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Simplified RAN Transport Solution

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About this document

Purpose

NSP Simplified RAN Transport Solution introduces the RAN transport functions to operators and administrators.

Scope

This document covers the RAN transport features and functions of the Network Health view. Other NSP views provide additional functionality that is required to manage RAN transport and is described in detail where applicable. See [1.1.3 “What other NSP functions are involved in managing RAN transport?” \(p. 10\)](#) for a list of relevant NSP views and where you can find more information about their functionality in the context of managing RAN transport.

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1 Simplified RAN Transport

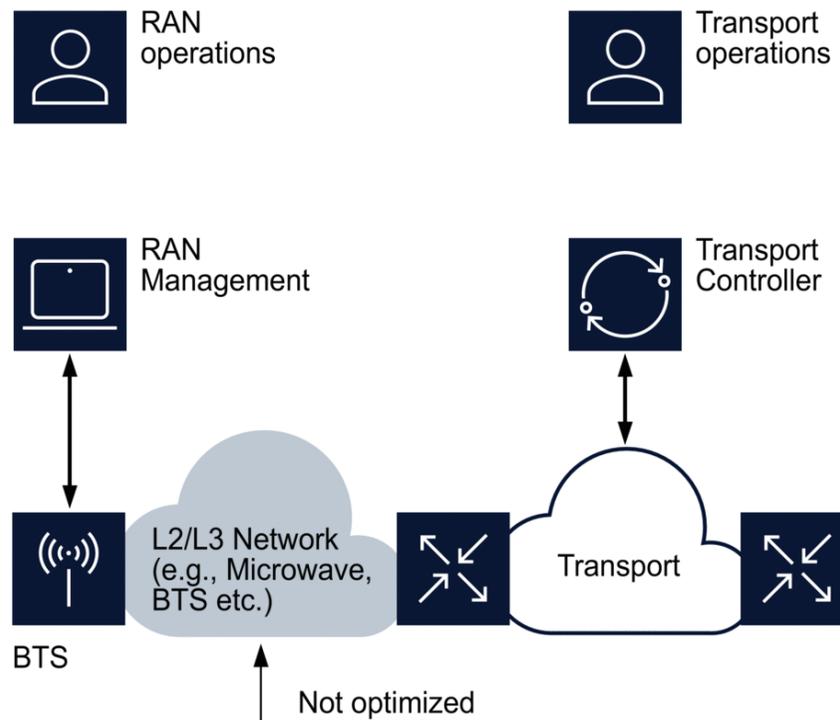
1.1 What is Simplified RAN Transport?

Consider the following issues in the traditional RAN management process:

- **Operations teams are split into separate departments to manage the RAN and transport domains.** Each team is responsible for provisioning, monitoring, and maintenance for their respective domain. See [Figure 1-1, “Present mode of operation for managing RAN and transport domains” \(p. 8\)](#).
- **Transport provisioning across the RAN/transport boundary requires provisioning alignment, but is typically managed via offline processes and tools** leading to double effort, error prone procedures, and longer lead time. Impact and fault analysis require additional time to identify root causes since troubleshooting procedures and data coordination must be implemented across more than one team.
- **Transport parameters (VLAN/IP, QoS) must be configured twice** via RAN and transport controllers. This presents double the effort and manual alignment of offline tools, along with an increases risk of errors.

Evolution to 5G with a RAN enabled for network slicing presents additional complexity that requires automation between the RAN and transport domains. The dynamic nature of network slicing leads to an exponential increase in OPEX.

Figure 1-1 Present mode of operation for managing RAN and transport domains



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1.1.1 NSP Simplified RAN Transport Solution

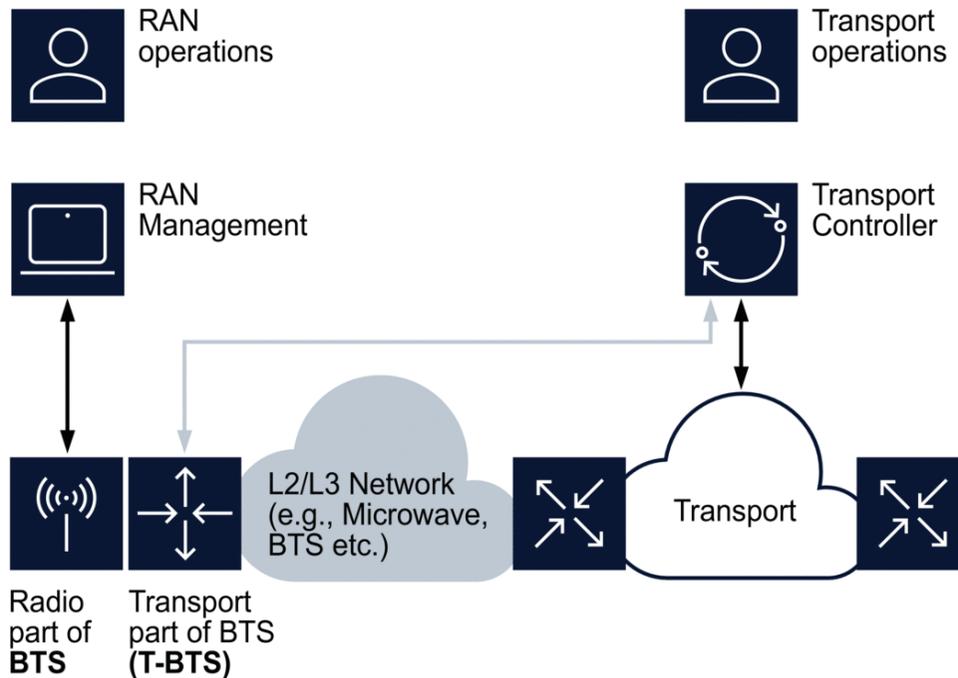
The NSP Simplified RAN Transport (SRT) solution streamlines the configuration of transport parameters by extending the transport domain to the RAN through management of the Transport BTS (T-BTS). SRT uses the existing RAN management functions of NetAct/MantaRay NM as a mediation layer to provide discovery, provisioning, fault management, and performance management for the T-BTS. Specifically, SRT provides a means to manage T-BTS transport features and radio plane (VLAN-based independent network layer) bindings to IP transport services in 3G, 4G, and 5G networks, in addition to easy access to T-BTS transport parameter configurations. See [Figure 1-2, “Enhance transport automation capabilities across the entire mobile network using SRT” \(p. 9\)](#).

SRT provides the following benefits:

- logical disaggregation of the transport portion of the T-BTS and manages the T-BTS as SDN controller via NetAct/MantaRay NM mediation
- extension of the transport domain to the RAN
- use of the existing RAN management functions of NetAct/MantaRay NM as mediation to NSP and management of T-BTS logical nodes via NetAct/MantaRay NM

- extension of the transport domain to the T-BTS, simplifying mobile transport provisioning and enhancing service and network assurance (FM and PM)
- using SRT, the operations team can access T-BTS transport parameters for configuration checks and troubleshooting
- transport capabilities previously used by the transport operations team can be brought to the RAN transport domain

Figure 1-2 Enhance transport automation capabilities across the entire mobile network using SRT



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Through NSP, SRT is aware of the L2 links between BTS and PE routers through the shared VLAN connection. Direct connections and microwave (Wavence) between the BTS and the transport network are supported. These topology elements are automatically updated on discovery, configuration change, and deletion via LLDP. In cases where LLDP is not supported by the node, the link can be manually created.

1.1.2 What are radio planes?

Radio planes are sources of network packets coming from the radio components of the T-BTS. One of the primary functions of SRT is to compute the "Binding State" for all radio planes on the T-BTS; a radio plane is considered "bound" to a given L3 VPN SAP on a mobile core router when the configuration (VLAN/IP/routes) on the T-BTS allows network traffic generated by the radio plane to reach the L3 VPN SAP by traversing the L2 backhaul network.

On NSP systems with SRT installed, radio plane binding information exists in a dedicated panel and table displayed in the Network Map and Health view called Radio Plane Bindings. SRT allows operators to perform a binding action on a given radio plane on the T-BTS, connecting the radio plane to a selected L3 VPN on the mobile core network. This is performed using a Workflow template that can be launched directly from the Radio Plane Bindings table.

See [3.1.4 “Radio plane bindings in SRT” \(p. 21\)](#) for more information about managing radio planes.

1.1.3 What other NSP functions are involved in managing RAN transport?

The following NSP functions are used for managing RAN transport:

- Network Map and Health: viewing RAN transport equipment and bindings, viewing T-BTS in the network map view, creating radio plane bindings, viewing T-BTS nodes and their links (with highest alarm severity), BTS inventory, viewing and managing T-BTS alarms. See [3.1 “How do I view RAN transport equipment and bindings?” \(p. 19\)](#) and [3.3 “How do I perform link management?” \(p. 28\)](#) for more information.

See the *NSP Network and Service Assurance Guide* for information about troubleshooting using alarms.

- Workflows: executing RAN bindings. See the *NSP Network Automation Guide* for more information.
- Device Management: managing NetAct/MantaRay NM and T-BTS supervision. See the *NSP Device Management Guide* for more information.
- Maps Layouts and Groups: creating views and supervision groups. See the *NSP System Administrator Guide* for more information.

Service Management provides the following capabilities:

- viewing T-BTS L2 backhaul services in SERVICES tab
- The description for each L2 backhaul service displays the names of the T-BTS associated with the service. See [3.4 “How do I manage L2 backhaul services?” \(p. 29\)](#) for more information.

1.1.4 What are the use-cases for SRT?

The following are examples of use-cases for SRT.

Discovering the transport portion of 3G/4G/5G T-BTS in NSP

SRT provides the functionality to discover T-BTS as transport nodes in NSP and display them on the network map view. The links between T-BTS and the transport network are also displayed on the map, and are either dynamically discovered via LLDP or manually configured. The following functionality is also provided:

- retrieve T-BTS equipment inventory
- retrieve T-BTS equipment alarms
- for T-BTS that are capable of RAN slicing, display equipment information specific to RAN slicing

Links can be created manually. See the *NSP Network and Service Assurance Guide* for information about creating physical links.

Retrieving 3G/4G/5G T-BTS radio planes and correlating to transport services

In this context, the SRT is capable of:

- retrieving and displaying all 3G/4G/5G radio planes, including relevant attributes and alarms
- auditing all radio planes for active connections to transport services
- correlating 3G/4G/5G radio planes to transport services

In addition to displaying the bindings between radio planes and transport services (see [3.1.4 “Radio plane bindings in SRT” \(p. 21\)](#)), SRT provides functionality to create these bindings (see [3.2 “How do I bind a radio plane?” \(p. 27\)](#)). RAN services that exist in the context of a 4G/5G RAN slice are also available in Transport Slice Controller.

