



Cisco Evolved Programmable Network Manager 4.1 RESTCONF API Guide

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
<http://www.cisco.com>
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

Abstract

The Cisco NBI OSS Integration Guide for RESTCONF gives information on OSS Integration using RESTCONF northbound interfaces.

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Cisco Evolved Programmable Network Manager 4.0.0 RESTCONF API Guide

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1.1 Obtaining Documentation, Obtaining Support, and Security Guidelines

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly What's New in Cisco Product Documentation, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

Subscribe to the What's New in Cisco Product Documentation as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.

Preface

This guide provides information about the RESTCONF Northbound APIs supported by Cisco Evolved Programmable Network (EPN) Manager. OSS operators can use this document to integrate Cisco EPN Manager with their OSS system.

1.2 Conventions

This document uses the following conventions:

| Convention | Indication |
|-------------------------------|---|
| bold | Indicates commands, keywords, and user-entered text. |
| <i>italic</i> | Indicates document titles, new or emphasized terms, and arguments for which you supply values. |
| [] | Indicates elements that are optional. |
| {x y z} | Indicates required alternative keywords grouped within brackets and separated by vertical bars. |
| [x y z] | Indicates optional alternative keywords grouped in brackets and separated by vertical bars. |
| String | Indicates a nonsuited set of characters. Do not use quotation marks around the string or the string will include the quotation marks. |
| <code>courier font</code> | Indicates code snippets and XML. |
| <> | Indicates nonprinting characters such as passwords. |
| [] | Indicates default responses to system prompts. |
| !,# | Indicates a comment when used at the beginning of a line of code. |
| Note | Means reader take note. Notes contain helpful suggestions or references to material not covered in the publication. |

1.3 Additional User Documentation

The RESTCONF and YANG Specifications can be obtained from IETF.

Northbound RESTCONF Interface

Cisco EPN Manager implements the RESTCONF API as a standards-based Northbound Interface for integrating Cisco EPN Manager with a standards-compliant OSS. It is a set of RESTful services confirmed to the RESTCONF/YANG specification.

The Cisco EPN Manager implementation of the RESTCONF/YANG interface supports the retrieval of device inventory, circuit inventory, circuit provisioning and notifications about respective resource changes and provisioning.

1.4 RESTCONF and Web Services Standards

RESTCONF NBI in Cisco EPN Manager is a RESTful Web Services Interface that follows the IETF Draft specification of RESTCONF protocol for defining its interfaces and YANG specification for defining the data model. The following W3C and IETF standards are used:

- RESTCONF Protocol – RFC 8040 (January, 2017)
- YANG Specification – RFC 6020
- RESTful Web Services (JAX-RS)
- XML Schema version 1.0 (XSD)
- Hypertext Transfer Protocol HTTP 1.1 - RFCs 7230-7237

While no standard exists for information model exposed by this interface, the model is roughly based on TeleManagement Forum (TMF) standards governing the modeling of physical and service inventory.

1.5 Communication Patterns

RESTCONF interfaces supported by Cisco EPN Manager use REST (Representational State Transfer) techniques. REST is stateless and uses a client-server protocol (HTTP 1.1).

1.6 Batch Retrieval

Default Batch Size

The default max batch size for retrieval is set to 100.

Batch Size Properties

The operations in the API would return a single or multiple objects. In case of operations that return multiple objects, set of standard query parameters are defined to manage the number of objects retrieved per request. The following http query parameters can be used to control the batch retrieval.

Request Query Params

| Query Param | Description |
|-------------|---|
| .startIndex | 0 based index as a start index of the data to be retrieved. Note the dot (.) prefix in the parameter name. This is required to identify this as a special parameter. |
| .maxCount | Maximum number of objects to be retrieved. Note the dot (.) prefix in the parameter name. This is required to identify this as a special parameter. |

The response for the data API always returns a list container with **startIndex** and **lastIndex** as first two elements of the container data to help with the batch sequence.

