

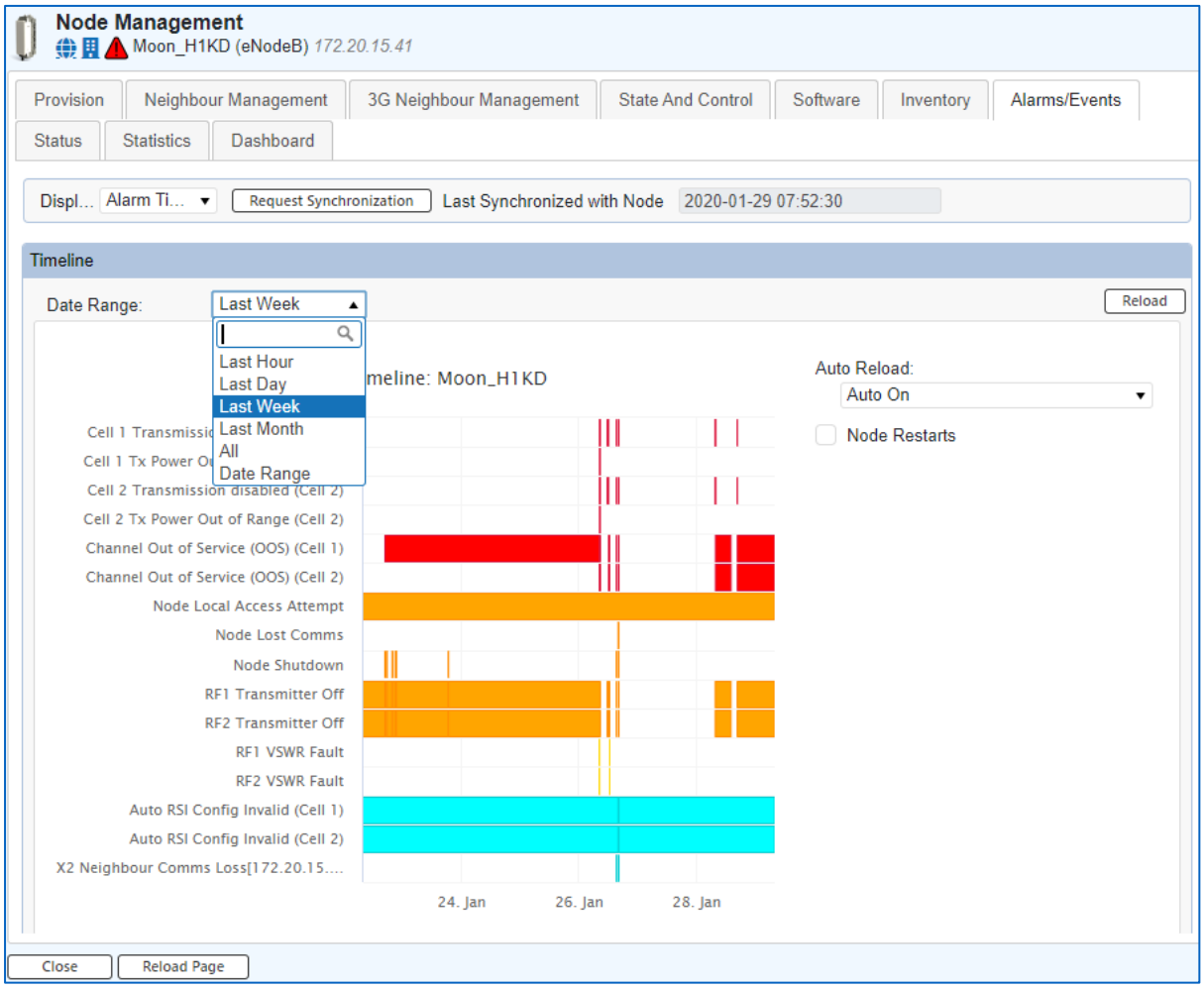


7.9.1 Selecting Alarm Period

You can set the alarm period to one of the following:

- Last Hour
- Last Day
- Last Week
- Last Month
- All
- Date Range

Figure 232: Selecting Period



8 Performance Management

Performance management is a Netspan function that collects performance data that can be used to analyse and optimise a given configuration of the network. This functionality identifies potential issues and thereby reduces call drops, improves the QoS, enhances user experience, and allows optimum network usage.

Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

The performance data that is collected from the network elements (nodes) includes counters, KPIs, and statistics. Using the Netspan UI, you can view this data in either tabular format so that you can see individual values and readings or you can opt to see it rendered in graphical format as charts. In either case, you have the option of viewing different groups of statistics at different measurement intervals and can choose to manually update the data by getting the latest real-time information from the node.

This section explains how to:

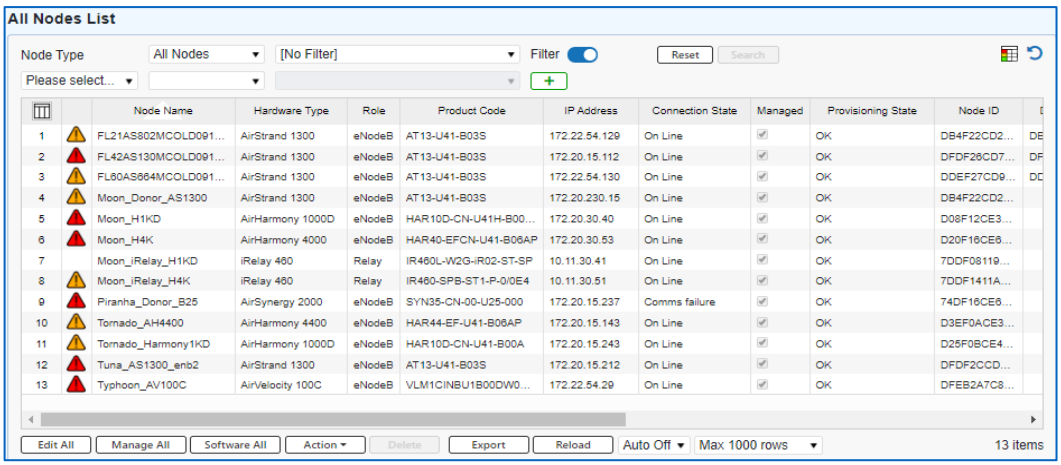
8.1 How to View Performance Statistics in Table Format

For each of the nodes operating on your network, Netspan provides you with the ability to view the statistical performance of the node displayed in either table or chart format. This section describes how to view the performance statistics in table format. See How to View Performance Statistics in Chart Format for details on how to view the information in graphical format.

To view a node's performance statistics in table format:

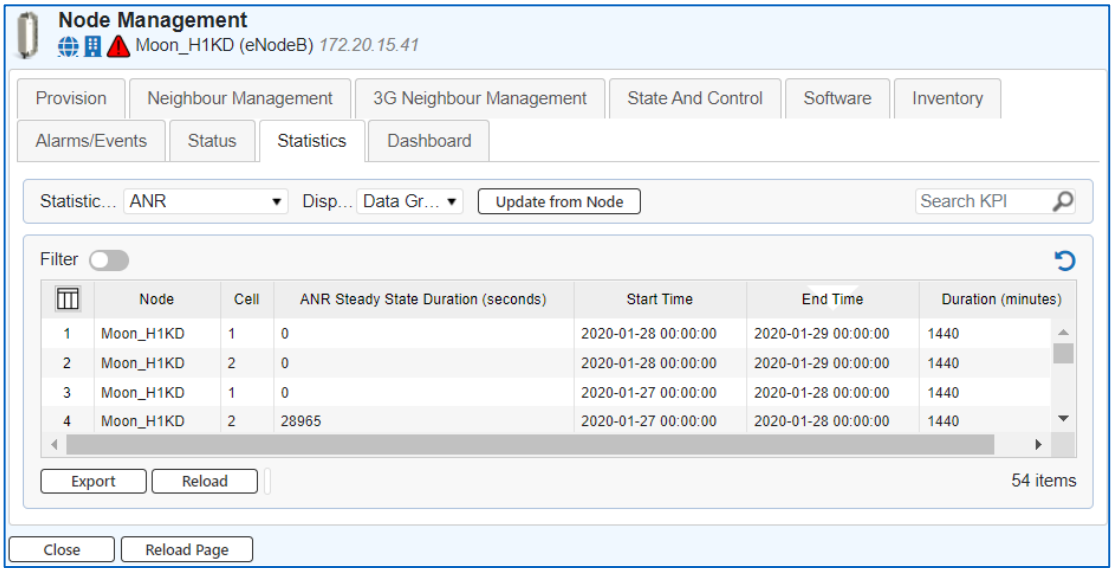
1. Choose **Configuration Management > Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 233: Node List Screen



2. Find the node in the list for which you want to view the performance statistics and either double click on it or select it and click **Manage**. Either operation opens the **Node Management** screen for your selected node. Click the **Statistics** tab and choose one of the **Data Grid** options in the **Display** field. Statistics for your selected node will be shown in a tabular display.

Figure 234: Node Management Statistics Tab - Table Display



3. The **Display** field gives you the option of viewing statistics gathered **hourly**, **daily**, or in **raw** format, which means that statistical data is taken and given a specific time/date stamp, rather than averaged over an hour or over a day.

4. Depending on the node type you are viewing the data, the statistics are collected into different groups. You can choose to view a particular group of statistics using the drop-down list in the Statistics Type field. The contents of this list will vary depending on the node type you are viewing. Table 36 lists the statistics type entries per node type.

Table 36. Statistics Type Groups per Node Type

Node Type	Statistics Type Groups	
eNodeB	• ANR • Backhaul QoS • Carrier Aggregation • Cell Level Radio Bearer QoS • Cell Level Radio Bearer QoS per QCI • CMAS • CSFB • CSFB per PLMN • Dynamic ACB • eMBMS • Enb Positioning Measurements • Equipment Measurements • E-RAB	• MME Overload • Neighbour Management • Paging • Per PLMN • Per PLMN Per QCI • Positioning Measurements • RACH Access Delay • RACH Preambles Sent • Radio Resource Utilization • Radio Resource Utilization for VoLTE per MCS • Radio Resource Utilization per ITBS • Radio Resource Utilization per MCS • Radio Resource Utilization per QCI

Node Type	Statistics Type Groups	
	• E-RAB per QCI • Ethernet Counter Per Port • ETWS • Events • GTP • Handover • Handover Per QCI • Handover Per Target Cell • HARQ • Incoming Handover • Intra eNB Load Balancing • Link Adaptation • Lite CoMP	• RF Measurements • RRC Connection • RRC Connection Per EARFCN • RSRP Measurement • RSRQ Measurement • SON • SON Per MCS • Sub-band CQI • Timing Advance • UE-Associated Logical S1-Connection • VoLTE Quality • VoLTE WB CQI
iBridge 440	• IP Stats • QoS Stats	• RF Stats
iBridge 460 Base/Term	• iBridge Base Air Interface Stats • iBridge Base Term RF Stats	• iBridge Base Air Interface Usage Stats • iBridge Base Term Data Stats
Relay	• Interface Stats • Neighbour Interface Stats	• Radio Stats • PDN Availability Per APN Stats
Relay eNodeB	• LTE ANR • LTE Backhaul QoS • LTE Carrier Aggregation • LTE Cell Level Radio Bearer QoS • LTE Cell Level Radio Bearer QoS per QCI • LTE CMAS • LTE CSFB • LTE CSFB per PLMN • LTE Dynamic ACB • LTE eMBMS • LTE Enb Positioning Measurements • LTE Equipment Measurements • LTE E-RAB • LTE E-RAB per QCI	• LTE Paging • LTE Per PLMN • LTE Per PLMN Per QCI • LTE Positioning Measurements • LTE RACH Access Delay • LTE RACH Preambles Sent • LTE Radio Resource Utilization • LTE Radio Resource Utilization for VoLTE per MCS • LTE Radio Resource Utilization per ITBS • LTE Radio Resource Utilization per MCS • LTE Radio Resource Utilization per QCI • LTE RF Measurements • LTE RRC Connection • LTE RRC Connection per Earfcn • LTE RSRP Measurement

Node Type	Statistics Type Groups	
	• LTE Ethernet Counter Per Port • LTE ETWS • LTE Events • LTE GTP • LTE Handover • LTE Handover Per QCI • LTE Handover Per Target Cell • LTE HARQ • LTE Incoming Handover • LTE Intra eNB Load Balancing • LTE Link Adaptation • LTE Lite CoMP • LTE MME Overload • LTE Neighbour Management	• LTE RSRQ Measurement • LTE SON • LTE SON per MCS • LTE Sub-band CQI • LTE Timing Advance • LTE UE PRACH Initial Timing Advance • LTE UE- Associated Logical S1-Connection • LTE VoLTE Quality • LTE VoLTE WB CQI • Relay Neighbour Interference Stats • Relay PDN Availability Per APN Stats • Relay Per MCS Stats • Relay Per QCI Stats • Relay Radio Stats
iBridge2 Base/Term	• iBridge2 Device Stats • iBridge2 RF Stats • iBridge2 Throughput Stats	• iBridge2 Ethernet Stats • iBridge2 QoS Stats

A description of the individual counters and KPIs that are found within these groups is provided in *ARD-D00740 Netspan Counters and KPIs Reference Guide*.

5. When you have finished reviewing the performance statistics for the selected node, click **Close** to return to the node list screen.

8.2 How to View Performance Statistics in Chart Format

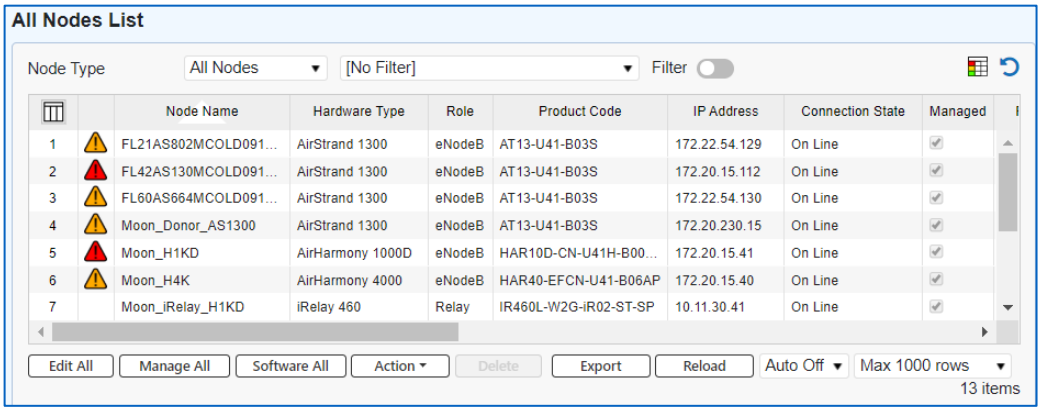
For each node operating on your network, Netspan provides you with the ability to view the statistical performance of the node displayed in either table or chart format.

This section describes how to view the performance statistics in chart format. See How to View Performance Statistics in Table Format for details on how to view the information in tabular format.

To view a node's performance statistics in chart format:

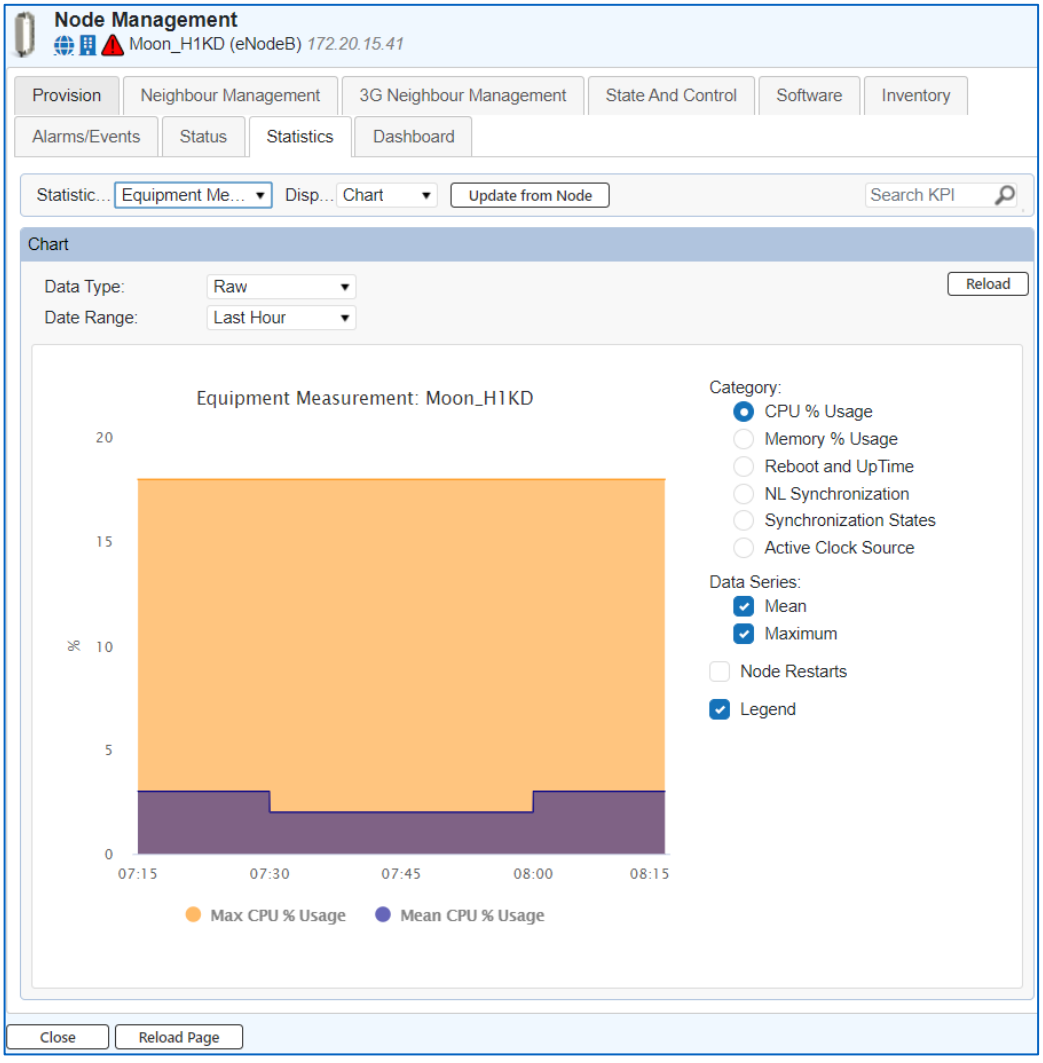
1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 235: Node List Screen



2. Find the node in the list for which you want to view the performance statistics and either double click on it or select it and click **Manage**. Either operation opens the **Node Management** screen for your selected node. Click the **Statistics** tab and choose the **Chart** option in the **Display** field. Statistics for your selected node are displayed as a chart.

Figure 236: Node Management Statistics Tab - Chart Display



3. The statistics chart uses interactive illustrations to summarise and display statistics of various counters and KPIs in an easily understandable format. The chart presents information related to different statistics types. For each statistics type, you can specify a date range and compare values across specified dates. For further details of how to change the display of the chart and how to alter the data shown, see How to Work with Performance Charts.
4. When you have finished analyzing the charts, click **Close** to return to the node list screen.

8.3 How to Work with Performance Charts

As described in How to View Performance Statistics in Chart Format, you can view the performance statistics of a given node in the Netspan UI in a graphical format. The chart display includes the following features:

- Provides multiple filter options based on the statistics type, date range, date type (raw, hourly, daily), and associated statistics features.
- Displays counters in chart format from the nodes in real time using the **Reload** button which proves useful in troubleshooting situations.
- Enables you to resize the graphs and customize the display interval.

8.3.1 Common Controls

Regardless of the node type you are examining statistics, certain controls on the chart display are common across all statistics type displays.

Table 37. Common Chart Controls

Control	Description
Date Range	A drop-down list containing the entries Last Hour, Last Day, All, and Custom. This enables you to change the date range of the chart to focus on a particular time frame or to view trends over time.
Data Type	A drop-down list containing the entries **Raw**, **Hourly,** and **Daily**. Enables you to view statistics at different levels of granularity.
Reload	A button that pulls real time data from the node to update the chart.

All other options are specific to the type of node you are examining the statistics for and the statistics type you have selected to display.

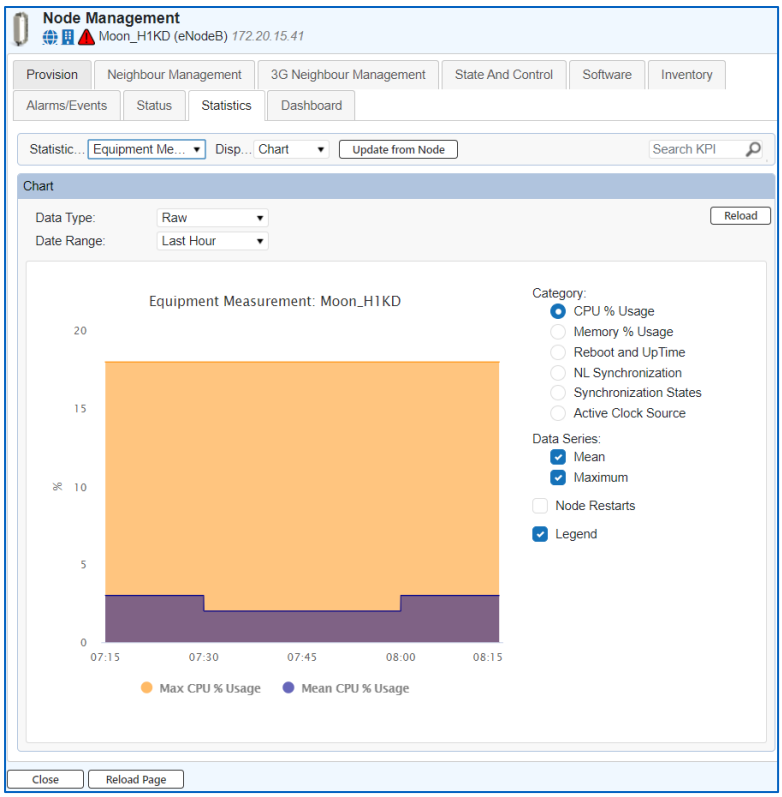
8.3.2 Process

Regardless of the type of the node you are viewing or the statistics group you have selected, the process and principles for using the chart display remain consistent.

1. Select a set of statistics to display from the **Statistics Type** drop-down list. The content of this list varies according to the type of the node you are examining.
2. Select an appropriate option from the **Display** drop-down list to view the data is chart or grid format.
3. Make a selection in the **Data Type** field to determine the granularity of the data to be displayed.
4. Change the **Date Range** to focus on a particular time frame or to view trends over time.
5. Select the checkboxes/radio buttons of each statistic you want to display on the chart. Each time you select or clear a checkbox, the chart will be dynamically redrawn.
6. Click **Reload** to pull real time data from the node and have it added to the chart.

Depending on the nature of the statistics you are viewing, Netspan renders the chart type most appropriate for that data.

Figure 237: Chart



Note: The formula used by Netspan to calculate the values displayed in the charts are detailed in *ARD-D00740 Netspan Counters and KPIs Reference Guide*.

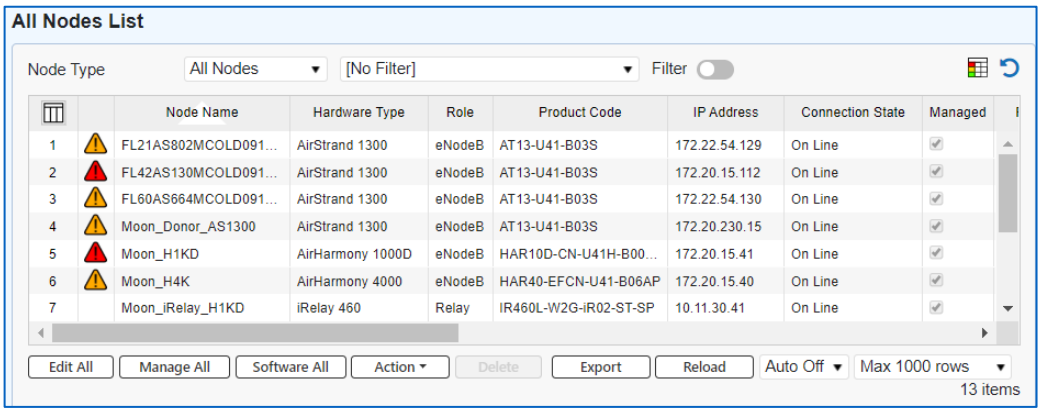
8.4 How to Export Performance Statistics into an Excel File

When you are working with a node's performance statistics in Netspan, you have the option of either viewing the performance statistics in the Netspan UI or you can export them as an Excel file on your machine so that you can examine, sort, and interrogate them as you please.

To export a node's performance statistics into an Excel file:

1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

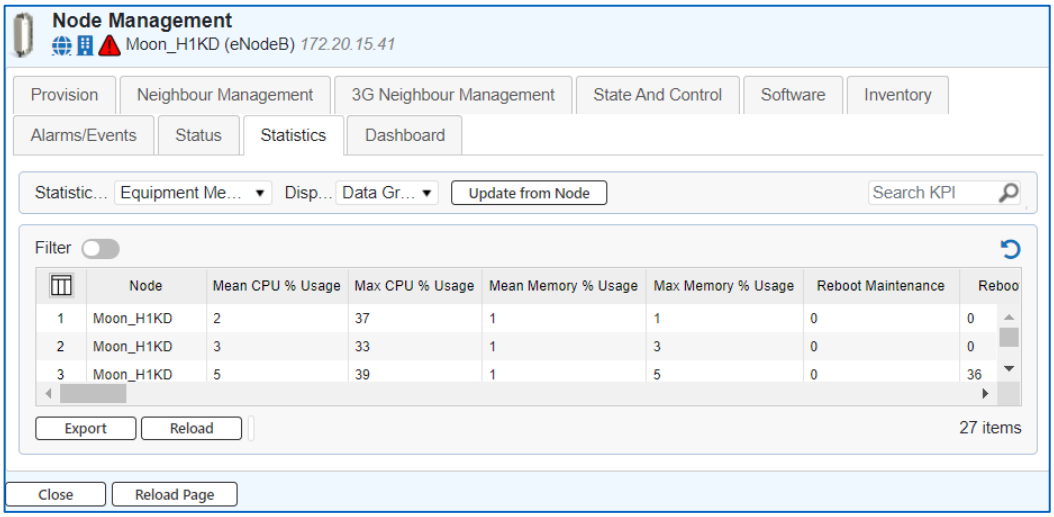
Figure 238: Node List Screen



2. Find the node in the list for which you want to view the performance statistics and either double click on it or select it and click **Manage**. Either operation opens the **Node Management** screen for your selected node. Click the **Statistics** tab and choose one of the **Data Grid** options in the **Display** field. Statistics for your selected node will be shown in a tabular display.

