NSP
Network Services Platform
Release 23.11

Release Description

3HE-18985-AAAC-TQZZA
Issue 1
December 2023

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About this document

Purpose

This document is intended to assist network planners and administrators by providing high-level feature descriptions for NSP Release 23, along with the schedule for delivery.

Scope

The NSP Release Description lists and describes all significant features introduced in NSP Release 23, including classic IP management (NFM-P). The features available in your deployment depend on the feature packages you purchased. For information about feature packages and the product functionality they license you to use, see the *NSP System Architecture Guide*.

Document organization

The document is organized on a cumulative basis by release. Descriptions reflect the release in which the feature was introduced. If an enhancement is delivered in a subsequent release, the enhancement feature would appear separately.

Feature descriptions are sorted in alphabetical order by product area, and then by feature key.

For more detailed information and procedures related to the features described in this Release Description document, refer to the customer documentation suite delivered with the NSP product.

Document support

Customer documentation and product support URLs:

- Documentation Center
- Technical support

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1 Introduction

1.1 Release information

1.1.1 Target schedule

Three releases with new content are planned in Release 23, as summarized below:

- Release 23.4 — April 2023
- Release 23.8 — August 2023
- Release 23.11 — December 2023

Service packs in support of these releases will be delivered as required.

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1.2 Ordering information

1.2.1 Sales engineering information

Table 1-1 NSP resources

Resource
Software download from the Nokia Support portal (registered customers only)
License keys (please contact your account representative for assistance)

1.2.2 Pricing information

To obtain NSP pricing information or assistance with ordering, please contact your regional sales representative.

1.2.3 Sizing

Contact your account representative to make a sizing request.

1.2.4 Support for Beta keys

Beta keys are controlled by NSP Product Management. To apply for the NSP Beta Program, contact your account representative.

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1.3 Additional information

1.3.1 Network element support

Please see the *NSP NFM-P Network Element Compatibility Guide* for complete network element compatibility information. This compatibility reference guide is updated frequently to incorporate new network element release information and compatibility with NFM-P. Always consult the latest version on the Doc Center.

1.3.2 Deprecations and support discontinuation notices

Feature deprecation and discontinuation notices are listed in the *NSP Release Notice*.

1.3.3 Scale and architecture

The scalability and performance targets for NSP Release 23 are described in the *NSP Planning Guide*.

1.3.4 Supported operating systems

Please refer to the *NSP Planning Guide* for detailed information about supported operating systems and requirements.

1.3.5 Adaptors and artifacts

Adaptors and other artifacts can be delivered off-cycle and are accompanied by their own documentation.

NSP framework features that support these artifacts are delivered with NSP releases and may be described in this document.

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2 NSP NMS feature descriptions

2.1 Wavence features

2.1.1 [NSPF-239805] NE Inventory: Radio Properties

Release introduced: 23.11

The Radio properties for microwave radio is available in the Info panel from the NE Inventory view.

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2.2 Transport Slice Controller and 5G features

2.2.1 [NSPF-277543] N:1 - use of prefix matching to map slice traffic onto LSPs and reuse of pre-created service

Release introduced: 23.4

Transport Slice Controller introduces a capability to map multiple slice instances into a single VPN. The traffic classification based onthe IPv6 address bits is used to map the slice specific traffic onto the corresponding connectivity construct / LSP tunnel.

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2.3 Simplified RAN Transport features

2.3.1 [NSPF-284836] Manage T-BTS clock synchronization for SyncE and PTP protocols

Release introduced: 23.11

Feature Description

This feature introduces management of T-BTS clock synchronization alarms, which are displayed in NSP for the affected T-BTS. Network Map and Health and the Alarm View are updated in real time.

A new T-BTS plane (S-plane) is introduced and managed in SRT.

Customer Benefit

1. NSP users can use the network map with all NEs on it (T-BTS NEs and IP SR NEs) interconnected, in the Network Map and Health view.

2. NSP users can view sync-related alarms raised against T-BTS nodes.

3. NSP users can see which routers are connected to RAN and T-BTS nodes, with alarms, in topology views.

Restrictions/Limitations

None.

2.3.2 [NSPF-293088] Support of Simplified Microwave Router (SMR) - site tail BTS is connected via pure MW to SMR

Release introduced: 23.11

Functional Description

SRT manages the following topologies where tail BTS are connected via pure Microwave to access network having SMR with IP + MW:

- MRBTS – cable – UBT – radio – UBT (SMR) IXR – cable – core router
- MRBTS – cable – MSS/UBT – radio – UBT (SMR) IXR – cable – core router
- MRBTS – cable – IXR (SMR) UBT – radio – UBT (SMR) IXR – cable – core router

The Binding status of Radio Planes is updated on physical topology links updates between BTS and SMR. Radio plane alarm synthesis available in Radio Plane Binding table takes alarms on the radio port of the router and the transport port of the router into account.

The Radio Plane operational State available in Radio Plane Binding table takes the operational state of the radio port of the router and the transport port of the router into account.

Customer Benefit

SRT supports the SMR solution with BTS connected via pure Microwave to SMR.

Restrictions/Limitations

None.

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2.3.3 [NSPF-268165] Automate stitching of L2 BH service

Release introduced: 23.11

Feature Description

The T-BTS L2 BH brownfield services are automatically stitched and available in NSP Service Management, Network Map and Health, and Object Troubleshooting.

- The created T-BTS L2 BH service is updated on BTS update configuration (vlan, port).
- The stitching of brownfield L2 BH service is also available as a RESTCONF command.

Notes:

- The BTS should be configured as BTS repeater and have at least 2 ports configured with the same VLAN.
- The "automatic stitching" option should be activated and configured (automatic schedule task with default value 5 min) in NSP.

Customer Benefit

T-BTS L2 BH service are available in NSP Service Management, Network Map and Health, and Object Troubleshooting.

Restrictions/limitations

None.

2.3.4 [NSPF-291660] Radio Plane summary for a NE in Troubleshooting dashboard

Release introduced: 23.11

Feature Description

NSP Troubleshooting dashboard supports T-BTS data. The Troubleshooting dashboard provides detailed information for the T-BTS selected in the Network Health Dashboard.

The following T-BTS details are provided in the Summary panel:

- Number of Radio Planes
- Healthy Bound Radio Planes
- Affected Bound Radio Planes
- Misconfigured Radio Planes
- Not Bound Radio Planes

Customer Benefit

- Simplification of Network Health dashboard for T-BTS.
- Alignment of T-BTS troubleshooting usability with standard NSP behavior.

Restrictions/Limitations

None.

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2.3.5 [NSPF-304979] Introduction of T-BTS 3G (WCDMA) Transport domain

Release introduced: 23.11

Feature Description

This feature introduces support of the 3G (WCDMA) RAT for SRAN BTS type. SRT features are extended to the SRAN WCDMA type. The following radio planes are added:

- cPlaneList/ipV4AddressDN
- cPlaneList/ipV6AddressDN
- uPlaneList/ipV4AddressDN
- uPlaneList/ipV6AddressDN

3G RAT is added to the SRT UI to be able to differentiate the radio technology of each RAN application.

Customer Benefit

SRAN WCDMA 6-BTS can be managed like 4G or 5G T-BTS in NSP for assurance, network topology, inventory and radio plane management.

Restrictions/Limitations

Only SRAN WCDMA type T-BTS is supported. Classical BTS 3G WCDMA is not introduced in this feature.

2.3.6 [NSPF-198619] Radio Plane operational state for transport level

Release introduced: 23.11

Functional Description

The Radio Plane operational state is computed according to operational state of:

- any object of a Radio Plane in the BTS (SNSSAI)
- physical port through T-BTS L2 BH service
- L2 backhaul services operational state (across BTS nodes or mix of BTS and microwave)
- L3 service VPRN operational state in routers
- RVLPS operational state
- physical link operational state

The Radio Plane operational state is updated in real time according BTS configuration updates and L2/L3/RPLS/Link operational state updates.

The Radio Plane operational state and the list of objects involved in Radio Plane operational state are available in Radio Plane binding table with columns Operational state and Operational state details.

The Operational State of a bound or misconfigured Radio Plane is:

- disabled if at least one of the operational state is disabled.
- enabled if all the all operational state are enabled.
- unknown if at least one of the operational state state is unknown.

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The Operational state of a not bound Radio Plane is unknown.

In Network Map and Health, Radio Planes are classified as follows:

- Healthy Bound Radio Planes (Radio Planes associated to a Transport Service via their vlanId in the same subnet) with or without alarms and Radio Plane operation state enabled.
- Affected Bound Radio Planes (Radio Planes associated to a Transport Service via their vlanId in the same subnet) with or without alarms and Radio Pane operational state disabled.
- Misconfigured Radio Planes (Radio Planes associated to a Transport Service via their vlanId but with a configuration mismatch) with or without alarms and any Radio Plane operational state value.
- Not Bound Radio Planes (Radio Planes configured with vlanId and transportIpAddress but with no associated Transport Service) with or without alarms and any Radio Plane operational state value.
- Not Configured Radio Planes (Radio Planes with incomplete configuration information, such as missing vlanId or transportIpAddress) with or without alarms and any Radio Plane operational state value.

Notes:

In Network Map and Health, the SRT Radio Plane KPIs have been renamed:

- "Healthy Bound Radio Planes" is the new name of "Bound Radio Planes".
- "Affected Bound Radio Planes" is the new name of "Affected Radio Planes".

Customer Benefit

Radio Plane operational state and Radio Plane operational state details are available in the Radio Plane Binding table.

Restrictions/Limitations

None.

2.3.7 [NSPF-272763] L2 Backhaul Service Real Time update

Release introduced: 23.11

Feature Description

SRT manages and displays Radio Plane Binding status in real time on T-BTS L2 BH services service and service endpoint updates (creation, deletion, and update).

SRT data displayed in the Radio Plane binding table and dashlet counters are updated in real time according to T-BTS L2 BH service configuration updates.

Note:

NSP operators can manually launch the workflow SRT_RefreshServices to update L2/L3 services in SRT backend following L2/L3 backhaul service configuration updates.

Customer Benefit

Radio Plane binding status and KPI counters are updated in real time on T-BTS L2 BH service configuration changes.

Restrictions/Limitations

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None.

2.3.8 [NSPF-284925] RVPLS real-time update

Release introduced: 23.11

Feature Description

RVPLS is managed in SRT but not in real-time. The scope of this feature is to introduce real-time management of RVPLS events in the network.

On reception of an RVPLS update, SRT data is automatically recomputed and updated. Data displayed (Radio Plane Binding table and KPI counters) in Network Map and Health are updated up in real-time according to the configured refresh period. A manual refresh by the operator is still possible using the "click to update" button.

Customer Benefit

Displayed information on Network Map and Health is accurate and updated in near real-time.

Restrictions/Limitations

None.

2.3.9 [NSPF-260904] SRT deployments

Release introduced: 23.11

Feature Description

This feature introduces four deployment types for Simplified RAN Transport (SRT) in function of the operational use cases required:

T-BTS Assurance

- Discover MantaRay NM (formerly NetAct) and T-BTS.
- Display T-BTS in NSP Network Map and Health dashboard and Object Troubleshooting.
- LLDP physical links are discovered and displayed.
- L2 Backhaul services for T-BTS are discovered and displayed in Service Management.

T-BTS Assurance and Provisioning

This deployment option is incremental to "T-BTS Assurance" deployment. The following use case is added:

- Life cycle management of L2 Backhaul services in Service Management for T-BTS for creation, resynchronization, deletion and update operations.

Radio Plane Assurance

This deployment option is incremental to "T-BTS Assurance" deployment. The following use cases are added:

- Display of T-BTS radio planes in Network Map and Health.
- Display of detailed radio planes status according to network topology.

Radio Plane Assurance and Provisioning

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This deployment option is incremental to "Radio Plane Assurance" deployment. The following use case is added:

- Life cycle management of L2 backhaul services in Service Management for T-BTS for creation, resynchronization, delete, and update operations.

Customer Benefit

SRT can be deployed and used without the NSP IBSF installation option, in case life cycle management of L2 Backhaul services are not required. If the use case to address is limited to T-BTS assurance, only the T-BTS adaptor is required.

Restrictions/Limitations

NSP IBSF installation option is required for the deployment options including the Life Cycle of L2 Backhaul services.

2.3.10 [NSPF-279448] Manage life cycle of greenfield and brownfield T-BTS L2 BH services

Release introduced: 23.11

Feature Description

The following operations are available Service Management:

- update a T-BTS L2 BH service: add/remove an endpoint to a T-BTS L2 BH service. On service deployment, the BTS configuration is updated. The configuration shall not be deployed on BTS having l2SwitchingEnabled and vlanAwarenessEnabled not activated.
- audit a T-BTS L2 BH service
- remove a T-BTS L2 BH service. The BTS configuration is updated.
- delete a T-BTS L2 BH service

Customer Benefit

Support of LCM of greenfield and brownfield T-BTS L2 BH services.

Restrictions/Limitations

None.

2.3.11 [NSPF-289423] Usability improvement of Radio Plane Binding table

Release introduced: 23.11

Feature Description

Improve usability of Radio Plane Binding table:

- Provide an at-a-glance view of the Radio Plane binding status.
- Reduce the amount of unnecessary information displayed.
- Provide additional information on transport configuration on T-BTS and router.
- Display one line per radio plane with Aggregated Binding Status and Aggregated Operational State.

Customer Benefit

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Reduce the number of columns and lines in the Radio Plane Binding table of the Network Map and Health view. Simplification of filters for radio plane states and troubleshooting for radio plane bindings.

Restrictions/Limitations

None.

2.3.12 [NSPF-251816] Manage Radio Plane for BTS multi RAT (4G and 5G)

Release introduced: 23.4

Feature Description

SRT manages the Radio Plane of BTS multi RAT (mix of 4G RAT and 5G RAT). 4G and 5G Radio Plane are available in the Radio Plane binding table.