1.7 Fully Distinguished Name (FDN)

Inventory objects in this interface has attributes representing FDN (Fully Distinguished Name). These attributes are used as identifiers of the object or as a reference to the object in query parameters or in the returns data wherever a reference to the object is needed.

This FDN is a formatted string that consists of a set of type/value pairs with the following syntax:

- Sequence of <type>=<value> pairs separated by “!” where:
 - <type> is a constant value defined in the data model to represent the inventory object in the hierarchy, e.g. MD,ND,EQ,PTP,FTP, CTP, TL,VC,CFS, etc.
 - <value> is any text or sequence of <attrName>=<attrValue> pair separated by “;” that represents the attribute/value pairs of the inventory object constitutes a unique value within the local scope of the object represented by the type.

The following are some examples for the FDNs:

- Node FDN= “MD=CISCO_EPNM!ND=asr9k-cluster.cisco.com”
- Equipment FDN = “MD=CISCO_EPNM!ND=asr9k-cluster.cisco.com!EQ=name=subslot 0/3 transceiver 0;partnumber=ONS-SI-155-SR-MM”
- Termination Point FDN = “MD=CISCO_EPNM!ND=ME3800-Automation!CTP=name=GigabitEthernet0/2;lr=lr-ip;ADDRESS=192.168.100. 31”

Note: It is assumed that the devices in the network managed by Cisco EPN Manager have unique names and that this is continuously ensured by the network operator. If two or more devices have the same name, the API will not produce consistent results when using the Object Name as input to any of the APIs.

Supported FDNs (Fully Distinguished Name) for the Inventory Objects

The following table list all the supported FDNs for Inventory objects handled with in the APIs.

| Inventory Object | FDN Format | Example |
|-------------------------|---|---|
| Node (Device) | MD=CISCO_EPNM!ND=<node.name> | MD=CISCO_EPNM!ND=asr9k-cluster.cisco.com |
| Equipment | MD=CISCO_EPNM!ND=<node.name>!EQ=name=<equipment.name>;partnumber=<equipment.part number> | MD=CISCO_EPNM!ND=asr9k-cluster.cisco.com!EQ=name=subslot 0/3 transceiver 0;partnumber=ONS-SI-155-SR-MM |
| PhysicalConnector | MD=CISCO_EPNM!ND=<node.name>!EQ=name=<equipment.name>;partnumber=<equipment.part number>!PC=name> | MD=CISCO_EPNM!ND=example.cisco.com!EQ=name=APPM-3-1!PC=ACHAN-3-1-1 |
| Termination Point – PTP | MD=CISCO_EPNM!ND=<node.name>!PTP=name=<discovered-name>;lr=<layer-rate> | MD=CISCO_EPNM!ND=isc-asr903b.cisco.com!PTP=name=SONET 0/2/3;lr=lr-dsr-oc3-and-stm1 |
| Termination Point – FTP | MD=CISCO_EPNM!ND=<node.name>!FTP=name=<discovered-name>;lr=<layer-rate> | MD=CISCO_EPNM!ND=ME3800-Automation!FTP=name=TenGigabitEthernet0/2;lr=lr-ten-gigabit-ethernet |
| Termination Point – CTP | MD=CISCO_EPNM!ND=<node.name>!CTP=name=<discovered-name>;lr=<layer-rate> Below are optional attribute=values in the type value: ADDRESS=<ip>;PWID=<pwid>;REMOTE_ADDRESS=<ip> | MD=CISCO_EPNM!ND=ME3800-Automation!CTP=name=GigabitEthernet0/2;lr=lr-ip;ADDRESS=192.168.100. 31 MD=CISCO_EPNM!ND=isc-cl-test-me3800x-1.cisco.com!CTP=name=PW_27_100.100.100.5;lr=lr-pseudowire;PWID=27;REMOTE_ADDRESS=100.100.100. 5 |
| Topological Link | MD=CISCO_EPNM!TL=<tl.name> | MD=CISCO_EPNM!TL=LINK PW 100.100.100.5_145_192.169.105.65 |
| Virtual Connection | MD=CISCO_EPNM!VC=<vc.name > | Discovered VC: MD=CISCO_EPNM!VC=Evclink_EthPwLink #EPW_61.61.61.30_185_172.16.90.2 User Provisioned VC: MD=CISCO_EPNM!VC=MyService |
| Network Interface | MD=CISCO_EPNM!NI=<ni.name> | MD=CISCO_EPNM!NI=MyEplUni MD=CISCO_EPNM!NI=MyAccessEplEnni |
| Customer Facing Service | MD=CISCO_EPNM!CFS=<cfs.name> | MD=CISCO_EPNM!CFS=MyEPLService1 |
| Customer | MD=CISCO_EPNM!CUSTOMER=<customer.name> | MD=CISCO_EPNM!CUSTOMER=MyGoldCustomer |
| QOS Policy | MD=CISCO_EPNM!POLICY_QOS=<name> | MD=CISCO_EPNM!POLICY_QOS=MyDeviceQoS |
| QOS Profile | MD=CISCO_EPNM!PROFILE_QOS=<name> | MD=CISCO_EPNM!PROFILE_QOS=MyUserDefineQoS |
| Service Profile | MD=CISCO_EPNM!PROFILE_SERVICE=<name> | MD=CISCO_EPNM!PROFILE_SERVICE=GoldEplServiceProfile1 |
| Path | MD=CISCO_EPNM!PATH=<name> | MD=CISCO_EPNM!PATH=123_exp_path |
| Controller Port | MD=CISCO_EPNM!ND=<node.name>!CTRLP=<name> | MD=CISCO_EPNM!ND=NCS4206-146.4!CTRLP=MediaType 0/4/0 |
| SR Policy | MD=CISCO_EPNM!CFS=<srpolicy.name> | MD=CISCO_EPNM!CFS=MySrPolicyPolicy |