> **Note:** In order to export performance data into an Excel file, you have to view the statistics in tabular format. You cannot export the graphical chart view into Excel.

Figure 239: Node Management Statistics Tab - Table Display

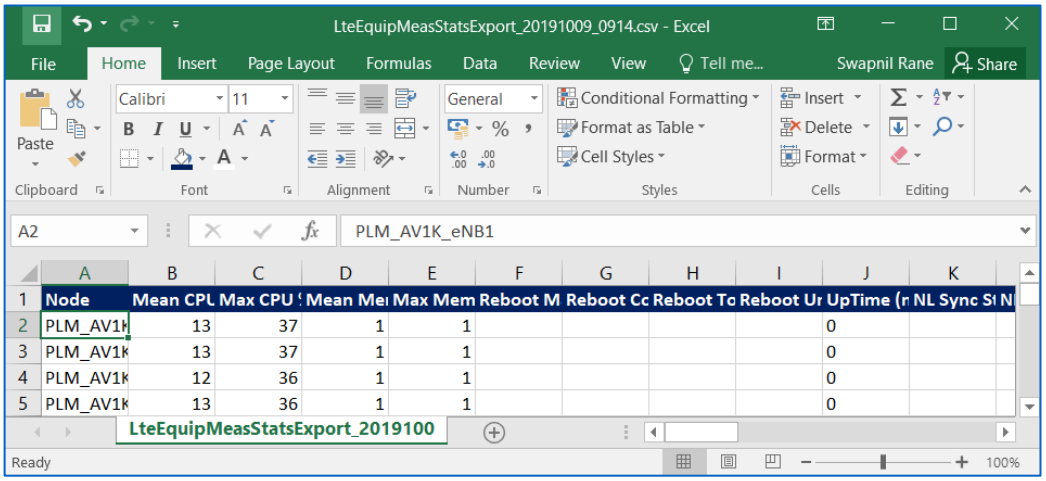


3. Make selections in the **Statistics Type** drop-down list and **Display** drop-down list as required so that you can view the required groups of statistics at the desired sampling time intervals.
4. Click **Export** depending on whether you want to export the statistics for your selected node currently held in Netspan's database. Your browser shows a message asking if you want to open or save **Export.CSV**, the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 240: Export Excel File Message

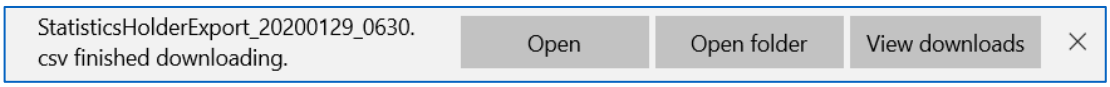
5. If you choose **Open**, your machine will launch Excel and will display the exported file of performance statistics.

Figure 241: Excel File View



6. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 242: Export Confirmation Message



From here, you have the option to **Open** the exported file, **Open folder** which will display a browse dialog open at the exported file's location, or **View downloads** which will open the View Downloads dialog in which you can open the exported file or go to its downloaded location.

8.5 KPI Search

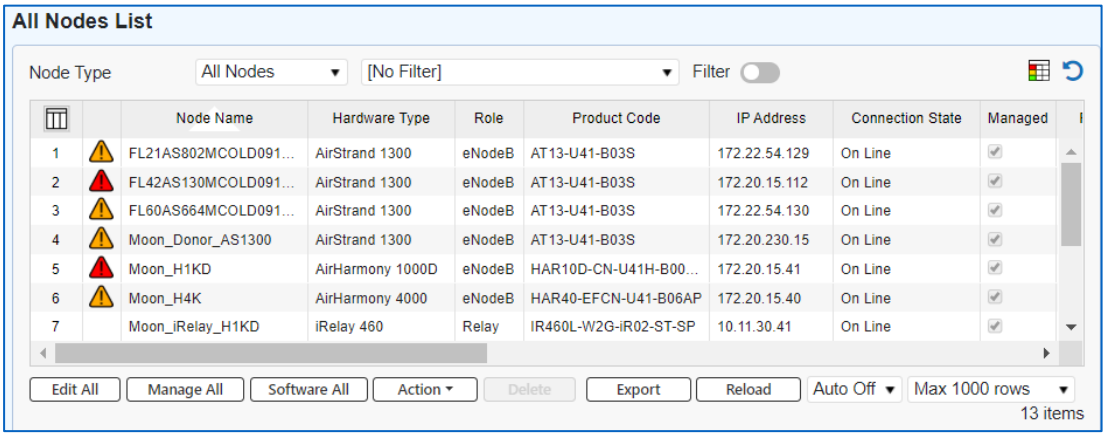
The users can quickly find a specific KPI and navigate to the KPI collection that is grouped under the statistics type of the counter that you searched for by using the search KPI textbox on the **Statistics** tab of the **Node Management** page.

Based on the search string that you enter in the *search* KPI box, Netspan returns a list of KPIs that contain the specified string in their name. From the list, you can select the KPI that you want to investigate. Clicking the desired KPI will redirect you to the Netspan screen, displaying the specific statistic type (chart or data grid ─ depending on the Display settings).

To search a KPI:

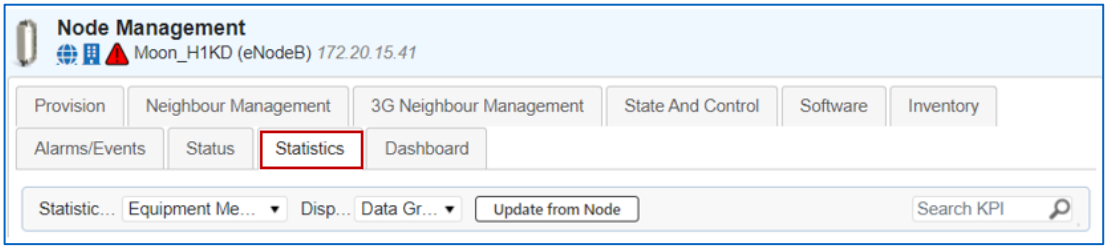
1. On the Netspan main menu, select **Configuration Management > Node > Node.** This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 243: Node List Screen



2. From the node list, click the node that you want to examine and click **Manage**. This opens the **Node Management** screen for your selected node. Then, click the **Statistics** tab.

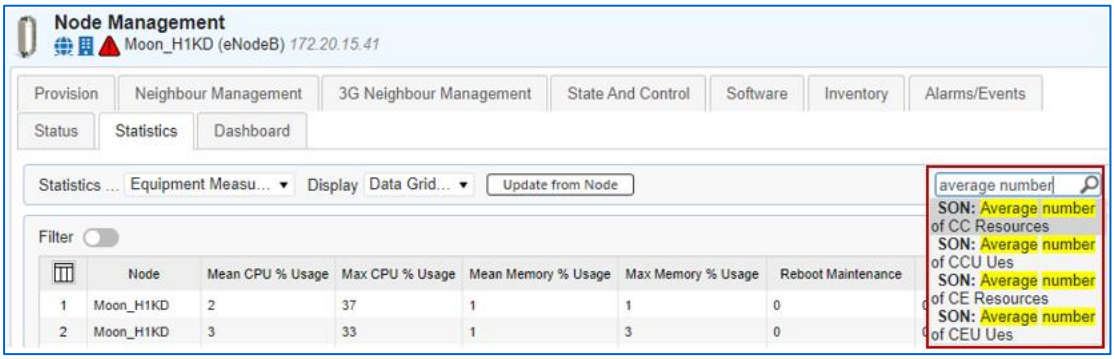
Figure 244: KPI Search



3. Enter the KPI name or part of the KPI name in the search textbox. A drop-down list will be displayed for your search.

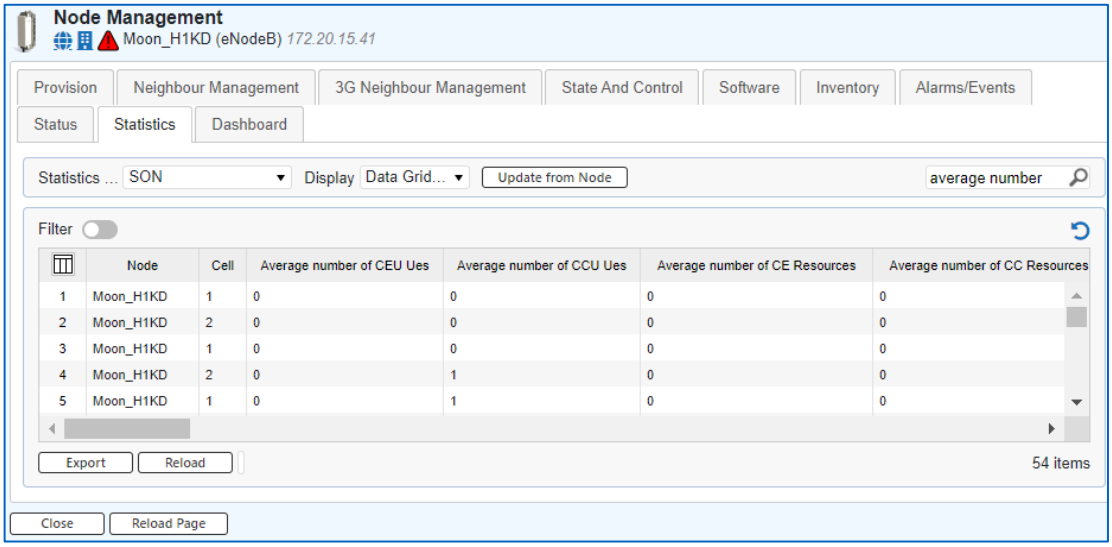
> **Note:** The KPI you are searching should have the same node type. Example, if the selected node is eNodeB, then the KPI that you are looking for should be of LTE only. If the selected node is iBridge LOS, then the KPI that you are looking for should be of iBridge LOS as well, else Netspan will not return any result for your search.

Figure 245: KPI Search



4. Select the desired KPI and the result will be displayed on the Node Management (Statistics tab) page.

Figure 246: Node Management



9 Node Management

The Netspan UI provides you with the ability to view the status of each node in your network so that you can review the current configuration, operation, and performance. This functionality includes being able to see real-time data from the nodes, but Netspan's node management capabilities also enable you to control the configuration of the nodes remotely, implement a reboot, or even delete a node from your network entirely.

Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

This section explains how to:

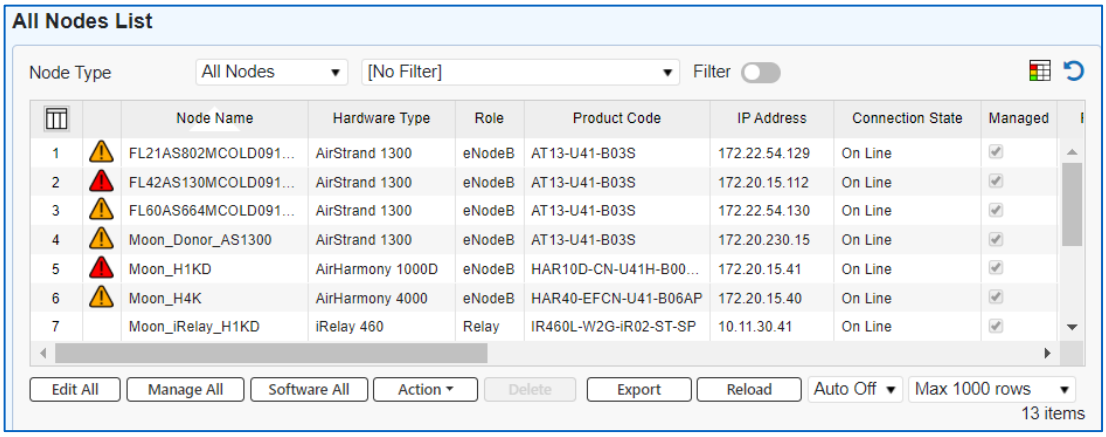
9.1 How to View Node List

Netspan's node management functionality includes the ability to view a list of all nodes present in your system. This is the quickest and the easiest way to get a high-level view of nodes in your network before having the option of exploring the details of individual nodes in more depth using the processes described in the rest of the node management sub-sections in this document.

To view the node list:

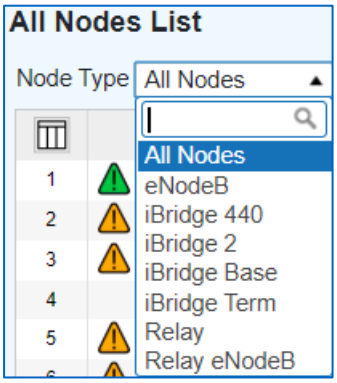
1. Choose **Configuration Management > Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 247: Node List Screen



2. In addition, you have the option to filter the list by node type or by a variety of other criteria depending on what you are examining the node list for. The **Node Type** drop-down field is available at the top of the screen and contains a list of different node types present in your network. It also has the All **Nodes** option, which displays all the nodes. Select the node type you want, for example: iBridge Term, and the list will be dynamically updated.

Figure 248: Node Type Selection

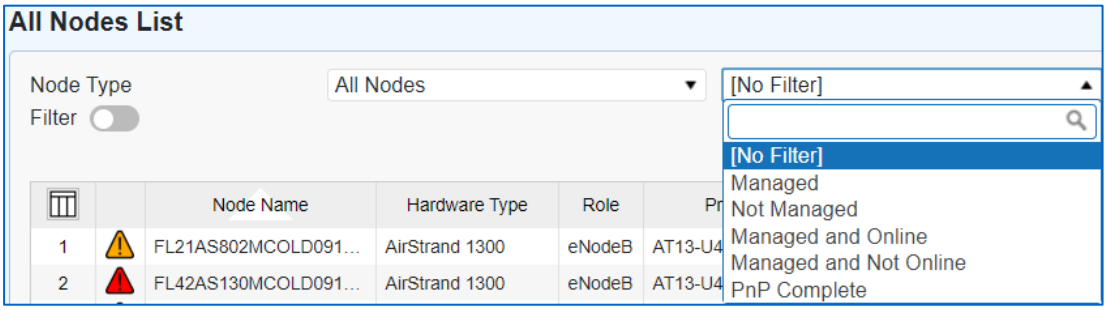


3. Moreover, the Node Type filter field provided at the top of the List panel offers various options in the drop-down list to filter the nodes displayed according to a number of the parameter headings shown on the screen. You can filter the node list by:
   - Managed
   - Not Managed
   - Managed and Online
   - Managed and Not Online
   - PnP Complete

   When you choose one of these options, a further drop-down list will be displayed, which will be populated depending on the selection you made in the Filter field. This field operates in

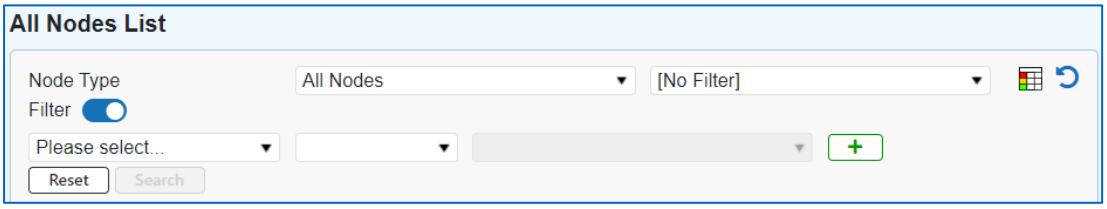
association with your filter choice to refine your filter. For example, if you choose a filter of Managed, the options in the for list are True or False, so your list of nodes will be filtered to show only managed or unmanaged nodes, depending on your selection.

Figure 249: Filter Field Selection



4. To supplement the two filter fields, select the filter type from the **Node Type** drop-down option, select an appropriate option from drop-down list, and then click the **Edit** checkbox. This will enable an additional filter option. Select appropriate option from the drop-down lists.

Figure 250: Filter Option



5. Once you have filtered your node list to find the node you want to view, you can examine the node's status and perform a number of operations on that node. These options are described in the other sub-sections of Node Management.

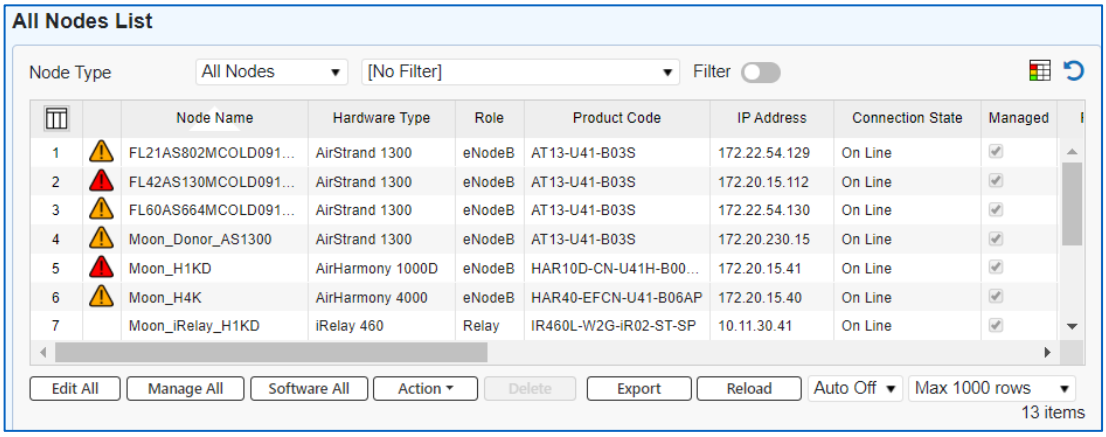
9.2 How to Examine Node Status

For each of the nodes operating on your network, Netspan provides you with the ability to examine the current status of the node across multiple operational categories so that you can review the node's current configuration, operation, and performance.

To examine a node's status:

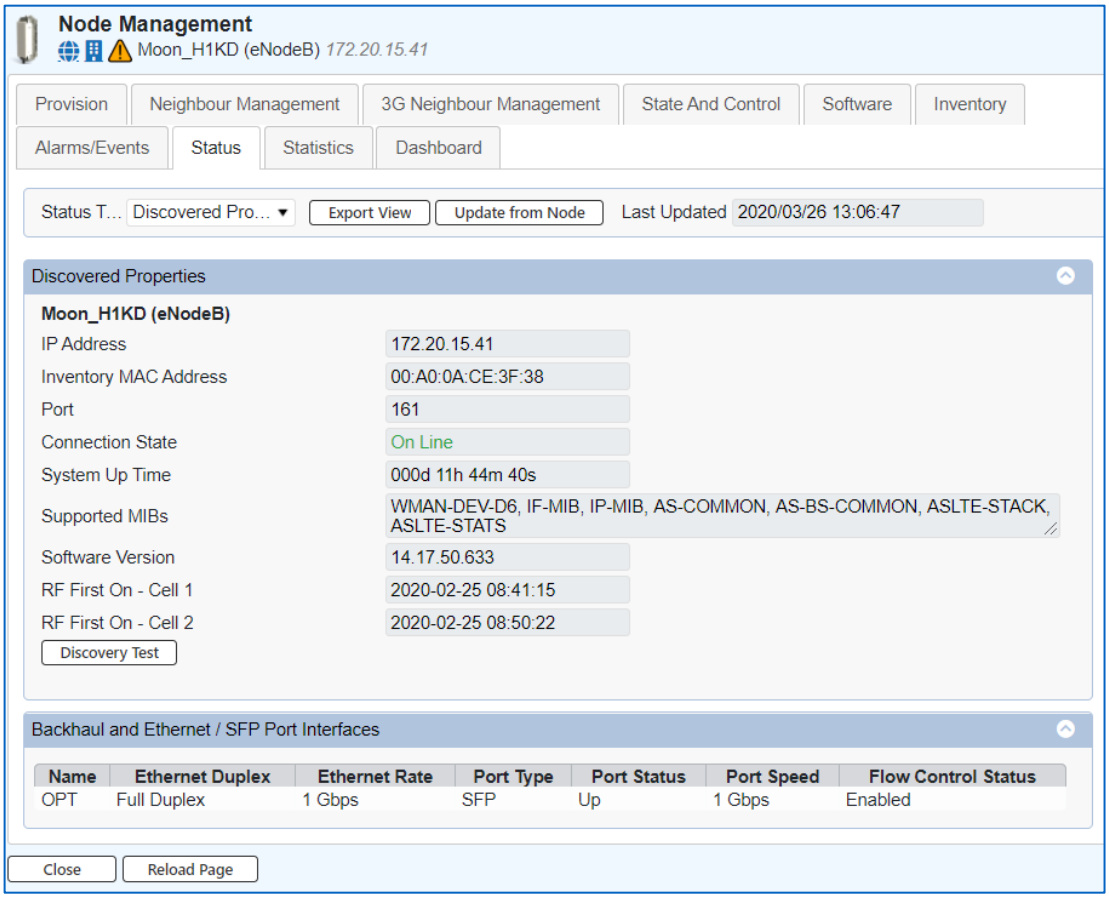
1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 251: Node List Screen



2. Find the node you want to examine in the list and either double click on it or select it and click **Manage**. Either operation opens the **Node Management** screen for your selected node. Click the **Status** tab.

Figure 252: Node Management Status Tab



3. Use the **Status Type** drop-down list to determine the type of information to be displayed. The contents of this list will vary depending on the type of the node you are examining. Table 38 shows which options are applicable to each node type, covering eNodeB, iBridge 440, iBridge 460 Base/Term, and iRelay nodes.

Table 38. Status Type Drop-Down List Content by Node Type

Status Type	Node Type					
	eNodeB	iB440	iB460 Base/Term	Relay	Relay eNodeB	iBridge2
Discovered Properties	✔	✔	✔	✔	✔	✔
Commissioned Properties		✔				✔
UE Status and IP Throughput	✔					
RF Status	✔	✔	✔		✔	
Sensor Status	✔	✔	✔	✔	✔	✔
Service Flow Status			✔			
SON Status	✔					

Status Type	Node Type					
	eNodeB	iB440	iB460 Base/Term	Relay	Relay eNodeB	iBridge2
Licence Status	✔		✔		✔	
Node Configuration Log	✔	✔	✔	✔	✔	✔
eMBMS Status	✔					
Logical IP Interface Status	✔					
Network Element Status	✔					
CBRS Status	✔					
Failure Logging		✔				
Support	✔			✔	✔	
Backhaul QoS Status	✔					
Maintenance Window Status	✔					
TWAMP	✔					
Event Log Status	✔					
LTE Backhaul QoS Status					✔	
LTE CBRS Status					✔	
LTE UE Status and IP Throughput					✔	
LTE eMBMS Status					✔	
LTE Ethernet Per Port Status					✔	
LTE Event Log Status					✔	
LTE Logical IP Interface Status					✔	
LTE Maintenance Window Status					✔	
LTE Network Element Status					✔	
LTE SON Status					✔	
LTE TWAMP					✔	
Ethernet Per Port Status	✔					
Location and Synchronization Status	✔		✔	✔	✔	✔
Relay WiFi Access Point Status						

Status Type	Node Type					
	eNodeB	iB440	iB460 Base/Term	Relay	Relay eNodeB	iBridge2
Link Acceptance Test		✔				
Backhaul and Connected Devices Status				✔	✔	
Spectrum Analyzer						✔
Log						✔
Overview						✔
Diagnostic Tests						✔

Note: If you examine the status of a node that is not correctly connected to your network, you only have the option of viewing its **Discovered Properties**. All other status information will be unavailable as collecting it requires a live link to the node.

4. Once you select a Status Type, the relevant information will be retrieved from the node. The fields and content shown on each screen are dependent on the type of the node you are examining. For example, different information will be retrieved for the RF Status of an eNodeB node when compared with an iB440 or iB460 Base/Term node.

Note: The data shown on the Status tab is read only as it is retrieved from the node and displayed for information purposes only.

5. When you have finished reviewing the status of your selected node, click **Close** to return to the Node List screen.

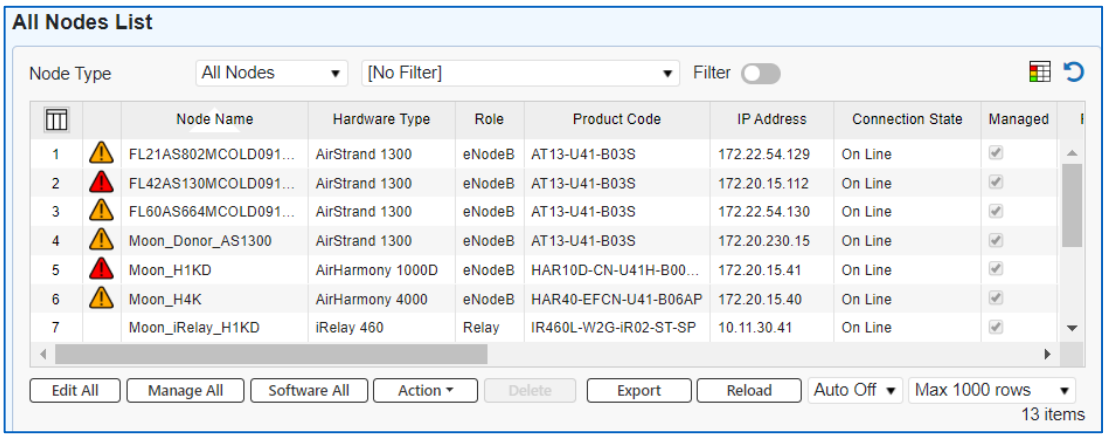
9.3 How to Reboot a Node

Netspan provides you with the capability to reboot a node remotely which may be required to force a provisioning change on a node or if an error condition has been raised which requires a reboot.