Leveraging 4G/5G network slicing full life cycle management

SRT provides the following end-to-end features:

- extension of automation to 5G transport slices and transport RAN with full flexibility for any combination of resource (IP address, VLAN, QoS, and traffic identifiers) between RAN and transport
- end-to-end monitoring, reporting, and alarm correlation for the T-BTS
- extension of closed-loop automation of transport slices to T-BTS

Zero footprint microwave with BTS networking boost

SRT simplifies Wavence deployment by integrating L2 transport features at cell sites inside the BTS. SRT is capable of managing the binding status of radio planes for RAN and transport networks connected via Wavence nodes.

1.1.5 SRT support in Release 23.11

See the *NSP NFM-P Network Element Compatibility Guide* for information about:

- supported Wavence releases
- supported NE releases

See the *NSP Nokia TBTS Adaptor Guide* for information about:

- supported NetAct/MantaRay NM releases
- supported BTS releases

1.1.6 Integration with NetAct/MantaRay NM

T-BTS are managed in NSP via NSP management of NetAct/MantaRay NM, which is managed through MDM adaptors. Through this, NSP can retrieve T-BTS nodes, RAN services, and associate the RAN services with transport services. T-BTS alarms are also retrieved from NetAct/MantaRay NM and displayed in NSP.

 **Note:** Fault management for NetAct/MantaRay NM servers is not provided through NSP.

2 SRT setup and configuration

2.1 How do I setup SRT?

2.1.1 Installation options for SRT in NSP

The following table describes the installation options required to enable functionality in NSP.

Installation option	T-BTS assurance	T-BTS assurance and provisioning	T-BTS Radio plane assurance	T-BTS Radio plane assurance and provisioning
platform-baseServices	Required	Required	Required	Required
platform-restForwarder	Required	Required	—	—
platform-pluggableNetworkAdaptation	Required	Required	Required	Required
networkInfrastructureManagement-basicManagement	Required	Required	Required	Required
networkInfrastructureManagement-simplifiedRanTransport	—	—	Required	Required
serviceActivationAndConfiguration-intentBasedServiceFulfillment	—	Required	—	Required

For more information:

- See the *NSP System Architecture Guide* for more information about feature packages and installation options.
- See the *NSP Installation and Upgrade Guide* for more information about enabling installation options in a containerized NSP deployment.

T-BTS assurance

T-BTS assurance provides the following functionality:

- discovery of MantaRay NM (formerly NetAct) and T-BTS using Device Discovery and Device Management
- display T-BTS in Network Map and Health, Object Troubleshooting, Network Inventory, Service Management, Current Alarms
- discovery of LLDP physical links
- discovery of L2 backhaul services in Service Management

T-BTS assurance and provisioning

T-BTS assurance and provisioning provides life cycle management of L2 Backhaul services in Service Management for T-BTS for creation, resynchronization, deletion and update operations. These features are incremental additions for T-BTS assurance.

T-BTS Radio plane assurance

Radio plane assurance adds the following:

- display of T-BTS radio planes in Network Map and Health in a dedicated radio plane bindings table
- display of detailed radio planes status according to network topology

T-BTS Radio plane assurance and provisioning

Radio plane assurance and provisioning provides life cycle management of L2 backhaul services in Service Management for T-BTS for creation, resynchronization, deletion and update operations. These features are incremental additions for radio plane assurance.

2.1.2 Import SRT bundles

Depending on your installation option, obtain the required bundles from the Nokia portal. Import and install the bundles using **Artifacts**.

Installation option	Required assurance bundle	Required SRT bundle
T-BTS assurance	nsp-mdt-intents- <i>release-ID</i> -svc-assurance-bundle.zip	—
T-BTS assurance and provisioning	nsp-mdt-intents- <i>release-ID</i> -svc-intent-bundle.zip	—
T-BTS and radio plane assurance	nsp-mdt-intents- <i>release-ID</i> -svc-assurance-bundle.zip	ran-services-app bundle
T-BTS and radio plane assurance and provisioning	nsp-mdt-intents- <i>release-ID</i> -svc-intent-bundle.zip	ran-services-app bundle

See the *NSP Network Automation Guide* for more information. Once completed, the following workflows and actions can be run in **Workflows**:

- In the Workflows view:
 - SRT_BindRadioPlane
 - SRT_RefreshBindingsData
- In the Actions view:
 - simplifiedRanTransport.RefreshBindingsData
 - simplifiedRanTransport.RefreshBindingsDataResult
 - simplifiedRanTransport.radioPlaneByTbtsId
 - simplifiedRanTransport.tbtsList
 - simplifiedRanTransport.transportIpByService
 - simplifiedRanTransport.transportServiceByServiceName
 - simplifiedRanTransport.transportServiceByTbtsId
 - simplifiedRanTransport.vlanIdByService

2.1.3 Perform adaptor installation, integration, and T-BTS discovery

See the *NSP Nokia TBTS Adaptor Guide* for information about:

- Installing and upgrading the T-BTS adaptor
- Configuring the SNMP and REST interfaces and integrating NSP and NetAct/MantaRay NM
- Discovering NetAct/MantaRay NM and the T-BTS

2.1.4 Setup service management configuration for L2 services

This section describes special functionality for L2 service management using SRT. See the [Network Developer Portal](#) for more information about the RESTCONF commands that follow.

Intent bundles

Obtain and install the required intent bundles as described in [2.1.2 “Import SRT bundles” \(p. 14\)](#) to perform service management and configuration.

Enable resync of L2 services

Run the following RESTCONF command to enable periodic resync of T-BTS L2 backhaul services:

```
PATCH /restconf/data/nsp-admin-resync:resync-policies/mdm/resync-policy=default%20policy/
node=tbts/version=v1/entity=nsd-service-l2backhaul%3A%2F%2Fbackhaul-sites%2Fsite
```

```
{
  "entity": [
    {
      "entity-type": "nsd-service-l2backhaul:/l2backhaul-sites/site",
      "period": 1440,
      "admin-state": "enabled",
      "description": "enable l2backhaul-sites periodic resync"
    }
  ]
}
```

The period is in minutes.

Enable automatic service stitching

Run the following RESTCONF command to enable service stitching, if required:

```
PATCH /restconf/data/nsp-service-stitch:nsp-service-auto-stitch-configs/nsp-service-auto-stitch-
config=mpr-backhaul
```

```
{
  "nsp-service-stitch:nsp-service-auto-stitch-config": [
    {
      "service-type": "mpr-backhaul",
      "admin-state": "unlocked",
      "algorithm-config": [
        {
          "algorithm": "local",
          "admin-state": "unlocked"
        }
      ]
    }
  ]
}
```

Service stitching is enabled by setting admin-state to “unlocked”. It can be disabled by setting admin-state to “locked”. When automatic service stitching is enabled, manual service stitching is not possible.

2.2 What does NE types does SRT support?

2.2.1 Supported router product types

SRT supports the following router product types:

- 7250 IXR
- 7705 SAR
- 7705 SAR H
- 7705 SAR Hm
- 7750 SR
- Cisco

The list of supported routers is described in the *srt-ran-services-app-configmap* file under “routerProductType”. Nokia support can modify this file to expand the list of products, if required.

After editing this file, a restart of the ran-service-app is required using the **kubectl -n nsp-psa-restricted delete pod ran-services-app-xxxxxxx** command.

Simplified Microwave Router (SMR)

The SMR is a single logical NE entity in NSP that represents a 7250 IXR or 7705 SAR router and a UBT SA linked by physical cable. In NSP network map and NE inventory views, only one NE is represented instead of two NEs.

In topologies that include SMR, SRT only computes the BTS radio planes "Binding State" in real time for the following cases (when the MRBTS is linked to a port of the SMR router):

- MRBTS ← any link (direct cable or link via UBT-SA, MSS or other BTS) → 7250 IXR (SMR) UBT (SMR) ← radio → any Wavence node
- MRBTS ← any link (direct cable or link via UBT-SA, MSS or other BTS) → 7705 SAR (SMR) UBT (SMR) ← radio → any Wavence node

For the following topologies that include SMR (when the MRBTS is linked to a port of the SMR UBT), SRT does not compute the BTS radio planes Binding State in real time:

- MRBTS ← any link (direct cable or link via UBT-SA, MSS or other BTS) → UBT ← radio -> UBT (SMR) 7250 IXR or 7705 SAR (SMR) ← cable → core router
- MRBTS ← any link (direct cable or link via UBT-SA, MSS or other BTS) → MSS/UBT ← radio → UBT (SMR) 7250 IXR or 7705 SAR (SMR) ← cable → core router

For topologies that do not have real-time Binding State values, you can manually force SRT to recompute them. See [3.5.5 "How do I force SRT to recompute binding states?" \(p. 32\)](#) for more information.

3 Using Simplified RAN Transport

3.1 How do I view RAN transport equipment and bindings?

3.1.1 Simplified RAN Transport Equipment and Bindings Summary

You can view a summary of managed T-BTS and their associated transport bindings using the **Simplified RAN Transport Equipment and Bindings Summary** view in the Network Map and Health view. This view can be filtered to display all radio planes, only those associated with a transport slice, or only the “basic” functions that do not belong to a slice.