1.8 HTTP Security Protocol

Any OSS Client accessing the Cisco EPN Manager RESTCONF NBI should use the HTTPS with TLS 1.2.

As of Cisco EPN Manager 2.1, Transport Layer Security (TLS) 1.2 is only supported for HTTPS and TLS related secured communication, for example, RADIUS EAP-TLS. Support for TLS 1.0, TLS 1.1 and all versions of SSL has been disabled due to security vulnerabilities.

This means that all peer systems and clients (such as OSS Clients using the NBI) that transact with Cisco EPN Manager using HTTPS/TLS must support TLS 1.2. If they do not support TLS 1.2, they must be upgraded. Where possible, the Cisco EPN Manager documentation highlights the potentially affected systems. Please contact your Cisco representative for support in this regard, if necessary.

1.9 Authentication

The RESTCONF resource paths in Cisco EPN Manager are secured. To access these resource paths, HTTP basic authentication is required. e.g. to access customer RESTCONF api

```
curl --cookie-jar cookie.txt --include --header "accept: application/json" --request
GET https://<EPNM-HOST>/restconf/data/v1/cisco-customer:customer --basic --user
<username>:<password>
```

After authenticating request to a RESTCONF resource path, web server returns a session cookie to the RESTCONF client in the response. This session cookie is valid for session time configuration for server (default being 60 minutes) and RESTCONF client can save this cookie. In subsequent requests for RESTCONF resource paths, RESTCONF client can include un-expired session cookie. The session cookie will be used in lieu of HTTP basic authentication by server in these subsequent requests. For making several call in a sessions using session cookie is recommended approach, not only response will be faster but such approach prevents the EPN Manager from making authentication requests to the local database or AAA server (Tacacs+, LDAP etc.) for each RESTCONF resource request. These authentication calls from EPN Manager can stress AAA server and using session cookie eliminates redundant EPN Manager to AAA server requests.