To reboot a node:

1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

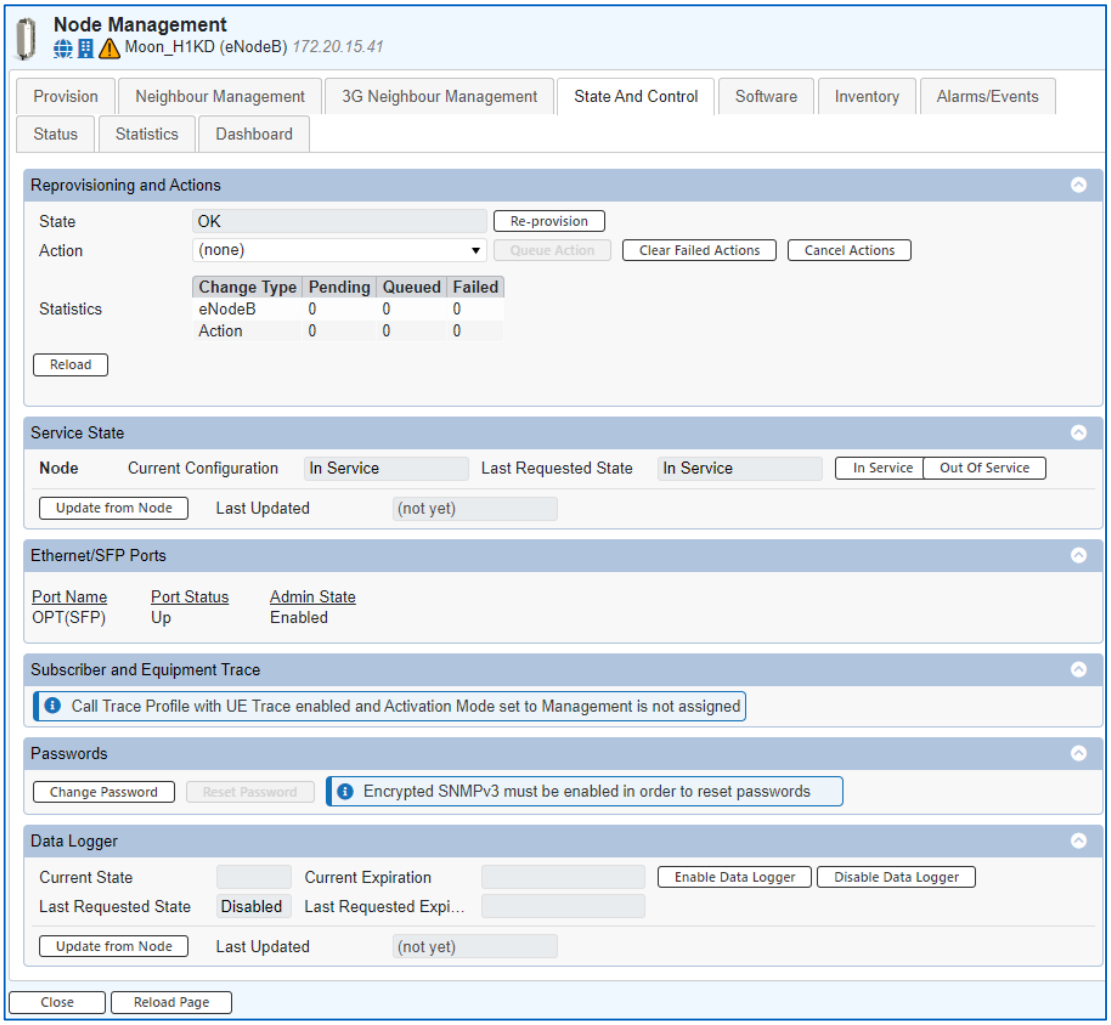
Figure 253: Node List Screen



2. Find the node you want to reboot in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as: eNodeB, iBridge Base, or iRelay.

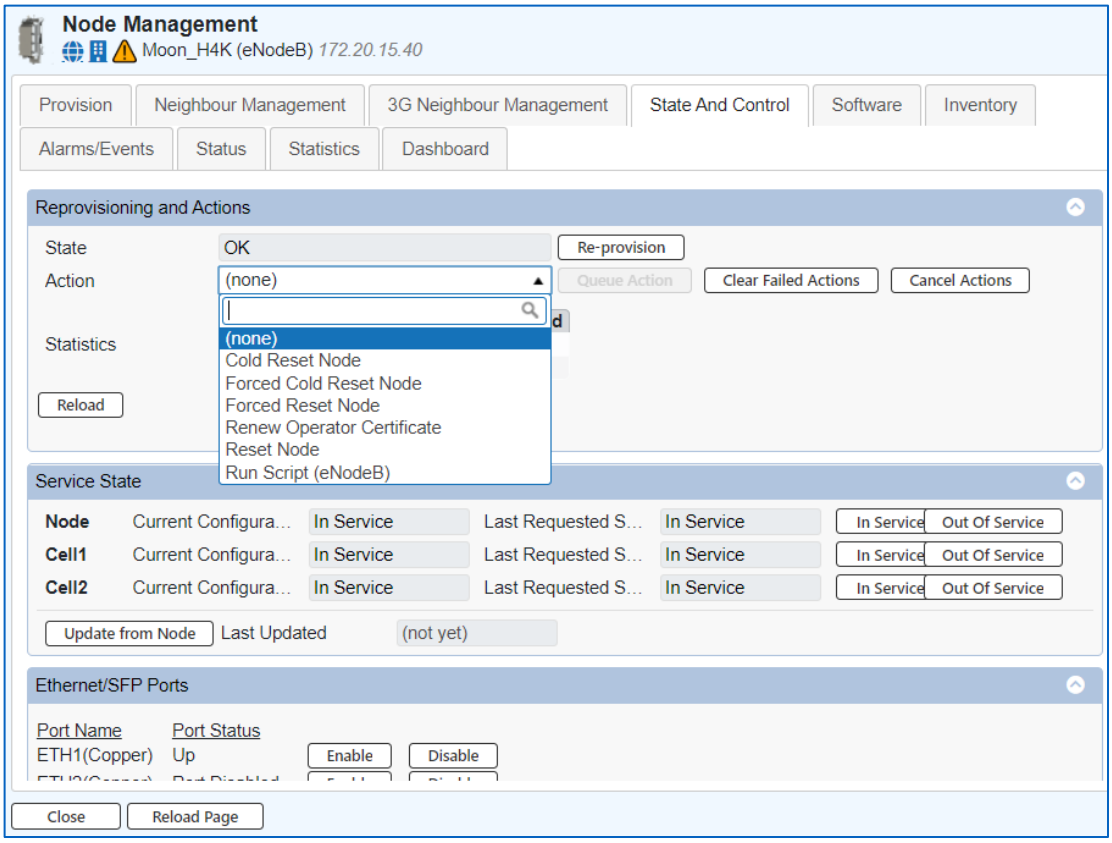
3. Either double click the node or select it and click **Manage**. Either action opens the **Node Management** screen. Then, select the **State and Control** tab.

Figure 254: Node Management Screen - State and Control Tab



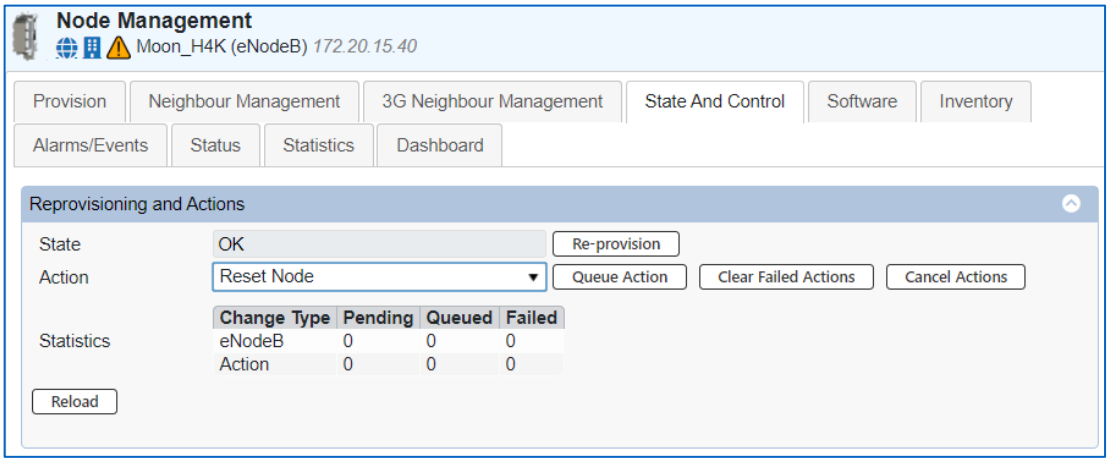
4. To reboot a node, you need to make appropriate selection in the **Action** field. The choices you have here depend on the node type you are rebooting. Every node type gives you the option to **Reset Node**, which reboots the individual node you have selected. Additionally, some node types (iBridge 400 Base and iBridge 460 Base) also give you the option to **Reset RF (PHY)** which resets the physical layer radio frequency rather than rebooting the node. Choose your required option.

Figure 255: Action Options Field



5. Making a selection in the Action field enables the **Queue Action** button. Click this to send your reset action to your selected node. You can review the progress of your requested action in the **Statistics** table. A reboot is not an instant action, it can take up to a minute for the request to reach the node and for the node to respond as required. When first requested, your action registers in the **Pending** column. When it is received by the node, it progresses to the **Queued** column while it awaits action to be taken. While the reboot is in progress, it registers in the **Awaiting Response** column. If there is an error during reboot, the value in the **Failed** column increments. Investigation is usually required to find the cause of the failure and examine the **Events** and **Active Alarms** menu options for further details.

Figure 256: Statistics Table



6. Click **Cancel Actions** if you want to cancel your reset request.
7. Click **Close** to return to the Node List screen.

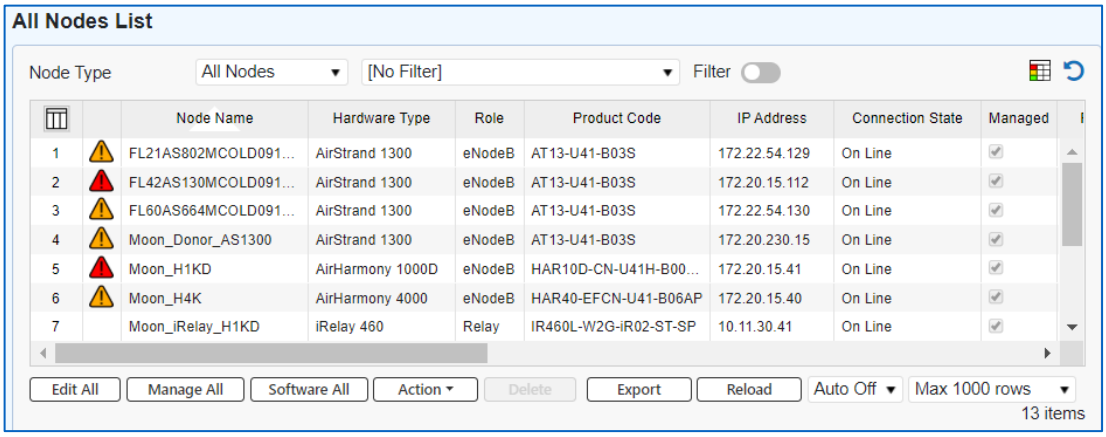
9.4 How to Change Service Status of a Node

A node has a service status of either ‘in service’, meaning it is available for operation, or ‘out of service’, whereby even though it is visible in your network, it is not available for operation. The Netspan UI enables you to change the service status of a node so that you can take it out of service to make configuration changes and, once completed, return the node to service.

To change the service status of a node:

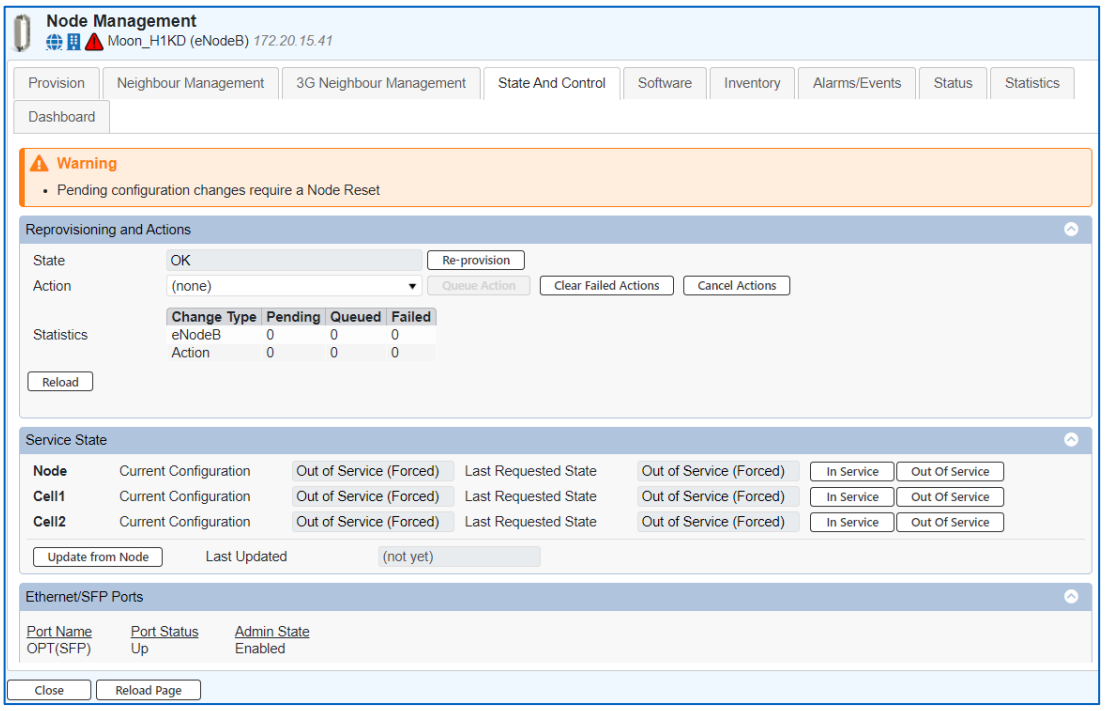
1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 257: Node List Screen



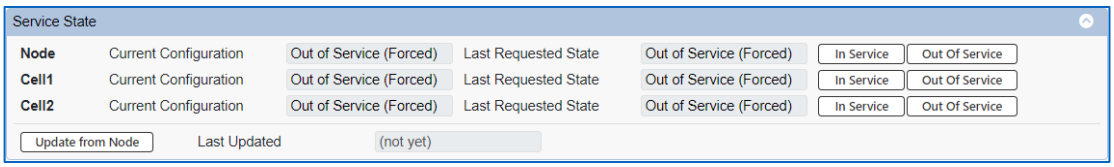
2. Find the node you want to change the service status of in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as eNodeB, or iBridge Base.
3. Either double click the node or select it and click **Manage**. Either action opens the **Node Management** screen. Then, select the **State and Control** tab.

Figure 258: Node Management Screen - State and Control Tab



4. On this tab is a **Service State** panel. Under the **Current Configuration** heading, you can see the current status of your selected node, whether it is *In Service* or *Out of Service*.

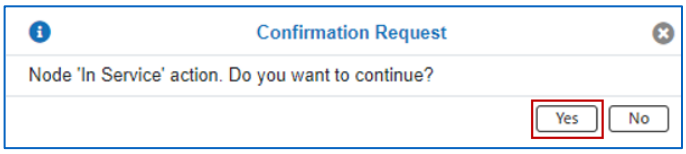
Figure 259: Service State Panel



5. If the node is currently *In Service* and you want to change its status, then click *Out of Service*. Similarly, if the node is currently *Out of Service* and you want to change its status, then click *In Service*.

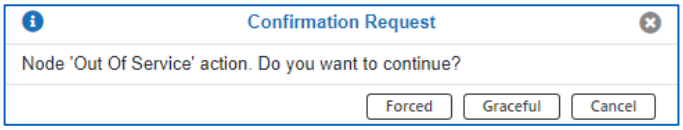
   a. Once you click In Service, a confirmation message will be displayed. Click **Yes** to confirm.

Figure 260: Confirmation Screen – In Service



   b. Once you click Out of Service, a confirmation message will be displayed. Select appropriate option.

Figure 261: Confirmation Screen - Out of Service



6. When you have made your selection, click **Save** to action your change. The entries in the **Current Configuration** and **Last Requested State** fields will change automatically to reflect your update.
7. Click **Close** to return to the Node List screen.

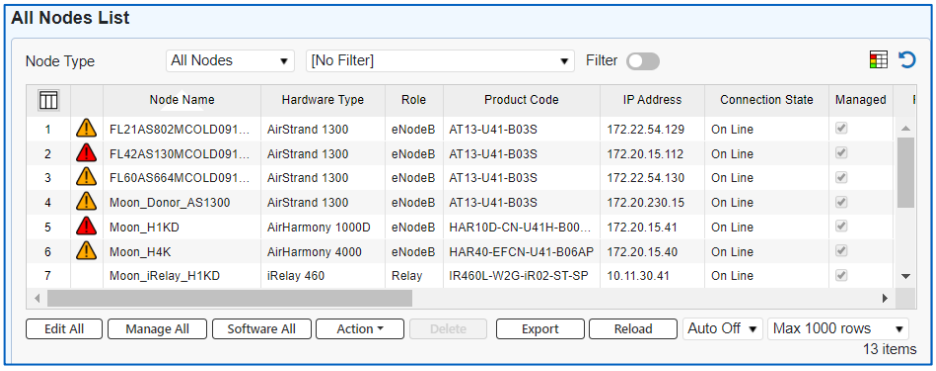
9.5 How to Reprovision a Node

Reprovisioning is the process whereby you resend a set of provisioning parameters to a given node to ensure that they have been applied. The Netspan UI provides you with the capability to reprovision a node through the Node Management screen.

To reprovision a node:

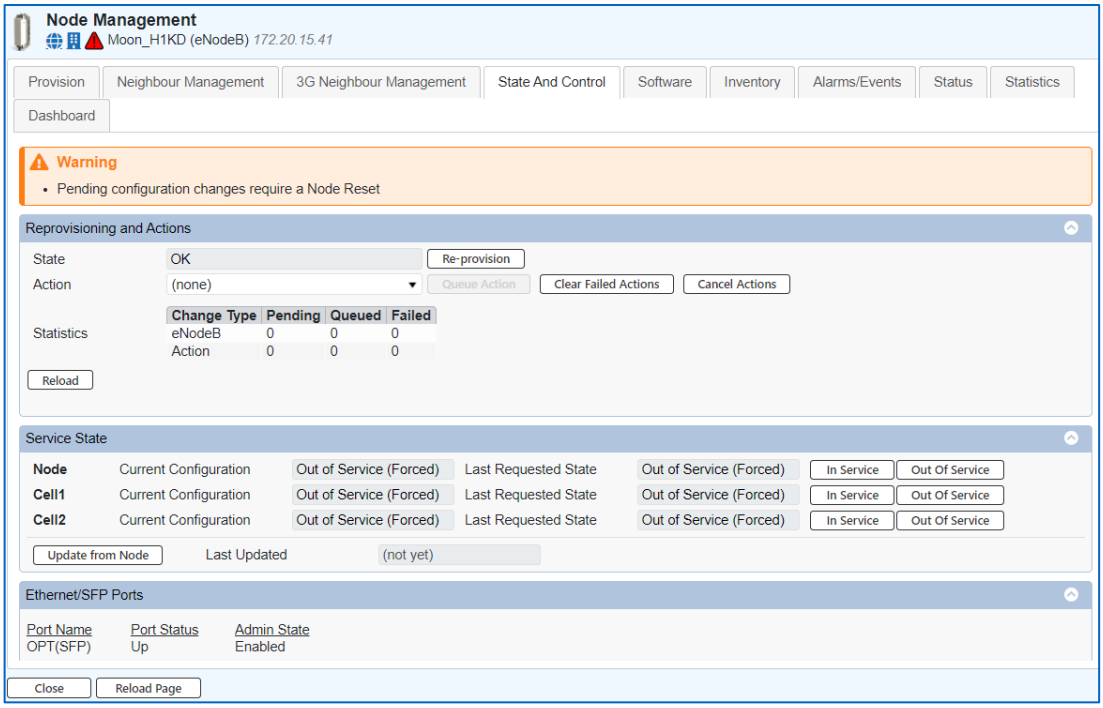
1. Choose **Configuration Management** > **Node > Node** menu option. This will open the **Node List** screen containing the nodes currently visible on your network.

Figure 262: Node List Screen



2. Find the node you want to reprovision in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as eNodeB, iBridge Base, or iRelay.
3. Either double click the node or select it and click **Manage**. Either action opens the **Node Management** screen. Then, select the **State and Control** tab.

Figure 263: Node Management Screen - State and Control Tab



4. To reprovision a node, click the **Re-provision** button. This button is present on the State and Control tab for all node types.

Figure 264: Reprovision Options Field

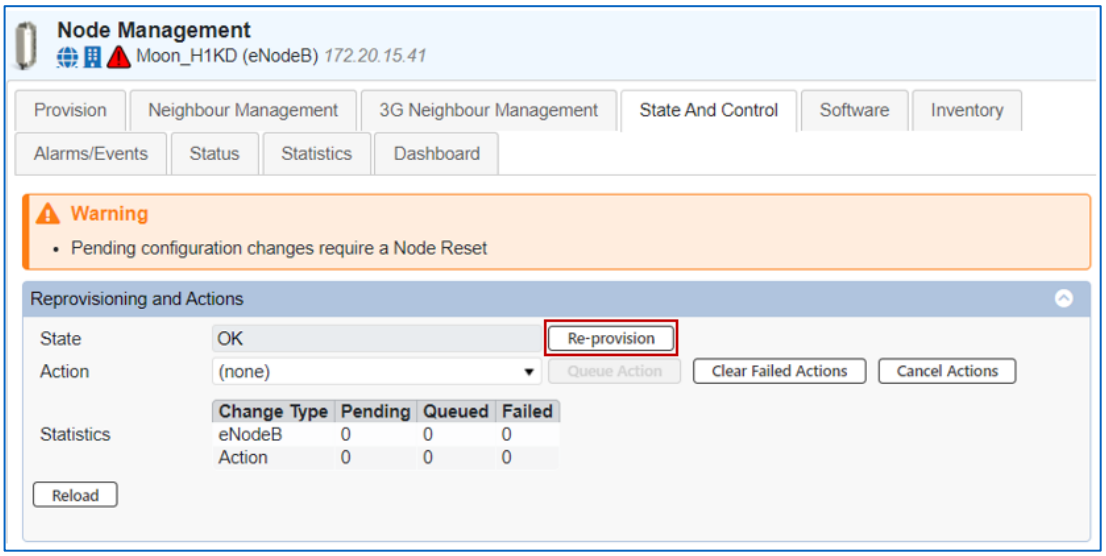


Figure 265: Reprovision Options Field for eNodeB

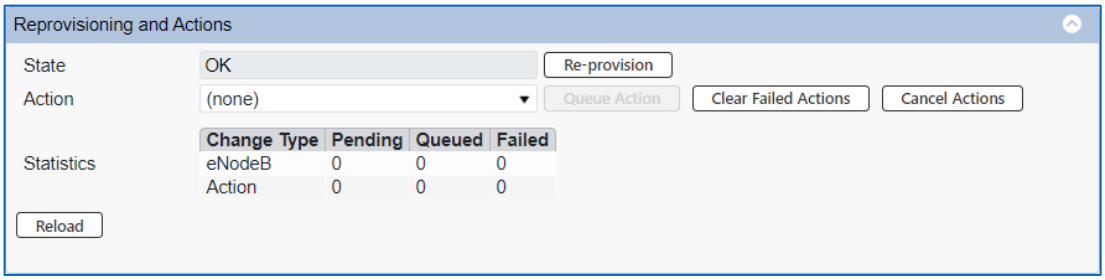
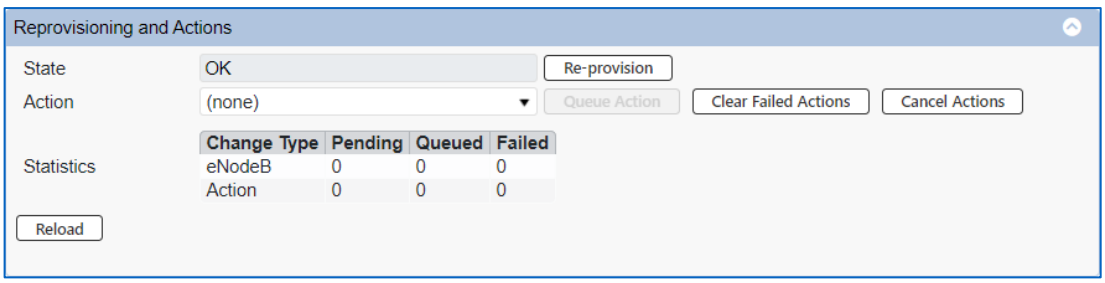


Table 39. Reprovision Option Field

Node Type	Re-provision	Actions
eNodeB	No options	Cold Reset Node Forced Cold Reset Node Forced Reset Node Renew Operator Certificate Reset Node Run Script (eNodeB)
iBridge 440	No options	Reset Node
iBridge 460	No options	Reset Node
Relay	No options	Reset Node Force Scan (Relay) Forced Cold Reset Node
Relay eNodeB	Node eNodeB Relay	Cold Reset Node Force Scan (Relay) Forced Cold Reset Node Forced Reset Node Renew Operator Certificate Reset Node Run Script (eNodeB) Scan (Relay) Tamper Detect Reset
iBridge2	No options	Reset Discovery (Auto) Reset Discovery (Manual) Reset Node

5. Clicking Reprovision sends your requested action to your selected node. You can review the progress of your requested action in the **Statistics** table. When first requested, your reprovision action registers in the **Pending** column. When it is received by the node, it progresses to the **Queued** column while it awaits action to be taken. While the reprovision takes place, it registers in the **Awaiting Response** column. If there is an error during the reprovision, the value in the **Failed** column increments. Investigation is usually required to find the cause of the failure and examine the **Events** and **Active Alarms** menu options for further details.

Figure 266: Statistics Table



6. Click **Cancel Actions** if you want to cancel your reprovision request.
7. Click **Close** to return to the Node List screen.