This view displays the following counters:

- total number of T-BTS
- total number of radio planes
- Healthy Bound radio planes (radio planes, with enabled or unknown operationalState, associated to a Transport Service via their vlanId in the same subnet)
- Affected Bound radio planes (radio planes, with disabled operationalState, associated to a Transport Service via their vlanId in the same subnet)
- Partially Bound radio planes (radio planes, with at least one of the transport paths “bound”, while one or more of the others are any combination of “partially bound”, “misconfigured”, and “not bound”).
- Misconfigured radio planes (radio planes associated to a Transport Service via their vlanId but with a configuration mismatch)
- Not Bound radio planes (radio planes configured with vlanId and transportIpAddress but with no associated Transport Service)

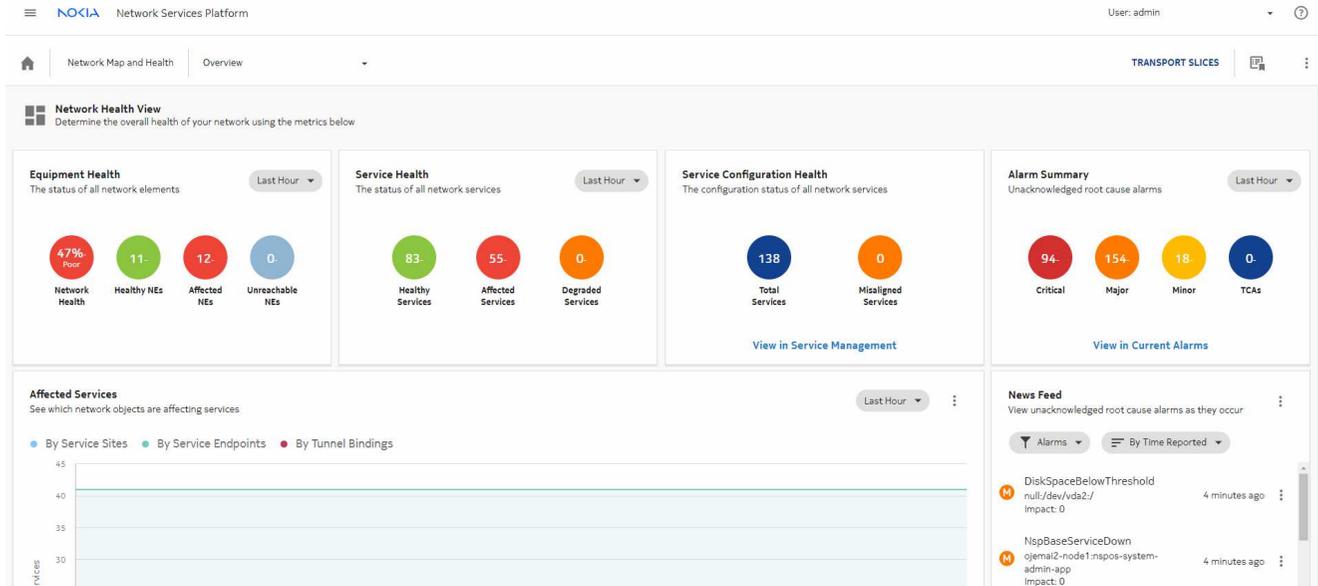
When the value of a counter is over 1000, the number displayed by the counter bubble is rounded down to the nearest 100 (for example, 8969 displays as “8.9k”). The mouse-over tooltip for the counter bubble displays the exact value.

Binding a radio plane to a transport service is possible only if there is a link between the BTS port and a Service Access Point (i.e a router port). The link can be a direct physical cable to the router’s port, or the two ports can be linked via a UBT-SA link (waveguide between two UBT Standalone Gears) or via MSS or other BTS nodes (via L2 backhaul services).

3.1.2 Fault management

Network Map and Health, Overview displays the overall health of the network, including the health of services and an at-a-glance view of alarms. For general information about network troubleshooting using NSP, see the *NSP Network and Service Assurance Guide*.

Figure 3-1 Network Map and Health, Overview



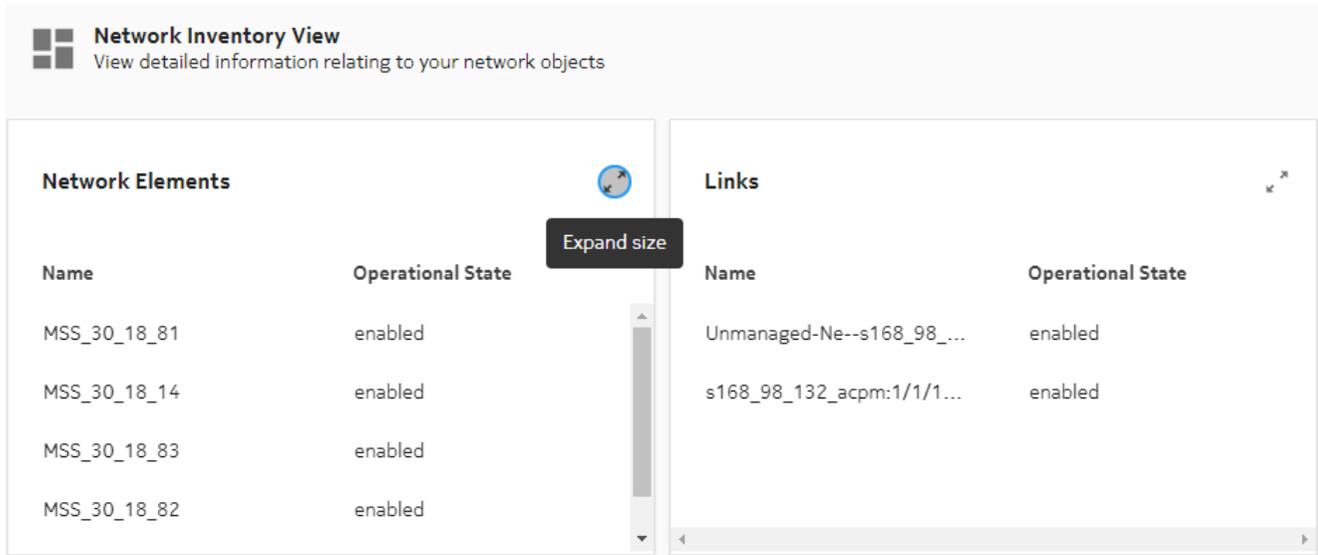
T-BTS alarms are updated in real time in NSP (Alarm Views, network map views, Radio Plane Bindings table, Transport Paths Binding Summaries).

SRT maps T-BTS alarms to the relevant equipment, such as ports and cards. The alarmed object ID displays the DN of the affected BTS or equipment (port or card). After an event that affects the alarm list, such as the discovery of new T-BTS nodes, the alarm view may need to be refreshed to display the updated alarm list.

3.1.3 Using views and crosslaunching other NSP functions

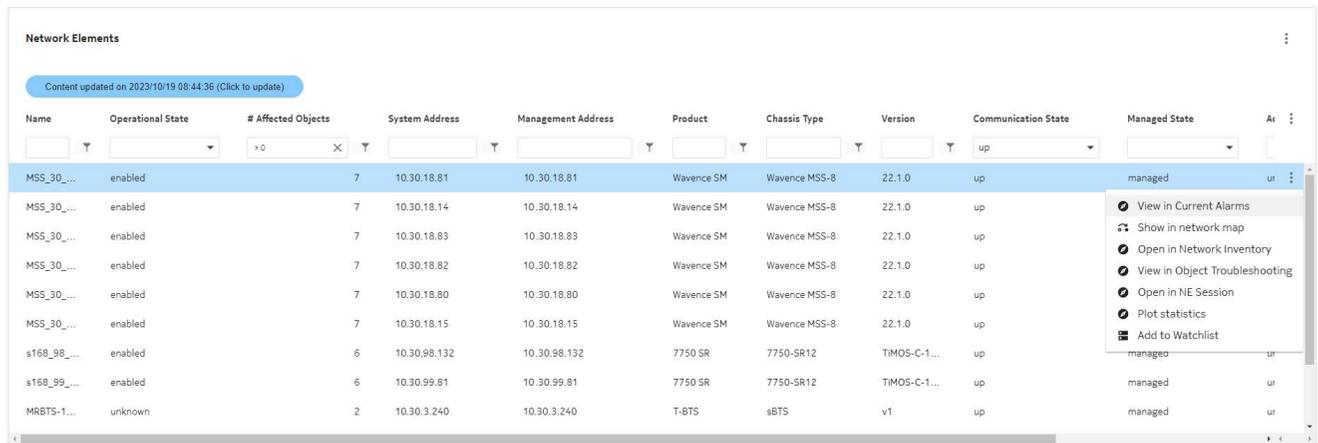
You can expand any of the **Network Inventory View** panels and open a NSP function view for that component type by clicking  and selecting a navigation option.

Figure 3-2 Expand panel size



SRT offers multiple crosslaunch options to other NSP functions for a selected NE.

Figure 3-3 Navigation from Network Elements list to other NSP functions



3.1.4 Radio plane bindings in SRT

SRT displays radio plane information in the following panels:

- **Simplified RAN Transport Equipment and Bindings Summary**
- **Radio Plane Bindings table**

The **Simplified RAN Transport Equipment and Bindings Summary** panel displays several KPIs represented by bubbles and can be viewed by All, Slice, or Base.

Figure 3-4 Simplified RAN Transport Equipment and Bindings Summary



Clicking the **# Base Stations (T-BTS)** counter bubble automatically navigates to a filtered list of T-BTS Network Elements. Clicking any of the radio plane-specific counter bubbles automatically navigates to a list in the Radio Plane Bindings table that is filtered for the selected KPI. The table can be further filtered and sorted to help find specific entries.

Note: Filtering is case-sensitive and does not support the use of { }.

When automatic refresh is enabled, the bubbles and table contents are refreshed every 5 minutes.

Clicking the **# Radio Planes** KPI navigates to and expands the **Radio Plane Bindings table**.

Figure 3-5 Radio Plane Bindings table

T-BTS ID	Network Element ID	Radio Plane Name	Aggregated Binding State	Aggregated Operational State	RAT	Radio Plane Type	User Label	Slice ID	IP Address Type
MRBTS-1000	10.0.3.238	NRBTS-1000.s1Uplane-1.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRBTS-1000.x2Cplane-1.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRBTS-1000.x2Cplane-1.IP1	Not bound	unknown	5G	Base			V6
MRBTS-1000	10.0.3.238	NRBTS-1000.x2Uplane-1.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRBTS-1000.x2Uplane-1.IP1	Not bound	unknown	5G	Base			V6
MRBTS-1000	10.0.3.238	NRBTS-1000.xnCplane-1.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRBTS-1000.xnUplane-1.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRBTS-1000.xnUplane-2.IP1	Not bound	unknown	5G	Base			V4
MRBTS-1000	10.0.3.238	NRNWSLICE_NSA-0.s1Uplane-1.IP1	Not bound	unknown	5G	SLICE	Fiat	128	V4

The **Radio Plane Bindings table** provides a filterable view of radio planes keyed on T-BTS and the NE ID, represented by the IP address of the BTS. If the table view is not expanded, click **More** and select **Expand size** to expand to the full-size displayed in Figure 3-5, “Radio Plane Bindings table” (p. 22).

Radio planes with multiple transport paths

Radio planes with multiple transport paths are represented in the Radio Plane Bindings table by a single entry. The “Aggregated Binding State” and “Aggregated Operational State” columns in the table display an aggregate value based on the current values of the associated transport paths. The aggregated value for Binding State can be one of the following:

- *Bound*—all of the transport paths are “bound”.
- *Partially bound*—at least one of the transport paths is “bound”, while one or more of the others are any combination of “partially bound”, “misconfigured”, and “not bound”.
- *Misconfigured*—none of the transport paths are “bound”, and at least one path is “misconfigured”.
- *Not bound*—all of the transport paths are “not bound”.