Slices that reference Radio Plane 4G or 5G are identified in Radio Plane binding table with SD/SSRT or QDI according to technology type.

Customer Benefit

The SRT solution is extended to support BTS multi RAT.

Restrictions/Limitations

None.

2.3.13 [NSPF-279136] Enable filter operators on string type column

Release introduced: 23.4

Feature description

NSP operators can apply the filters 'not contains', 'equals', 'notEquals', Starts with", 'Ends with" to Radio Plane Binding table string columns.

Note: Filters mentioned above are not applicable to "Slice Id" column.

Customer Benefit

Operators can drill down in the Radio Pane Binding table using a set of filters.

Restrictions/Limitations

None.

2.3.14 [NSPF-250241] Support of ASOE RAT LTE

Release introduced: 23.4

Feature Description

The SRT solution is extended to support ASOE RAT 4G.

ASOE RAT 4G BTS and physical links are discovered in NSP applications. T-BTS alarms are integrated into the NSP Fault management application. Radio Planes configured in ASOE BTS are audited in the Radio Plane binding table.

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ASOE BTS are represented in Equipment Inventory as SMOD ProductName = "ASOE AirScale Core".

Customer Benefit

Introduction of ASOE 4G RAT BTS in the SRT solution.

Restrictions/Limitations

None.

2.3.15 [NSPF-279101] Expand height of the Radio Plane table

Release introduced: 23.4

Feature Description

The full screen option of the Radio Plane Binding table offers NSP operators the capability to better visualize SRT data for large networks.

Customer Benefit

Enhanced operation efficiency with the Radio Plane binding table full screen option.

Restrictions/Limitations

None.

2.3.16 [NSPF-231196] Monitor T-BTS and NetAct reachability

Release introduced: 23.4

Feature Description

NetAct reachability is monitored by configuring for each NetAct in the Device Administrator application:

- a PING reachability policy to monitor REST endpoint IP address
- a SNMP reachability policy to monitor the SNMP agent IP address

When the NSP detects the loss of communication with NetAct on both reachability policies, NetAct reachability status in Device Admin is set to "Unreachable", the NSP raises the "ReachabilityProblem" alarm (alarm name) referencing the unreachable NetAct.

All BTS managed by the unreachable NetAct are unreachable and the reachability status of each T-BTS in the Device Administrator application is set to "Unreachable".

Upon NetAct communication recovery, NetAct reachability status is set to "Reachable" and the NSP clears the "ReachabilityProblem" alarm.

The reachability status of each T-BTS managed by this NetAct is set to "Reachable" in the Device Administrator application

When only one of the NetAct reachability policy status is "Unreachable", NetAct reachability status is set to "Partially reachable", NSP raises the "ReachabilityProblem" alarm (alarm name) referencing the unreachable NetAct.

All BTS managed by the partially reachable NetAct are "Partially reachable' and the reachability status of each T-BTS in Device Admin is set to "Partially reachable".

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Upon NetAct communication recovery, NetAct reachability status is set to "Reachable" and the NSP clears the "ReachabilityProblem" alarm.

The reachability status of each T-BTS managed by this NetAct is set to "Reachable" in the Device Administrator application

Customer Benefit

NSP monitors NetAct and BTS reachability.

Restrictions/Limitations

None.

2.3.17 [NSPF-273245] Introduction of Simplified Microwave Router (SMR) in SRT

Release introduced: 23.4

Feature Description

At the NSP level, via the Simplified Microwave Router solution, microwave and router nodes are aggregated as a single NE logical entity.

The introduction of SMR in SRT provides the following:

- the availability of the physical link between the T-BTS and the logical NE in NSP topology view
- the computation of Radio Plane binding status when L3 VPN are configured on SMR

SRT supports the topology where the T-BTS is connected to a router port of the SMR.

Customer Benefit

SRT is extended to a new microwave variant.

Restrictions/Limitations

None.

2.3.18 [NSPF-254172] [RoR] Alignment with RAN, NetAct and MW release

Release introduced: 23.4

Feature Description

This feature captures the support of 23R1-SR release in SRT.

RAN releases

- SRAN 21B, 5G 21B
- 22R1-SR, 22R1-5G
- 22R2-SR, 22R3-SR, 22R4-SR

NetAct releases

NetAct 20, NetAct 22.

Wavence releases

Releases supported by NSP 23.4.

Support of 5G NSA and 5G SA.

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Customer Benefit

Support of transport part of 23R1-SR releases in SRT.

2.3.19 [NSPF-253970] Consider BFD configuration in T-BTS during Radio Plane audit

Release introduced: 23.4

Feature Description

SRT displays all paths configured in the BTS routing table (IPRT managed object) corresponding to the Radio Plane IP address in the Radio plan binding table.

The following routing path parameters are available in Radio Plane binding table:

- Preference (configured in BTS routing table)
- Routing State:
  - active for paths configured in BTS routing table (IPRT-R object) with lowest preference
  - standby for other paths with the same destination subnet configured in BTS
- Rerouting enabled: this parameter indicates if the path is supervised or not. It is based on the triggerDN configured in BTS routing table (for example, BFD)
  - true: the path is supervised (a triggerDN is configured on the BTS)
  - false: the path is not supervised (a triggerDN is not configured on the BTS)
- Gateway

The Radio Plane binding table is updated on BTS configuration change notification (on Routing state or triggerDN) and/or BTS configuration resynchronisation. NSP operators can apply filters on the Radio Plane binding column Preference, Rerouting enabled, Routing State. Radio Planes are sorted in Radio Pane Binding table according the Preference configured on the path.

Customer benefit

SRT Radio Plane audit and binding status computation on link supervision configured on the BTS.

Restrictions/Limitations

None.

2.3.20 [NSPF-258859] Introduction of Cisco CSR in SRT

Release introduced: 23.4

Feature Description

SRT supports topologies with Cisco routers relying on a Cisco router adaptor delivered by NSP platform. SRT discovers Cisco routers and physical links in the Network Supervision Topology view.

Cisco L3VPN brownfield services are available in Service Fulfillment and Cisco L3VPN updates configuration are handled in real time in SRT.

The Radio Plane binding status is updated accordingly.

Customer Benefit

Topologies supported by SRT are extended with the introduction of Cisco routers.

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Restrictions/Limitations

None.

2.3.21 [NSPF-254970] Support of R-VPLS configuration on CSR port

Release introduced: 23.4

Feature Description

SRT supports VPLS configured on each router physical port. Radio Plane binding status is updated for RVPLS configuration updates and VLPLS service name is available in Radio Plane binding table.

Using the Workflow Manager application, NSP operators can manually launch the workflow SRT_RefreshServices to update RVPLS services in SRT backend upon RVPLS service configuration updates.

The physical links between the T-BTS and to the router are updated upon VPLS (of the corresponding VPRN) configuration updates. Alarms on VPLS are counted in the computation of Radio Plane alarm synthesis and Radio Plane alarm count of Radio Plane binding table.

When binding a Radio Plane to a Transport Service, NSP operators can select a VPRN that references a VPLS. The Service Fulfillment application provides VPRN and VPLS component service details.

Customer Benefit

R-VPLS configuration on CSR are supported by the SRT solution.

Restrictions/Limitations

None.

2.3.22 [NSPF-283756] Consider IPRT indirect routes for T-BTS Radio Plane binding audit

Release introduced: 23.4

Feature Description

SRT considers all the paths configured in T-BTS routing table to compute Radio Plane binding status. SRT manages the source routing configuration for virtual IP and transport IP, configured on the BTS.

Routing information is available in the Radio Plane binding table for each Radio Plane:

- "T-BTS Radio Plane Source IP Address" (to identify T-BTS Transport IP address for direct route)
- "Gateway" (to identify indirect route in case of gateway is configured).

Customer Benefit

Visibility of Radio Plane binding status for all routes configured on the BTS.

Restrictions/Limitations

None.

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2.4 Service Management features

2.4.1 [NSPF-246623] Ability to list Routing Policies

Release introduced: 23.11

This feature enables users to view logical inventory that has been defined in the managed network such as QoS policies, routing policies, and ACLs. This allows users to verify that required policies have been defined before beginning service creation.

2.4.2 [NSPF-221506] Ability to clone a service

Release introduced: 23.11

This feature introduces the ability to clone a service.

2.4.3 [NSPF-226239] Ability to invoke Infrastructure Configuration Management actions from the Service Fulfillment application

Release introduced: 23.4

This feature enables users to perform ICM actions on inventory items listed within the Service Fulfillment application.

2.4.4 [NSPF-243157] Bulk associate brownfield services to service templates

Release introduced: 23.4

This feature enables users to configure a set of rules to be followed when automatically associating brownfield services with service templates.

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2.5 Path Control features

2.5.1 [NSPF-230556] Visualise Flex-Algo support

Release introduced: 23.11

Additional FlexAlgo SIDs can be seen in the Info panel when selecting a node from the path control network map or node list views.

The Path Finder API and GUI are also enhanced to allow the specification of a FlexAlgo number which will enable the visibility of the path that packets will follow when using this FlexAlgo.

2.5.2 [NSPF-203002] User scope of command

Release introduced: 23.11

Multiple levels of scope of command are added to the Path Control:

1. Engineer - For commissioning
2. Operator - For LSP management
3. Troubleshooter - For debugging

2.5.3 [NSPF-280846] Automation Support for Latency-based Telemetry Optimization on 7210

Release introduced: 23.4

Latency-based telemetry is supported for 7210 through SNMP collection for interface latency.

2.5.4 [NSPF-280844] Automation Support for Latency-based Telemetry Optimization on 7705

Release introduced: 23.4

Latency-based telemetry is supported for 7705 through SNMP collection for interface latency.

2.5.5 [NSPF-202967] Visualize LSPs per path-profile and path-group on IP/MPLS Optimization map

Release introduced: 23.4

LSPs can be grouped by path-profile-group in listing form as well as being viewed as a group on the map.

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2.6 OMNI features

2.6.1 [NSPF-245813] AOS 8.9R03 Support

Release introduced: 23.11

NSP would support new AOS 8.9 R03 release on all applicable ALE devices managed by it.

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2.7 Network Configuration features

2.7.1 [NSPF-254924] LSP Management Phase 2

Release introduced: 23.11

Additional support of PCE-Init LSPs using draft-ietf-teas-yang-te

2.7.2 [NSPF-301293] Provide a single topic for Infrastructure Configuration Management lifecycle states

Release introduced: 23.11

Feature Description

This feature creates a single topic in kafka with messages for all ICM deployment status changes.

Each status change is one message in the topic.

A user can query this topic against a deployment to see multiple messages in sequence with status changes.

Customer Benefit

The single topic will help the OSS to analyze the status change of a deployment from deployment-created→creating-intent→intent-created>aligning-intent→intent-aligned.

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2.8 Mediation Collection features

2.8.1 [NSPF-290198] Implement Telemetry for cloud native - Phase 2

Release introduced: 23.11

Cloud-native Telemetry (CN TLM) is introduced for the collection of statistics for devices supporting the gRPC/gNMI protocol. CN TLM micro services enhance collection performance and scalability while allowing MDM to focus its resources on mediation tasks. Note that in this release MDM will continue to support the collection of SNMP statistics for multi-vendor devices and the collection of accounting statistics.

2.8.2 [NSPF-272671] OAM GUI App Enhancements 23.11

Release introduced: 23.11

Feature description

This feature improves the GUI by:

- automating filtering GUI operations
- handling non-nodal OAM results

Customer benefits

These enhancements enhance the usability and visualizing test and test-suite results.

2.8.3 [NSPF-184018] RESTCONF: Search Enhancements (Paging)

Release introduced: 23.11

Feature Description

This feature incorporates paging functionality in Model Device Configurator (MDC) API, which allows users to handle large data sets by specifying the number of items per page and utilizing pagination parameters.

Customer Benefit

Paging functionality improves performance and reduces bandwidth usage when working with large datasets, as only the requested subset of data is retrieved. Moreover, it improves GUI navigation.

2.8.4 [NSPF-271841] [MDM-OAM] OAM API to retrieve all test results given a test type

Release introduced: 23.11

Feature Description

This feature focuses on developing a RESTConf call to enable the retrieval of OAM test results for a particular test type. The API not only allows specifying the test type (e.g. OAM-PM DMM), but also applying filters such as time range and fields.

Customer Benefit

The API/RESTConf call streamlines the process of retrieving test results by providing a convenient and efficient method. Users no longer need to manually search through all the OAM tests. Users

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have the flexibility to apply various filters to refine their search for test results. They can specify a specific test type, define a time range, and select specific fields of interest. This level of customization allows users to retrieve only the relevant data, eliminating the need to sift through irrelevant or redundant information.

2.8.5 [NSPF-262067] [MDM-OAM] Multi-vendor TWAMP Light - Test Adaptor

Release introduced: 23.11

Feature Description

Two-Way Active Measurement Protocol (TWAMP) provides a standards-based method for measuring the IP performance (packet loss, delay, and jitter) between two devices. TWAMP Light is an optional model included in the TWAMP standard. TWAMP Light uses the standard TWAMP packet format but provides a lightweight approach to gathering ongoing IP delay, jitter and synthetic loss performance data.

Customer Benefit

The feature enables vendor-agnostic TWAMP Light from NSP. This feature provides a generic TWAMP Light model, which is the basis for developing TWAMP Light adaptors for third-party devices. MV support requires the development of adaptors to support this capability. Review support in the target vendor and family.