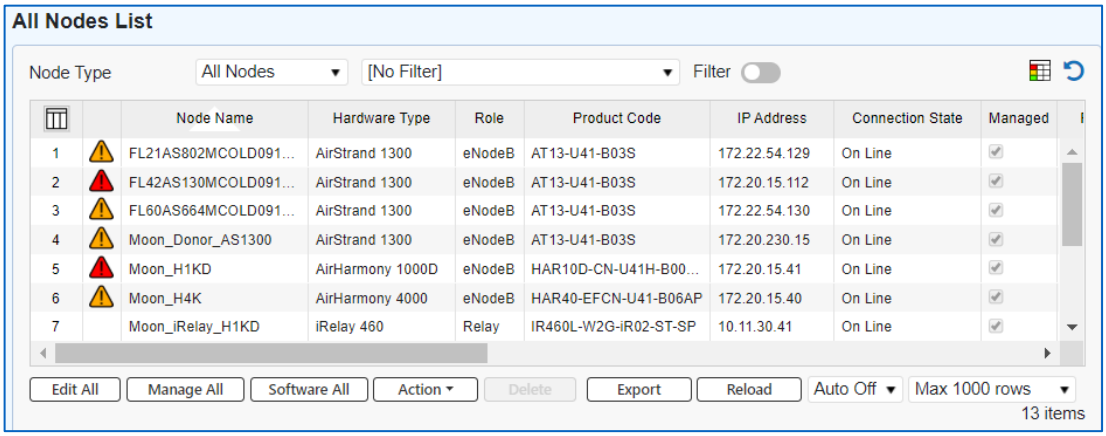
9.6 How to Receive Updates from a Node

Netspan pulls a lot of monitoring and management information from the node population connected to your network. This data is then displayed on various tabs on the **Node Management** screen. While polling nodes for information is an automated process, you have the option of manually forcing an update from a particular node to refresh the data displayed in the UI so that you have a completely up-to-date view of the current situation on the node.

To receive updates from a node:

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

Figure 267: Node List Screen



2. Find the node you want to edit in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as eNodeB, or iBridge Base.
3. Click the node to select it and click **Manage**. This opens the **Node Management** screen. Of the tabs available on this screen, several provide you with an **Update from Node** button. Click this to pull real-time data from your selected node which will be updated on the tab you are viewing. The tabs that have these options are:
   - **State and Control** (on the **Service State** panel for iBridge 440 Base, eNodeB, iBridge2, iBridge Base, and Relay eNodeB).
   - **Software** (on the **Current Software Status** panel for all node types apart from iBridge 440).
   - **Inventory** (all node types).
   - **Status** (all node types).
   - **Statistics** (all node types).

   Note: On the **Software** tab, the button is labelled **Update from Equipment** rather than Update from Node.
4. When you have finished reviewing the updated information from the node, click **Close** to return to the Node List screen.

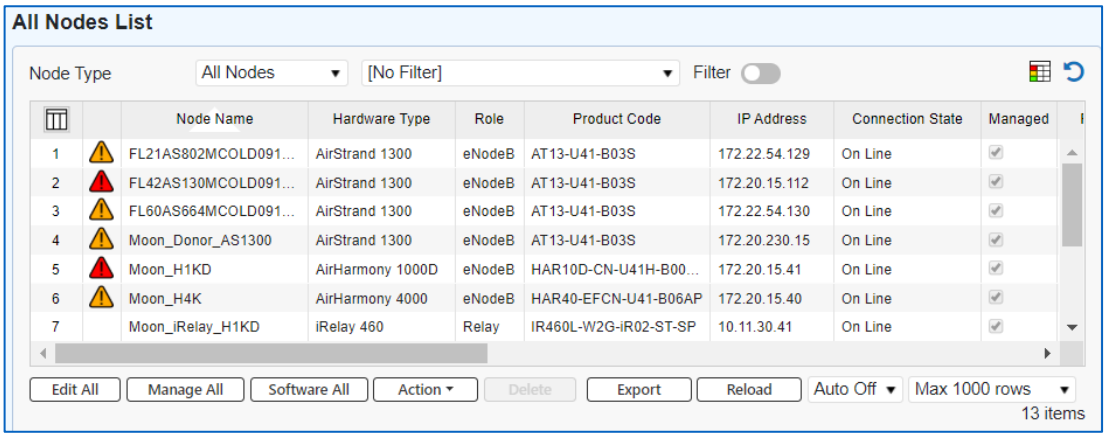
9.7 How to Edit a Node

The Netspan UI provides you with the ability to change the configuration parameters of a node so that its operation can be updated, such as applying a revised profile or changing its managed status.

To edit a node:

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

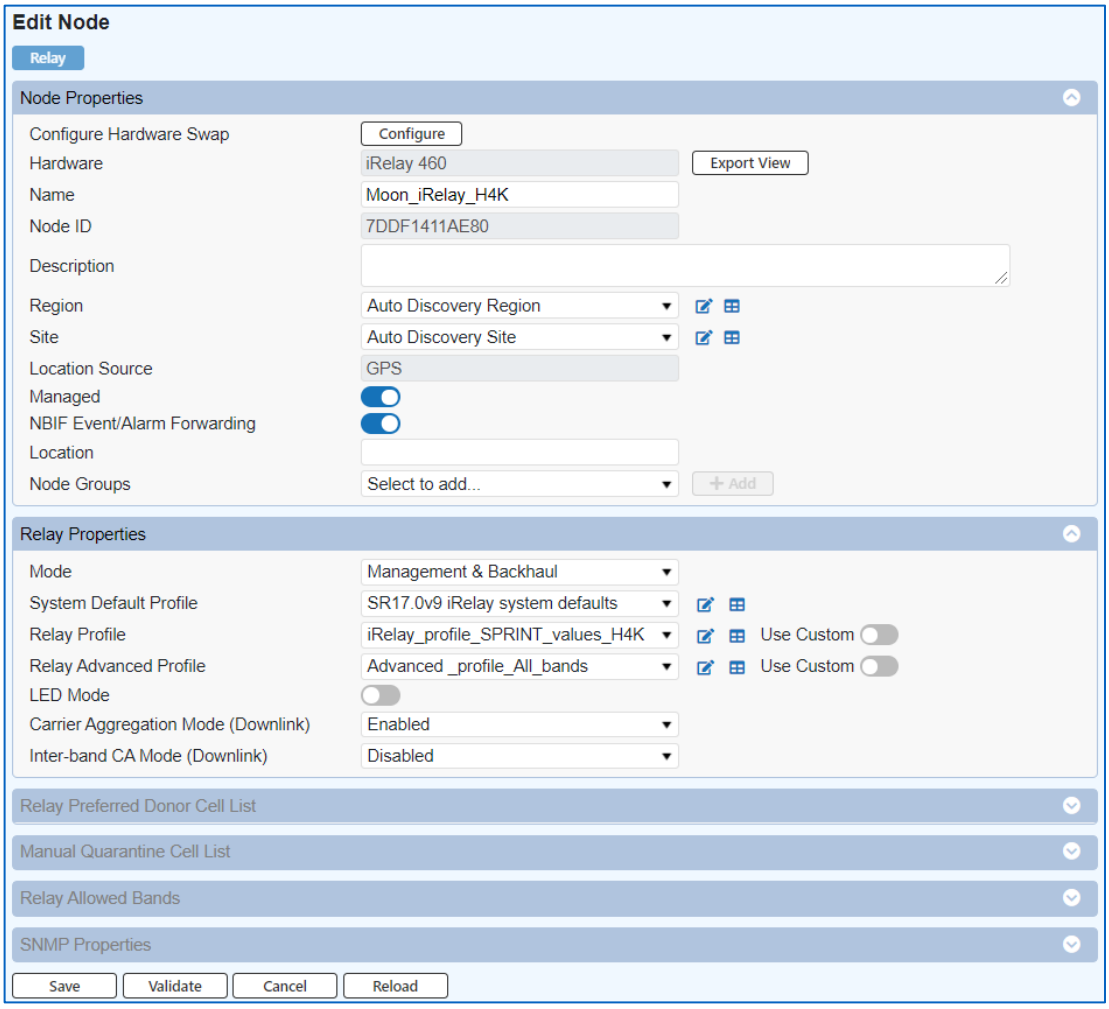
Figure 268: Node List Screen



2. Find the node you want to edit in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as eNodeB or iBridge Base.
3. Click the node to select it and click **Edit**. This opens the **Edit Node** screen. From here, you can change the node parameters as required. See *ARD-D00741 Netspan Parameters Reference Guide* for a detailed description of the node parameters displayed on this screen, including the valid ranges of values and whether changing the parameter will have a direct impact on the service provided.

> **Note:** The parameters shown on the Edit Node screen are dependent on the type of the node you are editing. Not all parameters are applicable to all types of nodes.
>
> You can also edit multiple nodes together. In order to perform this operation, you can click **Edit All** on the **All Nodes List** screen or you press **Ctrl + click the nodes** that you want to edit and then click **Edit**.

Figure 269: Edit Node Screen



4. When you have made your changes, click **OK** to commit them. This will close the Edit Node screen and you will be returned to the Node List.

9.8 Multi Edit Nodes

The Netspan UI also provides you with the ability to change the configuration parameters of multiple nodes together so that its operation can be updated simultaneously and same changes can be implemented throughout all the selected nodes.

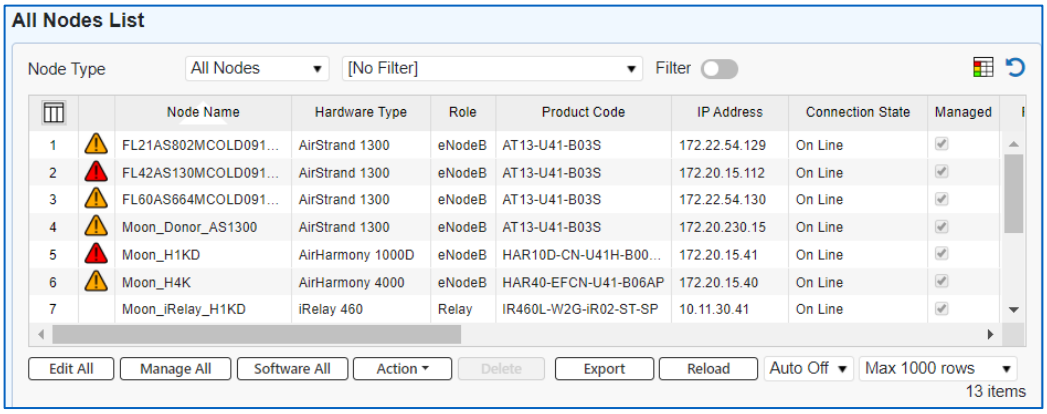
There are two methods by which you can edit multiple nodes:

9.8.1 Managing Nodes

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

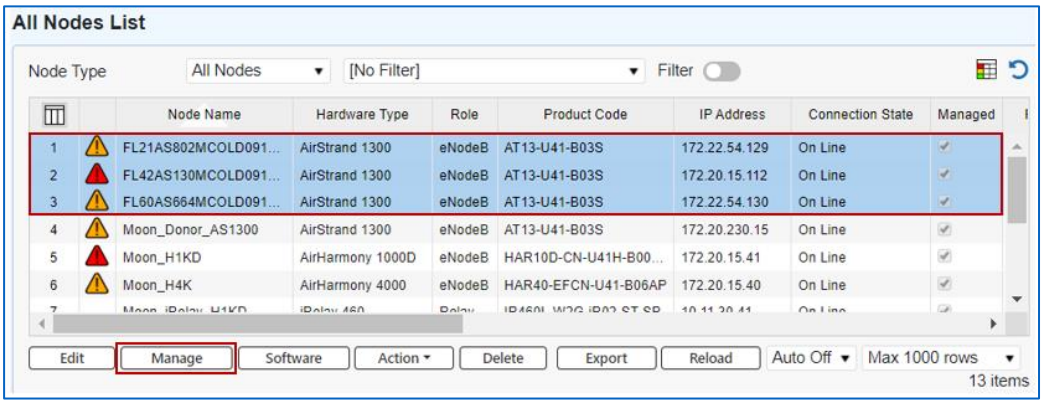
> **Note:** This process can also be performed for Node Search, Node Inventory, and Node RF.
>
> **For Node Search:** on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Search.**
>
> **For Node Inventory:** on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Inventory.**
>
> **For Node RF:** on the main Netspan menu, choose **Configuration Management** > **Node** > **Node RF.**

Figure 270: Node List Screen



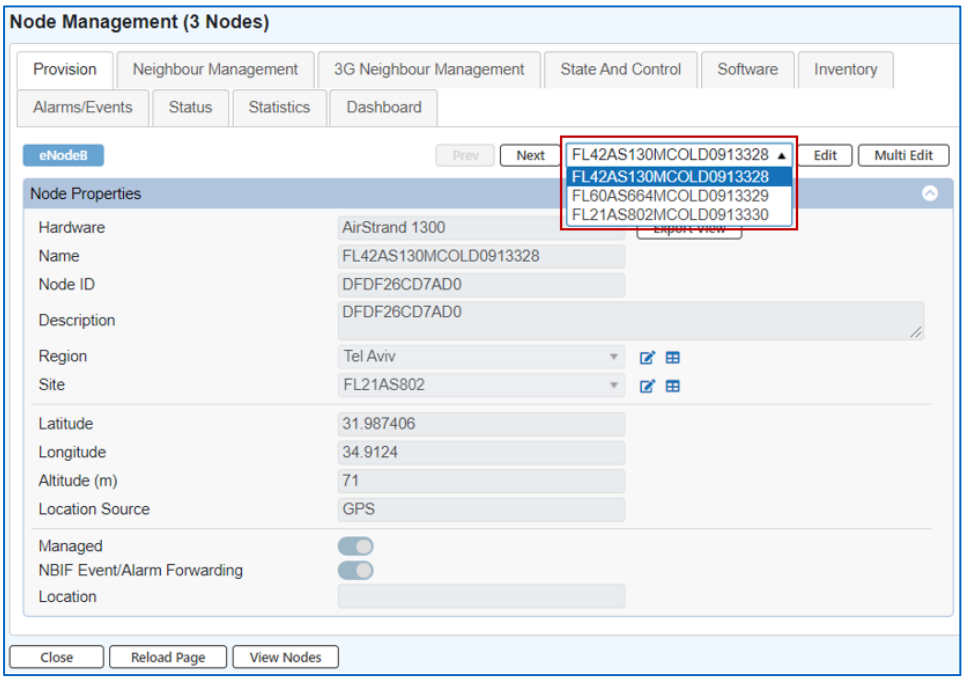
2. Find the nodes you want to edit in the node list. Press and hold **Ctrl + click multiple nodes** to select or press and hold **Shift + select an array of nodes** that you want to edit. Then, click **Manage**.

Figure 271: Node List Screen



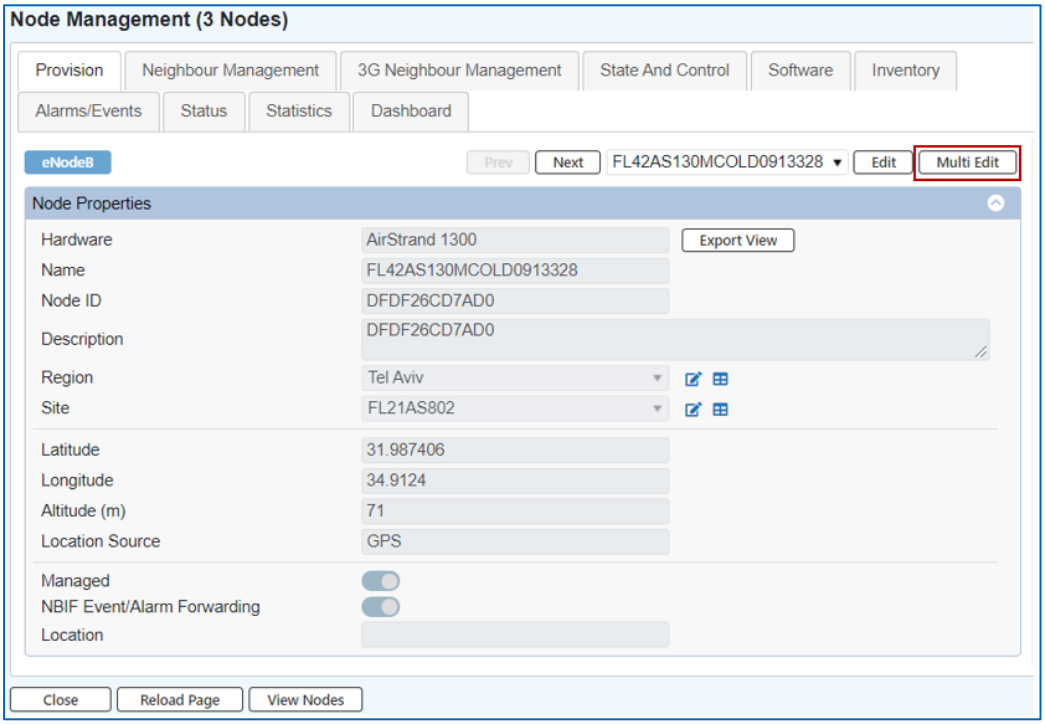
3. This opens the Node Management page. Click the drop down option to display the nodes that you have selected for editing as shown in Figure 272.

Figure 272: Multiple Node Management



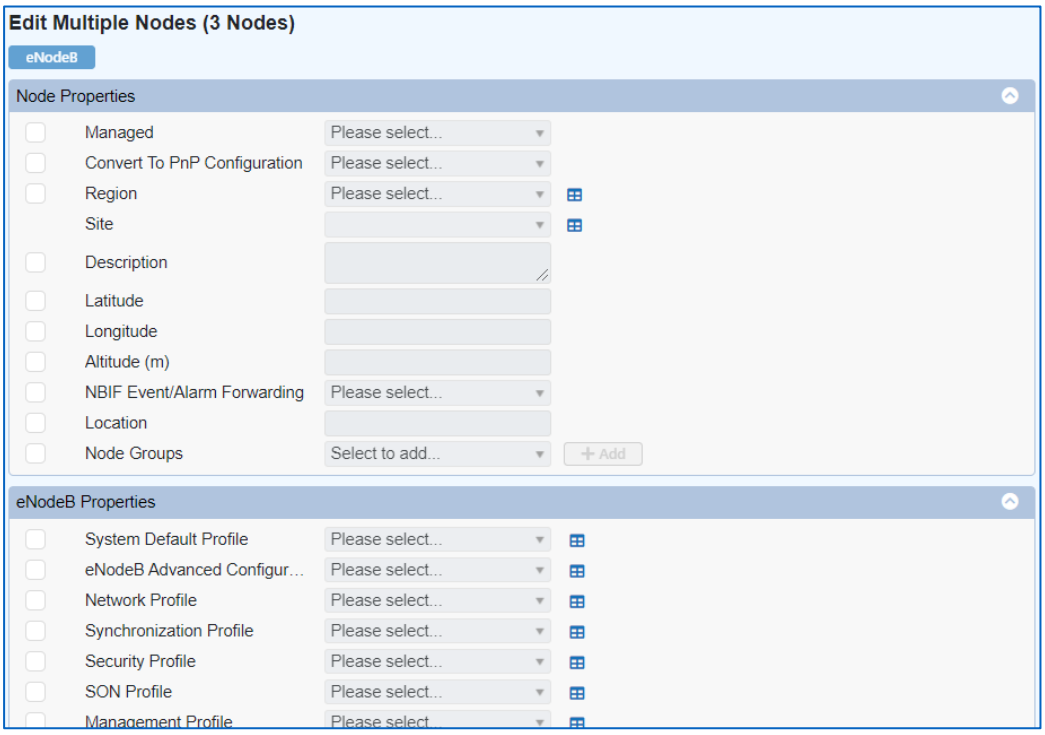
4. Click **Multi Edit** to simultaneously edit the selected nodes.

Figure 273: Multiple Node Management



5. The Edit Multiple Nodes page will be displayed. You can set values for your selected nodes on this page and the same changes will be implemented to all nodes simultaneously.

Figure 274: Editing Multiple Nodes



6. Once you edit the parameters for these nodes, click **Save**.

9.8.2 Editing Nodes

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

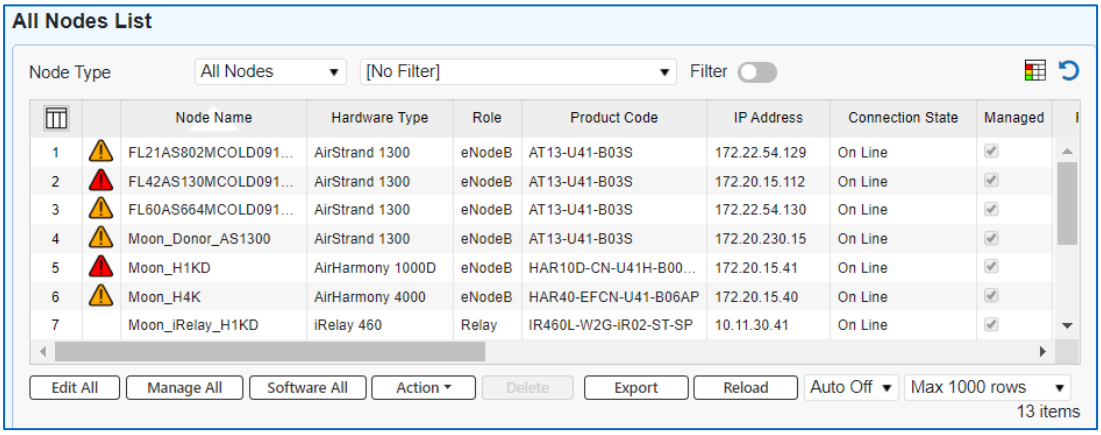
Note: This process can also be performed for Node Search, Node Inventory, and Node RF.

For Node Search: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Search.**

For Node Inventory: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Inventory.**

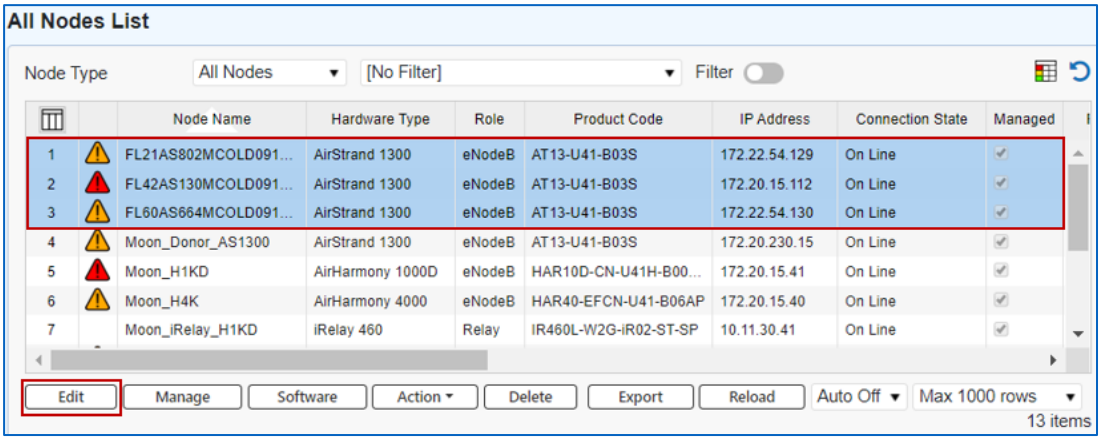
For Node RF: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node RF.**

Figure 275: Node List Screen



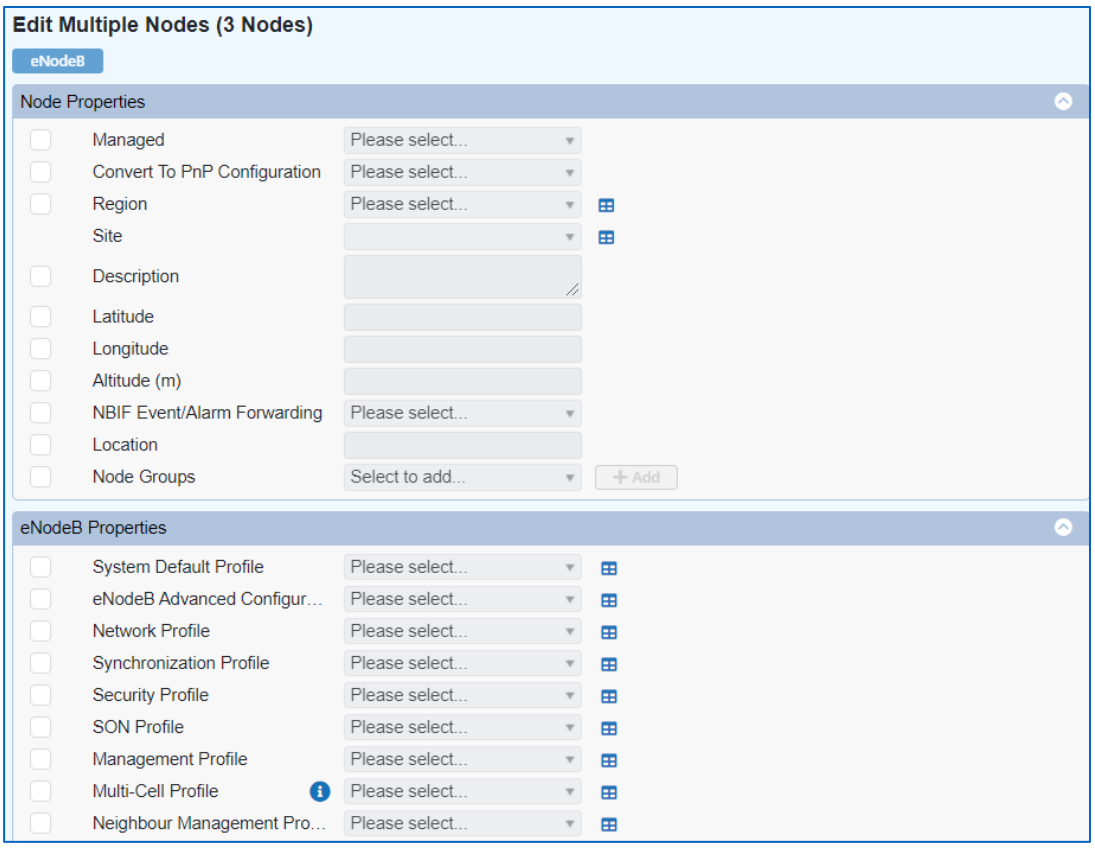
2. Find the nodes you want to edit in the node list. Press and hold **Ctrl + click multiple nodes** to select or press and hold **Shift + select an array of nodes** that you want to edit. Then, click **Edit**.