The aggregated value for Operational State can be one of the following:

- *Enabled*—all transport paths are operationally “Enabled”.
- *Disabled*—at least one transport path is operationally “Disabled”, regardless of the state of the other paths.
- *Unknown*—at least one transport path is operationally “Unknown”, and none are “Disabled”. For example, one path is “Enabled” but two others are “Unknown”.

Viewing a radio plane in Object Troubleshooting

You can navigate from a radio plane in the bindings table to a specific radio plane view in **Object Troubleshooting** by clicking the  icon. This view provides detailed information using the following panels:

- **Radio Plane Summary**—summarizes identifying information for the radio plane, including T-BTS ID, NE ID, Radio Plane Name, RAT (Radio Access Technology), and source IP.
- **Radio Plane Health Summary**—displays the aggregated Binding State and aggregated Operational State values for the radio plane.
- **Transport Binding Path Summary**—displays entries for each transport path (non-aggregated) for the radio plane with the full set of associated parameter values. In this view, you can see individual paths and perform assessment based on their Binding State and color-coded alarm status. You can also navigate from an entry in this list to a Current Alarms view filtered on chosen transport path by clicking **More**  and selecting **View in Current Alarms**.

For a detailed view of a transport path, you can click **More**  and select **View Details**. This moves focus to a series of panel tables under the path summary table that display the following components involved in the transport path binding:

- Network Element Ports—the ports that comprise the transport path and their operational states.
- Physical Links—the name of the associated physical links and their operational states.
- Services—services associated with the transport path, the service types (such as VPRN or VPLS), operational states, and affected component details (a list of the service components that are used by the transport path and have a disabled operational state).

From these panel tables you can further drill-down by clicking the  icon for an entry to view the selected component in Object Troubleshooting.

The following is an example workflow for using Object Troubleshooting to diagnose issues with a radio plane.

1. We open the Radio Plane Bindings table and see that a radio plane for MRBTS-308 has an Aggregated Binding State of “Bound” but an Aggregated Operational State of “disabled”. Since these are aggregated states, we need to view the associated transport paths individually. We click  for the radio plane to view it in Object Troubleshooting.
2. In the Object Troubleshooting view, we can see in the Transport Paths Binding Summary that all three transport paths for the radio plane are operationally disabled. We select a transport path, click **More** , and select **View Details**. The three panels described above (Network Element Ports, Physical Links, and Services) are displayed.
3. In the three panels, we can enter a filter entry of “disabled” for each of them in the Operational State column. All three panels now only display components that are operationally disabled.
4. Using the filtered displays, we can see that a TRMOD in Network Element ports is disabled. Correspondingly, a physical link is also disabled. We can click  to open Object Troubleshooting for the physical link.
5. In the Object Troubleshooting view for the physical link, we can verify that one of the link endpoints matches the disabled TRMOD, and that this endpoint is the only one that is operationally disabled for that link.
6. Moving back to the Object Troubleshooting view for the transport path, we can also see in the Services panel that a service is operationally disabled. In the Affected Component Details column, the message states that the L2 Backhaul Endpoint with the same name as the faulted TRMOD is disabled.
7. We now know that the issue with the radio plane is being caused by a faulted port on the MRBTS.

See the *NSP Network and Service Assurance Guide* for more information about the functionality available in Object Troubleshooting.

Radio Plane Bindings table parameters

See [Appendix B, “Radio Plane Bindings table parameters”](#) for more information about the parameters displayed in the Radio Plane Bindings table.

Binding State and Binding State Details

The Binding State column displays the status of each binding entry while the Binding State Details column provides a more detailed message on the status cause. The following table provides remedial action information for each possible binding state details message.

 **Note:** A radio plane may have several binding state details, separated by commas.

Table 3-1 Binding States, details messages, and remedial actions

Binding State	Possible Binding State Details	Remedial action
Not Bound	No physical connectivity to backhaul.	Check physical links between T-BTS and router. If physical links are OK but LLDP is not activated, create links between T-BTS and router via network map view.
Not Bound	T-BTS Port Name <i>T-BTS port name</i> : no L3 VPN found on Router <i>router NE ID router port name</i> .	Check the L3 VPN service configuration and/or Life Cycle State in Service Management or create a L3 VPN service with this VLAN on the router/port or bind the radio plane to another L3 VPN of this router/port.
Not Bound	T-BTS Port Name <i>T-BTS port name</i> : no L2 Backhaul service on Node <i>NE ID NE port name</i> leading to a Router.	Check the L2 backhaul service configuration and/or Life Cycle State in Service Management or create a L2 backhaul service with this VLAN between the T-BTS and the router.
Misconfigured	Vlan Id not configured for T-BTS radio plane Source IP Address <i>ip_address</i> .	Bind the radio plane with the same IP address and the same VPRN/VLAN.
Misconfigured	Vlan Id is not configured on physical T-BTS Port Name <i>T-BTS port name</i> .	Bind the radio plane with the same IP address and the same VPRN/VLAN.
Misconfigured	No route defined in T-BTS Routing Table.	Add routing configuration in the MRBTS (via WEB EM or NetAct/MantaRay NM).
Misconfigured	T-BTS Transport IP Address and L3 VPN SAP IP Address are not in the same subnet.	Bind the radio plane with the same VPRN/VLAN but correct IP address.

3.1.5 Binding radio planes to transport services

You can bind or rebind a radio plane to a transport service when there is a physical link between a T-BTS port and a backhaul equipment port. To create the binding, click **More**  and select **Bind to L3 VPN** in the Radio Plane Bindings view. This launches the Workflow Manager, where you can enter the inputs required for the binding.

Figure 3-6 Creating radio plane binding in Workflow Manager

The screenshot shows a 'Create Execution' window for the workflow 'Bind Radio Plane to Transport service'. The 'Input and Parameters' section is active, showing the following fields:

- Input Format: Direct Input (dropdown)
- Show Form: (toggle switch)
- Bind Radio Plane to Transport service section:
 - T-BTS Id* (text input)
 - Radio Plane Name* (text input)
 - IP Address Type* (text input)
 - L3 VPN Service* (text input)
 - T-BTS Radio Plane Source IP Address* (text input)
 - T-BTS Vlan Id* (text input)

Buttons: CANCEL, EXECUTE

When the binding is executed, NSP sends a configuration plan to NetAct/MantaRay NM with the specified inputs. In case of IPIF and/or VLANIF creation, userLabels are added to identify objects created via NSP. The binding creates IPIF objects with an ipMtu default value of 1500.

You can view the results of the binding workflow execution in the Workflow Executions history. Logs for this operation are also recorded in the NSP MdmServer.log file.

Note: Only single VLAN ranges (vlanId x, vlanId x) are added or removed from BRGPRT.I2VlanIdList during the binding operation. Multiple VLAN ranges (vlanId x, vlanId y) of BRGPRT.I2VlanIdList are not modified during the binding operation.

Note: When a BTS is linked to several routers containing the same L3 VPN with the same vlan ID, binding this BTS to the L3 VPN is not supported.

i **Note:** Binding 2 radio planes to a VLAN using 2 different IP addresses in the same subnet is not supported. For example, when radio plane 1 is bound to VLAN V using IP address 10.11.12.13/27, radio plane 2 cannot be bound to VLAN V using IP addresses 10.11.12.13/24 or 10.11.12.10/27.

3.2 How do I bind a radio plane?

You can bind a radio plane by executing the *Bind Radio Plane to Transport Service* workflow. Navigating to this workflow is possible from SRT, as described in this procedure, and the workflow can also be executed directly from **Workflows**. See the *NSP Network Automation Guide* for more information about using the workflows function.

i **Note:** Executing more than one binding operation at a time is not supported.

i **Note:** The “Bind to L3 VPN” action is not supported for radio planes with virtual IP addresses.

1

In **Network Map and Health, Overview** scroll to the **Simplified RAN Transport Equipment and Bindings Summary**.

2

Click a bubble to automatically scroll to the **Radio Plane Bindings** table for that category, for example “Not Bound Radio Planes”. The table is set with a filter criteria matching the selected bubble.

3

Click **More**  and select **Bind to L3 VPN. Workflows** opens to create the radio plane binding.

i **Note:** If you scroll away from the Radio Plane Bindings table and it is minimized, scroll back to it in the **Data Page**, click **More**  and select **Expand Size**.

4

In **Workflows**, enter the required parameter configuration and click **Execute**. Mandatory parameters are identified by a star.

i **Note:** “T-BTS Radio Plane Source IP Address” is set by default to the IP address of the L3 VPRN SAP. The value must be changed to another valid IP address in the same subnet.

i **Note:** Parameters to configure a radio plane with a virtual IP address are not available or supported.

5

Wait until the end of the workflow execution (status will display success or error). In case of error:

- Click **Quick View** to view the reason for the error.

- Fix the error and repeat the binding operation.

In case of success, go back to the **Radio Plane Bindings** table and click on the “Content updated on *date/time*(Click to update)” bubble or wait for an automatic refresh. After a few minutes (the BTS may reboot), the table is updated.

END OF STEPS

3.3 How do I perform link management?

3.3.1 Link discovery using LLDP

NSP discovers physical links between BTS nodes using LLDP and displays them on the Network Map view.

When the operationalState values of the port(s) used for a LLDP link are disabled, or when remote neighbors of the link are no longer detected by LLDP, NSP sets the operationalState of the link to disabled. When the operationalState values of the port(s) used for a LLDP link are enabled, and when remote neighbors of the link are detected by LLDP, NSP sets the operationalState of the link to enabled.