2.8.6 [NSPF-267421] Modeled Device Configurator: RESTCONF support for with-defaults query params ('report-all' & 'explicit')

Release introduced: 23.4

Feature Description

RESTCONF protocol supports two query parameters called 'report-all' and 'explicit' for handling the default values of the data nodes as described in RFC 8040, the behavior of each query is:

- When 'report-all' is used, the information in the response includes all the values, regardless of whether the values are the same as the default values or not.
- When 'explicit' is used, the information that has non-default values is included in the response.

Customer Benefit

These query parameters can be used with GET and GET-config methods to retrieve data resources from network devices via Model Device Configuration using RESTCONF protocol. By using these query parameters, the client can choose how to handle default values and get a more accurate representation of the data resources on the device.

Moreover, this feature is used by NSP applications to improve their efficiency by using 'report-all' and 'explicit' to obtain the required parameters.

2.8.7 [NSPF-262021] NSP YANG Framework Extensions: Improvements in the support of WHEN clause

Release introduced: 23.4

Feature Description

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Yet Another Next Generation (YANG) is a data modelling language for the definition of data sent over network management protocols such as the NETCONF and RESTCONF.

YANG provides statements in RFC 6020 to model the data used for network management.

Customer Benefit

The feature enables the support for when statements. The **"when" statement** makes its parent data definition statement conditional. The node defined by the parent data definition statement is only valid when the condition specified by the "when" statement is satisfied.

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2.9 Infrastructure features

2.9.1 [NSPF-252007] Make Oauth2 the default sso mechanism

Release introduced: 23.11

Keycloak-based OAUTH2 authentication is now the default NSP Single-Sign-On (SSO) mechanism. KeyCloak supports local user management, as well as SSO access for local and remote users. TACACS, RADIUS, and LDAP are supported for remote access.

A Release 23.11 NSP system in OAUTH2 mode includes a UI function for importing NFM-P local users to the NSP local user database.

CAS remains supported for use in IP/optical deployments.

2.9.2 [NSPF-217619] Improve monitoring for support of NSP

Release introduced: 23.4

Feature Description

The feature adds a system administration dashboard UI to the NSP. The dashboard includes such elements as near-real-time KPIs displayed in graphical and text format.

Customer Benefit

The feature simplifies NSP system monitoring, management, and troubleshooting.

Restrictions/Limitations

None

Applicability

Applicable NSP 23.4

2.9.3 [NSPF-268181] Support the ability to verify the NSP DB replication status in HA/DR deployments

Release introduced: 23.4

Feature Description

The feature provides a way to verify the NSP DB replication status in an HA/DR deployment. An NSP operator can run a command to show the current replication status of the various NSP databases, such as PostgreSQL and Neo4j.

A future release may incorporate a visualization of the command result in an administration GUI.

Customer Benefit

The main customer benefits are greater visibility of the replication status, and the ability to detect misalignments among the various NSP database replicas, whether geographically dispersed, or local to the NSP cluster, as in an enhanced deployment.

The feature provides operator assurance before performing a manual switchover by making key redundancy status information available.

Restrictions/Limitations

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None.

Applicability

Applicable NSP 23.4.

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2.10 Cross Domain Coordination features

2.10.1 [NSPF-290472] Ciena T-API Controller - 2.4.1 support Phase 1

Release introduced: 23.11

NSP supports TAPI version R2.4.1.

2.10.2 [NSPF-289573] TIP MUST 400ZR link creation

Release introduced: 23.8

This feature allows for automated provisioning of 400ZR links utilizing T-API to communicate the 4 coherent parameters between NSP and WS-NOC: Power level, center frequency, Mode, and admin state. Link creation is initiated by NSP IM, which triggers WS_NOC to provide the required parameter values via T-API. This eliminates the need for the customer to manually execute provisioning commands to establish cross-layer coordination.

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2.11 Automation Frameworks features

2.11.1 [NSPF-286108] Operations Manager | User Experience Backup Restore

Release introduced: 23.11

This capability allows users to access the list of available backups (operations and files) for a given node, choose a backup to perform a restore operation and compare files within two backups.

2.11.2 [NSPF-206055] Network Intents | RBAC: Span of Control

Release introduced: 23.11

Control which individual users or group of users can create/read/update/delete intents per intentType.

2.11.3 [NSPF-286106] Policy-based cleanup of workflow execution results

Release introduced: 23.11

With this functionality, users can define clean up policies to automatically remove old workflow and operation executions based on labels, names, operation types, status, etc.

The user defines the schedule on which the policy is executed and the retention time, so that executions that are older than this time are automatically removed from the system.

2.11.4 [NSPF-291914] Network Intents: Approved misalignments

Release introduced: 23.11

This feature allows users to approve configuration drift, where the desired device configuration snippet differs from the actual device configuration snippet.

Approved changes are persisted and applied to future audit and sync operations.

2.11.5 [NSPF-269509] Intent Manager | Intent-Type Decomposition for Artifact Administrator (schema-form/view-config)

Release introduced: 23.4

This feature permits decomposing artifacts within an intent type (i.e. schema-form/view-config definitions) to maintain a separate lifecycle using Artifact Administrator.

2.11.6 [NSPF-261762] LSO | User Experience: Operations Queue versus History

Release introduced: 23.4

This feature combines the operations and history queues into a single queue to ease the tracking of running operations and avoid operations from automatically disappearing from the operations queue when finished.

This feature enables troubleshooting options in operations already terminated (history).

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2.11.7 [NSPF-250743] Workflow Manager | Dual Management (CLI, FILE TRANSFER) Phase1

Release introduced: 23.4

This feature provides a consistent way to access MDM and classic managed devices using management protocols directly. Part of the feature is the access using CLI and file-transfer such as SCP or SFTP.

With this feature it is possible to implement use-cases like NE Backup/Restore and NE Software Upgrades without relying on NFM-P backend functions for those NE operations.

Note: To enable this functionality, the right MDM discovery adaptors must be in place. For 19.X and newer SROS releases, NETCONF can be used as the discovery protocol. Additionally, for any release shallow discovery via SNMP can be enabled when installing the appropriate discovery adaptor. This discovery adaptor will be delivered off-cycle post 23.4.

2.11.8 [NSPF-266109] Intent Manager | Programmability: Provide JSON input at JavaScript API Phase 2

Release introduced: 23.4

Intent script methods can now access the intent data in JSON without the need to do manual schema-aware conversion of XML to JSON. This leads to a simplification of the intent code.

2.11.9 [NSPF-250509] Intent Manager | Mediator to talk to external NFMP

Release introduced: 23.4

Support integration with one or more external NFM-P instances, including redundancy and older NFM-P releases.

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2.12 Assurance features

2.12.1 [NSPF-293248] Migration of Grouping Concept within new NSP Navigation

Release introduced: 23.11

NSP 23.11 offers brand new and improved GUI visualization for fault management, network and service assurance as part of the network health summary and troubleshooting dashboards with a much easier access to all the functionality and tools via the new NSP GUI navigation system. Operators will have an enhanced user experience.

As a result of this change, there is no need anymore for having to create network and service supervision views and groups in order to get NEs, links and services under supervision and assurance. In other words, there are manual steps for on-boarding of network and service assurance.

2.12.2 [NSPF-310193] GUI Support for Logical Inventory - GA

Release introduced: 23.11

NSP 23.11 offers brand new and improved GUI visualization for fault management, network and service assurance as part of the network health summary and troubleshooting dashboards with a much easier access to all the functionality and tools via the new NSP GUI navigation system. Operators will have an enhanced user experience.

This feature includes a brand new and complete equipment and logical (e.g. routing areas and interfaces) for any given Network Element (NE) with in-context navigation from NEs available on the network health summary and troubleshooting dashboards.

2.12.3 [NSPF-279943] Fault Management GUI application evolution

Release introduced: 23.11

The former Fault Management application has evolved in NSP 23.11 to offer improved GUI visualization for fault management as part of the network health summary and troubleshooting dashboards with a much easier access to all the functionality and tools via the new NSP GUI navigation system. Operators will have an enhanced user experience.

2.12.4 [NSPF-279946] Network Supervision -GUI evolution into dashboards

Release introduced: 23.11

The former Network Supervision application has evolved in NSP 23.11 to offer improved GUI visualization for network assurance as part of the network health summary and troubleshooting dashboards with a much easier access to all the functionality and tools via the new NSP GUI navigation system. Operators will have an enhanced user experience.

2.12.5 [NSPF-279948] Service Supervision GUI application evolution into dashboards

Release introduced: 23.11

The former Service Supervision application has evolved in NSP 23.11 to offer improved GUI visualization for service assurance as part of the network health summary and troubleshooting

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dashboards with a much easier access to all the functionality and tools via the new NSP GUI navigation system. Operators will have an enhanced user experience.

2.12.6 [NSPF-292342] BNG CUPS - Dashlet for Subscriber Performance KPIs

Release introduced: 23.8

As part of this feature, new BNG CUPS dashlets have been introduced to capture following Subscriber level KPIs in Network Health and Troubleshooting dashboard :

- Subscriber Count
- Subscriber Session Count for IPoE, PPPoE, FWA, IPv4, IPv6 etc

2.12.7 [NSPF-292340] BNG CUPS - Dashlet for System Performance KPIs

Release introduced: 23.8

As part of this feature, new BNG CUPS dashlets have been introduced to capture following System level KPIs in Network Health and Troubleshooting dashboard :

- CPU Usage
- Memory Usage
- ODSA Pool Usage
- PFCP Peer Connectivity View
- Control Plane and User Plane Node View
- Control Plane - 1:1 Hot Redundancy View

2.12.8 [NSPF-273661] TIP MUST - IETF Network Topology [L3 enhancements to add SR TE support]

Release introduced: 23.4

NSP has enhanced support for retrieval of Layer 3 topology via RESTCONF APIs and, in accordance to the IETF models specified in RFC8346, for layer 3 with the addition of the TE information.

2.12.9 [NSPF-291810] Service Troubleshooting dashboard - additional components health added to service

Release introduced: 23.4

In 23.4, the network troubleshooting dashboard has added service components to the service dashboard, i.e. a list of sites, endpoints, and bindings.

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2.13 Analytics features

2.13.1 [NSPF-293291] N&S: MW Radio Links Summary Report

Release introduced: 23.8

Use cases

Capacity Planning—Use the report to examine the utilization of the links and audit.

Troubleshooting – Use the report to examine the performance degradation.

Supported Nodes:- Wavence nodes which support radio links.

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3 NSP nodal feature descriptions

3.1 Wavence features

3.1.1 [NSPF-297863] MSS-E/HE/XE & NIM OSPFv3

Release introduced: 23.11

New section needs to be added

Attributes under WebCT - Networking Configuration to be update for OSPFV6 configuration.

A) Enable TMN/PPP

B) OSPF

C) Area #1, #2 and #3

D) Area ID

E) Stub

Do TMN/PPP OSPF Network Configuration by check (✓) under Area #0/1/2/3

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3.2 Simplified RAN Transport features

3.2.1 [NSPF-208804] Creation of T-BTS L2 backhaul on one or several T-BTS

Release introduced: 23.4

Feature Description

NSP operators can provision a T-BTS L2 BH service in Service Fulfillment using a dedicated T-BTS service intent.

The service intent "tbtsbackhaul" shall be imported in NSP.

On T-BTS L2 BH service creation, the NSP operator specifies the following information:

- Template name : Template created by operator based on_ tbtsbackhaul_ intent
- Service name:
- Customer Id: selected through a pre-defined customer list
- Service description
- outer tag: VLAN ID of the service
- the list of T-BTS part of the service and for each T-BTS, the endpoints to be configured with the VLAN ID (at least two endpoints are required). All endpoints must be provided, with the final and intermediate endpoints along the path.

Notes:

- NSP operators must be aware of physical topology and shall provide final and intermediate endpoint along the physical link.
- T-BTS L2 BH service update, delete and LCM in Service Fulfillment are not supported for services deployed on the BTS.
- NSP Operators must use NetAct to update or delete T-BTS L2 BH service deployed on BTS. The new configuration is available in NSP following resynchronization with the BTS.
- On T-BTS L2 BH service creation failure, the service Deployer State is "Failed" in Service Fulfillment. NSP operators must delete and recreate the service in Service Fulfillment.
- The service creation will not be sent to BTS not configured as repeater.

Customer Benefit

Provisioning of T-BTS L2 BH service on one or several BTS repeater.

Restrictions/Limitations

None.

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3.3 OMNI features

3.3.1 [NSPF-257874] Support for OS6900T48-F

Release introduced: 23.8

This feature supports OmniSwitch 6900T48, that offers 48 1-10 GigE SFP+/1-10 GBASE-T ports and six 100 GigE QSFP28 ports that operate at 100 GigE or 40 GigE, with two ports splittable either 4x25 GigE or 4x10 GigE.

3.3.2 [NSPF-257876] Support for OS6900C32E-F

Release introduced: 23.8

This feature supports OmniSwitch 6900C32E, that offers 32 x QSFP28 ports and can operate at 100 GigE, 4x25 GigE, 40 GigE, or 4x10 GigE. The maximum density of 25G ports is 128 ports.

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3.4 Assurance features

3.4.1 [NSPF-251829] BNG CUPS - MAG-c Fault Management

Release introduced: 23.4

This feature delivered Alarm Support for MAG-C 23.3 R1.

3.4.2 [NSPF-271650] BNG CUPS - Subscriber Performance parameters

Release introduced: 23.4

This feature delivered BNG CUPS Subscriber Session Telemetry KPIs support for MAG-C 23.3 R1.

3.4.3 [NSPF-271648] BNG CUPS - System Performance parameters

Release introduced: 23.4

This feature delivered BNG CUPS System Telemetry KPIs support for MAG-C 23.3 R1.