Figure 276: Node List Screen



3. The Edit Multiple Nodes page will be displayed. You can set values for your selected nodes on this page and the same changes will be implemented to all nodes simultaneously.

Figure 277: Editing Multiple Nodes



4. Once you edit the parameters for these nodes, click **Save** to save the changes.

9.9 Multi Manage Nodes

There can be scenarios where you need to update multiple nodes together. The Netspan UI provides you with the ability to do this quickly and efficiently.

9.9.1 Managing Nodes

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

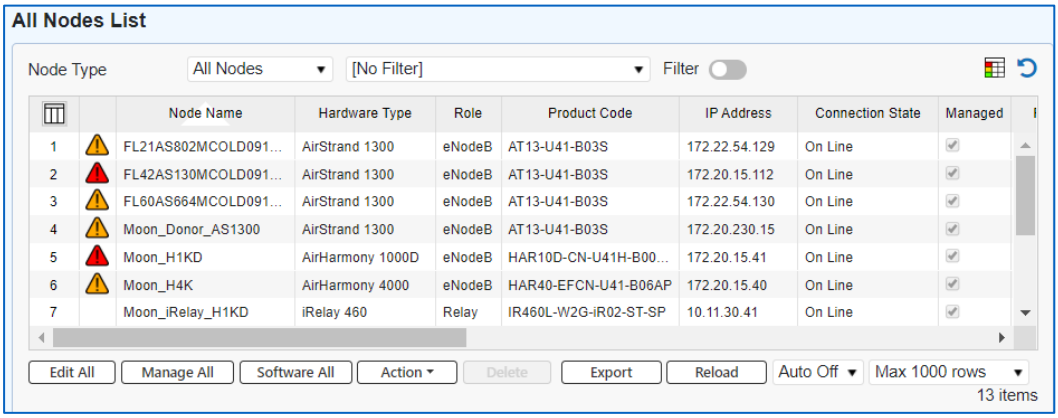
Note: This process can also be performed for Node Search, Node Inventory, and Node RF.

For Node Search: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Search.**

For Node Inventory: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node Inventory.**

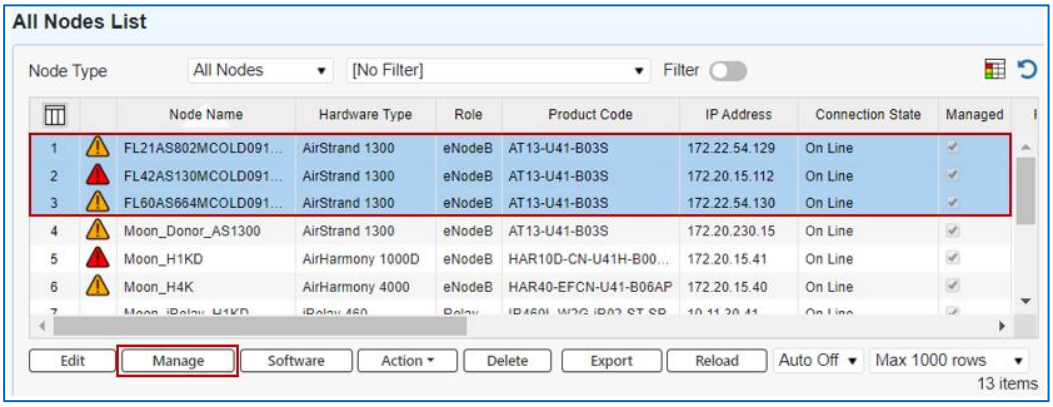
For Node RF: on the main Netspan menu, choose **Configuration Management** > **Node** > **Node RF.**

Figure 278: Node List Screen



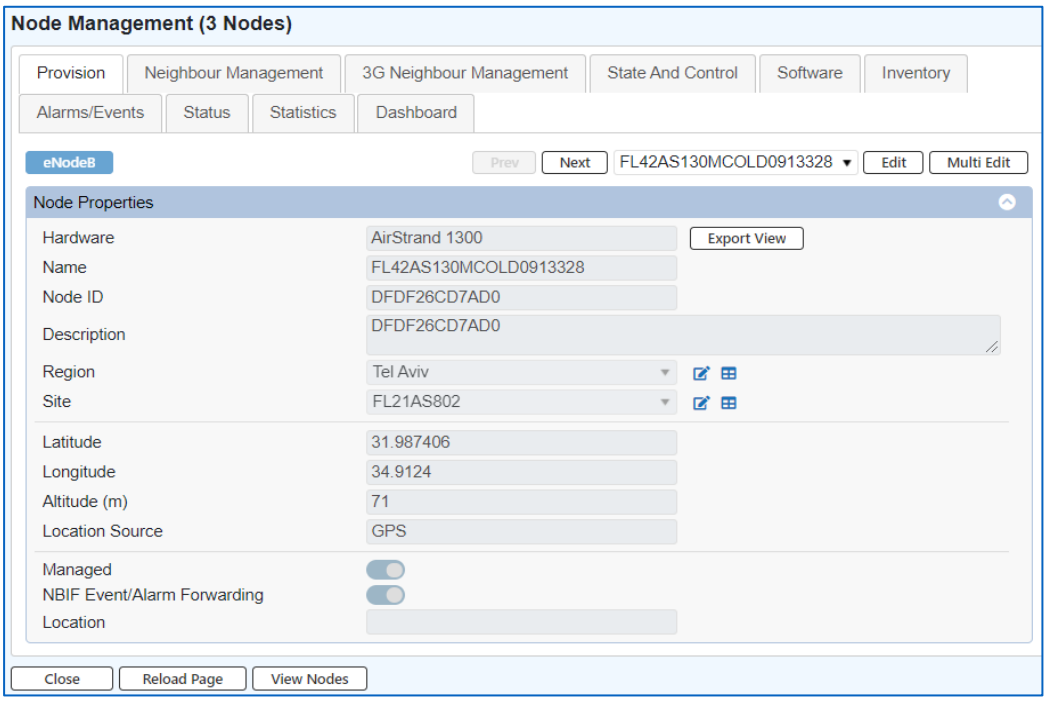
2. Find the nodes you want to manage in the node list. Press and hold **Ctrl + click the nodes** to select them or press and hold **Shift + select an array of nodes** that you want to manage. Then, click **Manage**.

Figure 279: Node List Screen



3. This opens the Multiple Node Management page.

Figure 280: Multiple Node Management



4. On this page, for the nodes selected, you can perform the following:
   - **Neighbour Management tab:** Add/delete a neighbor (refer How to Manage LTE Neighbour List).
   - **State and control tab:** Re-provision node, change the service status, and receive updates for a node (refer Node Management).
   - **Software tab:** View software details for the node selected, upgrade the software of the selected node, and upgrade multiple nodes (refer Software Upgrade).
   - **Inventory tab:** Examine the inventory for the selected node (refer How to Obtain Node/Network Inventory).
   - **Alarms/Events tab:** View and edit alarms and events (refer Alarm Management / Event Management).
   - **Status tab:** Examine the current status of the node across multiple operational categories (refer How to Examine Node Status).
   - **Statistics tab:** View performance statistics of a node (refer Performance Management).

9.10 How to Delete a Node

There may be times when you need to remove a node from your network. The Netspan UI provides you with the ability to do this quickly and efficiently.

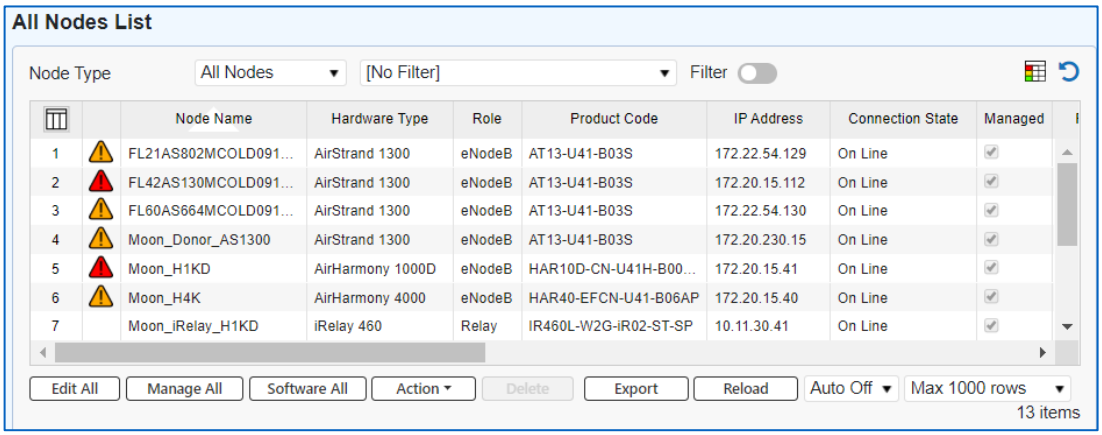
There are two potential scenarios in which you might need to delete a node:

- **Case 1:** Delete a node completely from Netspan with the requirement to keep the node in service (for example, if the node needs to be moved from one Netspan instance to another).
- **Case 2:** Delete a node completely from Netspan with the requirement to set the node to *out of service*.

Case 1: If you only want to delete a node completely from Netspan with the requirement to keep the node in service, perform the following steps:

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

Figure 281: Node List Screen



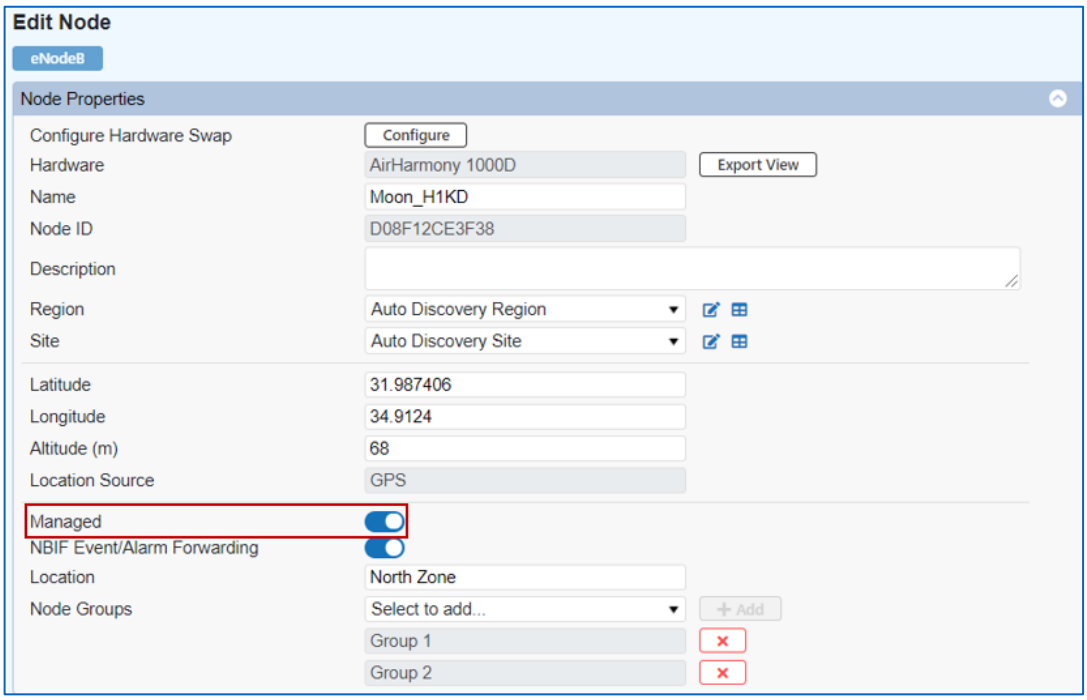
2. Find the node you want to delete in the node list. Filter the list of nodes using the **Node Type** drop-down field, if required, to limit the displayed nodes by type, such as eNodeB or iBridge Base.

Note: For an iBridge node, make sure to select a feeder base. **The procedure detailed here should be performed on the feeder base**. You cannot perform it on a feeder terminal.

You can also delete multiple nodes together. In order to perform this operation, you can click **Manage All** on the **All Nodes List** screen or you press **Ctrl + click the nodes** that you want to delete and then click **Delete**.

3. Before you delete a node, it must first have a status of 'unmanaged'. One of the properties displayed on the Node List screen is whether the node is **Managed**. If the Managed toggle button is enabled, then it is managed; if the toggle button is disabled (not clicked), then it is unmanaged. If the node you want to delete is already unmanaged, then click the node to select it and click **Delete**.
4. If you need to change the Managed status of the node, click the node to select it and click **Edit**. This opens the **Edit Node** screen.
5. In the **Node Properties** panel, click the Managed toggle button to set the node to unmanaged. Click **Save** to save your changes and return to the Node List screen.

Figure 282: Node Properties Panel

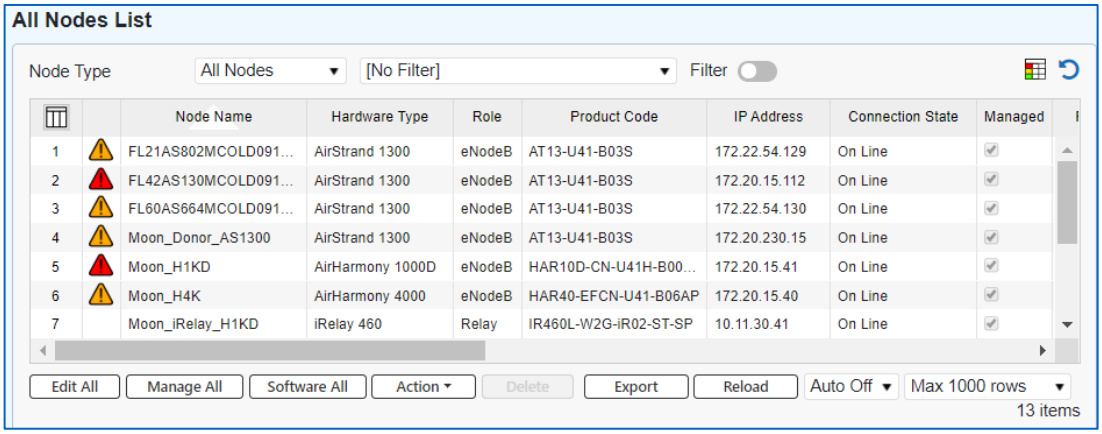


6. Now that the node is unmanaged, select it in the node list and click **Delete**.

Case 2: If you want to delete a node completely in Netspan with the requirement to set the node to *out of service*, perform the following steps:

1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node**. The **Node List** screen will be displayed with a list of all the currently configured nodes in your system.

Figure 283: Node List Screen

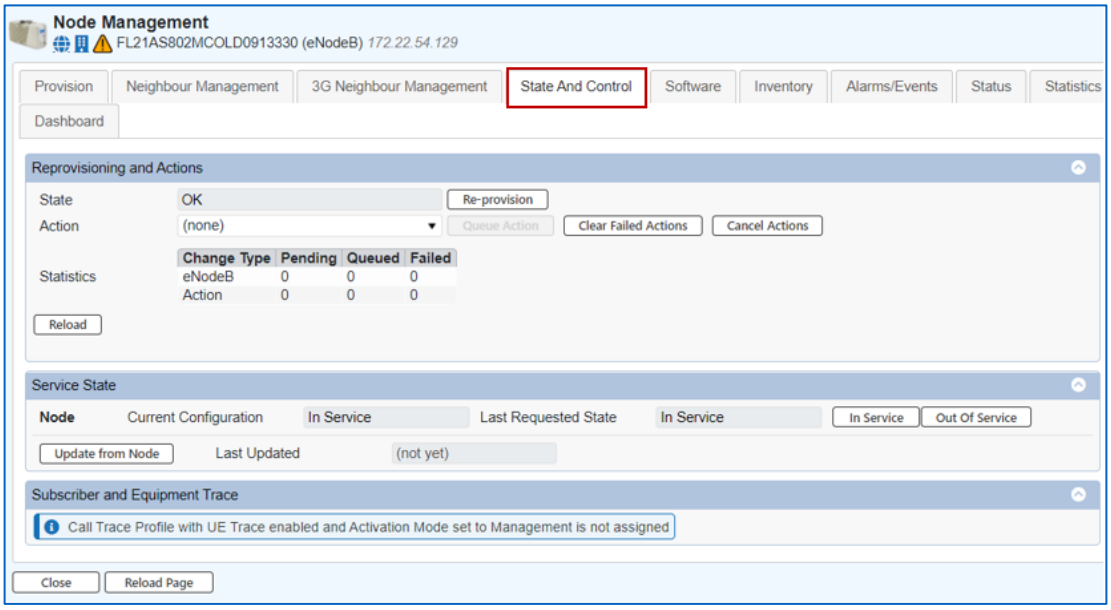


2. In the node list, find the node you want to delete. You can filter the list of nodes using the Node Type drop-down field to limit the displayed nodes by type, such as eNodeB or iBridge Base.

Note: For an iBridge node, make sure to select a feeder base. **The procedure detailed here should be performed on the feeder base.** You cannot perform it on a feeder terminal. You can also delete multiple nodes together. In order to perform this operation, you can click **Manage All** on the **All Nodes List** screen or you press **Ctrl + click the nodes** that you want to delete and then click **Delete**.

3. Click **Manage** at the bottom of the **Node List** page.
4. On the succeeding **Node Management** page, select the **State and Control** tab.

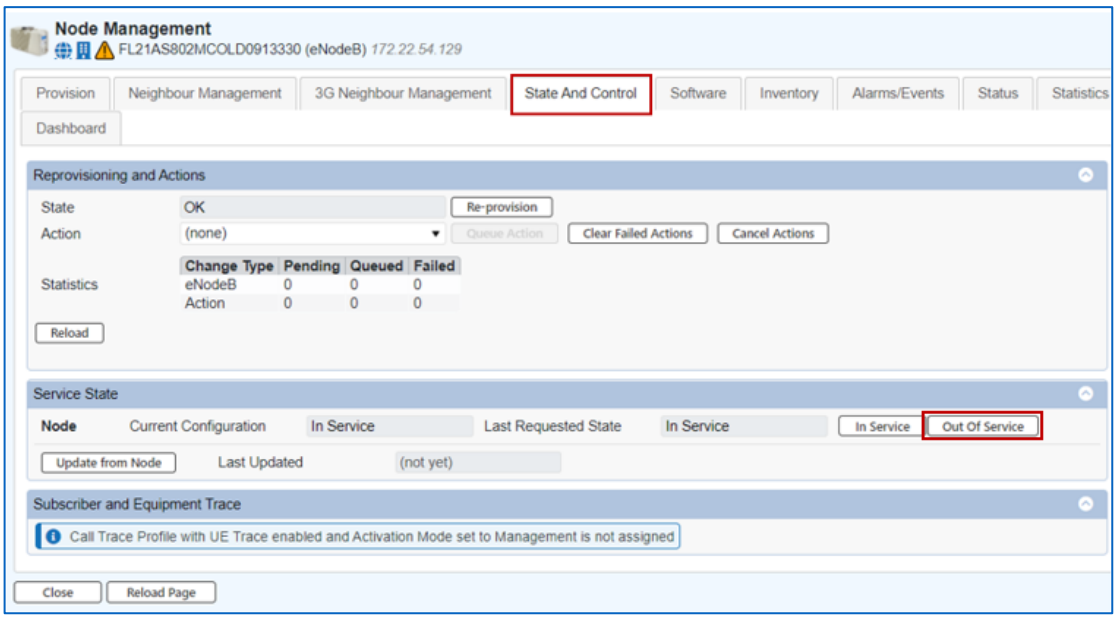
Figure 284: State and Control Tab



5. In the **Service State** panel, click **Out of Service**.

Note: This option is enabled only if the selected node is in the **Managed** state.

Figure 285: Setting Node to Out of Service



6. Click **Save** to complete the process of moving the node into the **Out of Service** state.

7. After moving the node to the **Out of Service** state, follow the procedure detailed in **Case 1** to remove it from Netspan.

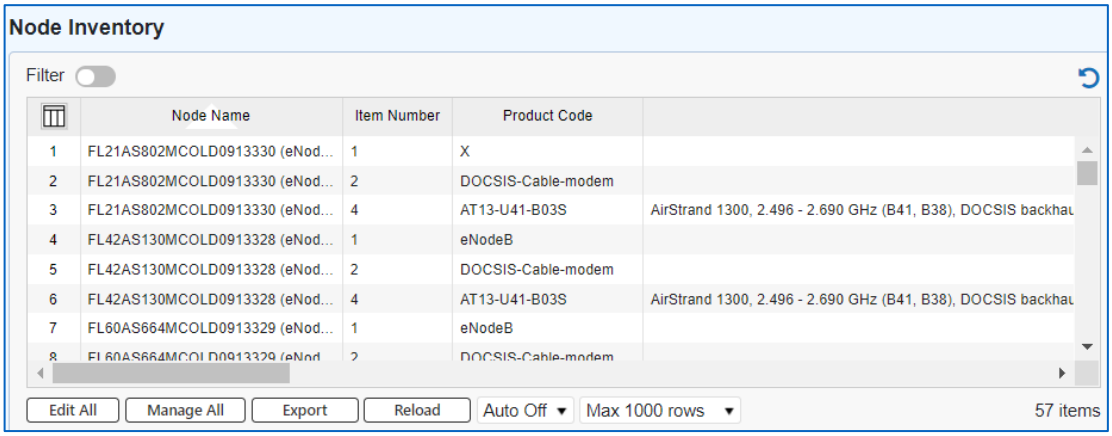
9.11 How to Obtain Node/Network Inventory

Netspan provides you with the ability to view the inventory of a node, i.e. a detailed examination of the hardware and software that combine to create a node.

To review a node's inventory:

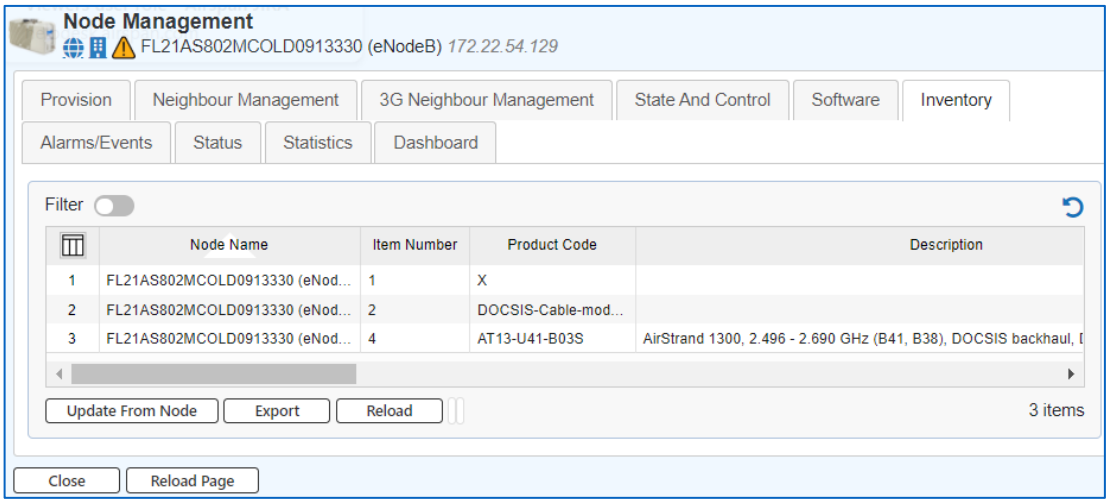
1. On the main Netspan menu, choose **Configuration Management** > **Node** > **Node Inventory**. The **Node Inventory List** screen will be displayed with a list of nodes currently configured in your system along with their hardware and software inventories.

Figure 286: Node Inventory List Screen



2. Find the node that you want to examine the inventory for in the node list, and either double click it or select it and click **Manage**. Either of these actions opens the **Node Management** screen for your selected node with the **Inventory** tab displayed.

Figure 287: Inventory Tab



3. The details shown on the Inventory tab will give you an analysis of the hardware and software that currently constitute the node's operating profile. This information will be read from the node by Netspan and cannot be edited; it is for information and review purposes only. The details displayed on the tab are described in Table 40.