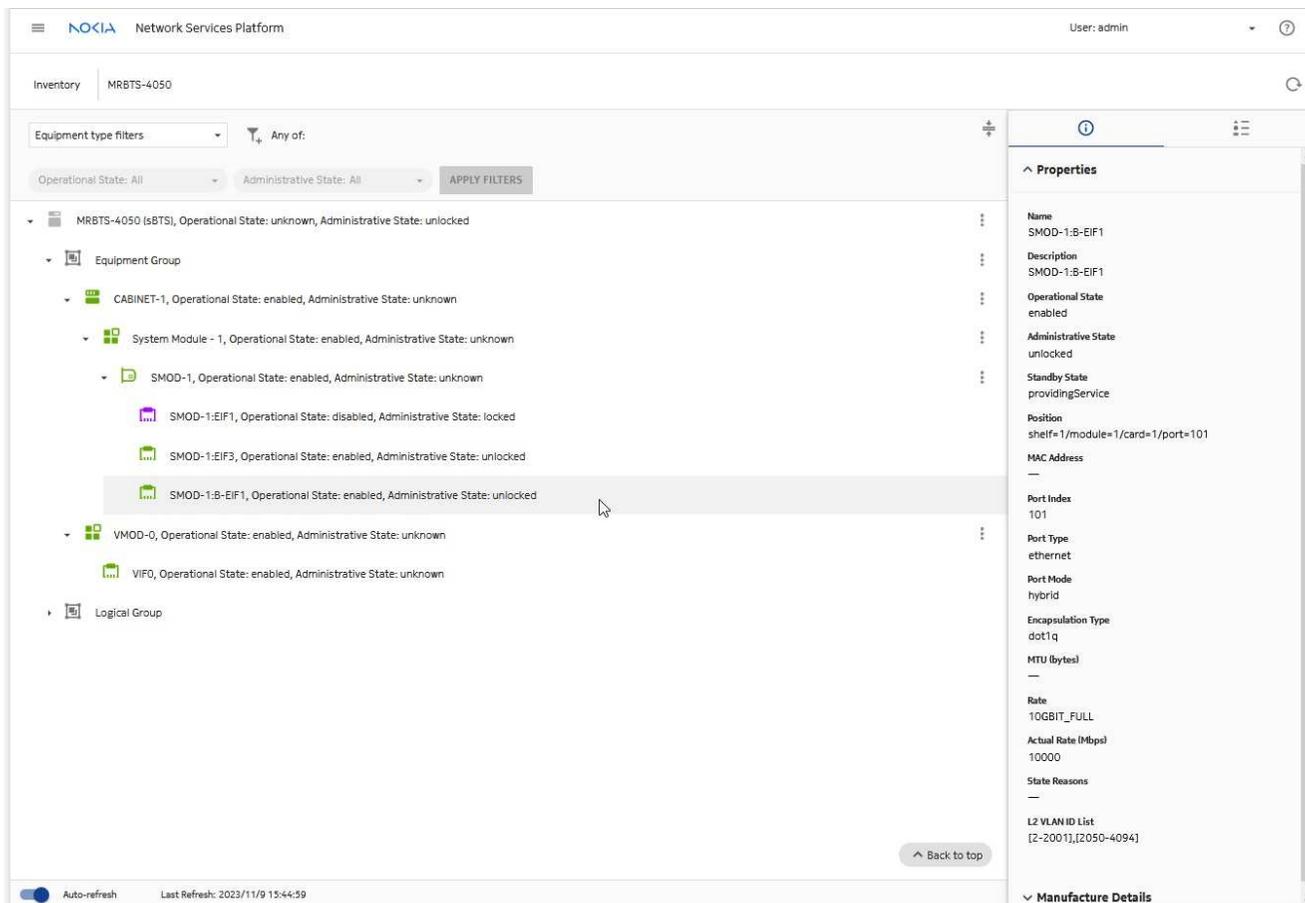
Note: Links are not deleted by NSP when their operationalState values are disabled. To prevent the radio planes using these links from keeping a binding state of “bound”, the links can be manually deleted.

Figure 3-7 Physical link discovered via LLDP



The Equipment Inventory view for MRBTS-4050 displays the mapping between the port name and position.

Figure 3-8 T-BTS port name and position in Equipment Inventory



See the *NSP Network and Service Assurance Guide* for more information.

3.4 How do I manage L2 backhaul services?

3.4.1 Service discovery

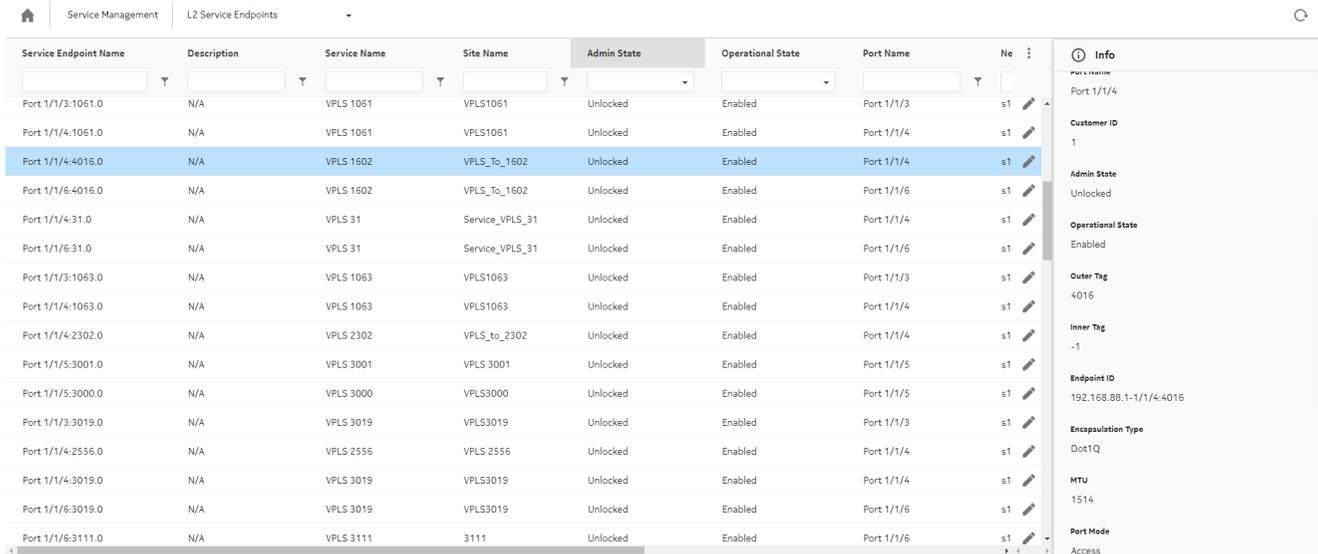
SRT discovers L2 backhaul services across BTS, microwave, and UBT nodes that are configured with the same VLAN. NSP displays services in Service Management. Navigating to the Service View, you can view service sites and service endpoints of the selected service in **Details**, **Components**, including Admin and Operational State.

The L2 backhaul service list is updated for BTS configuration changes (for example, creation/deletion of VLAN) and when BTS nodes are managed/unmanaged by NSP.

In this release, some configuration is required to view L2 services using Service Management. See [2.1.4 “Setup service management configuration for L2 services” \(p. 15\)](#) for more information.

See the *NSP Service Management Guide* for more information about managing services with Service Management.

Figure 3-9 Component view of L2 service displaying endpoints with Admin and Operational State



Service Endpoint Name	Description	Service Name	Site Name	Admin State	Operational State	Port Name	Ne	Info
Port 1/1/3-1061.0	N/A	VPLS 1061	VPLS1061	Unlocked	Enabled	Port 1/1/3	s1	Port Name Port 1/1/4
Port 1/1/4-1061.0	N/A	VPLS 1061	VPLS1061	Unlocked	Enabled	Port 1/1/4	s1	Customer ID 1
Port 1/1/4-4016.0	N/A	VPLS 1602	VPLS_To_1602	Unlocked	Enabled	Port 1/1/4	s1	Admin State Unlocked
Port 1/1/6-4016.0	N/A	VPLS 1602	VPLS_To_1602	Unlocked	Enabled	Port 1/1/6	s1	Operational State Enabled
Port 1/1/4-31.0	N/A	VPLS 31	Service_VPLS_31	Unlocked	Enabled	Port 1/1/4	s1	Outer Tag 4016
Port 1/1/6-31.0	N/A	VPLS 31	Service_VPLS_31	Unlocked	Enabled	Port 1/1/6	s1	Inner Tag -1
Port 1/1/3-1063.0	N/A	VPLS 1063	VPLS1063	Unlocked	Enabled	Port 1/1/3	s1	Endpoint ID 192.168.88.1-1/1/4-4016
Port 1/1/4-1063.0	N/A	VPLS 1063	VPLS1063	Unlocked	Enabled	Port 1/1/4	s1	Encapsulation Type Dot1Q
Port 1/1/4-2302.0	N/A	VPLS 2302	VPLS_to_2302	Unlocked	Enabled	Port 1/1/4	s1	MTU 1514
Port 1/1/5-3001.0	N/A	VPLS 3001	VPLS 3001	Unlocked	Enabled	Port 1/1/5	s1	Port Mode Access
Port 1/1/5-3000.0	N/A	VPLS 3000	VPLS3000	Unlocked	Enabled	Port 1/1/5	s1	
Port 1/1/3-3019.0	N/A	VPLS 3019	VPLS3019	Unlocked	Enabled	Port 1/1/3	s1	
Port 1/1/4-2556.0	N/A	VPLS 2556	VPLS 2556	Unlocked	Enabled	Port 1/1/4	s1	
Port 1/1/4-3019.0	N/A	VPLS 3019	VPLS3019	Unlocked	Enabled	Port 1/1/4	s1	
Port 1/1/6-3019.0	N/A	VPLS 3019	VPLS3019	Unlocked	Enabled	Port 1/1/6	s1	
Port 1/1/6-3111.0	N/A	VPLS 3111	3111	Unlocked	Enabled	Port 1/1/6	s1	

How BTS L2 services are created in NSP

The BTS requires the following for L2 backhaul service discovery:

- L2SWI.I2SwitchingEnabled set to “true” and L2SWI.vlanAwarenessEnabled set to “true”
AND
- the vlanId of the service configured on two ports of the BTS (in two BRGPRT.I2VlanIdList)

BTS L2 backhaul service name at service discovery is set to the value L2SVC_VLAN_XX, with XX equal to the vlanId. It is possible to modify the name of the BTS L2 backhaul service using Service Management.

Only singleton BRGPRT.I2VlanIdList (range with size 1, lowValue equals highValue in BTS) are taken into account for BTS L2 services creation.

Admin and Operational States

The Admin States of L2 services are not managed directly at the service level, only at the endpoint level. At the service level, the Admin State always displays as “Unlocked”. At the endpoint level, the Admin State is reflected by the value of the ETHLK administrationState.

The Operational State is managed at the service level by aggregating the operational state of all endpoints in the service. The Operational State of the service displays as “Disabled” if at least one port is operationally disabled/down.

L2 backhaul BTS service stitching

Service stitching can be performed in two ways:

- automatically, as described in [“Enable automatic service stitching”](#) (p. 15)
- manually, as described in [3.5.10 “Modifications of T-BTS L2 backhaul services do not appear in Service Management”](#) (p. 35)

Manual service stitching cannot be performed when automatic service stitching is enabled.