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4 NSP Release 23 features at a glance

4.1 NMS feature list

4.1.1 NSP NMS features

Table 4-1 NSP Release 23.11

Key	Summary	Area
[NSPF-197737]	Interface Utilization with forecast (NSP)	Analytics
[NSPF-230427]	Interface Utilization Summary (NSP) report	Analytics
[NSPF-253777]	Indicators - Scale	Analytics
[NSPF-276833]	SRL- NSP Inventory Reports	Analytics
[NSPF-276836]	SRL- NSP Utilisation Reports	Analytics
[NSPF-279943]	Fault Management GUI application evolution	Assurance
[NSPF-279946]	Network Supervision -GUI evolution into dashboards	Assurance
[NSPF-279948]	Service Supervision GUI application evolution into dashboards	Assurance
[NSPF-293248]	Migration of Grouping Concept within new NSP Navigation	Assurance
[NSPF-310193]	GUI Support for Logical Inventory - GA	Assurance
[NSPF-206055]	Network Intents | RBAC: Span of Control	Automation Frameworks
[NSPF-246795]	Resource Management | Allocation algorithm performance -Numeric Pool	Automation Frameworks
[NSPF-280882]	LSO | User Experience: Automatic fallback	Automation Frameworks
[NSPF-280886]	LSO | User Experience: Option to execute phase target by target	Automation Frameworks
[NSPF-286106]	Policy-based cleanup of workflow execution results	Automation Frameworks
[NSPF-286108]	Operations Manager | User Experience Backup Restore	Automation Frameworks
[NSPF-286110]	Workflow Migration tool from NFM-P CLI scripts	Automation Frameworks
[NSPF-291914]	Network Intents: Approved misalignments	Automation Frameworks
[NSPF-293165]	Artifacts | Alarms integration with NSP	Automation Frameworks
[NSPF-290472]	Ciena T-API Controller - 2.4.1 support Phase 1	IP/Optical Coordination
[NSPF-295136]	IP/optical coordination - Ciena Controller real time notification support	IP/Optical Coordination
[NSPF-313068]	Add WS-NOC in UI main menu	IP/Optical Coordination
[NSPF-279043]	Support SRL OS 23.3.2	Device Operations

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Table 4-1 NSP Release 23.11 (continued)

Key	Summary	Area
[NSPF-279045]	Support SRL OS 22.11.3	Device Operations
[NSPF-279047]	Support SRL OS 23.7.1	Device Operations
[NSPF-279049]	Support SRL OS 23.7.2	Device Operations
[NSPF-304817]	Support SRL OS 23.3.3	Device Operations
[NSPF-229633]	Provide proper details for switch of activity alarms	Infrastructure
[NSPF-246919]	File Server UI - file viewer/editor	Infrastructure
[NSPF-251779]	RBAC - Scope of Command - Application access for new UI paradigm	Infrastructure
[NSPF-252007]	Make Oauth2 the default sso mechanism	Infrastructure
[NSPF-262861]	Support installation of NSP in restricted PSA	Infrastructure
[NSPF-271286]	Introduce System Administration Dashboard	Infrastructure
[NSPF-288885]	Update NSP K8S Platform Packages - kubespray 2.22 (k8s v1.26)	Infrastructure
[NSPF-294636]	Support VMWare ESXi 8.0	Infrastructure
[NSPF-184018]	RESTCONF: Search Enhancements (Paging)	Mediation Collection
[NSPF-262067]	[MDM-OAM] Multi-vendor TWAMP Light - Test Adaptor	Mediation Collection
[NSPF-271841]	[MDM-OAM] OAM API to retrieve all test results given a test type	Mediation Collection
[NSPF-272671]	OAM GUI App Enhancements 23.11	Mediation Collection
[NSPF-283875]	RESTCONF support for query parameter "content"	Mediation Collection
[NSPF-290198]	Implement Telemetry for cloud native - Phase 2	Mediation Collection
[NSPF-292697]	Telemetry certification for MV support using gNMI	Mediation Collection
[NSPF-227765]	Access Port - RS232 Predefined Intent	Network Configuration
[NSPF-229552]	NGE support - Predefined Intent Type	Network Configuration
[NSPF-250225]	Predefined for E&M Ports	Network Configuration
[NSPF-254924]	LSP Management Phase 2	Network Configuration
[NSPF-274922]	Ability to multi edit multiple config instances	Network Configuration
[NSPF-275625]	Ability to multi audit/align config instances (Audit NE configs use case)	Network Configuration
[NSPF-301293]	Provide a single topic for Infrastructure Configuration Management lifecycle states	Network Configuration
[NSPF-304598]	Product artifact for SROS customer management	Network Configuration
[NSPF-245813]	AOS 8.9R03 Support	OMNI
[NSPF-203002]	User scope of command	Path Control

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Table 4-1 NSP Release 23.11 (continued)

Key	Summary	Area
[NSPF-230556]	Visualise Flex-Algo support	Path Control
[NSPF-268853]	Grafana dashboards (Stats and metrics)	Path Control
[NSPF-289919]	IGP Topology Discovery Service (Phase 2)	Path Control
[NSPF-217731]	Protect port 8443 against Cross-Site Scripting (NFM-P)	Platform core
[NSPF-304657]	Windows Server 2022 support for the client delegate and single-user client	Platform core
[NSPF-221506]	Ability to clone a service	Service Management
[NSPF-245444]	Support of service span - Span of control	Service Management
[NSPF-246623]	Ability to list Routing Policies	Service Management
[NSPF-249662]	Ability to view which LSPs auto-bind services are using	Service Management
[NSPF-254338]	NSP as a domain controller for multiple HCOs	Service Management
[NSPF-267823]	Customer management	Service Management
[NSPF-277721]	Ability to list QoS policies from inventory model	Service Management
[NSPF-279153]	Ability to copy/clone a table entry	Service Management
[NSPF-280768]	Ability to enable a pop up when removing table entries	Service Management
[NSPF-286622]	Menu option to invoke Audit/Align on inventory objects targets	Service Management
[NSPF-287721]	Complete VLAN awareness on port selection in UX	Service Management
[NSPF-300373]	Improve asynchronous messaging for deployment	Service Management
[NSPF-198619]	Radio Plane operational state for transport level	Simplified RAN Transport
[NSPF-260904]	SRT deployments	Simplified RAN Transport
[NSPF-268165]	Automate stitching of L2 BH service	Simplified RAN Transport
[NSPF-272763]	L2 Backhaul Service Real Time update	Simplified RAN Transport
[NSPF-279448]	Manage life cycle of greenfield and brownfield T-BTS L2 BH services	Simplified RAN Transport
[NSPF-284836]	Manage T-BTS clock synchronization for SyncE and PTP protocols	Simplified RAN Transport
[NSPF-284925]	RVPLS real-time update	Simplified RAN Transport
[NSPF-289423]	Usability improvement of Radio Plane Binding table	Simplified RAN Transport
[NSPF-291660]	Radio Plane summary for a NE in Troubleshooting dashboard	Simplified RAN Transport

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Table 4-1 NSP Release 23.11 (continued)

Key	Summary	Area
[NSPF-293088]	Support of Simplified Microwave Router (SMR) - site tail BTS is connected via pure MW to SMR	Simplified RAN Transport
[NSPF-294598]	Deliver SRT workflows as artifacts	Simplified RAN Transport
[NSPF-304979]	Introduction of T-BTS 3G (WCDMA) Transport domain	Simplified RAN Transport
[NSPF-239805]	NE Inventory: Radio Properties	Wavence
[NSPF-265908]	OAM support for MW services	Wavence
[NSPF-293558]	Service Assurance - Support "blocking" state in service maps	Wavence
[NSPF-303137]	RSL/Log file Policy support	Wavence

Table 4-2 NSP Release 23.8

Key	Summary	Area
[NSPF-293291]	N&S: MW Radio Links Summary Report	Analytics
[NSPF-292340]	BNG CUPS - Dashlet for System Performance KPIs	Assurance
[NSPF-292342]	BNG CUPS - Dashlet for Subscriber Performance KPIs	Assurance
[NSPF-293586]	NE physical inventory GUI - add additional manufacturing data for pluggable modules (DCR)	Assurance
[NSPF-234036]	Device Admin : Ability to edit a scheduled operation	Automation Frameworks
[NSPF-289573]	TIP MUST 400ZR link creation	Cross Domain Coordination
[NSPF-290470]	ZR/ZR+ : Managed alien solution	Cross Domain Coordination
[NSPF-291769]	IP/Optical : Integrate NSP 23.4 and 23.8 with WS-NOC/WS-RC 23.6	Cross Domain Coordination
[NSPF-221400]	Support SELinux in enforcing mode for NSP	Infrastructure
[NSPF-294537]	NSP Integration in the context of 4K model driven SROS node network - Part 2	SDN Scale Performance

Table 4-3 NSP Release 23.4

Key	Summary	Area
[NSPF-245870]	Top N Worst Emulated Services reports enhancements	Analytics
[NSPF-259351]	Dynamic NE Types support in Reports	Analytics
[NSPF-261173]	Enhancement to Port Forwarding Class Details	Analytics
[NSPF-261667]	Uptime Report enhancements	Analytics

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Table 4-3 NSP Release 23.4 (continued)

Key	Summary	Area
[NSPF-266518]	Enhancement to Comprehensive - Port and interface Forwards Report	Analytics
[NSPF-267947]	Node Power & Voltage Summary	Analytics
[NSPF-267949]	Enhancements to Optical Power & Voltage Summary & Details Report	Analytics
[NSPF-268439]	Enhancement to Comprehensive - Port and interface Utilization Summary	Analytics
[NSPF-268441]	Enhancement to NSP- Port Inventory	Analytics
[NSPF-268470]	Enhancements to Comprehensive Node Availability Summary report	Analytics
[NSPF-242374]	NE physical inventory Yang/RESTCONF APIs - add additional manufacturing data for pluggable modules (DCR) Phase1	Assurance
[NSPF-258493]	BNG CUPS - Device Discovery Adaptor	Assurance
[NSPF-264739]	NSP Fault Management - provide alarm correlation for MD SROS alarms (services)	Assurance
[NSPF-271972]	Network assurance - IETF L2 Topology - modify links to become uni-directional	Assurance
[NSPF-273661]	TIP MUST - IETF Network Topology [L3 enhancements to add SR TE support]	Assurance
[NSPF-277089]	NSP Fault Management - Vendor Agnostic Service Model related gNMI ON_CHANGE alarms - MD SR OS	Assurance
[NSPF-277093]	NSP Fault Management - Logical Inventory related gNMI ON_CHANGE alarms - SR OS	Assurance
[NSPF-280618]	Rule Based gNMI ON_CHANGE : Artifact Administrator and Version control Phase 2	Assurance
[NSPF-291810]	Service Troubleshooting dashboard - additional components health added to service	Assurance
[NSPF-250103]	Workflow Manager | Component Upgrade: libyang to libyang2	Automation Frameworks
[NSPF-250509]	Intent Manager | Mediator to talk to external NFMP	Automation Frameworks
[NSPF-250641]	Workflow Manager | Configurable Execution Retention	Automation Frameworks
[NSPF-250743]	Workflow Manager | Dual Management (CLI, FILE TRANSFER) Phase1	Automation Frameworks
[NSPF-255062]	Workflow Manager and Intent Manager GUI Enhancements Phase1	Automation Frameworks
[NSPF-261762]	LSO | User Experience: Operations Queue versus History	Automation Frameworks
[NSPF-264160]	ArtifactMgmt | WebUI	Automation Frameworks
[NSPF-264162]	ArtifactMgmt | Dependency Management	Automation Frameworks

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Table 4-3 NSP Release 23.4 (continued)

Key	Summary	Area
[NSPF-266109]	Intent Manager | Programmability: Provide JSON input at JavaScript API Phase 2	Automation Frameworks
[NSPF-269509]	Intent Manager | Intent-Type Decomposition for Artifact Administrator (schema-form/view-config)	Automation Frameworks
[NSPF-280884]	LSO | User Experience: Error messages at WebUI	Automation Frameworks
[NSPF-280888]	LSO | User Experience: Access to pre/post check reports	Automation Frameworks
[NSPF-283884]	File upload on nsp.https action	Automation Frameworks
[NSPF-187206]	NRC-X adapter for Ciena Optical controller	Cross Domain Coordination
[NSPF-194188]	NRC-X: LLI enhancement	Cross Domain Coordination
[NSPF-246694]	Reference Intent for provisioning ZR link for UC1x	Cross Domain Coordination
[NSPF-197658]	NBI | Add authentication to kafka when registering to topics	Infrastructure
[NSPF-217619]	Improve monitoring for support of NSP	Infrastructure
[NSPF-236365]	Explicit logout message must be displayed to the user	Infrastructure
[NSPF-265684]	Upgrade NSP K8S Platform - kubespray v2.20 (k8s 1.24)	Infrastructure
[NSPF-268181]	Support the ability to verify the NSP DB replication status in HA/DR deployments	Infrastructure
[NSPF-215133]	[MDM-OAM] Add High Availability, Load Balancing and Horizontal Scaling	Mediation Collection
[NSPF-238405]	gNMI on-change notifications for OAM md-resync	Mediation Collection
[NSPF-256937]	Flow Collector for IP/MPLS Optimization without NFM-P	Mediation Collection
[NSPF-258784]	[MDM-OAM] Verify OAM and CFM generation for NFM-P to MDM scenarios	Mediation Collection
[NSPF-262021]	NSP YANG Framework Extensions: Improvements in the support of WHEN clause	Mediation Collection
[NSPF-267421]	Modeled Device Configurator: RESTCONF support for with-defaults query params ('report-all' & 'explicit')	Mediation Collection
[NSPF-268288]	[IETF] MD-Converter support service patch request beyond top container	Mediation Collection
[NSPF-269080]	ArtifactMgmt | Integrate IETF Support artifacts	Mediation Collection
[NSPF-277737]	[Telemetry] Support for mTLS (client/server certificates) for secure gRPC	Mediation Collection
[NSPF-227605]	Infrastructure Configuration Management: Card Predefined Config Intent	Network Configuration