Table 40. Node Inventory Properties and Descriptions

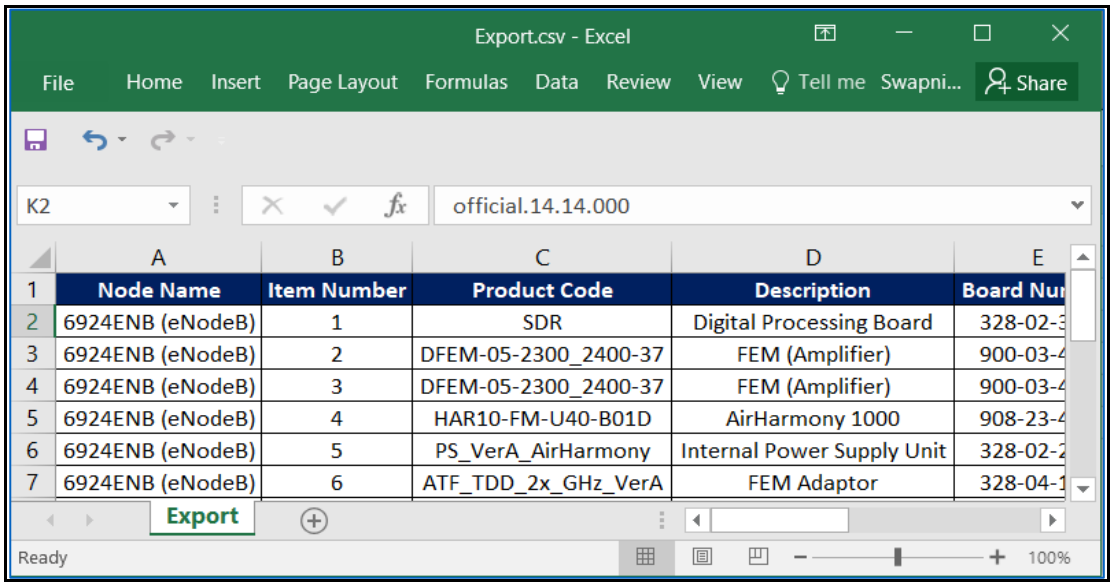
Property	Description
Node Name	Name of the node.
Item Number	The instance of the inventory item for items that have the same port number. For example, SCRT instances 1 and 2 would share the same board number but have different serial numbers.
Product Code	The code identifying the individual product in this row of the table. This is an alpha-numeric string.
Description	A user-friendly description of the current inventory on the node.
Board Number	An octet string to identify the board number if relevant to this inventory type, e.g.900-02-450.
Board Revision	An octet string to identify the revision number of the board identified by the Board Number.
Serial Number	An octet string to uniquely identify the physical entity.
Hardware Config Flags	The hardware identifier information retrieved from the CPLD.
Software Product Number	An octet string to identify the software product running on the current inventory. The field is empty when there is no software installed or when the software does not have a product ID.
Description (Software)	A description of the current software inventory as entered by the embedded software.
Software Version	The current software version running on the inventory item. There may be different software versions running on different instances of the same inventory port number, e.g. reflecting software versions running on multiple SCRTs.
Assembly Number	A number identifying the assembly of this inventory item.
Assembly Revision	The revision number of the assembly identified by the Assembly Number.
CLEI Code	The Common Language Equipment Identification as defined by OEM/PM.
Description (Manufacturing)	A description of the current inventory as entered during manufacturing.
Manufacturing Date	The date on which the unit was manufactured, shown as a string in the format dd.mm.yyyy.
Hardware MAC Address	The MAC address of the front panel Ethernet of the node or another MAC address selected for the purpose of identification of this inventory item. Shown in the format nn:nn:nn:nn:nn:nn.
Manufacturer Name	The name of the company who manufactured the inventory item.
Factory Code	The factory code of the manufacturer, entered as a string, with a maximum of 6 characters.

4. Click **Export** to export the node inventory you can currently see on the Inventory tab. Your browser shows a message asking if you want to open or save **Export.csv**, the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 288: Export Excel File Message

5. If you choose **Open**, your machine will launch Excel and will display the exported file of inventory details.

Figure 289: Excel File View (Example)



	A	B	C	D	E
1	Node Name	Item Number	Product Code	Description	Board Nu
2	6924ENB (eNodeB)	1	SDR	Digital Processing Board	328-02-3
3	6924ENB (eNodeB)	2	DFEM-05-2300_2400-37	FEM (Amplifier)	900-03-4
4	6924ENB (eNodeB)	3	DFEM-05-2300_2400-37	FEM (Amplifier)	900-03-4
5	6924ENB (eNodeB)	4	HAR10-FM-U40-B01D	AirHarmony 1000	908-23-4
6	6924ENB (eNodeB)	5	PS_VerA_AirHarmony	Internal Power Supply Unit	328-02-2
7	6924ENB (eNodeB)	6	ATF_TDD_2x_GHz_VerA	FEM Adaptor	328-04-1

6. If you choose **Save**, Netspan will display a confirmation message stating that List.xls has been downloaded.

Figure 290: Export Confirmation Message

7. From here, you have the option to **Open** the exported file, **Open folder** which will display a Browse dialog open at the exported file's location, or **View downloads** which will open the View Downloads dialog in which you can open the exported file or go to its downloaded location.

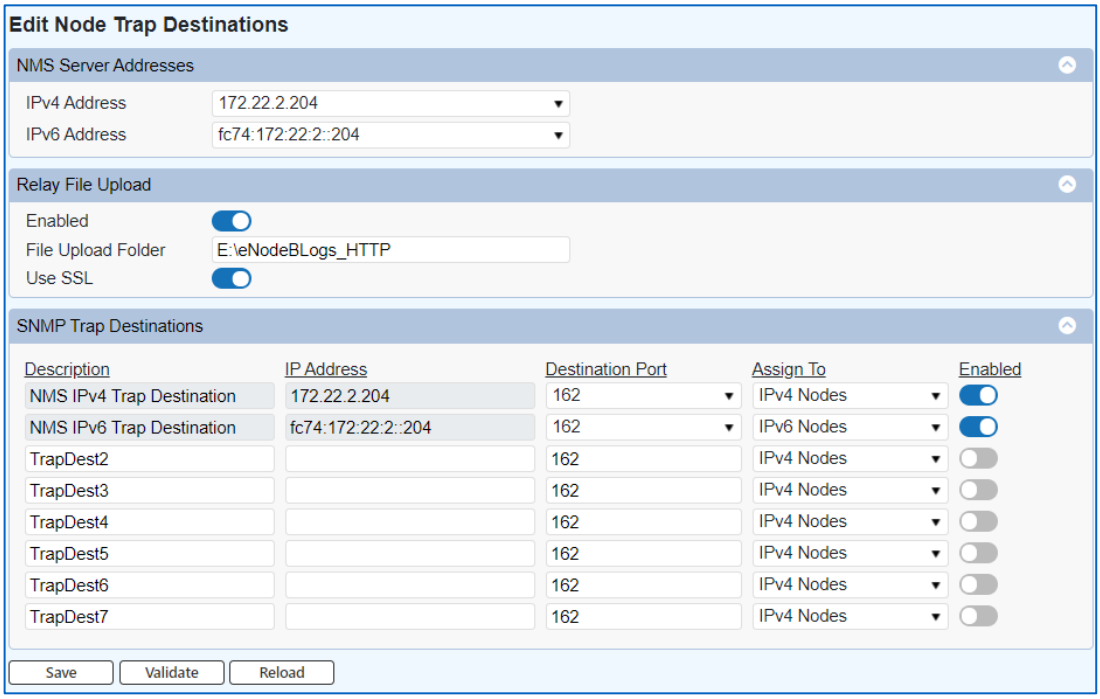
9.12 How to Set Trap Destinations

During the normal course of operation, nodes raise events which notify Netspan that certain actions have taken place or that particular condition has occurred, such as node re-booting or losing communication. Netspan is notified of these events by SNMP traps, unsolicited messages sent from an agent (a node) to a server (Netspan) triggered automatically when certain conditions occur on a node. These messages are sent in data packages in SNMP format. You will be able to determine where this trap information is sent using Netspan UI.

To set trap destinations:

1. On the main Netspan menu, choose **Fault Management** > **Node Trap Destinations**. The **Edit Equipment Trap Destinations** screen will be displayed which shows the currently configured trap destinations for your system.

Figure 291: Edit Equipment Trap Destination Screen

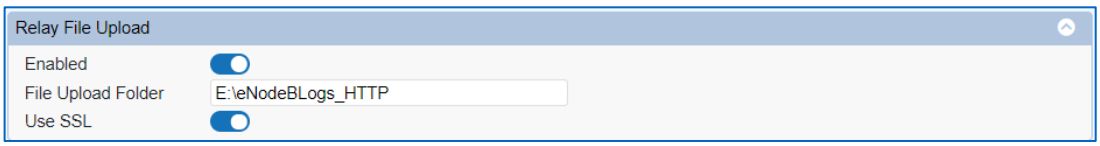


2. In the **NMS Server Address** fields at the top of the screen, select the Netspan IP address that you want to send the trap information to. Drop-down fields are provided for both IPv4 and IPv6 address types, while it is likely that your network will operate on either one IP version or the other, Netspan can support a mixed network. These drop-down lists will be automatically populated by Netspan with the IP addresses of the existing server (or servers).

3. The **Node File Upload** panel is relevant where your network includes eNodeB nodes. If an eNodeB experiences a significant problem, it can send additional diagnostic information to Netspan as well as the trap details. To enable this extra information to be sent, select the **Enable** from the drop-down option. This displays a **File Upload Folder** field. In this text field, enter the folder location on the Netspan server to which the file from the node should be written.

> **Note:** If you do not have eNodeB nodes in your network, you do not need to complete this step.

Figure 292: Node File Upload Panel



4. In the **SNMP Trap Destinations** panel, define the details of the IP addresses and ports that the nodes should send their trap information to. The fields you need to define are described in Table 41.

Table 41. SNMP Trap Destinations Fields

Field	Description
Description	A text field to enter a description for the trap destination you are defining. Note that default trap destinations will be pre-populated by Netspan for IPv4 and IPv6, depending on your network profile. These pre-defined descriptions are read only.
IP Address	A text field to enter the IP address of the server to which the trap information should be sent. The format of the IP address you enter here will alter the content of the **Assign To** field. If you enter an IPv4 address, nn.nn.nn.nn, then an IPv4 Nodes option will be available in the assign to list. If you enter an IPv6 address, nn:nn:nn:nn:nn:nn, then an IPv6 Nodes option will be available. Note that default trap destinations will be pre-populated by Netspan for IPv4 and IPv6, depending on your network profile. These pre-defined addresses are read only.
Destination Port	For the pre-defined trap destinations, a drop-down list will be provided from which you can choose the port to send the trap information to. For trap destinations you will be creating, the field is a text entry field for you to enter the port number.
Enabled	A checkbox to determine whether the trap destination is active. Select it to enable the destination in that row of the table, leave it clear to have the destination defined but not active.
Assign To	A drop-down list in which you should select the nodes that will use your defined trap destination. You have the option of either assigning the destination to **All Nodes** or just those of IPv4 or IPv6 configuration. The presence of IPv4 or IPv6 in the list will be changed dynamically depending on the format of the IP address you entered in the **IP Address** field. If your address is in the form nn.nn.nn.nn, the IPv4 option will be included. If it is in the form nn:nn:nn:nn:nn:nn, the IPv6 option will be included.

5. Click **Apply** to commit your defined trap destinations.

9.13 Performing Hardware Swap

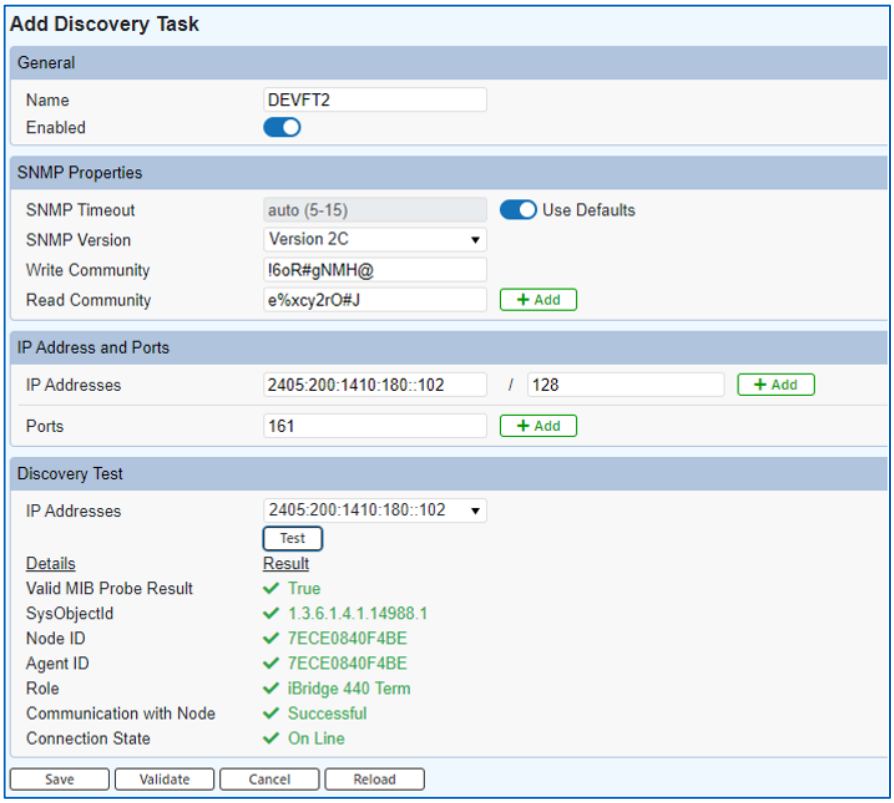
9.13.1 iBridge440 Hardware Swap

Note: The node has to be commissioned (please refer *UG-D01013 – AirCAP Installation and User Guide*) before the HW swap, as it is not PnP.

To perform a hardware swap of iBridge440 node, follow the steps below:

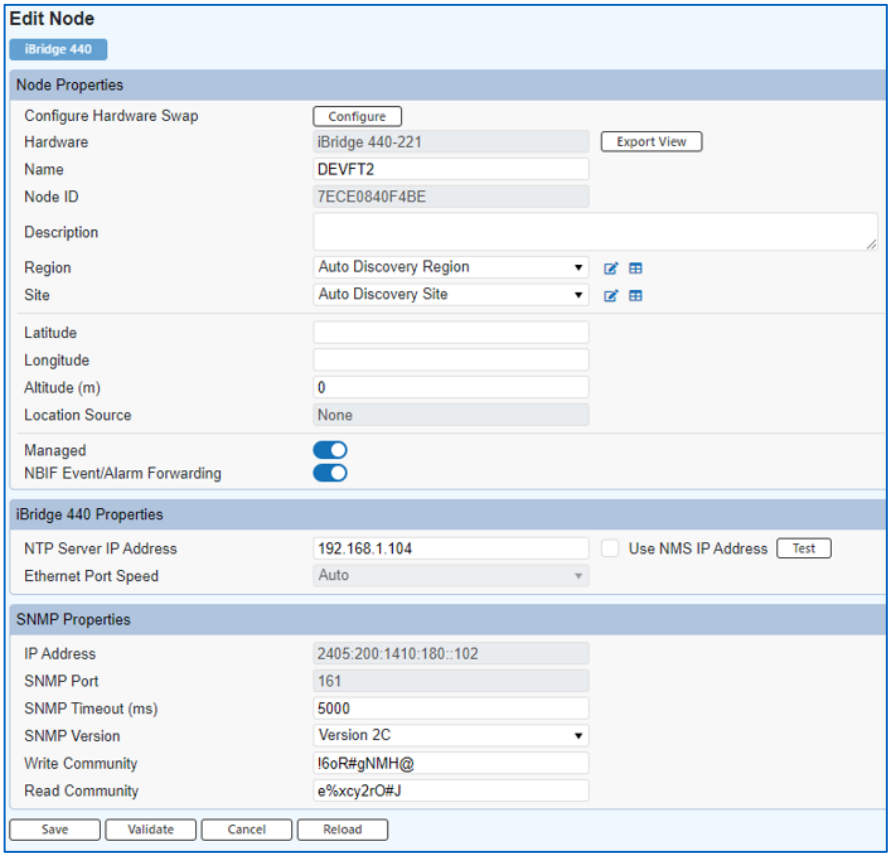
1. On the main Netspan menu choose **Server** > **Discovery Tasks**. The Discovery Tasks screen will be displayed with a list of all discovery tasks currently defined in your system.
2. Click **Add** below the task list. This opens the **Add Discovery Task** screen.
3. Complete the fields according to the descriptions provided in Table 7.
4. Once you have defined your discovery task, a **Test** panel will be displayed at the bottom of the screen. If you want to try your discovery task to see if it reaches the node(s) you are trying to discover, click **Test** in this panel. Results will be returned, showing whether the node has been discovered by Netspan.

Figure 293: Discovery Task Test



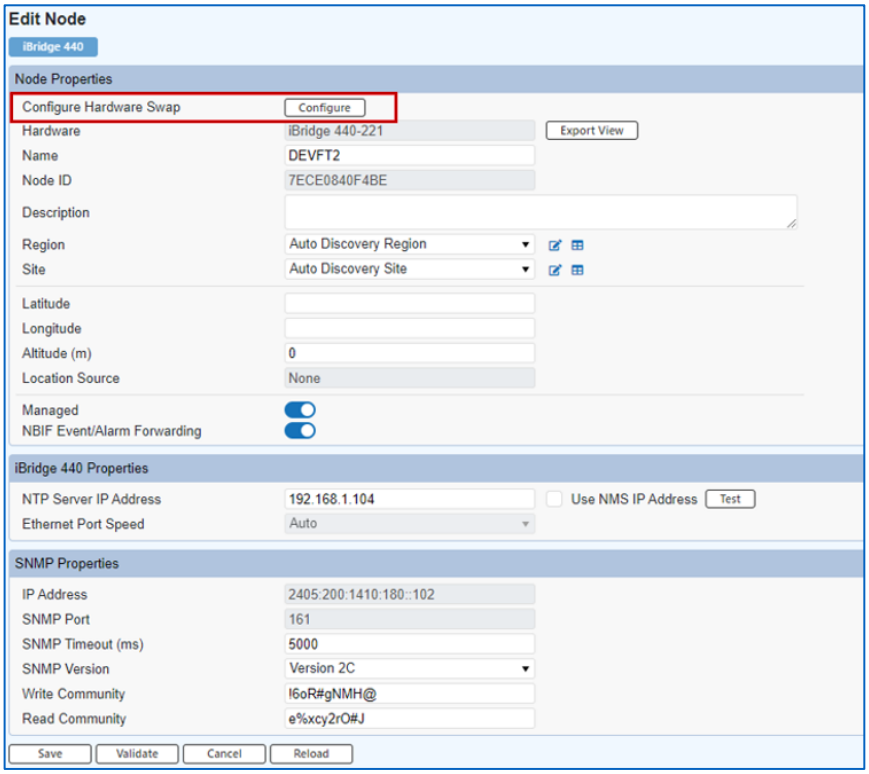
5. Go to **Configuration Management** > **Node** > **Node**, the new node created will be displayed in the node list. Select the node you have discovered and click **Edit**.

Figure 294: Node Management Screen



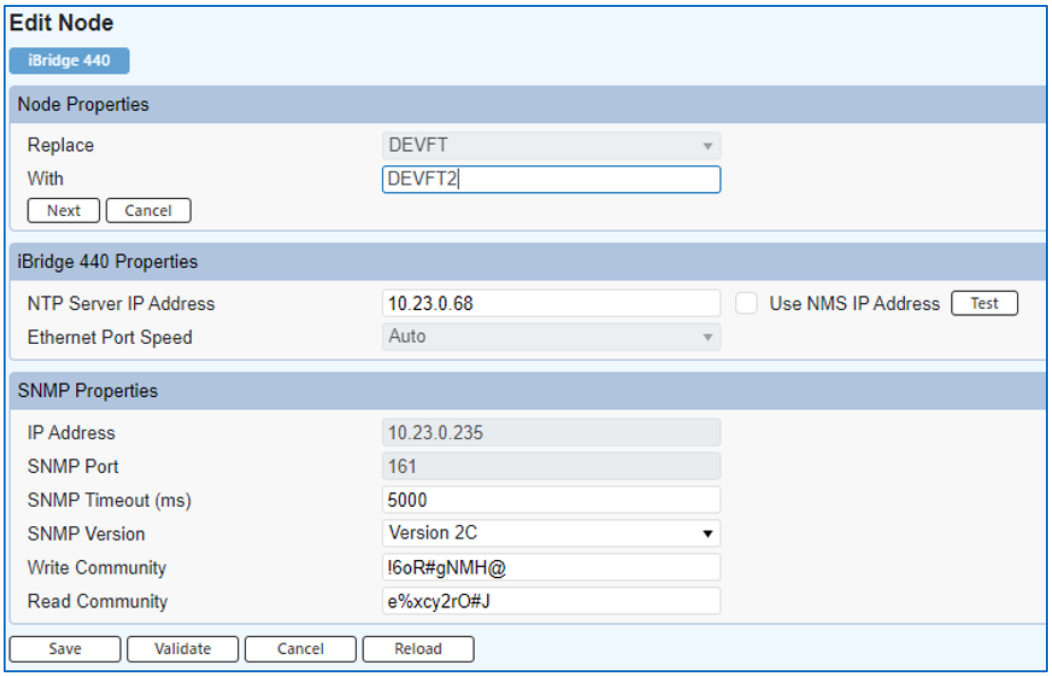
6. Click **Configure** button.

Figure 295: Provisioning Tab



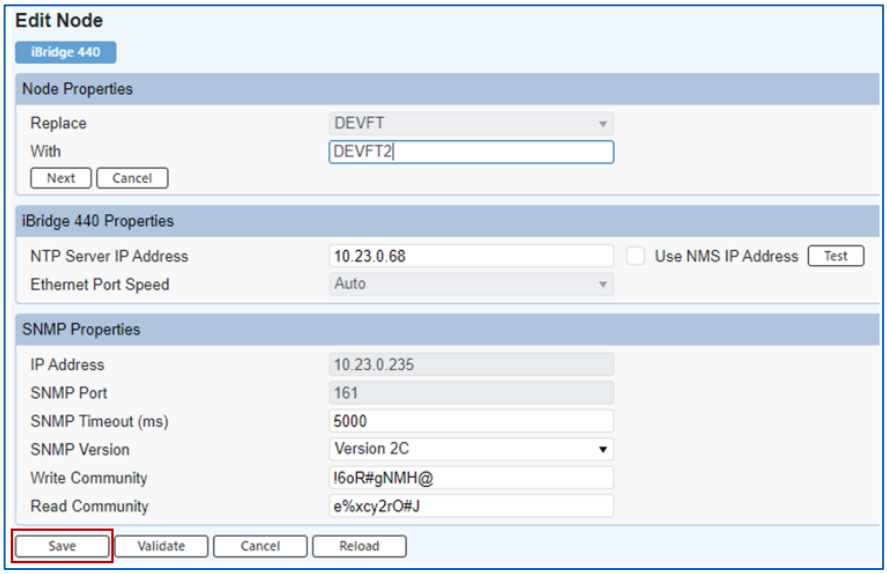
7. Enter the name of the new node that you had discovered earlier.

Figure 296: Hardware Swap Screen



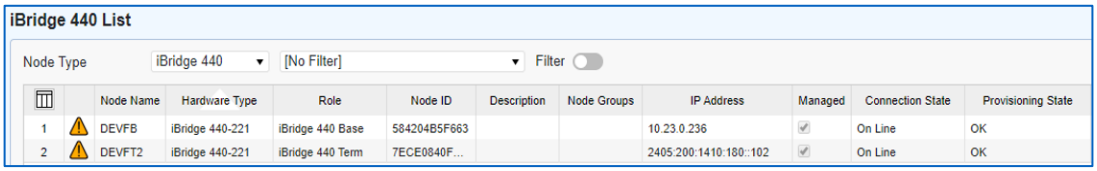
8. Click **Save**.

Figure 297: Replaced Hardware Screen



9. The updated node will be displayed in the node list.

Figure 298: Node List Screen

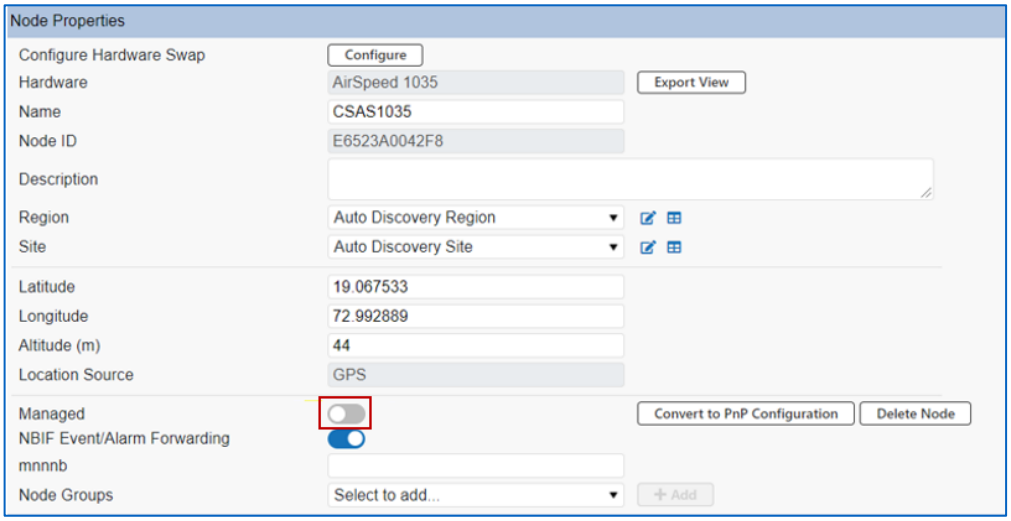


9.13.2 PnP Node Hardware Swap

Note: This section is applicable to the nodes that support PnP functionality.

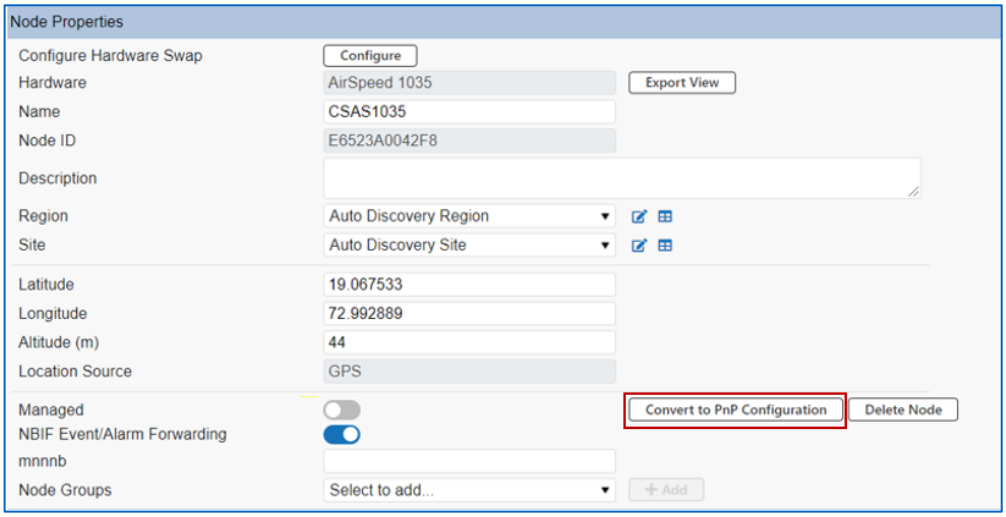
1. Go to **Configuration Management** > **Node** > **Node**, the node list will be displayed. Select the node for which you need to perform this process and click **Manage**.
2. One the **Node Management** page, click **Edit** to provision the node. Then, click **Managed** toggle button, this will display the **Convert To PnP Configuration** button.