3.4.2 Managing BTS L2 services using Service Management

You can use the “Tbts Template” service intent in Service Management to create T-BTS L2 services. The following information must be specified when creating the service:

- Template Name
- Service Name
- Customer ID (selectable from a predefined list)
- Description
- Outer Tag (the vlanId of the service)
- Admin State
- Site Details (see below)

The Site Details specifies T-BTS nodes that are part of the service, with the endpoints for each T-BTS configured with the vlanId (at least two endpoints are required). All endpoints must be provided, including the final and intermediate endpoints along the path.

You can also use Service Management to perform updates (add/remove endpoint), audits, removal, and deletion for L2 services.

When the service is created, the corresponding BRGPRT.I2VlanIdList is created in the associated T-BTS nodes.

 **Note:** Service creation and updates are only possible on T-BTS configured as “repeater” nodes (L2SWI.I2SwitchingEnabled and L2SWI.vlanAwarenessEnabled are set to true).

3.5 How do I troubleshoot T-BTS management?

3.5.1 T-BTS components in Object Troubleshooting

You can perform troubleshooting of T-BTS using Object Troubleshooting by selecting Radio Plane as the Target Type. See [“Viewing a radio plane in Object Troubleshooting”](#) (p. 23). See the *NSP Network and Service Assurance Guide* for more information about using Object Troubleshooting.

3.5.2 T-BTS alarm mapping

The names of some T-BTS alarms in NSP differ from their versions in NetAct/MantaRay NM, MRBTS, and NIDD.

Specific problem ID	MRBTS alarm name	NSP alarmName
7658	BASE STATION LICENSE LIMITATION	BaseStationLicense-Limitation2
61029	LOS on \$UNIT, \$INTERFACE	LossOfSignal
61050	Missing SFP module on \$UNIT, \$INTERFACE	MissingOrNonCompliantSfpModule
61410	CCM fault level \$LEVEL, prio \$PRIORITY, cause \$CAUSE	CcmFault
61607	Auto-negotiation mismatch on \$UNIT, \$INTERFACE	AutoNegotiationMismatch
61632	Dup Addr detected-\$DUPLICATEIPV6ADDRESS	DupIpV6AddrDetected
61641	IP Traffic Capturing ongoing \$UNIT, \$INTERFACE, \$MACADDRESS	IpTrafficCapturingOngoing

3.5.3 Backend logging

SRT backend logs are viewable using NSP LogViewer. Logging levels can be configured by Nokia support using the `kubectl -n nsp-psa-restricted edit cm srt-ran-services-app-logback` command.

3.5.4 Simplified RAN Transport in Grafana

The Grafana logging application features dedicated SRT metrics that can be found by searching for "Simplified RAN Transport". See the *NSP System Administrator Guide* for more information about using the Grafana dashboard.

3.5.5 How do I force SRT to recompute binding states?

For SMR topologies that do not have real-time binding state computation, you can force SRT to recompute all BTS radio plane binding states using one of the following methods:

- From **Workflows**:
 1. Execute SRT_RefreshBindingsData workflow.
 2. Confirm SRT_RefreshBindingsData action.
 3. Wait for SRT_RefreshBindingsData workflow execution success.
- Using REST API:
 1. POST /restconf/operations/nsp-srt:refresh-radio-plane-binding-data
 2. POST /restconf/operations/nsp-srt:refresh-radio-plane-binding-result

i **Note:** This operation can take several minutes (up to 15 minutes for 5000 BTS) depending on the amount of managed MRBTS. While the operation is running, radio plane binding states are not displayed accurately.

3.5.6 Parsing error case 1: missing T-BTS parameter

In this error case, the T-BTS is missing a mandatory parameter. The following occurs:

- NSP logs the error during the resynchronization process with the name of the missing parameter
- the T-BTS resync state is failed

Note that the MO id parameter is mandatory only in T-BTS Yang model v1.

The logs for a resync failure can be viewed in MdmServer.log. The following is an example:

```
<2021.06.30 12:43:13 811 +0000><mdm><E><mdm-server-0>  
<ResyncPollerTaskExecutor[3]><com.nokia.nsp.mdm.core.sbi.resync.imp.  
ResyncConsumer.failed> Full resync failed for node=10.0.3.238,  
detailStatus=null
```

```
java.lang.RuntimeException: com.fasterxml.jackson.databind.  
JsonMappingException: N/A
```

```
at [Source: (ByteArrayInputStream); line: 1, column: 6618] (through  
reference chain: com.nokia.nsp.mdm.device.mrbts.model.impl.rest.  
adaptation.read.DescendantMoLitesResponse["moLites"]->java.util.HashMap  
["PLMN-PLMN/MRBTS-1000"]->java.util.ArrayList[46]->com.nokia.nsp.mdm.  
device.mrbts.model.impl.rest.adaptation.common.MoLite["moId"])
```

```
at io.reactivex.internal.util.ExceptionHelper.wrapOrThrow  
(ExceptionHelper.java:45)
```

```
<2021.06.30 12:43:13 778 +0000><mdm><I><mdm-server-0>  
<ResyncPollerTaskExecutor[13]><com.nokia.nsp.mdm.device.mrbts.model.impl.  
rest.adaptation.read.ReadHelper.queryAllObjectsFDNAsString> queryAll:  
Perform Rest Request POST /persistency/v1/descendantMOLites
```

```
<2021.06.30 12:43:13 768 +0000><mdm><E><mdm-server-0><pool-15-thread-2>  
<com.nokia.nsp.mdm.device.mrbts.model.impl.rest.adaptation.read.  
ReadHelper.getObjectsFDN> Could not read descendantMoLites
```

3.5.7 Parsing error case 2: T-BTS parameter type not compliant with NSP Yang model

In this case, a parameter has been set as a string when an integer is required. The following occurs:

- NSP logs the error
- the T-BTS resync state is failed

The logs for a resync failure can be viewed in MdmServer.log. The following is an example:

```
2021.06.29 07:29:59 041 +0000><mdm><E><mdm-server-0>  
<ResyncPollerTaskExecutor[13]><com.nokia.nsp.mdm.core.sbi.resync.imp.
```

```
ResyncConsumer.failed> Full resync failed for node=10.0.3.243,  
detailStatus=null
```

```
java.lang.NumberFormatException: For input string: "Test"
```

```
at java.lang.NumberFormatException.forInputString(NumberFormatException.  
java:65)
```

3.5.8 REST error case 1: NetAct/MantaRay NM is unreachable on T-BTS configuration resynchronization

NetAct/MantaRay NM is unreachable and the error is logged in MdmServer.log. The following is an example:

```
<mdm><E><mdm-server-0><ResyncPollerTaskExecutor [37]><com.nokia.nsp.mdm.  
core.sbi.resync.imp.ResyncConsumer.failed> Partial resync failed for  
node=10.0.3.243, detailStatus=null, class="nokia-tbts-v1-model":  
/MRBTS/TNLSVC/TNL/ETHAPP/LLDP
```

```
java.lang.RuntimeException: org.apache.http.conn.  
HttpException: Connect to 10.11.210.158:8001 [/10.11.210.158]  
failed: Connection refused (Connection refused)
```

```
at io.reactivex.internal.util.ExceptionHelper.wrapOrThrow  
(ExceptionHelper.java:45)
```

```
at io.reactivex.internal.observers.BlockingMultiObserver.blockingGet  
(BlockingMultiObserver.java:91)
```

```
at io.reactivex.Single.blockingGet(Single.java:2157)
```

3.5.9 REST error case 2: Body is not compliant with REST format

There is a syntax error in the REST body. For example, there is a missing “}” and the structure is invalid. The error is logged in MdmServer.log. The following is an example:

```
<mdm><E><mdm-server-0><ResyncPollerTaskExecutor [38]><com.nokia.nsp.mdm.  
core.sbi.imp.AsynResync.doResync> Partial aInCurrent=com.nokia.nsp.mdm.  
device.mrbts.model.impl.rest.adaptation.read.ReadAdaptation@535e9f6e,  
aInMetaDevicePojo=MetaDevicePojo{classId='nokia-tbts-v1-model:  
/MRBTS/TNLSVC/TNL/ETHAPP/LLDP', sbiProtocol=rest, priority=21,  
alwaysReadFromNetwork=false, resyncType=getQuery, isGenericPojo=true,  
iDevicePojoBuilder=null, FilterNode=null}
```

```
java.lang.RuntimeException: com.fasterxml.jackson.core.  
JsonParseException: Unexpected close marker '}': expected ']' (for root  
starting at [Source: (ByteArrayInputStream); line: 1, column: 0])
```

```
at [Source: (ByteArrayInputStream); line: 1, column: 2]
```

```
at io.reactivex.internal.util.ExceptionHelper.wrapOrThrow
(ExceptionHelper.java:45)

at io.reactivex.internal.observers.BlockingMultiObserver.blockingGet
(BlockingMultiObserver.java:91)

at io.reactivex.Single.blockingGet(Single.java:2157)

at com.nokia.nsp.mdm.device.mrbts.model.impl.rest.adaptation.read.
ReadHelper.readLLDP(ReadHelper.java:254)

at com.nokia.nsp.mdm.device.mrbts.model.impl.rest.adaptation.read.
ReadHelper.read(ReadHelper.java:178)

at com.nokia.nsp.mdm.device.mrbts.model.impl.rest.adaptation.read.
ReadAdaptation.read(ReadAdaptation.java:71)
```

3.5.10 Modifications of T-BTS L2 backhaul services do not appear in Service Management

Workaround: Run a RESTCONF POST request using the stitchservices command to perform a service stitching operation for the affected T-BTS sites:

```
POST /restconf/data/nsp-service-intent:stitchservices
```

The following input is required:

- “service-type”:”mpr-backhaul”
- “algorithm”:”local”
- “sites”:”bts-ip”, “bts-ip”, “bts-ip”
where *bts-ip* is the T-BTS site ID

 **Note:** Manual service stitching cannot be performed when automatic service stitching is enabled.

3.5.11 Updated BTS transport configuration does not appear in Radio Plane Bindings

Workaround: Verify that NetAct/MantaRay NM reachability = Reachable in Device Management, if not then see [3.5.15 “NetAct/MantaRay NM and BTS reachability is Partially reachable or Unreachable, ReachabilityProblem alarm on NetAct/MantaRay NM”](#) (p. 36). Upload MRBTS configuration in NetAct/MantaRay NM then launch a resynchronization of the BTS from Device Management. See the *NSP Device Management Guide* for more information.