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Table 4-3 NSP Release 23.4 (continued)

Key	Summary	Area
[NSPF-228540]	Infrastructure Configuration Management: Network Interface Predefined Intent	Network Configuration
[NSPF-228551]	Infrastructure Configuration Management: Base Security Predefined Intents	Network Configuration
[NSPF-228621]	Infrastructure Configuration Management: File and Accounting Policy Predefined Intents for Service & Network	Network Configuration
[NSPF-229368]	Infrastructure Configuration Management: Ethernet Port Predefined Config Intent	Network Configuration
[NSPF-234767]	Infrastructure Configuration Management: IP Filters BP Config Intents	Network Configuration
[NSPF-267924]	Infrastructure Configuration Management Scalability and efficiency enhancements	Network Configuration
[NSPF-272745]	Infrastructure Configuration Management: Template Align all - Option to just align misaligned ones	Network Configuration
[NSPF-282813]	Infrastructure Configuration Management: Support of Artifact Administrator	Network Configuration
[NSPF-202967]	Visualize LSPs per path-profile and path-group on IP/MPLS Optimization map	Path Control
[NSPF-268636]	SPAT as Microservice Phase 1	Path Control
[NSPF-268639]	IGP Topology Discovery Service	Path Control
[NSPF-273472]	NSP PCE - Association Group support on RSVP-TE	Path Control
[NSPF-280035]	NSP PCE - BSID LSP hardening	Path Control
[NSPF-280844]	NSP PCE - Automation Support for Latency-based Telemetry Optimization on 7705	Path Control
[NSPF-280846]	NSP PCE - Automation Support for Latency-based Telemetry Optimization on 7210	Path Control
[NSPF-289460]	NSP PCE - 7750 16.0Rx Link and LSP utilization via NFM-P	Path Control
[NSPF-288791]	NSP Integration in the context of 4K model driven SROS node network - Part 1	SDN Scale Performance
[NSPF-226239]	Ability to invoke Infrastructure Configuration Management actions from the Service Fulfillment application	Service Management
[NSPF-243157]	Bulk associate brownfield services to service templates	Service Management
[NSPF-246990]	Service Fulfillment: LAG Inventory view improvements	Service Management
[NSPF-250252]	Service Fulfillment: Predefined IT to support N+1	Service Management
[NSPF-251992]	Service Fulfillment: Add in a delete state under templates for workflow execution	Service Management
[NSPF-251994]	Service Fulfillment: Ability to unassociate/migrate a service from templates	Service Management

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Table 4-3 NSP Release 23.4 (continued)

Key	Summary	Area
[NSPF-255549]	Service Fulfillment: Common missing aspects in predefined	Service Management
[NSPF-259477]	Service Fulfillment: stitching of MDM discovered services	Service Management
[NSPF-271215]	Service Fulfillment: service component views add the "NE Name" column	Service Management
[NSPF-282815]	Service Fulfillment: Support of Artifact Administrator	Service Management
[NSPF-231196]	Monitor T-BTS and NetAct reachability	Simplified RAN Transport
[NSPF-250241]	Support of ASOE RAT LTE	Simplified RAN Transport
[NSPF-251816]	Manage Radio Plane for BTS multi RAT (4G and 5G)	Simplified RAN Transport
[NSPF-252724]	[RoR] Adaptation of T-BTS adaptor to NSP 23.4	Simplified RAN Transport
[NSPF-253970]	Consider BFD configuration in T-BTS during Radio Plane audit	Simplified RAN Transport
[NSPF-254172]	[RoR] Alignment with RAN, NetAct and MW release	Simplified RAN Transport
[NSPF-254970]	Support of R-VPLS configuration on CSR port	Simplified RAN Transport
[NSPF-258859]	Introduction of Cisco CSR in SRT	Simplified RAN Transport
[NSPF-259204]	Simplified RAN Transport upgrade from NSP 22.11 to NSP 23.4	Simplified RAN Transport
[NSPF-273245]	Introduction of Simplified Microwave Router (SMR) in SRT	Simplified RAN Transport
[NSPF-279101]	Expand height of the Radio Plane table	Simplified RAN Transport
[NSPF-279136]	Enable filter operators on string type column	Simplified RAN Transport
[NSPF-283756]	Consider IPRT indirect routes for T-BTS Radio Plane binding audit	Simplified RAN Transport
[NSPF-241337]	5G TSC: Align IB-TSC NBI Yang model to IETF draft	Transport Slice Controller and 5G
[NSPF-269847]	N:1 mapping of multiple slice realization intents onto a shared set of LSPs	Transport Slice Controller and 5G
[NSPF-269854]	RBAC: Role-based Access Control for slice management	Transport Slice Controller and 5G
[NSPF-277543]	N:1 - use of prefix matching to map slice traffic onto LSPs and reuse of pre-created service	Transport Slice Controller and 5G

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Table 4-3 NSP Release 23.4 (continued)

Key	Summary	Area
[NSPF-286671]	RSL Monitoring and Deviation Alert	Wavence

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4.2 Nodal feature list

4.2.1 NSP

Table 4-4 NSP Release 23.11

Key	Summary	Node
[NSPF-287882]	BNG CUPS - MAGC 23.7 R1 release support	
[NSPF-287884]	BNG CUPS - MAGC 23.10 R1 LTS & 23.7 R2/R3 release support	
[NSPF-293603]	BNG CUPS alarm on SR UPF	
[NSPF-296282]	Support to 7250 IXR-e2	
[NSPF-271157]	MAG CP Appliance - MAGc-a2	7x50

Table 4-5 NSP Release 23.4

Key	Summary	Node
[NSPF-208804]	Creation of T-BTS L2 backhaul on one or several T-BTS	
[NSPF-251818]	BNG CUPS - CP and UP Connectivity Status	
[NSPF-251822]	Beta Quality: BNG CUPS - Subscriber Performance parameters (UX)	
[NSPF-251827]	Beta Quality: BNG CUPS - System Performance parameters (UX)	
[NSPF-251829]	BNG CUPS - MAG-c Fault Management	
[NSPF-258585]	BNG CUPS - Threshold Crossing Alerts / ACT	
[NSPF-258587]	BNG CUPS - RestConf NBI	
[NSPF-260355]	BNG CUPS - IP Pool Utilization Statistics	
[NSPF-271648]	BNG CUPS - System Performance parameters	
[NSPF-271650]	BNG CUPS - Subscriber Performance parameters	
[NSPF-288167]	BNG CUPS - MAGC 23.3 R1 release support	

4.2.2 Classic NE management (formerly known as NFM-P)

Table 4-6 NSP Release 23.11

Key	Summary	Node
[NSPF-292668]	AOS/HW Variant EoS : Block management support	
[NSPF-216832]	EVPN VPLS (K12, K30)	7210 SAS
[NSPF-223210]	BFDv6 HW, LAG and Multihop session	7210 SAS

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-258581]	PoE Enhancements - Support to additional PoE related details	7210 SAS
[NSPF-263632]	IPv4 FIB improvement on K12	7210 SAS
[NSPF-270476]	Masking function when entering password	7210 SAS
[NSPF-270482]	cFlowd Stats for RSVP-TE LSP	7210 SAS
[NSPF-270498]	Monitoring for errors/congestion on satellite uplink ports	7210 SAS
[NSPF-276816]	Y.1564 Multi Stream Support	7210 SAS
[NSPF-276822]	ESMC Tunneling	7210 SAS
[NSPF-279066]	2Kbit RSA key for SSH server hostkey fingerprint	7210 SAS
[NSPF-285688]	Cflowd – IP interfaces L3 services SASR	7210 SAS
[NSPF-263145]	7250 IXR: CCM remote mep-auto discovery	7250 IXR
[NSPF-295015]	7250 IXR-R6d/R6dl MDAs -32 x cSFP	7250 IXR
[NSPF-275518]	IPSec IKEv2 Peer Identity verification	7705 SAR
[NSPF-276888]	Deprecate SDIv1	7705 SAR
[NSPF-276892]	Log file encryption on 7705	7705 SAR
[NSPF-276895]	Mask User Configurable Passwords for SAR	7705 SAR
[NSPF-276898]	IPSec with AES-GCM Support on SAR	7705 SAR
[NSPF-276900]	SR-TE IPv4 LSP PCEP Return of Delegation to local CSPF	7705 SAR
[NSPF-276902]	PCEP security - Authentication & Encryption (RFC8253)	7705 SAR
[NSPF-276904]	TLS Support on 7705 (only as required for PCEP security - Authentication & Encryption)	7705 SAR
[NSPF-276914]	ADC Multi-Path (AMP): Startup/Recovery w single path, etc	7705 SAR
[NSPF-276918]	MEF8 for SDI, FXS, FXO	7705 SAR
[NSPF-283176]	PCEP Inband OOB selection	7705 SAR
[NSPF-283178]	EVPN MH Preference-Based and Non-Revertive DF Election	7705 SAR
[NSPF-283180]	Allow CRL to be optional for PKI	7705 SAR
[NSPF-285661]	Cpipe Network Latency Measurement	7705 SAR
[NSPF-285672]	Update SSH stack on 7705 to incorporate security vulnerability fixes in latest SSH version and send the updated SSH version to scan tools.	7705 SAR
[NSPF-285676]	Loopback control leads (RTS to CTS) on RS-530 serial interfaces	7705 SAR
[NSPF-285682]	6PE on 7705	7705 SAR
[NSPF-285684]	ADC Multi-Path (AMP) - Support on E1 of SAR-A	7705 SAR