Figure 299: Edit Node Screen (Example)



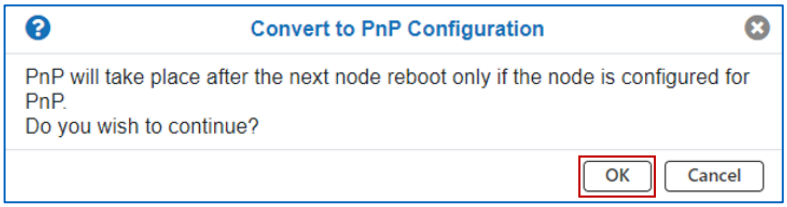
3. Click **Convert To PnP Configuration** button.

Figure 300: Figure 290: Edit Node Screen (Example)



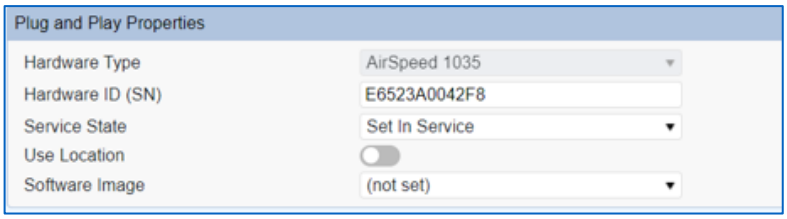
4. A Confirmation Request will be displayed. Click **OK** (this will move the configuration from the node provisioned list to PnP provisioning list).

Figure 301: Confirmation Request



5. Change the PnP related information to allow Netspan to discover the replaced node based on location of the node (where node supports GPS), Hardware ID (SN) of the replaced unit, or both.

Figure 302: Plug and Play Properties (Example)

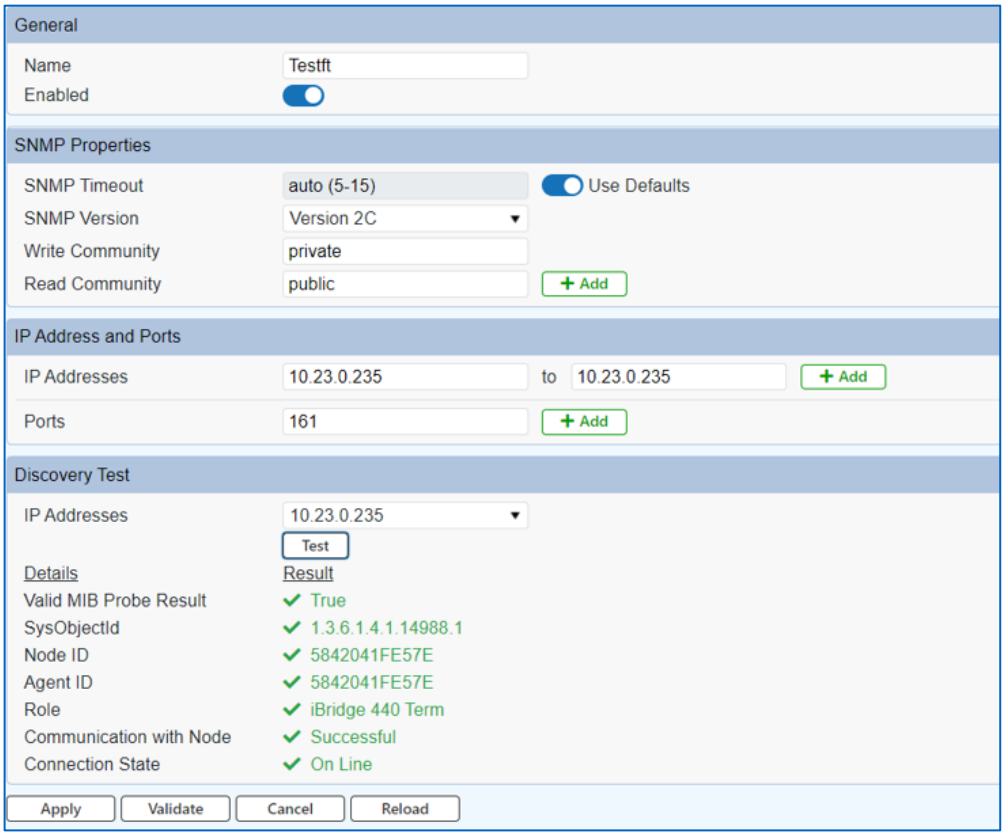


6. Click **Save** to save the changes. Then, switch on the replaced/swapped node.

Note: Steps 1-5 can be done in advance to actual replacement of units.

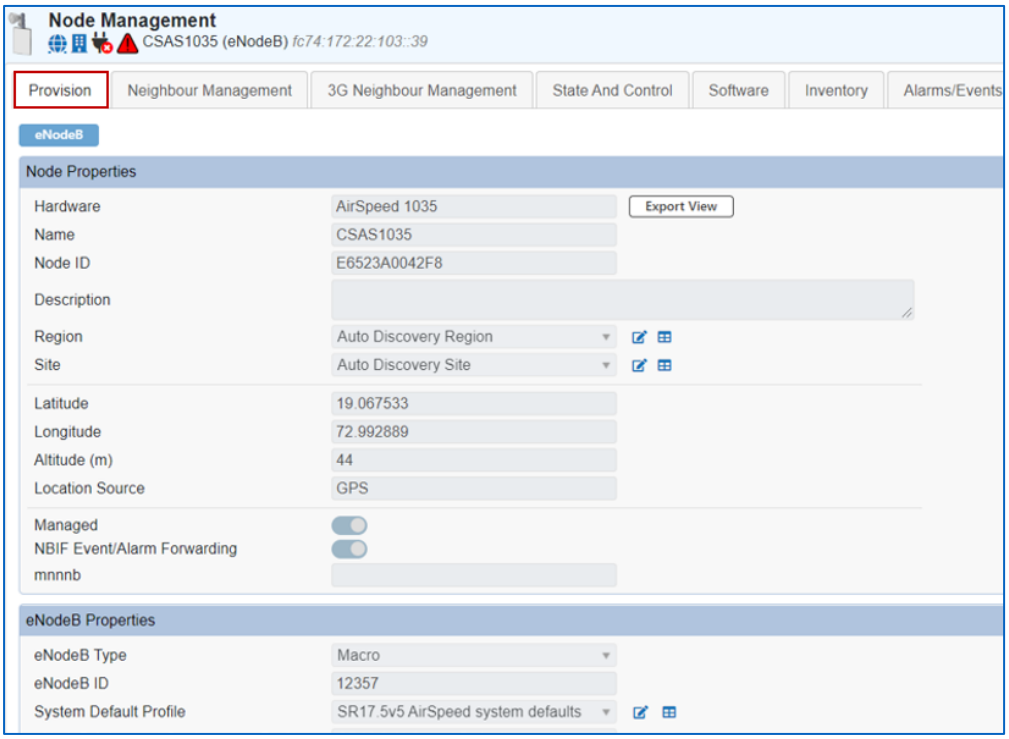
7. On the main Netspan menu choose **Server > Discovery Tasks**. The Discovery Tasks screen will be displayed with a list of all discovery tasks currently defined in your system.
8. Click **Add** below the task list. This opens the **Add Discovery Task** screen.
9. Complete the appropriate fields.
10. Once you have defined your discovery task, a **Test** panel will be displayed at the bottom of the screen. If you want to try your discovery task to see if it reaches the node(s) you are trying to discover, click **Test** in this panel. Results will be returned, showing whether the node has been discovered by Netspan.

Figure 303: Discovery Task Screen



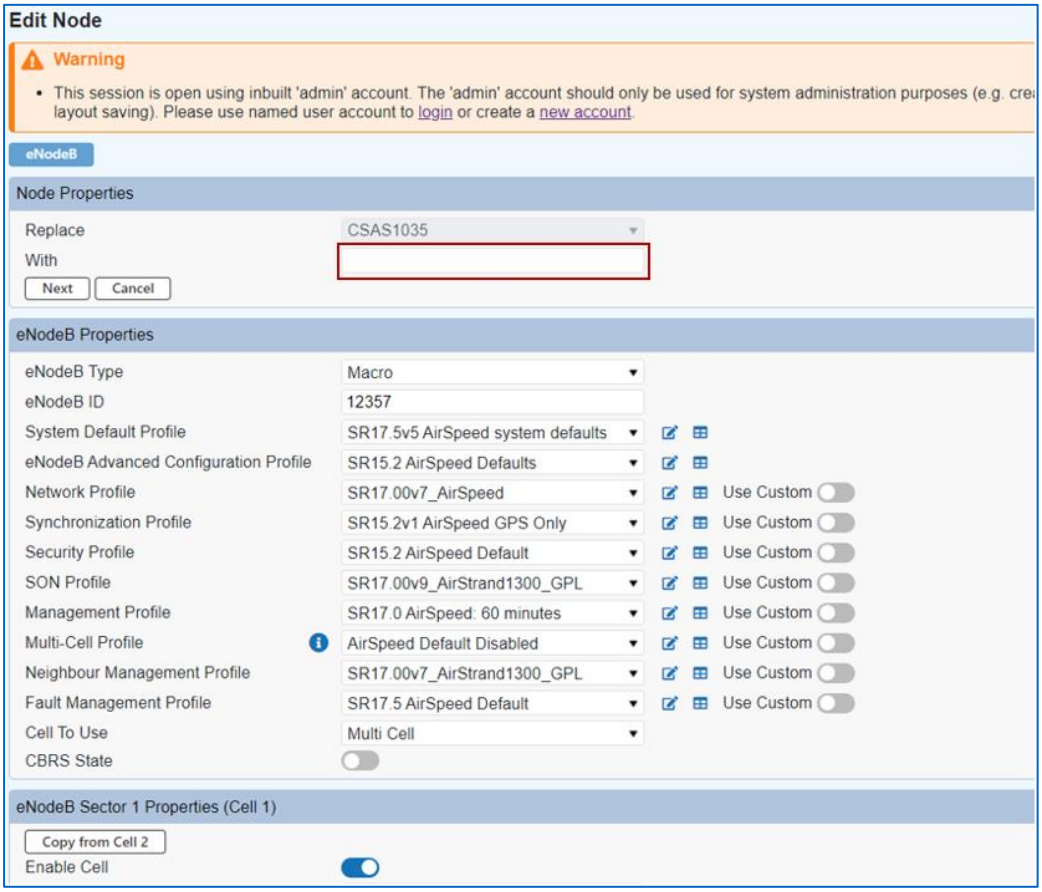
11. Go to **Configuration Management > Node > Node**, the new node created will be displayed in the node list.
12. Select the node, for which you need to perform the hardware swap, and click **Manage**. Then, go to **Provisioning** tab of the node.

Figure 304: Node Management Screen



13. Click **Edit**, then on the **Edit Node** screen click the **Configure** button. Enter the name of the new node that you had discovered earlier.

Figure 305: Edit Node



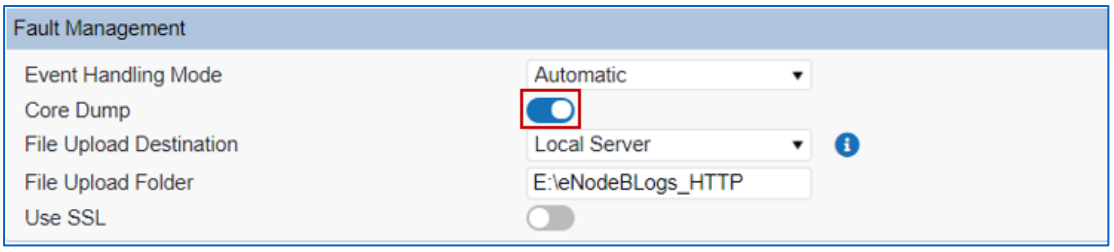
14. Click **OK** to save your changes.
15. The updated node will be displayed in the node list.

9.14 Core Dump Process

Below are the steps to enable core dump in Netspan SR17.50.

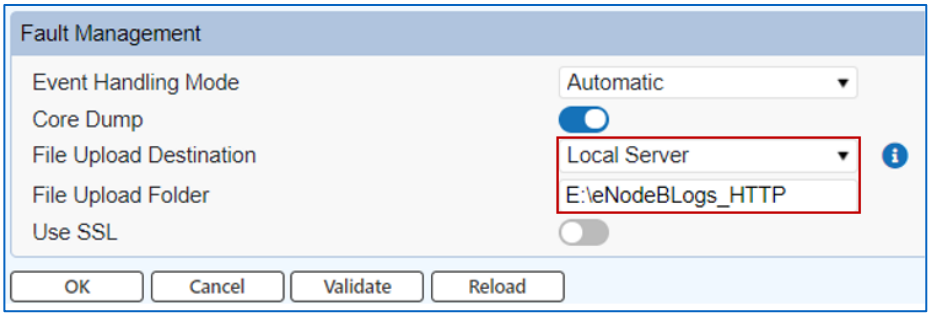
1. Go to **Node Profiles** > **eNodeB** > **Management Profile** and click **Add**. Alternatively, you can select the respective profile from the list and click **Edit**.
2. On the eNodeB Management Profile page, go to the Fault Management section and enable Core Dump.

Figure 306: Enabling Core Dump



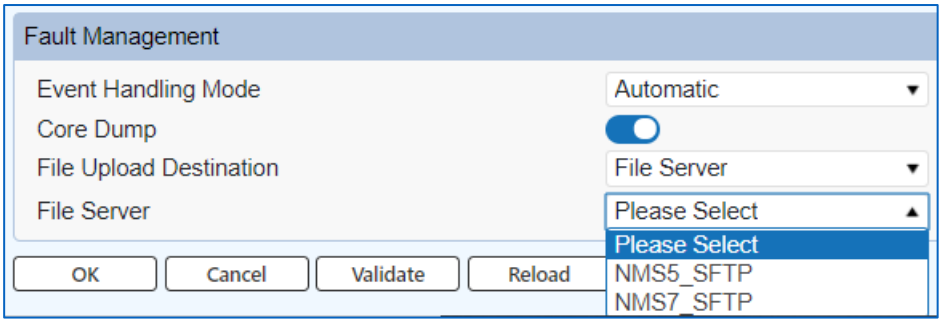
3. Select appropriate File Upload Destination folder from the drop-down option.
   - **Local Server:** Select Local Server for Netspan and specify the File Upload Folder path.

Figure 307: Selecting Local Server



   - **Filer Server:** Select Filer Server if you are uploading from FTP or SFTP and select the appropriate SFTP/FTP from the drop down option.

Figure 308: Selecting File Server

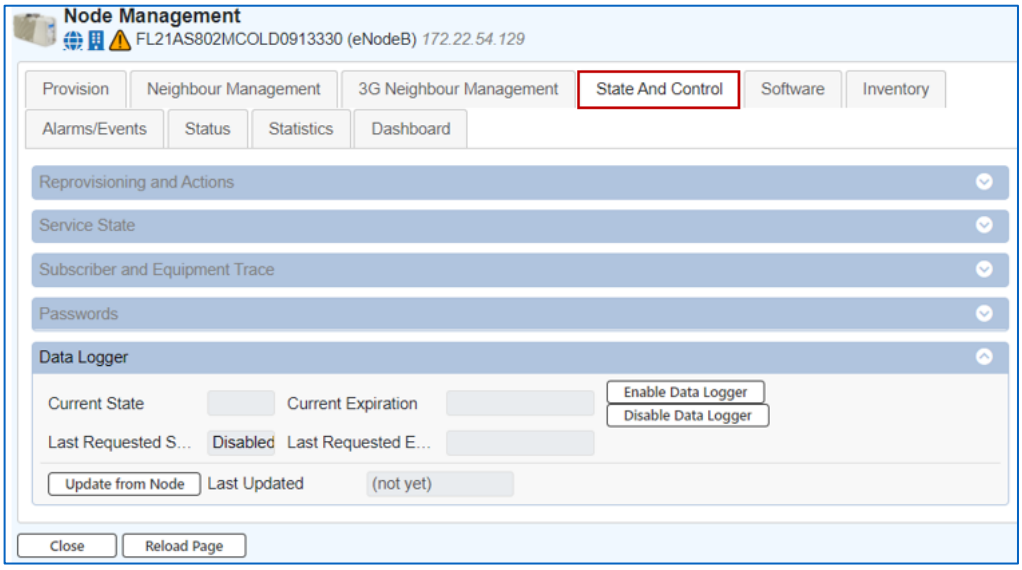


9.14.1 Data Logger

Follow the procedure below to upload log files to Netspan.

1. If you need to monitor any specific log, then select the required node from node list and click **Manage**. Then, go to **Data Logger** on the State and Control tab.

Figure 309: Data Logger

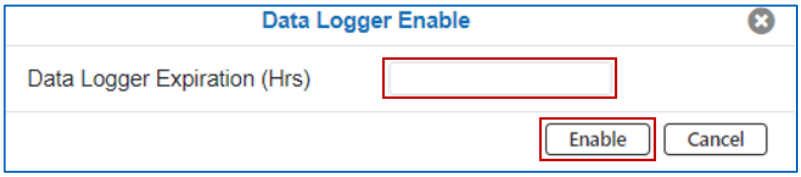


2. Under Data Logger, click **Enable Data Logger**.

Figure 310: Enable Data Logger

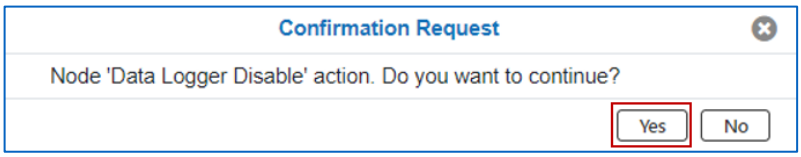
3. Specify the duration for which you want to monitor the log and click **Enable**.

Figure 311: Set Duration for Logging



4. If you need to stop tracking, then you can also disable the Data Logger by clicking Disable data Logger. Click **Yes** on confirmation request screen.

Figure 312: Confirmation Request



10 Event Management

A Netspan event is a notification indicating the occurrence of a condition on the Netspan server or any of the nodes in your network, for example a *Channel Action Error,* where the node reports a change in its status per channel.

The following conditions can raise a Netspan event:

- Receipt of an SNMP trap or notification by Netspan.
- Transmission of any internal Netspan notification by any Netspan component.
- Occurrence of a significant change (for example, rebooting the server or change of an alarm status).

Note: This chapter applies to the following Netspan managed nodes:

- eNodeB
- iBridge
- iRelay
- Relay eNodeB

Events can be notifications of normal operating procedures, such as a node being restarted, and does not have to be indicated that there is an error condition. Events that notify Netspan of fault conditions raise alarms. So an alarm being raised will always be triggered by an event, but not all events raise alarms. For details on managing alarms in Netspan, see Alarm Management.

Depending on the event severity, Netspan will raise an alarm until the underlying condition is cleared. Resolving a fault in the network clears the associated alarm, but an event remains until it is expired from Netspan's event buffer.

Netspan stores events in its database. The Netspan events buffer can store up to a maximum of one million events.

This section explains how to:

- How to View Events
- How to View and Edit Event Types
- How to Export Events View into an Excel File
- How to Understand Event Details
- Filtering Events

10.1 How to View Events

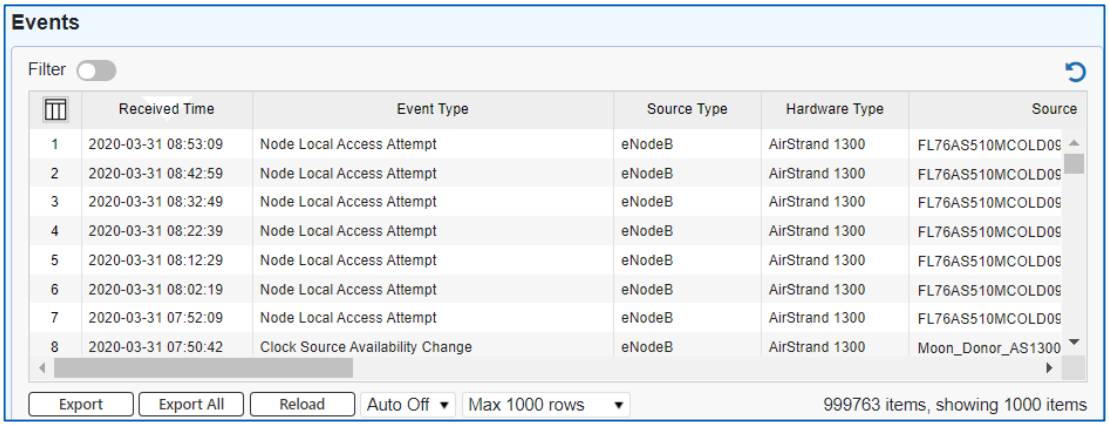
Events, whether reporting routine node operation or a more significant error condition, are raised on nodes in the network and reported to Netspan. Assuming the event type in question has logging enabled, then details of the event are written in the Netspan event database and are displayed on the Events screen of the UI where you can view them to find out further details.

Note: For a full description on event types that can be triggered and reported in the Netspan UI, see *ARD-D00742 Netspan Alarms and Events Reference Guide*.

To view the list of existing events:

1. On the main Netspan menu, choose **Fault Management** > **Events**. The **Events List** screen will be displayed which lists the current events in your network. The default layout settings sort the events by date with the latest events being displayed first.

Figure 313: Events List Screen



2. The events list could potentially contain thousands of events. So, the Netspan UI enables you to refine the list using the **Filters** field to make it easier for you to find events of a particular type, from a particular source, or that have been raised within a particular time frame. The options available in the Filter drop-down list are described in Table 42.

Table 42. Event Filter Criteria

Criterion	Description
Received Time	Displays the events received in a certain date and time with a search condition.
Event Type	Displays the events that match your specified event type.
Source Type	Displays the events that match your specified source type.
Hardware Type	Displays the events that match a hardware type.
Source	Displays the events that match a source name (node name).
MAC Address	Displays the events that match a MAC address (node MAC address).
Unique ID Name	Displays the name of the events that match a unique ID name.
Unique ID	Displays the events that match a unique ID value.
Event Info	Displays the events that match the event info with a search condition.
Event Status	Displays the events that match a specific status with a search condition.

3. In addition to the Filter field, the Netspan UI also provides you with a **Search** option so that you can interrogate the events list for a particular keyword or term. To do this, click on the **Filter** checkbox, select appropriate option from a list of drop-down options available, and then click on **Search**.

Note: The search may take a little while to return results depending on the number of events present in Netspan.

10.2 How to View and Edit Event Types

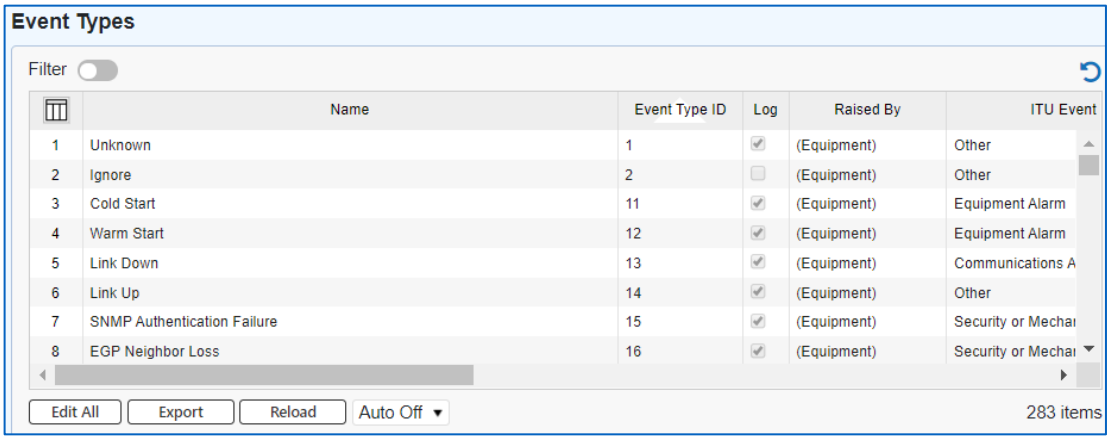
Netspan contains many different event types. While the names and ITU event types of these events are pre-configured and cannot be changed. You can control whether a particular event type has its **Log** and **Forward** properties enabled. Logging determines whether the event information is written on the Netspan database and is displayed in the UI, while forwarding controls whether Netspan forwards that event as an SNMP trap over the NBIF.

Note: For a full list of the event types configured in a particular software release of Netspan, see *ARD-D00742 Netspan Alarms and Events Reference Guide*.

To view and edit the details of an event type:

1. On the main Netspan menu, choose **Fault Management > Event Types**. This will open the **Event Types** List screen, which contains all event types currently configured in your system.

Figure 314: Events Types List Screen



2. Click the event type you want to edit the details for. Double click the selected event or click the **Edit** button. Either action opens the **Edit Event Type** screen.

Figure 315: Edit Event Type Screen

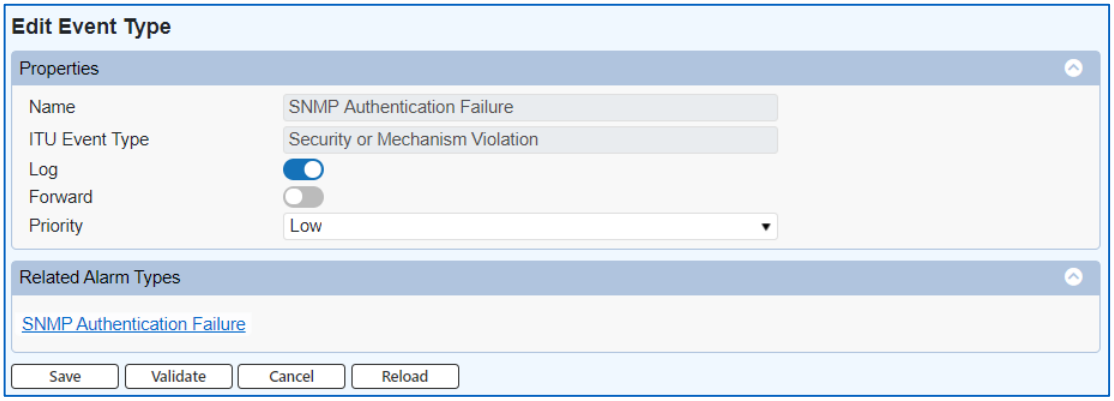


Table 43 describes the fields on the **Edit Event Type** page.