3.5.12 Updated BTS alarms do not appear in NSP

MRBTS alarms may not be properly updated in NSP (alarm views, Radio Plane Bindings table).

Workaround: Verify that NetAct/MantaRay NM reachability = Reachable in Device Management, if not then see [3.5.15 “NetAct/MantaRay NM and BTS reachability is Partially reachable or](#)

[Unreachable, ReachabilityProblem alarm on NetAct/MantaRay NM](#) (p. 36). Launch a resync of the NetAct/MantaRay NM server acting as NE controller for this BTS from Device Management.

3.5.13 MRBTS is unreachable

NSP is not aware when MRBTS are unreachable from NetAct/MantaRay NM. In this case, BTS resynchronizations launched from Device Management will show as successful, but any radio plane bindings will fail.

3.5.14 NetAct/MantaRay NM ResyncStatus = failed or PollerProblem alarm on NetAct/MantaRay NM

When NSP is unable to successfully complete a BTS alarm resynchronization, NSP will:

- set the ResyncStatus of the NetAct/MantaRay NM server acting as NEcontroller to “failed” (Device Management)
- raise a PollerProblem alarm against the NetAct/MantaRay NM server acting as NEcontroller (Current Alarms)
- automatically relaunch the T-BTS FM full resynchronization at the next heartbeat reception from the affected NetAct/MantaRay NM server

Workaround: If the problem is not automatically resolved by NSP (2 failed retries), you must resolve the issue by manually launching a resynchronization of the NetAct/MantaRay NM server acting as NEcontroller using Device Management.

3.5.15 NetAct/MantaRay NM and BTS reachability is Partially reachable or Unreachable, ReachabilityProblem alarm on NetAct/MantaRay NM

When NSP detects a loss of communication with NetAct/MantaRay NM on SNMP reachability policy:

- NSP raises the ReachabilityProblem and SnmpConnectionProblem alarms on NetAct/MantaRay NM
- NSP sets NetAct/MantaRay NM and the corresponding T-BTS reachability to 'Partially reachable'
- NSP sets the corresponding T-BTS communication state to 'Down'

When NSP detects a loss of communication with NetAct/MantaRay NM on ping (=REST) reachability policy:

- NSP raises the ReachabilityProblem and PingConnectionProblem alarms on NetAct/MantaRay NM
- NSP sets NetAct/MantaRay NM and the corresponding T-BTS reachability to 'Partially reachable'
- NSP sets the corresponding T-BTS communication state to 'Down'

When NSP detects a loss of communication with NetAct/MantaRay NM on SNMP and ping (=REST) reachability policies:

- NSP raises the ReachabilityProblem, SnmpConnectionProblem, and PingConnectionProblem alarms on NetAct/MantaRay NM
- NSP sets NetAct/MantaRay NM and the corresponding T-BTS reachability to 'Unreachable'

- NSP sets the corresponding T-BTS communication state to 'Down'

Workaround: Resolve SNMP and/or REST communication issues with NetAct/MantaRay NM. See the *NSP Nokia TBTS Adaptor Guide* for information about configuring the SNMP interface, integrating NSP and NetAct/MantaRay NM, and discovering NetAct/MantaRay NM and the T-BTS.

When NSP detects that communication is restored with NetAct/MantaRay NM on SNMP and ping (=REST) reachability policies:

- NSP clears the ReachabilityProblem, SnmpConnectionProblem, and PingConnectionProblem alarms on NetAct/MantaRay NM
- NSP sets NetAct/MantaRay NM and the corresponding T-BTS reachability to 'Reachable'
- NSP sets the corresponding T-BTS communication state to 'Up'

3.5.16 Updated BTS software version or chassis type does not appear in Device Management

The MRBTS productVariant parameter value is displayed as chassis type in Device Management. Updating the software version or the productVariant in the BTS configuration is not reflected in Device Management, even after performing a resync of the BTS.

Workaround: Unmanage and rediscover the BTS from Device Management, or check updated values in equipment inventory.

3.5.17 Modifications of T-BTS L2 backhaul endpoints do not appear in Service Management or Network Map

Workaround: Run the following RESTCONF command to trigger a resync:

```
POST /restconf/operations/nsp-admin-resync:trigger-resync
```

```
{ "nsp-admin-resync:input": {  
  "plugin-id": "mdm",  
  "network-element": [{  
    "ne-id": " bts-ip ",  
    "sbi-classes": [{  
      "class-id": "nsd-service-l2backhaul:/l2backhaul-sites/site"  
    }]  
  }]  
}
```

where *bts-ip* is the T-BTS site ID.

A Radio plane to MRBTS configuration mapping

Radio plane objects in the MRBTS configuration are abstracted in NSP. The following tables display the mapping between NSP radio plane and MRBTS objects.

Table A-1 NSP 4G base radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
TRSNW-i.cPlane-1.IP1	V4	TRSNW-i. cPlane. ipV4AddressDN1
TRSNW-i.cPlane-1.IP1	V6	TRSNW-i. cPlane. ipV6AddressDN1
TRSNW-i.cPlane-2.IP2	V4	TRSNW-i. cPlane. ipV4AddressDN2
TRSNW-i.cPlane-2.IP2	V6	TRSNW-i. cPlane. ipV6AddressDN2
TRSNW-i.uPlane-1.IP1	V4	TRSNW-i. uPlane. ipV4AddressDN1
TRSNW-i.uPlane-1.IP1	V6	TRSNW-i. uPlane. ipV6AddressDN1
TRSNW-i.uPlane-2.IP2	V4	TRSNW-i. uPlane. ipV4AddressDN2
TRSNW-i.uPlane-2.IP2	V6	TRSNW-i. uPlane. ipV6AddressDN2

Table A-2 NSP 5G SNSSAI SLICE radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
SNSSAI-i.ngUplane-1.IP1	V4	SNSSAI-i. ngUplane. ipV4AddressDN1
SNSSAI-i.ngUplane-1.IP1	V6	SNSSAI-i. ngUplane. ipV6AddressDN1
SNSSAI-i.ngUplane-1.IP2	V4	SNSSAI-i. ngUplane. ipV4AddressDN2
SNSSAI-i.ngUplane-1.IP2	V6	SNSSAI-i. ngUplane. ipV6AddressDN2
SNSSAI-i.xnUplane-1.IP2	V4	SNSSAI-i. xnUplane. ipV4AddressDN1
SNSSAI-i.xnUplane-1.IP2	V6	SNSSAI-i. xnUplane. ipV6AddressDN1
SNSSAI-i.xgUplane-1.IP1	V4	SNSSAI-i. xgUplane.ipV4AddressDN1
SNSSAI-i.xgUplane-1.IP1	V6	SNSSAI-i. xgUplane.ipV6AddressDN1

Table A-3 NSP 5G NRNWSLICE_NSA SLICE radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
NRNWSLICE_NSA-i.s1Uplane-1.IP1	V4	NRNWSLICE_NSA-i.s1Uplane.ipV4AddressDN1
NRNWSLICE_NSA-i.s1Uplane-1.IP1	V6	NRNWSLICE_NSA-i.s1Uplane.ipV6AddressDN1
NRNWSLICE_NSA-i.s1Uplane-1.IP2	V4	NRNWSLICE_NSA-i.s1Uplane.ipV4AddressDN2
NRNWSLICE_NSA-i.s1Uplane-1.IP2	V6	NRNWSLICE_NSA-i.s1Uplane.ipV6AddressDN2

Table A-4 NSP 4G NWSLICE SLICE radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
NWSLICE-i.Uplane.IP1	V4	NWSLICE-i.ipV4AddressDN1
NWSLICE-i.Uplane.IP1	V6	NWSLICE-i.ipV6AddressDN1

Table A-5 NSP 5G base radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
NRBTS-i.e2Plane-1.IP1	V4	NRBTS-i.e2Plane.ipV4AddressDN1
NRBTS-i.e2Plane-1.IP1	V6	NRBTS-i.e2Plane.ipV6AddressDN1
NRBTS-i.ngCplane-j.IP1	V4	NRBTS-i.ngCplane(j).ipV4AddressDN1
NRBTS-i.ngCplane-j.IP1	V6	NRBTS-i.ngCplane(j).ipV6AddressDN1
NRBTS-i.ngCplane-j.IP2	V4	NRBTS-i.ngCplane(j).ipV4AddressDN2
NRBTS-i.ngCplane-j.IP2	V6	NRBTS-i.ngCplane(j).ipV6AddressDN2
NRBTS-i.ngUplane-j.IP1	V4	NRBTS-i.ngUplane(j).ipV4AddressDN1
NRBTS-i.ngUplane-j.IP1	V6	NRBTS-i.ngUplane(j).ipV6AddressDN1
NRBTS-i.ngUplane-j.IP2	V4	NRBTS-i.ngUplane(j).ipV4AddressDN2
NRBTS-i.ngUplane-j.IP2	V6	NRBTS-i.ngUplane(j).ipV6AddressDN2
NRBTS-i.s1Uplane-j.IP1	V4	NRBTS-i.s1Uplane(j).ipV4AddressDN1
NRBTS-i.s1Uplane-j.IP1	V6	NRBTS-i.s1Uplane(j).ipV6AddressDN1
NRBTS-i.s1Uplane-j.IP2	V4	NRBTS-i.s1Uplane(j).ipV4AddressDN2
NRBTS-i.s1Uplane-j.IP2	V6	NRBTS-i.s1Uplane(j).ipV6AddressDN2
NRBTS-i.x2Cplane-j.IP1	V4	NRBTS-i.x2Cplane(j).ipV4AddressDN1
NRBTS-i.x2Cplane-j.IP1	V6	NRBTS-i.x2Cplane(j).ipV6AddressDN1
NRBTS-i.x2Uplane-j.IP1	V4	NRBTS-i.x2Uplane(j).ipV4AddressDN1
NRBTS-i.x2Uplane-j.IP1	V6	NRBTS-i.x2Uplane(j).ipV6AddressDN1
NRBTS-i.xnCplane-j.IP1	V4	NRBTS-i.xnCplane(j).ipV4AddressDN1
NRBTS-i.xnCplane-j.IP1	V6	NRBTS-i.xnCplane(j).ipV6AddressDN1
NRBTS-i.xnUplane-j.IP1	V4	NRBTS-i.xnUplane(j).ipV4AddressDN1
NRBTS-i.xnUplane-j.IP1	V6	NRBTS-i.xnUplane(j).ipV6AddressDN1

Notes:

- (j) represents the instance number

Table A-6 7 NSP 3G base radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
WNBTS-i.cPlane-1.IP1	V4	WNBTS-i.cPlaneList.ipV4AddressDN
WNBTS-i.cPlane-1.IP1	V6	WNBTS-i.cPlaneList.ipV6AddressDN
WNBTS-i.uPlane-j.IP1	V4	WNBTS-i.uPlaneList(j).ipV4AddressDN
WNBTS-i.uPlane-j.IP1	V6	WNBTS-i.uPlaneList(j).ipV6AddressDN

Notes:

- (j) represents the instance number

Table A-7 NSP TOP synchronization base radio planes mapping to MRBTS configuration

Radio plane name	IP Address type	T-BTS Radio Plane Source IP Address
SYNC-i.CLOCK-1.TOP-1.sPlane.IP1	V4 or V6	SYNC-i.CLOCK-1.TOP-1.sPlaneIpAddressDN

B Radio Plane Bindings table parameters

The following table describes the parameters of the Radio Plane Bindings table in detail.