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-285686]	IPipe on clear/unframed E1 (extend to Sar-x w cHDLC)	7705 SAR
[NSPF-293936]	G8275.2 with APTS on SAR	7705 SAR
[NSPF-310453]	New Entropy Solution to Support FIPS-140-3	7705 SAR
[NSPF-263430]	MAC-criteria on SAR-Hmc/SAR-Hm/VSR	7x50
[NSPF-276295]	ALB with MC-LAG	7x50
[NSPF-283020]	Kitzbuhel_ms28, 18xSFP28 MDA in low speed slots [5,6]	7x50
[NSPF-283052]	SSH: config system security source-address sshv6	7x50
[NSPF-283070]	Ping/trace for SRv6 policy with NETCONF action support: UDP Traceroute	7x50
[NSPF-283098]	SRv6 Policy: sBFD enhancement - controlled return path	7x50
[NSPF-283100]	SRv6 Policy: base statistics	7x50
[NSPF-283104]	SRv6-VPN: VPLS (End.DT2U, End.DT2M) - routing conformance	7x50
[NSPF-283158]	VSR: Show Transceiver Data in "show port detail" for PCI-PT mode - i40e driver	7x50
[NSPF-283160]	7750 SR-s 6.0T 36p 800G QSFP-DD XMA2-s	7x50
[NSPF-283170]	MDA2-se: 6p 800G QSFP-DD	7x50
[NSPF-285823]	7250 IXR-e2 (2x QSFP56-DD, 2x QSFP28, 24x SFP28/SFP+)	7x50
[NSPF-286943]	Openconfig platform inventory add wattage and input voltage to power supplies	7x50
[NSPF-286945]	Test satellite client port as standby LAG member	7x50
[NSPF-287170]	Support for SFP28 BX40-U/D	7x50
[NSPF-287176]	YANG Operations: 'reset log' Commands	7x50
[NSPF-287178]	Configurable port for grpc-server	7x50
[NSPF-287181]	Additional syslog HOSTNAME controls	7x50
[NSPF-287183]	Output 'when' error messages as 'when' descriptions in customer YANG	7x50
[NSPF-287187]	MCI Performance: load (populating the candidate, not including commit) - 23.7 part	7x50
[NSPF-287189]	YANG Operations: 'reset system script-control/management-interface' Commands	7x50
[NSPF-287191]	Multimodule Management Control	7x50
[NSPF-287195]	YANG state: satellite HW data (chassis) (AR 1-7884721)	7x50
[NSPF-287199]	400G ZR/ZR+: coherent optics performance metrics	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-287201]	Add 72 as an option for min-frame-length (FP4/FP5)	7x50
[NSPF-287203]	Mirror-dest per-flow hashing	7x50
[NSPF-287205]	MD and Classic CLI alignment for mirroring on IXR	7x50
[NSPF-287209]	YANG Operations: 'perform lag' Commands	7x50
[NSPF-287211]	7250 IXR - IPv4/v6/MAC ingress/egress filter logging	7x50
[NSPF-287213]	7250 IXR - CPM protection: cpm-filters	7x50
[NSPF-287215]	7250 IXR - Prefix-list support in ip-filter	7x50
[NSPF-287217]	Filter qualifiers to identify GTP/5G flows	7x50
[NSPF-287223]	SSHv2 Public Key Authentication only	7x50
[NSPF-287227]	ZTP day 0 IXR/SR config enhancements, auto configure chassis/IMM/IOM/MDAs	7x50
[NSPF-287229]	ZTP day 0 config for MD-CLI	7x50
[NSPF-287235]	Add AES-CMAC option for NTP authentication	7x50
[NSPF-287237]	EAP/802.1x over LAG on satellite ports	7x50
[NSPF-287241]	7250 IXR - Configurable ultra-low latency mode with port QoS	7x50
[NSPF-287249]	7250 IXR - Alarm when reaching capacity limits	7x50
[NSPF-287251]	7250 IXR-e2 - Q2A policers / statistics scale	7x50
[NSPF-287253]	FP4/FP5 vPort slot and system scaling increase	7x50
[NSPF-287255]	7250 IXR - Storm control for EVPN	7x50
[NSPF-287257]	IXR: YANG state for queues	7x50
[NSPF-287261]	7250 IXR - 4500 SAPs x (3 child policers + 1 aggregate) minimum, 9K SAPs w/ 4 child + aggregate preferred	7x50
[NSPF-287265]	Inner-dot1p egress re-marking	7x50
[NSPF-287267]	7250 IXR - Flexible policer and stat allocation	7x50
[NSPF-287269]	OAM: lsp-ping and lsp-traceroute for flex-algo	7x50
[NSPF-287271]	YANG cfg: test-oam mpls-echo-request, mpls-time-stamp	7x50
[NSPF-287279]	Ping/trace for SRv6 policy with NETCONF action support: TCP Traceroute	7x50
[NSPF-287281]	IXR: Increase CFM domain scale	7x50
[NSPF-287285]	Increase OAM PPS scale to 3000 PPS (Tx/Rx) Launch and Receive for TWAMP Light PPS (IP PM)	7x50
[NSPF-287287]	ELMI tunneling for VPLS	7x50
[NSPF-287289]	Name-based CFM show and output	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-287291]	426193: CFM: Data TLV Placement in CCM and LBM Packets	7x50
[NSPF-287295]	Weighted ECMP for VPN routes over BGP tunnels over RSVP-TE (@PE)	7x50
[NSPF-287297]	BGP ATTR_SET (RFC6368)	7x50
[NSPF-287301]	Strict-mode BFD for BGP including BGP FRR with BFD session status (DTS398193)	7x50
[NSPF-287303]	Extended scope for exporting inactive BGP routes from a VPRN	7x50
[NSPF-287305]	SR IGP shortcut over strict-path SR-TE (PCEP SR-TE configuration)	7x50
[NSPF-287307]	Graceful method to handle ISIS Overload when FIB scale is exhausted	7x50
[NSPF-287309]	Support for RFC 7981 IS-IS Extensions for Advertising Router Information	7x50
[NSPF-287311]	ISIS LSP scale increase on IXR-s to match IXR-R6	7x50
[NSPF-287313]	OSPFv2v3 point-to-multipoint interface support	7x50
[NSPF-287315]	Policy: limit routes exported from BGP into IGP	7x50
[NSPF-287319]	BGP route resolution using leaked static routes	7x50
[NSPF-287323]	Pipe mode support for P2MP LSPs (do not change TTL value)	7x50
[NSPF-287327]	Rate statistics for SR and SRv6 Policies	7x50
[NSPF-287329]	PCEP security with TCP-AO	7x50
[NSPF-287333]	Augment HW MPLS ECMP Group exhaustion in SW - prioritize ECMP routes, SW driven RR for rest	7x50
[NSPF-287335]	LUoSR-ISIS, SW based ECMP after HW ECMP resources depletion	7x50
[NSPF-287337]	426640: Map Nokia RSVP Interface Bandwidth state info to OpenConfig	7x50
[NSPF-287340]	7250 IXR: SRv6 transport over regular non-locator routes	7x50
[NSPF-287342]	SRv6: Policy Actions	7x50
[NSPF-287344]	SRv6: Policy Match	7x50
[NSPF-287346]	SRv6 locator prefix overload max-metric (including on-boot)	7x50
[NSPF-287348]	Assignment of loopback interface address from SRv6 locator subnet	7x50
[NSPF-287350]	SRv6 USD Decapsulation Mode Support	7x50
[NSPF-287352]	422669: show router isis routes flex-algo 128 does not provide any output	7x50
[NSPF-287354]	7250 IXR - Control-word support under EVPN	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-287357]	7250 IXR: Multi-instance EVPN-VPLS (MPLS to SRv6 interworking)	7x50
[NSPF-287359]	EVPN unequal ECMP for RT5 IFL routes SRv6	7x50
[NSPF-287361]	7250 IXR - SRv6-VPN VPLS without MH (Multi-Homing)	7x50
[NSPF-287363]	YANG state for proxy-arp/nd entries	7x50
[NSPF-287367]	IXR: Q-tag manipulation under EVPN-VPLS	7x50
[NSPF-287369]	EVPN virtual ESI on IXR	7x50
[NSPF-287371]	Deterministic EVPN blackhole MAC loop protection	7x50
[NSPF-287379]	EVPN Multi-homing for OISM and EVPN proxy	7x50
[NSPF-287381]	YANG: state path for telemetry to report the total number of services per type	7x50
[NSPF-287383]	IXR dynamic scaling enhancement: moving ARP out of his own FEC partition	7x50
[NSPF-287385]	YANG Operations: 'perform filter' Commands	7x50
[NSPF-287387]	Allow PBR as forward to next-hop 0.0.0.0	7x50
[NSPF-287389]	PBR redirect to SRv6 Policy (5-tuple and dscp as filter criteria)	7x50
[NSPF-287409]	IXR: DHCP Server IPv6 under IP-VPNv6	7x50
[NSPF-287411]	TLI: IPv6 target support	7x50
[NSPF-287415]	Avoid DSM address reuse	7x50
[NSPF-287419]	Ignore RTP sequence gap for unicast egress	7x50
[NSPF-287423]	FirstNet DSLA security requirements	7x50
[NSPF-287427]	VSR Sapphire Rapid CPU	7x50
[NSPF-288926]	Chamonix_mg MDA (for Fx7 only - 40p SFP/ 80p cSFP)	7x50
[NSPF-288930]	7250 IXR-e2c (2x QSFP28, 12x SFP28/SFP+)	7x50
[NSPF-288941]	Support for 400G ZR from Molex	7x50
[NSPF-288946]	ESA 400G refreshed server/CPU (Gen 11)	7x50
[NSPF-288950]	SyncE input reference through a Satellite (SAS and IXR)	7x50
[NSPF-288956]	IXR-s as Ethernet satellite	7x50
[NSPF-288967]	Log infra enforcement of internal log event definitions	7x50
[NSPF-288971]	Output the log event "source" stream for every log event in show/state	7x50
[NSPF-288975]	MCI Performance: load (populating the candidate, not including commit) - 23.10 part	7x50
[NSPF-288979]	Block NETCONF and gRPC operations until system is ready	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-288981]	YANG Operations: 'perform system script-control/management-interface' Commands	7x50
[NSPF-288983]	64 bit counter for SNMP (system uptime)	7x50
[NSPF-288986]	Revoked deployed license without node reboot	7x50
[NSPF-288991]	Interface description on CPM interfaces	7x50
[NSPF-289002]	CESoPSN support on 32p E1 card in IXR-R6	7x50
[NSPF-289006]	7250 IXR - Egress IPv4/v6/MAC filter drop counters	7x50
[NSPF-289018]	SSHv2 Client with PKI	7x50
[NSPF-289036]	Monitoring: 1588 v2.1 (Annex J) Performance stats (BL)	7x50
[NSPF-289038]	PBT enabled on multiple interfaces in the same port for PTP with IP encap	7x50
[NSPF-289049]	DCR for E1 on IXR-R6	7x50
[NSPF-289053]	MACSec for IXR-R4, m4-10g-sfp++1-100g-cfp2	7x50
[NSPF-289063]	MACSec for IXR-R6d/R6dl Kitzbuhel_ms MDA	7x50
[NSPF-289065]	MACSec for IXR-R6dl Chamonix_ms MDA	7x50
[NSPF-289069]	TLS status-verify for revocation of certificate	7x50
[NSPF-289071]	MACSec support for PSK via SNMPv3 in mixed and classic CLI mode	7x50
[NSPF-289074]	7250 IXR - Ultra low latency propagation to FPGA on R6d/dl	7x50
[NSPF-289076]	7250 IXR - Packet Byte Offset (compensate for internal headers)	7x50
[NSPF-289078]	New counters for buffer management on FP4/FP5 cards	7x50
[NSPF-289080]	IXR: YANG state revision - policers	7x50
[NSPF-289082]	HW aggregate shapers with different queue-set size (FP4/FP5 platforms only)	7x50
[NSPF-289084]	IP prefix list for IPv4 and IPv6 matching criteria at network egress	7x50
[NSPF-289088]	7250 IXR - 10K SAPs-PWs with aggregate-policer only to shared vlan-qos	7x50
[NSPF-289093]	Tree SID OAM	7x50
[NSPF-289103]	IXR-x3: 25ms multihop BFD support	7x50
[NSPF-289107]	7250 IXR - BFD - self-generated traffic (SGT) QoS	7x50
[NSPF-289109]	Y.1564 traffic generator/reflector support on routed interfaces (client and reflector)	7x50
[NSPF-289113]	LSP-traceroute for PCEP SR-TE LSP with BSID in SID list	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-289115]	ICMP-tunneling for PCEP SR-TE LSP with BSID in SID list	7x50
[NSPF-289117]	IXR: Primary VLAN support (SAP only)	7x50
[NSPF-289119]	IXR: CFM Support on Connection-Profile SAPs	7x50
[NSPF-289121]	Increase LLDP sessions per port	7x50
[NSPF-289123]	OAM-PM Infra: allow intervals of 100ms to 900ms (in increments of 100ms), 1s, 10s for Ethernet and IP tests	7x50
[NSPF-289125]	OAM-PM Infra: add support for 50ms interval for Ethernet and IP tests	7x50
[NSPF-289127]	OAM-PM Infra: add support for 1-min measurement-interval for all sessions	7x50
[NSPF-289129]	OAM-PM Infra: add support for auto test-id allocation	7x50
[NSPF-289133]	IXR Cflowd IPFix 10 Sampling on EVPN-VXLAN SAP ingress	7x50
[NSPF-289137]	Hostname advertisement in BGP-LS NRLI	7x50
[NSPF-289141]	YANG Operations: 'reset router isis' Commands	7x50
[NSPF-289143]	YANG Operations: 'reset router ospf' Commands	7x50
[NSPF-289147]	YANG Operations: 'perform router isis' Commands	7x50
[NSPF-289153]	Default Router Preference for Router Advertisements	7x50
[NSPF-289155]	7250 IXR - PIM Auto-RP Full MA Functionality	7x50
[NSPF-289161]	7250 IXR - Tools dump resource-usage system available via SNMP/YANG	7x50
[NSPF-289169]	YANG Operations: 'reset router segment-routing' Commands	7x50
[NSPF-289173]	Show command for P,Q and PQ node information in LFA	7x50
[NSPF-289175]	SRv6-VPN: VPLS MH (Arg.FE2)	7x50
[NSPF-289177]	Multi-instance EVPN-VPWS (MPLS to SRv6 interworking)	7x50
[NSPF-289179]	7250 IXR - FAT label support	7x50
[NSPF-289187]	Sticky-ECMP for EVPN-IFL/IFF routes (including unequal EVPN ECMP)	7x50
[NSPF-289189]	IXR: VXLAN: EVPN-VXLAN for VPLS	7x50
[NSPF-289191]	IXR: VXLAN: EVPN-VXLAN for R-VPLS	7x50
[NSPF-289199]	FAT label support for EVPN services (VPWS and VPLS as in draft-ietf-bess-7432bis)	7x50
[NSPF-289201]	Increase EVPN-VPLS scaling	7x50
[NSPF-289203]	10K SAPs support	7x50
[NSPF-289205]	10K PWs support	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-289231]	Subnet broadcast and link local multicast handling for ESM	7x50
[NSPF-289233]	ESM over soft-GRE for Facility Management Devices	7x50
[NSPF-289241]	IPsec performance testing and two tunnel-vm per socket support- ESA 400G-2 refreshed server/CPU (Gen11)	7x50
[NSPF-289243]	IPsec performance testing - general	7x50
[NSPF-289251]	AA-lite Firewall features on SAR-Hm/Hmc	7x50
[NSPF-289255]	7250 IXR - Port MTU profiles support	7x50
[NSPF-289358]	Ping/trace for SRv6 policy with NETCONF action support: ICMP Ping with sgt-qos	7x50
[NSPF-294702]	Support for QSFP28 BX20-U/D on IXR-R6d/R6dl	7x50
[NSPF-294704]	Add new transceiver state for invalid form factor (Catfish_ZD14)	7x50
[NSPF-294706]	QSFP-DD 400G ZR+ support for additional 0dBM modes on FP5/IXR-d6/d6l/IOM5-e	7x50
[NSPF-294708]	Interop testing between the Acacia 400G ZR+ -10dBm and II-VI 400G ZR+ 0dBm	7x50
[NSPF-294712]	7750 SR-1se lower temps for 400G ZR/ZR+ (new fan algorithm)	7x50
[NSPF-294714]	7750 SR-1se Alarm for PSU fan failure	7x50
[NSPF-294716]	PBT support on PPAC_S12 (3HE11903AA - MDA-e 12p 10/1GE MACsec SFP+)	7x50
[NSPF-294718]	BFD testing on IXR as Ethernet satellite (IXR-x1, IXR-xs, IXR-E-Ax)	7x50
[NSPF-294720]	7250 IXR - Filter qualifiers to identify GTP/5G flows based on IPv6 flow label	7x50
[NSPF-294722]	PTP support for IPv6 (G.8275.2, G.8265.1) - Bell Labs systems - add port capabilities and notification in agent	7x50
[NSPF-294724]	Add APTS backup source attribute to PTP peer and port (RFE DTS429023)	7x50
[NSPF-294726]	7250 IXR - Shared Policer	7x50
[NSPF-294728]	429310: uBFD - allow any valid IP address as the local/remote IP address for uBFD sessions	7x50
[NSPF-294730]	BGP prefix-limit option to keep session up and do not install excess routes	7x50
[NSPF-294736]	Regex non-matching operator in AS path and community regex’	7x50
[NSPF-294738]	IXR: sBFD controlled Response TE path for SR-TE LSP	7x50
[NSPF-294740]	7250 IXR - SRv6 ingress IPv6 filter support	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-294742]	IXR: Configurable MAC aging timers for VPLS/SAP/SDP on IXR	7x50
[NSPF-294744]	432402/425649: Traffic drop on one of the spoke SDPs	7x50
[NSPF-294746]	IPv4 / IPv6 static-host managed routes: cpe-check target address sharing	7x50
[NSPF-294752]	422317: VSR support for Cisco Intel XL710	7x50
[NSPF-294754]	7250 IXR - Scale increase BGP-LU LTN from 20K to 24K	7x50
[NSPF-294758]	Support for QSFP-DD-LS Amplifier	7x50
[NSPF-294760]	Support for QSFP28 ZR4 - on IXR-R6d/R6dl	7x50
[NSPF-294765]	Support QSFP56-DD 400G SR4.2 4x100G 1.2 0/70C	7x50
[NSPF-294767]	Support QSFP28 - 100G SR1.2 100m BIDI	7x50
[NSPF-294777]	Support for c1-400g ZR/ZR+ QSFP-DD DCO 400G Optical Modules on IXR-e2	7x50
[NSPF-294780]	403790: Prevent a dual CPM crash when the active CPM pchip locks up	7x50
[NSPF-294788]	ESM/L2TP testing on IXR as Ethernet satellite (IXR-x1, IXR-xs, IXR-E-Ax)	7x50
[NSPF-294794]	Satellite packet drops (silently) - port stats required for performance management tool	7x50
[NSPF-294796]	IXR-satellite enhancement: additional port speed support	7x50
[NSPF-294812]	Show pre-login message (including hostname) on CPM standby prompt	7x50
[NSPF-294814]	7250 IXR - Increase max port MTU to 9800	7x50
[NSPF-294816]	LI MAC filter match on VLAN id	7x50
[NSPF-294824]	7250 IXR - Filter action forward statistics	7x50
[NSPF-294827]	Configurable MBS in filter rate-limit action	7x50
[NSPF-294833]	Internal PXC with 800G MAC loopback on E5	7x50
[NSPF-294835]	PXC scale increase to 256	7x50
[NSPF-294837]	PTP support for IPv6 on IXR-R4/R6 (BCM8239x)	7x50
[NSPF-294839]	EAP/802.1x per host authentication and LAG on satellite ports	7x50
[NSPF-294847]	432195: 7250 - IXR source-knockout counters	7x50
[NSPF-294849]	Service-SAP shaping and parenting by vPort	7x50
[NSPF-294851]	IXR-R4: HW timestamping for TWAMP on IXR-R4	7x50
[NSPF-294853]	7250 IXR - STAMP End-2-End Performance Measurement	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-294855]	7250 IXR - CFM MEP support for LAG member port on COE MDA ports	7x50
[NSPF-294857]	7250 IXR - CFM MEP support for LAG member port on mix of COE and non-COE MDA ports	7x50
[NSPF-294859]	7250 IXR - LAG member port support of ETH-BNM on CoE MDA ports	7x50
[NSPF-294861]	7250 IXR - LAG member port support of ETH-BNM on mix of CoE and non-COE MDA ports	7x50
[NSPF-294863]	YANG Operations: 'reset router bfd' Commands	7x50
[NSPF-294865]	Openconfig: support BFD model on IXR platforms	7x50
[NSPF-294867]	MAC-swap loopback and lbm-svc-act-responder bandwidth testing	7x50
[NSPF-294869]	Cflowd collector to be filtered for egress/ingress	7x50
[NSPF-294873]	431293: State and show command support of per-VPRN route next-hop-tag info	7x50
[NSPF-294875]	YANG state (Nokia model): in depth testing OSPF packet-drop reasons	7x50
[NSPF-294877]	QPPB based on both source IP and dest IP	7x50
[NSPF-294879]	Or-Longer prefix list modifier	7x50
[NSPF-294889]	Return path label additions to SR Policy Controlled Return TE Path	7x50
[NSPF-294899]	Service origination and termination on shortest path SRv6 tunnel without FPE	7x50
[NSPF-294907]	Service Interworking with two SRv6 instances in the same VPRN service	7x50
[NSPF-294909]	PBR VPRN-target enhancements	7x50
[NSPF-294921]	Private Pool With NO Logging, Interleaved SPF, per Port Allocations and SPF Port Preemption (16K SPF)	7x50
[NSPF-294924]	Qualify HN8 HW for SeGW	7x50
[NSPF-294926]	Qualify HN7 HW for SeGW	7x50
[NSPF-294928]	IPsec ESP sequence number ordering on VSR	7x50
[NSPF-294930]	SecGW N:M Model - failover to DS Convergence improvement	7x50
[NSPF-294932]	Containerized VSR (SeGW function)	7x50
[NSPF-294935]	Multiple certification chain support with Sub-CA having same subject and key	7x50
[NSPF-294937]	ESA phase 2 rekey performance improvement during MC switchover	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-294945]	Perfect Stream support on ESA	7x50
[NSPF-294947]	Video function support on ESA-400G Gen 11 server	7x50
[NSPF-294949]	Support SAR-Hm on SRUX	7x50
[NSPF-294951]	Cellular band selection on MG401/301/302	7x50
[NSPF-294953]	Remote access to cell diagnostic port on SW radios	7x50
[NSPF-294955]	Security: Config file and Bof encryption	7x50
[NSPF-294961]	VSR-a HN series rev BA (HP Gen 11)	7x50
[NSPF-294963]	VSR support for RHEL 8.8 (RFE DTS432364)	7x50
[NSPF-294965]	VSR support for Mellanox ConnectX-6 LX 10/25 Network Adapters (RFE DTS433048)	7x50
[NSPF-294967]	VSR-a HN series rev AA (Gen10+) – RHEL 8.6 Security/Patch update	7x50
[NSPF-294979]	7250 IXR: ECMP Dynamic Scale	7x50
[NSPF-294989]	7750 SR-2se XCMc-2se	7x50
[NSPF-294994]	7750 SR-s IOM2-se 6.0T	7x50
[NSPF-294998]	MDA2-se: 24p 200G SFP-DD	7x50
[NSPF-295009]	7750 SR-s IOM2-se 3.0T	7x50
[NSPF-304502]	7250 IXR: Flexible policer allocation – Aggregate and Shared Policers	7x50
[NSPF-306144]	YANG config & state: SAA vccv-ping	7x50
[NSPF-307288]	Ping/traceroute for SRv6 policy candidate paths	7x50
[NSPF-310205]	ISIS SR-MPLS MT2 support	7x50
[NSPF-310207]	ECMP tunnel next-hop table size increase (FP4 profile-b and FP5)	7x50
[NSPF-310211]	436316: Add configurability of speed and autonegotiation to OES1 A/4 port of CPM2-s	7x50
[NSPF-310213]	436021: Video - allowing CLI to provision two ESA-VM in the same video group	7x50
[NSPF-310217]	436019: Video - ESA and ISA index number sharing	7x50
[NSPF-310223]	439258: Video: FCC/RET support of SR-1-24D	7x50
[NSPF-310226]	434134: 7250 IXR-X1 can't configure 2 breakouts types on block c9-c12	7x50
[NSPF-310228]	IXR-X1 Satellite: 100G uplink and 100G+40G Client support	7x50
[NSPF-310230]	Classic SRv6 SRH SID depth increase	7x50