Table 43. Event Properties

Property	Description
Properties	
Name	Provides the name of the event type. **Note:** This field is read only.

ITU Event Type	Specifies the ITU event type of the event, which can be one of the following: • Other • Communications Alarm • Quality of Service Alarm • Processing Error Alarm • Equipment Alarm • Environmental Alarm • Integrity Violation • Operational Violation • Physical Violation • Security Service or Mechanism Violation • Time Domain Violation **Note:** This field is read only.
Log	Specifies whether event logging is enabled or disabled. **Note:** For an event type, if you disable event logging, that event will not appear on the **Events** page.
Forward	Specifies whether event forwarding is enabled or disabled. **Note:** For an event type, if you enable event forwarding, Netspan forwards that event as an SNMP trap over the NBIF.
Priority	Specifies the priority of the event (Low, Medium, or High).
Related Alarm Types	
Lists the linked alarm types for the selected event type.	

3. After editing the properties, click **Save**. Your changes will be committed and you will be returned to the **Event Types List** screen.

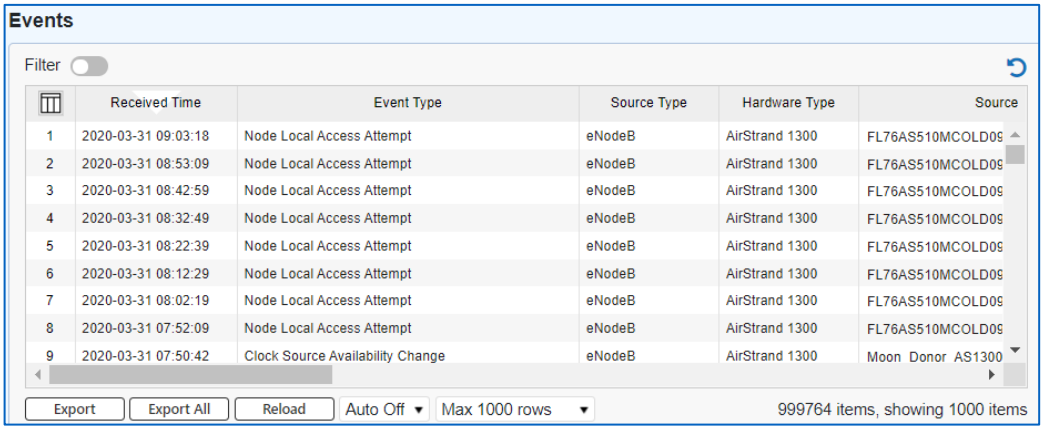
10.3 How to Export Events View into an Excel File

When you are working with events in Netspan, you have the option of either viewing various event details in Netspan UI or you can export them as an Excel file to your machine so that you can examine, sort, and interrogate them as you please.

To export the events view into an Excel file:

1. Choose **Fault Management** > **Events** menu option. This will open a **List** screen containing the current events in your network.

Figure 316: Events List Screen

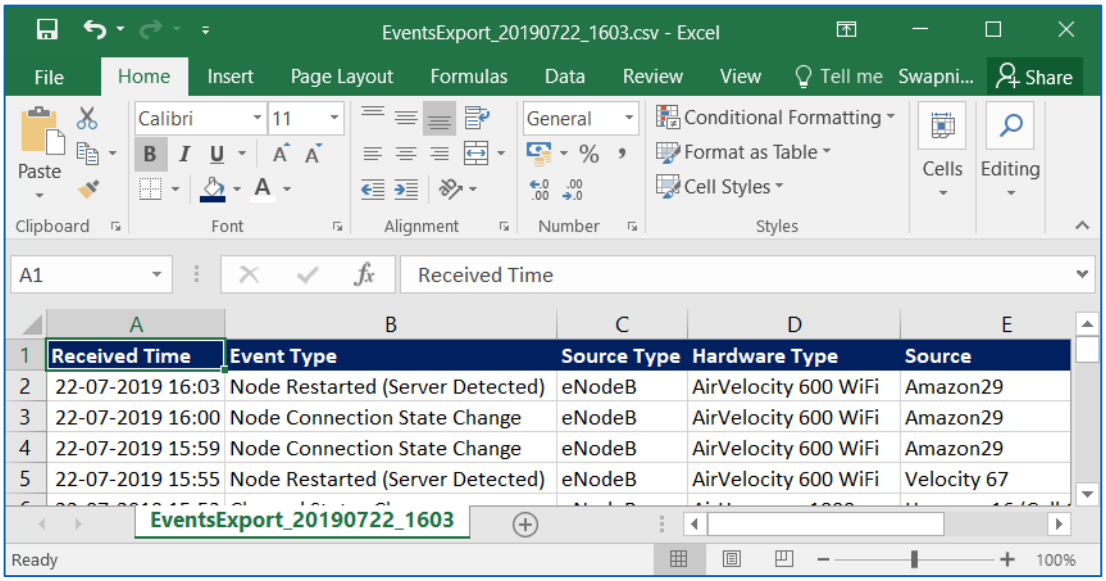


2. Click **Export** to export the events you can currently see on the Event List screen. Your browser will show a message asking if you want to open or save Export.csv, the Excel file generated by Netspan for export. Click **Open** or **Save** as appropriate.

Figure 317: Export Excel File Message

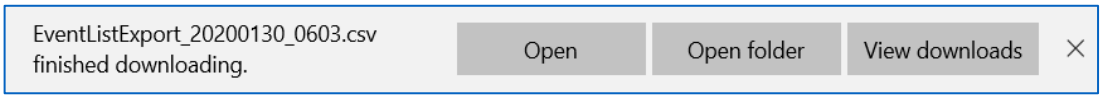
3. If you choose **Open**, your machine will launch Excel and will display the exported file of event details.

Figure 318: Excel File View (Example)



4. If you choose **Save**, Netspan will display a confirmation message stating that Export.csv has been downloaded.

Figure 319: Export Confirmation Message



From here, you have the option to **Open** the exported file, **Open folder** which will display a Browse dialog open at the exported file's location, or **View downloads**, which will open the View Downloads dialog in which you can open the exported file or go to its downloaded location.

10.4 How to Understand Event Details

When you open the Events List screen, the Netspan UI will display details about the events in tabular format. The information shown in this table is described in Table 44.

Table 44. Event List Screen Information

Column Heading	Description
Received Time	The date and time when the event information was received by Netspan.
Event Type	The type of the event.
Source Type	The equipment type on which the event took place.
Hardware Type	The applicable hardware type of the event.

Column Heading	Description
Source	The name of the equipment on which the event took place. Where the event has taken place on a node, the name of the node is displayed as a hyperlink; follow the link to open the **Node Management** screen for that node.
MAC Address	The MAC address of the equipment on which the event took place.
Unique ID Name	Unique ID Name assigned for a specific event instance.
Unique ID	Unique ID assigned for a specific event instance.
Event Info	Provides further information about the particular instance of the event, such as status.
Event Status	Only visible to users with 'Engineering' authorisation privileges, to be used for troubleshooting purposes.

10.5 Filtering Events

On some occasions, you might find it convenient to display only events that match a qualified filter. The **Alarms/Events** tab on the **Node Management** page of each node allows you to display the following, depending on what you select in the **Display Type** drop-down list:

- Events
- Alarms
- Alarm History
- Alarm State History
- Alarm Timeline

When you select **Events** from the **Display Type** drop-down list to filter events, Netspan allows you to create a custom event filter based on one of the following properties:

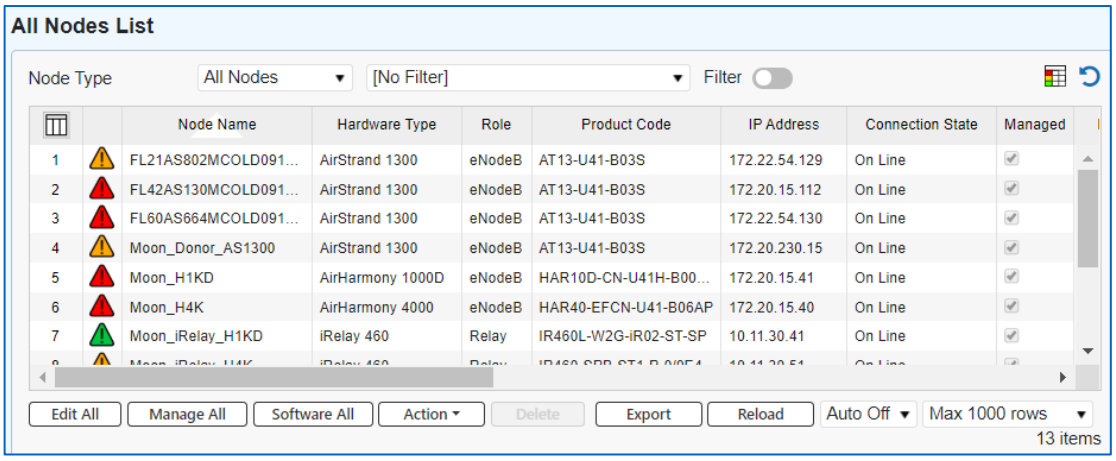
- Received Time
- Event Type
- Source Type
- Source
- MAC Address
- Unique ID Name
- Unique ID
- Event Info
- Event Status

This Netspan feature helps you refine the events list to only display the events that you are interested in.

To create a custom event filter:

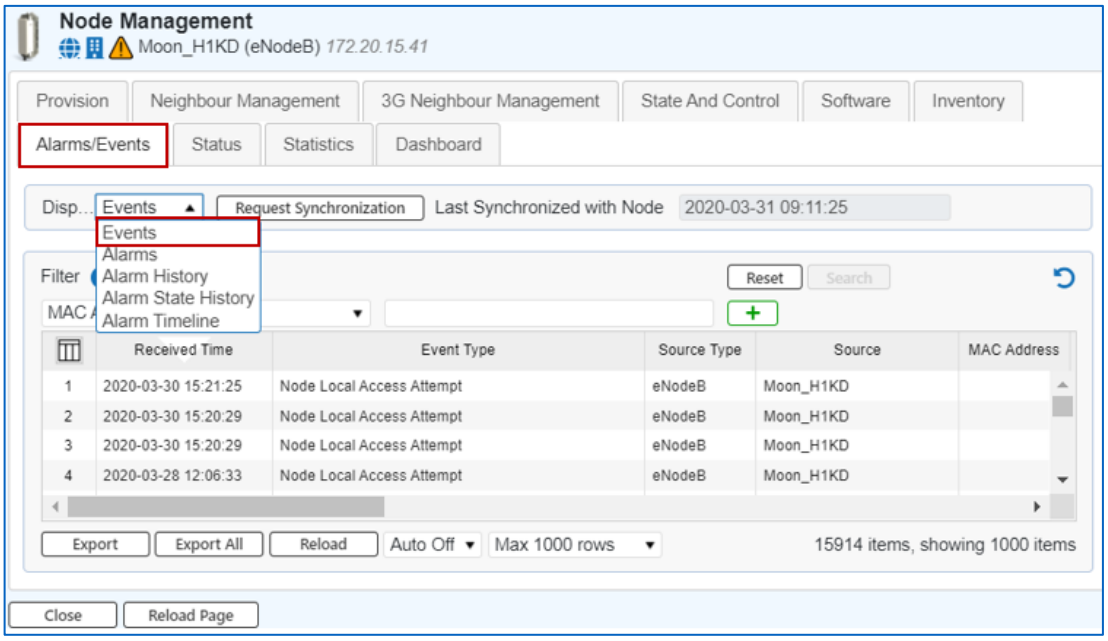
1. On the Netspan main menu, select **Configuration Management** > **Node** > **Node**. The **Nodes List** page appears.

Figure 320: Node List



2. Double-click the node on which you want to apply event filtering and refine the **Events** list. The **Node Management** page appears.
3. On the **Node Management** page, select the **Alarms/Events** tab, and then select **Events** from the **Display Type** drop-down list.

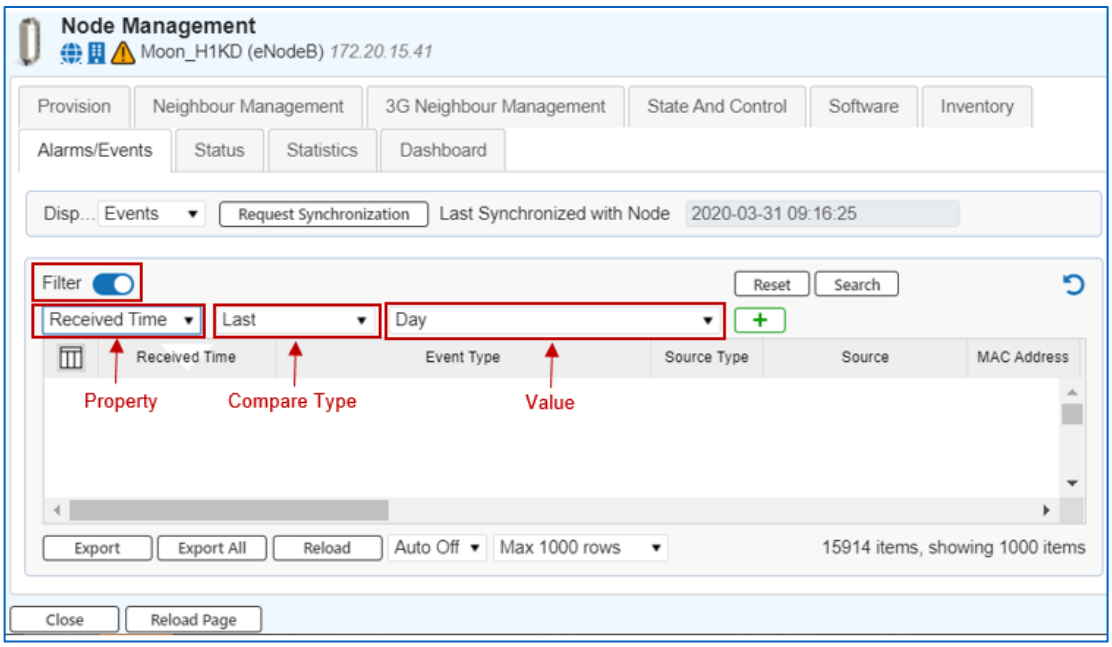
Figure 321: Configuring Event Filtering



4. Click the **Filter** toggle button to enable event filtering.

5. Customize your filter by making an appropriate selection in the *property*, *comparer type* and *value* boxes that appear when you enable the **Filter** checkbox.

Figure 322: Configuring Event Filtering



Compare types enhances the filter criteria by offering the ability to select specific parameter values. Depending on what comparison you want to perform, select the compare type. Each compare type has a unique function that is designed for making your node search simple, easy, and effective. For more information on the compare types that you can use to improve your event filtering process, see Table 45.

The list of applicable compare types varies depending on the selected **Property**.

Table 45. Compare Types

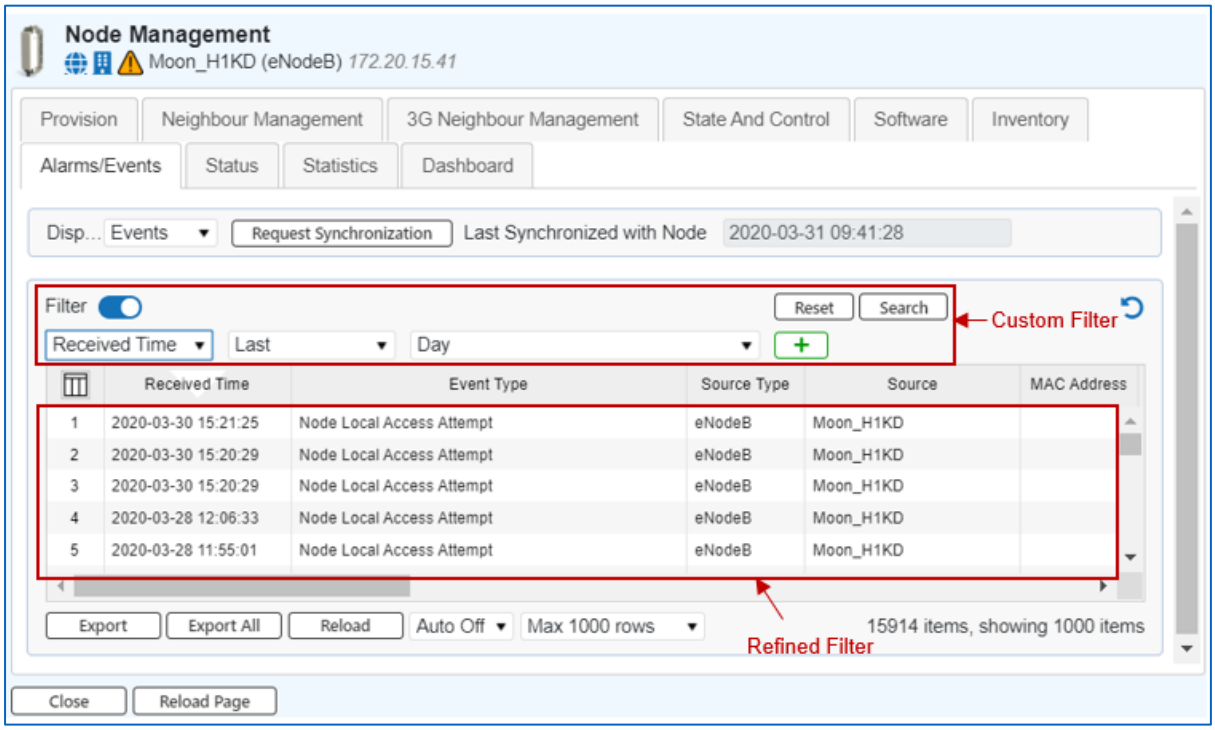
Compare Type	Function
Last **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred in the past 24 hours, one hour or 5 minutes.
> **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred before the specified period.
>= **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred before or during the specified period.
< **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred after the specified period.
<= **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred after or during the specified period.
Between **Note:** This compare type applies to the **Received Time** property only.	Returns a list of events occurred between the specified time range.
= **Note:** This compare type does not apply to the **Received Time** property.	Returns a list of events where the selected property matches the set value.

!= **Note:** This compare type does not apply to the **Received Time** property.	Returns a list of events where the selected property does not match the set value.
Starts with **Note:** This compare type does not apply to the **Received Time** property.	Returns a list of events where the selected property starts with the substring that you specified in the **Value** field.
Contains **Note:** This compare type does not apply to the **Received Time** property.	Returns the details of the events where the selected property contains the substring that you specified in the **Value** field.
Not Contains **Note:** This compare type does not apply to the **Received Time** property.	Returns the details of the events where the selected property does not contain the substring that you specified in the **Value** field
In List **Note:** This compare type does not apply to the **Received Time** property.	Returns the details of the events where the selected property matches the values that you selected/typed/pasted using the **Set List** option. **Tip:** Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. **Note:** Instead of selecting the items, if you want to type or paste a list of values, after selecting the **Set List** button, click the **Advanced** button. This opens a new window where you can type or paste your items. When you are in the **Advanced** mode, click the **Basic** button to revert to the **Basic** mode.
Not in List **Note:** This compare type does not apply to the **Received Time** property.	Returns the details of the events where the selected property does not match the values that you selected/typed/pasted using the **Set List** option **Tip:** Use **Ctrl** + **click** to select multiple entries and **Shift** + **click** to select an array of entries. **Note:** Instead of selecting the items, if you want to type or paste a list of values, after selecting the **Set List** button, click the **Advanced** button. This opens a new window where you can type or paste your items. When you are in the **Advanced** mode, click the **Basic** button to revert to the **Basic** mode.
Is Set **Note:** This compare type applies to the **Event Status** property only.	Returns the details of the events where the selected property is defined or set.
Is Not Set **Note:** This compare type applies to the **Event Status** property only.	Returns the details of the events where the selected property is not defined or set.

Example 1:

In this example, event filtering is performed to retrieve a list of events that occurred during a specific time period.

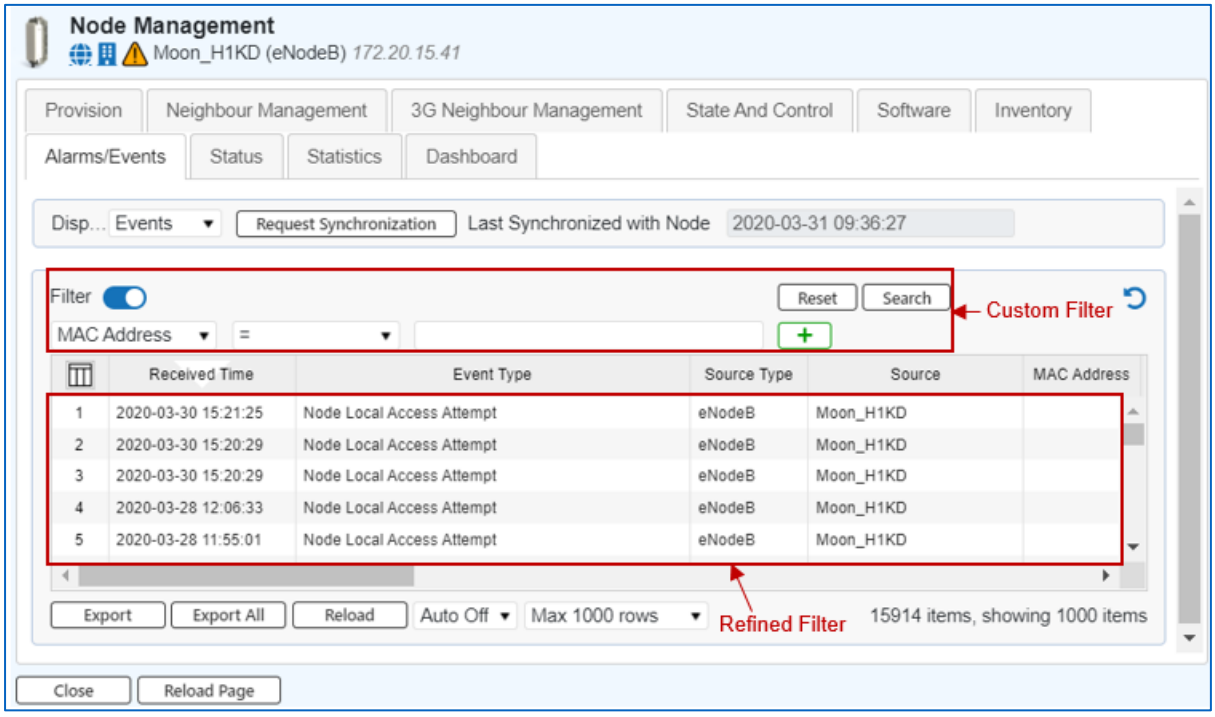
Figure 323: Applying Event Filter – Example 1



Example 2:

In this example, event filtering is performed to retrieve a list of PnP events.

Figure 324: Applying Event Filter – Example 2



A Abbreviations

Term	Expansion
Ack	Acknowledge
ANR	Automatic Neighbor Relation
APN	Access Point Name
BS	Base Station
CBRS	Citizens Broadband Radio Service
CGI	Cell Global Identity
CLEI	Common Language Equipment Identification
CMAS	Commercial Mobile Alert System
CoMP	Coordinated Multipoint
CPLD	Complex Programmable Logic Device
CQI	Channel Quality Indicator
CSFB	Circuit Switched FallBack
CSG	Closed Subscriber Group
EARFCN	E-UTRA Absolute Radio Frequency Channel Number
ECI	E-UTRAN Cell Identifier
eMBMS	Evolved Multimedia Broadcast Multicast Services
EMS	Element Management System
eNB	eNodeB
eNodeB	Evolved Node B
E-RAB	E-UTRAN Radio Access Bearer
ETWS	Earthquake and Tsunami Warning System
FDD	Frequency Division Duplex
FTP	File Transfer Protocol
GPS	Global Positioning System
GTP	GPRS Tunneling Protocol
GUI	Graphical User Interface
HARQ	Hybrid Automatic Repeat Request
HO	Handover
ID	Identity Document
IIS	Internet Information Services
IP	Internet Protocol
IPv4	Internet Protocol Version 4
IPv6	Internet Protocol Version 6
ITU	International Telecommunication Union
KPI	Key Performance Indicators
LOS	Line of Sight
LTE	Long Term Evolution

MAC	Media Access Control
MCC	Mobile Country Code
MCS	Modulation Coding Scheme
Mgmt	Management
MME	Mobility Management Entity
MNC	Mobile Network Code
MNO	Mobile Network Operator
MSB	Most Significant Bit
MVNO	Mobile Virtual Network Operator
N/A	Not Applicable
NBIF	Northbound Interface
NE	Network Element
NLOS	Non Line of Sight
NMS	Network Management System
NOC	Network Operations Center
OEM	Original Equipment Manufacturer
OS	Operating System
PC	Personal Computer
PCI	Physical Cell Identity
PDCL	Priority Donor Cell List
PDN	Packet Data Network
PHY	Physical
PLMN	Public Land Mobile Network
PM	Performance Management
PnP	Plug and Play
QCI	QoS Class Identifier
QoS	Quality of Service
RACH	Random Access Channel
RF	Radio Frequency
RNC	Radio Network Controller
RRC	Radio Resource Control
RSRP	Reference Signal Received Power
RSRQ	Reference Signal Received Quality
SAS	Spectrum Allocation Servers
SCRT	Single Channel Radio Transceiver
SFTP	Secure File Transfer Protocol
SN	Sequence Number
SNMP	Simple Network Management Protocol
SOAP	Simple Object Access Protocol
SON	Self-Organizing Network
SQL	Structured Query Language

SS	Subscriber Station
SW	Software
TAC	Tracking Area Code
TDD	Time Division Duplex
TFTP	Trivial File Transfer Protocol
TWAMP	Two-Way Active Management Protocol
UARFCN	UTRA Absolute Radio Frequency Channel Number
UDP	User Datagram Protocol
UE	User Equipment
UI	User Interface
UMTS	Universal Mobile Telecommunication System
UTRA	Universal Terrestrial Radio Access
UTRAN	Universal Terrestrial Radio Access Network
V2C	Version 2C
V3	Version 3
VLAN	Virtual Local Area Network
VoLTE	Voice over Long-Term Evolution
Wi-Fi	Wireless Fidelity
XML	Extensible Markup Language