Table B-1 Radio Plane Bindings table parameters

Name	Description	Related T-BTS parameters	Origin
T-BTS ID	Name of T-BTS.		T-BTS
Network Element ID	Network Element ID of T-BTS.	MPLANENW. mPlaneIpv4AddressDN or MPLANENW. mPlaneIpv6AddressDN	T-BTS
Radio Plane Name	Name of the radio plane configured in T-BTS.	Appendix A, "Radio plane to MRBTS configuration mapping"	T-BTS
Aggregated Binding State	Aggregated Radio Plane Status binding regarding configured Transport Paths binding of this radio plane.		Set by SRT
Aggregated Operational State	Aggregated Radio Plane Operational State for configured Transport Paths operational state of this radio plane.		Set by SRT
RAT	3G for radio planes defined by T-BTS managed object = WNBTS 4G for radio planes defined by T-BTS managed object = LNBTS or child of LNBTS (TRSNW, NWSLICE) 5G for radio planes defined by T-BTS managed object = NRBTS or child of NRBTS (SNSSAI, NRNWSLICE_NSA) - for radio planes defined by T-BTS managed object = MNL or child of MNL (TOP)		T-BTS
Radio Plane Type	Radio plane type Base or SLICE		T-BTS
User Label	User label configured in T-BTS for the radio plane.	SNSSAI.userLabel or NRNWSLICE_NSA.userLabel	T-BTS

Table B-1 Radio Plane Bindings table parameters (continued)

Name	Description	Related T-BTS parameters	Origin
Slice Id	Slice Id configured in T-BTS for the radio plane.	For SNSSAI slice: sst:sd (Slice Service Type and Slice Differentiator). For NWSLICE slice: values of NWSLICE. operatorSpecificQciList separated by commas. For NRNWSLICE_NSA slice: values of NRNWSLICE_NSA. operatorSpecificQCIList separated by commas.	T-BTS
IP Address Type	IP address type of the radio plane (v4 or v6). IPv6 addresses are displayed in rfc5952 format.		T-BTS
T-BTS Radio Plane Source IP Address	IP address configured in the T-BTS for the radio plane, IP used as source IP in outbound packets.	Appendix A, "Radio plane to MRBTS configuration mapping"	T-BTS
Alarm severity	A colored indicator that displays the highest alarm severity currently impacting the radio plane plane binding: <ul style="list-style-type: none"> • Red: critical • Orange: major • Yellow: minor 		Set by SRT

Table B-2 Transport Paths Binding Summary parameters

Name	Description	Related T-BTS parameters	Origin
Binding State	Radio plane status for the connection to a Cell Site Router (CSR)		Set by SRT
Binding State Details	Detailed status of transport path binding state.		Set by SRT

Table B-2 Transport Paths Binding Summary parameters (continued)

Name	Description	Related T-BTS parameters	Origin
Operational State	<p>Transport path operational state. For transport paths with Binding State = Not bound, Operational State is computed by SRT to unknown.</p> <p>For transport paths with Binding State = Bound or Misconfigured, Operational State is computed by SRT according to the operational state of all objects impacting the transport path:</p> <ul style="list-style-type: none"> • T-BTS Slice object (for SNSSAI) • Port objects (either for T-BTS or other NE in the binding) • Physical Link objects • L2 Backhaul Endpoint objects • L2 Backhaul Site objects • L2 Backhaul Service objects • L3VPN Endpoint object • L3VPN Site object • L3VPN Service object • VPLS Endpoint object • VPLS Site object • VPLS Service object <p>Possible values: enabled, disabled, unknown.</p>	SNSSAI. operationalState ETHLK_R. operationalState	Set by SRT
IP Address Type	IP address type of the radio plane (v4 or v6). IPv6 addresses are displayed in rfc5952 format.		T-BTS
T-BTS Port Name	T-BTS port for transport path outbound traffic		T-BTS
T-BTS Destination Subnet	Subnet configured in T-BTS routing table associated to the transport path source IP address	IPRT_R. forwardingEntries. destIpAddr or IPRTV6_R. forwardingEntries. destIp6Addr	T-BTS

Table B-2 Transport Paths Binding Summary parameters (continued)

Name	Description	Related T-BTS parameters	Origin
Gateway	IP address of the next hop configured in the T-BTS routing table for the destination subnet	IPRT_R. forwardingEntries. gateway or IPRTV6_R. forwardingEntries. gatewayIpv6Addr	T-BTS
Preference	Ordering of static route configured in T-BTS for a same destination subnet	IPRT_R. forwardingEntries. preference or IPRTV6_R. forwardingEntries. preference	T-BTS
Routing State	Status of route configured in T-BTS Active if the route is used by the T-BTS (present in T-BTS runtime routing table) Standby if the route is not used by T-BTS (not present in T-BTS runtime routing table)	IPRT.staticRoutes, IPRT_R. forwardingEntries or IPRTV6. staticIpv6Routes, IPRTV6_R. forwardingEntries	T-BTS
Rerouting Enabled	Status of route configured in T-BTS True if the route is secured by fast IP re-routing, triggerDN present in MRBTS False if the route is not secured by fast IP re-routing, triggerDN not present in MRBTS	IPRT.staticRoutes. triggerDN or IPRTV6. staticIpv6Routes. triggerDN	T-BTS
T-BTS Transport IP Address	Transport IP used to reach the Cell Site Router configured in T-BTS for the radio plane		T-BTS
T-BTS Vlan Id	VLAN value configured in T-BTS for the radio plane	VLANIF.vlanId	T-BTS
L3 VPN SAP IP Address	IP ADDRESS configured on CSR for L3 connectivity on the Router Port Name		CSR
L3 VPN Service	L3VPN configured on CSR for L3 connectivity on the Router Port Name		CSR

Table B-2 Transport Paths Binding Summary parameters (continued)

Name	Description	Related T-BTS parameters	Origin
VPLS Service Name	R-VPLS configured on CSR for L3 connectivity on the Router Port Name		CSR
Router Name	Name of the CSR providing the L3 connectivity		CSR
Router Port Name	Access port name of the CSR providing the L3 connectivity		CSR
End to End Connectivity	Connectivity type to reach the Gateway L2 for topology between radio plane and the router with L2 services (via MSS or repeater MRBTS) L1 for topology between radio plane and the router without L2 services (via physical cable or UBT)		Set by SRT
Alarm severity	A colored indicator that displays the highest alarm severity currently impacting the transport path: <ul style="list-style-type: none"> • Red: critical • Orange: major • Yellow: minor 		Set by SRT

C Filtering using Slice Id

You can filter for slices with specific QCI list, SST, and SD values using the “Slice Id” column of the radio plane Bindings table. Using specific filter values with commas and/or colons returns specific types of results, as explained in the following table. In general, commas return 4G slice QCI list values while colons return 5G slice SST:SD values. Numbers on the left of a colon match SST and numbers on the right match SD.

Table C-1 Slice Id filter examples and returned results

Filter value	Slices returned by filter	Specific values matched
3	NWSLICE-i.Uplane.IP1	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP1	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP2	QCI list contains qci=3
	SNSSAI-i.ngUplane-1.IP1	sst=3
	SNSSAI-i.ngUplane-1.IP2	sst=3
	SNSSAI-i.xgUplane-1.IP1	sst=3
	SNSSAI-i.xnUplane-1.IP1	sst=3
3,4	NWSLICE-i.Uplane.IP1	QCI list contains qci=3
	NWSLICE-i.Uplane.IP1	QCI list contains qci=4
	NRNWSLICE_NSA-i.s1Uplane-1.IP1	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP2	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP1	QCI list contains qci=4
	NRNWSLICE_NSA-i.s1Uplane-1.IP2	QCI list contains qci=4
3:	SNSSAI-i.ngUplane-1.IP1	sst=3
	SNSSAI-i.ngUplane-1.IP2	sst=3
	SNSSAI-i.xgUplane-1.IP1	sst=3
	SNSSAI-i.xnUplane-1.IP1	sst=3

Table C-1 Slice Id filter examples and returned results (continued)

Filter value	Slices returned by filter	Specific values matched
3:4	SNSSAI-i.ngUplane-1.IP1	sst=3 and sd=4
	SNSSAI-i.ngUplane-1.IP2	sst=3 and sd=4
	SNSSAI-i.xgUplane-1.IP1	sst=3 and sd=4
	SNSSAI-i.xnUplane-1.IP1	sst=3 and sd=4
:4	SNSSAI-i.ngUplane-1.IP1	sd=4
	SNSSAI-i.ngUplane-1.IP2	sd=4
	SNSSAI-i.xgUplane-1.IP1	sd=4
	SNSSAI-i.xnUplane-1.IP1	sd=4
3,4,:5	NWSLICE-i.Uplane.IP1	QCI list contains qci=3
	NWSLICE-i.Uplane.IP1	QCI list contains qci=4
	NRNWSLICE_NSA-i.s1Uplane-1.IP1	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP2	QCI list contains qci=3
	NRNWSLICE_NSA-i.s1Uplane-1.IP1	QCI list contains qci=4
	NRNWSLICE_NSA-i.s1Uplane-1.IP2	QCI list contains qci=4
	SNSSAI-i.ngUplane-1.IP1	sd=5
	SNSSAI-i.ngUplane-1.IP2	sd=5
	SNSSAI-i.xgUplane-1.IP1	sd=5
	SNSSAI-i.xnUplane-1.IP1	sd=5
:	SNSSAI-i.ngUplane-1.IP1	Any sst:sd
	SNSSAI-i.ngUplane-1.IP2	Any sst:sd
	SNSSAI-i.xgUplane-1.IP1	Any sst:sd
	SNSSAI-i.xnUplane-1.IP1	Any sst:sd