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-310232]	436015: Remove tmnxSysLicenseUpdateRequired facility alarm status	7x50
[NSPF-310236]	7250 IXR: Assignment of loopback interface address from micro-segment SRv6 locator subnet	7x50
[NSPF-310240]	SRv6 scale from 16k to 32k	7x50
[NSPF-310244]	438629: LACP tunneling doesn't work when STP enabled	7x50
[NSPF-310248]	433547/425100: BSX [ip-id-assist] positive-application ID	7x50
[NSPF-310261]	FirstNet DSLA security requirements	7x50
[NSPF-310281]	QSFP-DD 400G ZR+ support for additional 0dBM modes on Catfish/Sharkfish/IXR-R6d/dl/IOM5-e	7x50
[NSPF-310283]	Shark_2c, IOM2-se - licensing restrictions	7x50
[NSPF-310285]	Shark_1c, IOM2-se - licensing restrictions	7x50
[NSPF-310287]	IXR: MD and Classic CLI alignment for mirroring on IXR	7x50
[NSPF-310289]	VSR: Intel Sapphire Rapid CPU HW	7x50
[NSPF-310291]	OOB Management Ethernet Port Redundancy on SR-2s Platforms (RFE DTS392802)	7x50
[NSPF-310293]	Metadata support in pySROS	7x50
[NSPF-310295]	AnySec on FP5 SR-1/SR-1x/SR-1se	7x50
[NSPF-310297]	AnySec OAM	7x50
[NSPF-310299]	Natural Display Order for List Keys	7x50
[NSPF-310301]	Support VSR-I on SRUX (CNF k8s container)	7x50
[NSPF-310303]	SCP protocol for the MD-CLI file copy command	7x50
[NSPF-310305]	Add PTP algorithm reset command (Bell Labs)	7x50
[NSPF-310307]	IXR: port-range match in IP filter (IXR-eAx, IXR-x1/xs)	7x50
[NSPF-310310]	HW aggregate shapers with overrides for SAPs (FP4/FP5 platforms only)	7x50
[NSPF-310314]	IXR: Sticky-ECMP for IPv4/IPv6/Label-ipv4/label-ipv6/EVPN-IFL/EVPN-IFF routes (including unequal ECMP)	7x50
[NSPF-236542]	Ethernet Counters in CA SM topology	Wavence
[NSPF-265997]	MSS-E-HE-XE-NIM IPv6 - finalisation	Wavence
[NSPF-284240]	MSS-E-HE-XE & NIM transition RSL file retrieval from SFTP server to SFTP client model	Wavence
[NSPF-284248]	CAHD: Radio NplusN protection	Wavence
[NSPF-294596]	W23A support	Wavence

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Table 4-6 NSP Release 23.11 (continued)

Key	Summary	Node
[NSPF-294648]	Discontinue of W21 & W20	Wavence
[NSPF-294650]	Transition CorEvo SFTP on SSH from server to client roleImpacts	Wavence
[NSPF-294792]	MSS-XE TDM2TDM E1 DS1 Differential	Wavence
[NSPF-295013]	MSS-E/HE/XE/NIM G.8032v2 ERPS ring support	Wavence
[NSPF-295174]	MSS-E-HE-XE-NIM QoS Step 2	Wavence
[NSPF-295189]	UBT-I 1+1 HSB/SD in standalone	Wavence
[NSPF-295191]	UBT-S 1+1 HSB/SD in standalone	Wavence
[NSPF-297846]	Support of BNM in CA with third party for UBT in Standalone	Wavence
[NSPF-297858]	Peak and average counters and PM for UBTs in CA in SA	Wavence
[NSPF-297863]	MSS-E/HE/XE & NIM OSPFv3	Wavence

Table 4-7 NSP Release 23.8

Key	Summary	Node
[NSPF-257874]	Support for OS6900T48-F	
[NSPF-257876]	Support for OS6900C32E-F	
[NSPF-286403]	Support of IXR-E2 (SROS 23.7) on NFM-P 23.8	7250 IXR

Table 4-8 NSP Release 23.4

Key	Summary	Node
[NSPF-266418]	AOS 8.9R02 Support	
[NSPF-215620]	LLDP MED TLV support (Sx/S 1/10GE standalone, VC)	7210 SAS
[NSPF-235728]	7210 SAS: Cflowd (SAS-Mxp)	7210 SAS
[NSPF-254443]	LLDP MED TLV support on Dxp	7210 SAS
[NSPF-263620]	Copper SFP in the SFP slot of the Combo port of 7210 SAS-Sx 1/10GE	7210 SAS
[NSPF-263624]	SNMPv3 SHA256 authentication key support	7210 SAS
[NSPF-263626]	Configurable UP MEP MAC address	7210 SAS
[NSPF-263628]	PTP Power profile	7210 SAS
[NSPF-263634]	LDP IPv6	7210 SAS
[NSPF-276805]	Port Range Support for IP Filters	7210 SAS
[NSPF-276808]	Shared Access Ingress Policy Extensions	7210 SAS
[NSPF-276812]	MEP Squelching	7210 SAS

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-276814]	OAM-PM 50ms intervals for SLM and DMM	7210 SAS
[NSPF-276818]	Support adv-service-mtu	7210 SAS
[NSPF-276820]	VPLS with Multiple Range SAP , no vc-vlan tag addition on Spoke SDP	7210 SAS
[NSPF-276826]	Accounting Statistics Alignment	7210 SAS
[NSPF-279059]	Deprecate 7210 SAS-10/100GE CFP4 support	7210 SAS
[NSPF-279061]	Deprecate 7210 SAS-R IMM-c CFP4 support	7210 SAS
[NSPF-279070]	Support for PTP ePRTC	7210 SAS
[NSPF-263045]	50G mixed-speed LAG on IXR	7250 IXR
[NSPF-263172]	PTP support for IPv6 (G.8275.2, G.8265.1) - Bell Labs systems	7250 IXR
[NSPF-270424]	7250- Fx4/Fx7 dot1x per host authentication	7250 IXR
[NSPF-270426]	P2MP RSVP-TE PMSI for NGMVPN	7250 IXR
[NSPF-276265]	Kitzbuhel_s56, 10xSFP56 MDA - 50G support in low speed slots	7250 IXR
[NSPF-276271]	Support for SFP+ 10G BX80-U/D optics	7250 IXR
[NSPF-276299]	G.8262.1 Compliance (IXR-R4)	7250 IXR
[NSPF-276301]	G.8262.1 Compliance (IXR-R6)	7250 IXR
[NSPF-247205]	7705 SAR: OAM Tools for SR-TE LSPs	7705 SAR
[NSPF-247935]	SR ti-LFA node/link-protect, rLFA with IS-IS	7705 SAR
[NSPF-264751]	Seamless BFD for SAR	7705 SAR
[NSPF-264763]	CPM/MAF/IP Filter Limits Increase and add Prefix List	7705 SAR
[NSPF-276794]	Multi-clock PTP Profile Conversion	7705 SAR
[NSPF-276883]	Deprecate a8-ethv2	7705 SAR
[NSPF-276886]	Deprecate SAR-W	7705 SAR
[NSPF-276906]	IP Interface hold up/down timers	7705 SAR
[NSPF-276908]	LDP→session-parameters→peer→export-prefixes	7705 SAR
[NSPF-276916]	IPipe on clear/unframed E1	7705 SAR
[NSPF-247178]	PTP Profile Interworking G8275.1 <→ G8275.2 (Bell Labs)	7x50
[NSPF-261829]	EVPN: S-PMSI Routes (RT 10)	7x50
[NSPF-261863]	Support port association in all-active ethernet segments for EVPN	7x50
[NSPF-261877]	Shared queuing on standalone (non-LAG) ports	7x50
[NSPF-263149]	STAMP End-2-End Performance Measurement	7x50

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-263194]	EAG support for Flex-Algo	7x50
[NSPF-263198]	Route policy match criteria with RD	7x50
[NSPF-263257]	Binding-SID to SR-TE LSP	7x50
[NSPF-263297]	EVPN IP Aliasing for EVPN-IFL SRv6 routes	7x50
[NSPF-263299]	EVPN IP Aliasing for EVPN-IFF routes	7x50
[NSPF-263321]	FAT label signaling in BGP-VPLS/VPWS (RFC8395)	7x50
[NSPF-263368]	Remove PPPoA/ATM CLI	7x50
[NSPF-263413]	IPsec ESP sequence number ordering on VSR/ESA	7x50
[NSPF-263438]	Video application: data path remove LAG limitation	7x50
[NSPF-265205]	TLS 1.3 - Govt.Mandate	7x50
[NSPF-265227]	Log file encryption	7x50
[NSPF-270406]	gRPC tunnel service	7x50
[NSPF-270410]	Rework of NMI Connector class (hold reference to absolute running, etc)	7x50
[NSPF-270412]	Support for QSFP28 100G LR Single Lambda	7x50
[NSPF-270414]	Support for QSFP28 100G ER4 0/70C	7x50
[NSPF-270416]	Support for QSFP-DD 4x100G LR	7x50
[NSPF-270418]	ALB user configurable bandwidth threshold	7x50
[NSPF-270420]	BGP unnumbered peers: support for IBGP and Graceful Restart	7x50
[NSPF-270432]	Protobuf version upgrade	7x50
[NSPF-270446]	411094: Add CLI knobs to control whether layer-2 proxy-ARP/ND replies to DAD requests/solicitations	7x50
[NSPF-270448]	Model GNSS as PTP Virtual port	7x50
[NSPF-270456]	Fan Control Enhancement for IXR-X (RFE-413072)	7x50
[NSPF-270464]	386295/411514: Configuration fails to load after reboot due to port config speed 1000 not set before configuring the port-topology for TSAT device	7x50
[NSPF-270468]	414289/411243: 7250 IXR-E: Copper SFP - Internal loopback Bandwidth is only limited to 1G	7x50
[NSPF-276261]	Extend 'show isis router status' output with 'IPv6 router-id'	7x50
[NSPF-276263]	WLAN GW Performance testing for AA + BB VMs on ESA-400G	7x50
[NSPF-276273]	QSFP-DD 400G ZR+ support for additional 0dBM modes	7x50
[NSPF-276277]	Add support for 7210 SAS 23.x (voyager satellite not supported in 23.x), remove support for 20.9	7x50

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-276279]	Add support for 7250 IXR satellites running 23.x	7x50
[NSPF-276281]	Lock SNMPv3 user for failed login attempts	7x50
[NSPF-276283]	SNMP Bulk Request Timer	7x50
[NSPF-276293]	LAG: obsolete port-weight-speed and weight-threshold	7x50
[NSPF-276297]	ATM, Frame Relay, and PPP code removal (CLI, log events, apipe, fpipe, etc.)	7x50
[NSPF-276310]	3K BFD sessions support on 7750 SR-2s	7x50
[NSPF-276312]	Cflowd (l2-ip template) support for 6K L2 (EVPN) SAPs	7x50
[NSPF-276316]	SR IGP shortcut over strict-path SR-TE	7x50
[NSPF-276320]	IP next-hop scaling improvement (64K nexthops)	7x50
[NSPF-276322]	PIM Register: source IP selection criteria for the PIM messages (RFE322742)	7x50
[NSPF-276324]	NG-MVPN UMH detection by UFD in Core Diversity loopback case	7x50
[NSPF-276488]	Dynamic Adjacency-SID persistence	7x50
[NSPF-276490]	Octet to bit conversion in monitor srte lsp stats	7x50
[NSPF-276492]	Deprecation of GMPLS UNI	7x50
[NSPF-276494]	SRv6: BGP-LS (ISISv6)	7x50
[NSPF-276498]	Deprecate XMPP Nuage Service Integration	7x50
[NSPF-276500]	GRE-over-IPv6 (GREv6) SDP support for Epipe Services	7x50
[NSPF-276508]	Octopus SFM2 (7750 FP5 SR-14s/SR-7s)	7x50
[NSPF-276510]	Squid XCM2-14s (7750 FP5 SR-14s)	7x50
[NSPF-276512]	Kraken XCM-14s-b (FP4 XMA Compatible, 7750 FP5 SR-14s)	7x50
[NSPF-276514]	Cuttlefish XCM2-7s (7750 FP5 SR-7s)	7x50
[NSPF-276516]	Siren XCM-7s-b (FP4 XMA Compatible, 7750 FP5 SR-7s)	7x50
[NSPF-276518]	Orca_DD, 6c (7750 FP5 SR-14s, SR-7s, SR-2se)	7x50
[NSPF-276520]	Humpback_DD, 4c (7750 FP5 SR-14s, SR-7s, SR-2se)	7x50
[NSPF-276523]	7750 FP5 SR-2se - Seacow chassis	7x50
[NSPF-276525]	CFM MEP support for LAG member port on non-COE MDA ports	7x50
[NSPF-276527]	Multihop BFD rerouting over FRR paths - limited to SR tunnels (excluding SR-TE)	7x50
[NSPF-276529]	LAG member port support of ETH-BNM on non-CoE ports	7x50
[NSPF-276533]	IGMP/MLD snooping on RVPLS EVPN services	7x50

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-276535]	IGMP/MLD snooping on RVPLS EVPN services	7x50
[NSPF-276537]	IPv4/v6 Spoke-SDP termination under VPRN for all transport but BGP-LU	7x50
[NSPF-276539]	IPv4/v6 Spoke-SDP termination under VPRN for all transport but BGP-LU	7x50
[NSPF-276543]	Enable GNSS receiver on 7750 FP5 CPM	7x50
[NSPF-276545]	405243: Accounting Stats for satellite port SAPs per host port	7x50
[NSPF-276551]	Configuration Save Enhancements - Radius VSA support	7x50
[NSPF-276553]	PTP support for IPv6 (G.8275.2, G.8265.1) - Bell Labs systems	7x50
[NSPF-276555]	FP4 based HQoS - support of configurable number of queues per hw-agg-shaper - ESM part	7x50
[NSPF-276561]	Multi-instance EVPN-VPLS (VXLAN to SRv6 interworking)	7x50
[NSPF-276565]	Policy Based Routing: with bgp-evpn (rt=5) - EVPN support for vprn-target	7x50
[NSPF-276567]	ESM/BNG support on FP4 SR-14s	7x50
[NSPF-277651]	IXR HW timestamping - ETH-CFM (DMM) + TWAMP/TWAMP-light Round-trip Delay Measurement for IXR-R6d/R6dl	7x50
[NSPF-282823]	LFA solution across IGP area/instance boundaries (SRv6-ISIS)	7x50
[NSPF-282829]	Sync/PTP support on K_q/K_qddq for IXR-R6d/R6dl	7x50
[NSPF-282831]	Support for QSFP-DD 400G ER8	7x50
[NSPF-282845]	FP4 based HQoS - support of hw-agg-shapers on PXC ports	7x50
[NSPF-282849]	Changes to YANG state roll-out in subscriber HW queues	7x50
[NSPF-282853]	394023/419385: Extend output of show router bgp next-hop to show extra details	7x50
[NSPF-282855]	384861: Inactive CPM failed due to "Inactive has gone out of sync"	7x50
[NSPF-282857]	422502: PIM: MSDP Register-stop msgs are sometimes dropped on non-pim-enabled interfaces while there are alternatives	7x50
[NSPF-282861]	423462: Multihop BFD (iBGP) session flap upon lag interface going down	7x50
[NSPF-283022]	400G ZR/ZR+ new operations modes - oif-400gZr, openZrpOfec1 & openZrpOfec2	7x50
[NSPF-283024]	ESA 100G-2 (Gen 10+)	7x50
[NSPF-283026]	CRC monitoring for errors on satellite uplink ports	7x50
[NSPF-283028]	Deprecate support for 64x10G + 4x100G 7210 satellite	7x50

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-283030]	MCI Performance: Standby validation rework	7x50
[NSPF-283032]	MCI Performance: load (populating the candidate, not including commit)	7x50
[NSPF-283036]	IXR-X3: Configurable hash-weight w/ reserved-member-counts for LAG (8/16/32/64) + trunk pool	7x50
[NSPF-283040]	ZTP support on 7750 SR-2e	7x50
[NSPF-283042]	IP encapsulation and G.8265.1 (IXR-s)	7x50
[NSPF-283044]	PTP support for IPv6 (G.8275.2, G.8265.1) - Vitesse PHYs	7x50
[NSPF-283046]	Profile: G.8275.1 clock class 135 during BC holdover (BCM)	7x50
[NSPF-283048]	EAP/802.1x per host authentication and LAG on IXR-R6d/R6dl COE ports	7x50
[NSPF-283050]	Classic CLI: remove CLI for unsupported SSH version and ciphers	7x50
[NSPF-283056]	7250 IXR-X3 - HQoS on LAG	7x50
[NSPF-283058]	New CLI command to control maximum-data-transmission per queue	7x50
[NSPF-283062]	7250 IXR HW time stamping - One-way Delay Measurement (eth-cfm, TWAMP, TWAMP light)	7x50
[NSPF-283066]	BFD - self-generated traffic (SGT) QoS	7x50
[NSPF-283072]	425750: TWAMP Server configuration to ignore test session start-time check	7x50
[NSPF-283076]	Increase Cflowd queue shaper limit on FP5 SR-1/SR-1x platforms	7x50
[NSPF-283078]	Increase Cflowd performance on FP5 SR-2se platform via multi-tasking	7x50
[NSPF-283080]	Enhancements to 'show route detail' command for RPKI	7x50
[NSPF-283082]	Strict-mode BFD as a client of OSPF	7x50
[NSPF-283086]	Enhancement for 64-character length support for prefix-list name (RFE 260549)	7x50
[NSPF-283088]	Scale increase - Max GRE tunnels using PXCs per chassis	7x50
[NSPF-283090]	MPLS-QA - DataPlane: Enhance MPLS dataPlane automation coverage	7x50
[NSPF-283092]	MPLS-QA - Multicast-MPLS: infrastructure creation	7x50
[NSPF-283096]	MPLS-QA - LDP: Enhance ildp and tldp (functional / scaling) automation coverage	7x50
[NSPF-283102]	EVPN-L3: neighbor-trust	7x50

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Table 4-8 NSP Release 23.4 (continued)

Key	Summary	Node
[NSPF-283106]	EVPN Proxy-ND - RFC9047 Support	7x50
[NSPF-283108]	CW and MTU signaling support for EVPN VPLS (as in draft-ietf-bess-7432bis)	7x50
[NSPF-283112]	423034: Add SAP oper state of Split-Horizon-Group parameters in show service id sap detail	7x50
[NSPF-283140]	CMPv2 enhancements	7x50
[NSPF-283142]	N:M tunnel scale increase - phase 1	7x50
[NSPF-283144]	Obsoleting commands for video VPLS, RT-client, and Ad-insertion	7x50
[NSPF-283146]	AA FW: Scaling enhancement: session filter and session filter entries	7x50
[NSPF-283148]	423390: AA Header enrichment using certificate and base64 encoding	7x50
[NSPF-283152]	423464: TTL-based tethering detection of TCP, UDP flows	7x50
[NSPF-283154]	420206: Flow-tethering detection of UDP VPN apps and RTP	7x50
[NSPF-283156]	Tools auto-discovery deprecation to "tools perform auto-boot" (DTS384428)	7x50
[NSPF-283164]	7750 SR-s IOM2-se 3.0T	7x50
[NSPF-283166]	7750 SR-s IOM2-se 6.0T	7x50
[NSPF-283168]	MDA2-se: 14p 800G QSFP-DD & 4p 400G QSFP	7x50
[NSPF-283172]	MDA2-se: 24p 200G SFP-DD	7x50
[NSPF-283174]	MDA2-se: 6p 400G CFP2 DCO	7x50
[NSPF-285690]	Support for QSFP112-DD 8x100G LR1 10km 0/70C (Innolight T-DP8CNL-N00) on FP5	7x50
[NSPF-285692]	Support for QSFP112-DD 2x400G LR4 10km 0/70C (Innolight T-DC8CNL-NNO) on FP5	7x50
[NSPF-236548]	SFP PTX and RSL level via SNMP for all SFP	Wavence
[NSPF-267335]	Enabler for CAHD	Wavence
[NSPF-267338]	enabler for CAHD in release – step 2	Wavence
[NSPF-267340]	CAHD: Synchronization and SSM	Wavence
[NSPF-267344]	CAHD: Ethernet counters per queue and per aggregate	Wavence

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