Recommended flow for authentication of RESTCONF session is as follows

- Initialize a REST session using HTTP basic authentication to get and save a session cookie from spring security with http POST request to `https://<epnmhost>/restconf/j_spring_security_check` e.g.

```
curl --cookie-jar cookie.txt --include --header "Content-type: application/x-www-form-
urlencoded" --request POST https://<epnmhost>/restconf/j_spring_security_check -d
"j_username=<username>&j_password=<password>"
```

- Include saved session cookie in subsequent call to RESTCONF resource paths during the session and do not include HTTP Authorization header for basic authentication e.g.

```
curl --cookie cookie.txt --include --header "accept: application/json" --request
GET https://<EPNM-HOST>/restconf/data/v1/cisco-customer:customer
```

In summary, HTTP basic authentication can always be performed for individual RESTCONF resources paths, however it is recommended to get the authentication session/cookies established through spring security before making subsequent requests in a session.

1.10 Authorization

User credentials passed for accessing the RESTCONF resource paths require authorization to use the API. This authorization can be configured using Cisco EPN Manager's security management interface. In Cisco EPN Manager, NBI read privileges are required to perform GET (retrieval) on the RESTCONF data interfaces, whereas to use the provisioning interfaces, you need NBI write privileges.

Note: NBI Credential user group is Deprecated.

Virtual Domain Support

RESTCONF controls access to data by the virtual domain of the NBI user, as configured through the Cisco EPN Manager's security management interface. This interface allows an administrator to create virtual domains and assign them to users. Among other things, virtual domains contain a list of Network Devices (Nodes) accessible to the user. Refer the *Cisco EPN Manager User and Administration Guide* for details.

In general, a user may access all the data associated with a network device (Node) within the user's virtual domain. In case of the physical inventory, this is straight forward; if the user has access to a Node, the user may access any Chassis, Equipment, Module, and Physical Connector on that Node.

For services (QoS policies, Termination Points, Topological Links, Virtual Connections and Routes, and Customer Facing Services), RESTCONF allows access to the service data if **any** of the associated endpoints or policies are on a node that the user may access. However, note that for APIs where RESTCONF returns information about the service's endpoints, it includes data for authorized end points only, and omits data for end points on devices that are not accessible to the user.

For provisioning interfaces (Optical, CEM, Flex LSP, L2VPN, L3VPN, MPLS-TE, Model-Based Configuration, and Set Termination Point), NETCONF checks all resources, as identified by their Fully Distinguished Name (FDN), against the authorizations configured in the user's virtual domain. If the object identified by the FDN is not associated with a device in the user's virtual domain, RESTCONF reports that the resource is not accessible or does not exist. (For security reasons, RESTCONF does not confirm that the resource exists in scenarios where access is denied.)

RESTCONF currently supports one virtual domain per NBI user. Add all network devices accessible to a user to this single domain. Multiple NBI users may share the same virtual domain, but each user must have only one virtual domain.

1.11 Rate Limiting

The API is rate limited to protect against overload situations.

Overview

Rate limiting on the API is designed to protect RESTCONF from excessive requests. When the number of requests received within a time window reaches a threshold number, then further requests are rejected until the rate falls back below that threshold. Also, the maximum number of concurrent requests (per user and across all users) that the servers will handle can be configured. Once this limit is reached, further requests will be rejected. There are five thresholds that can be set by the system administrator of the platform.

- The maximum number of requests for all users within the window period
- The maximum number of requests per user within the window period
- The maximum number of concurrent requests per user
- The maximum number of concurrent requests for all users
- The maximum size of pages request

If any of these thresholds is exceeded, the requests will be rejected with status code of 503 (service unavailable). The text of the response will contain information about the cause as appropriate:

- NBI Global Rate limit exceeded (More than xxx in yyy ms)
- NBI Rate limit for user <userId> exceeded (More than xxx in yyy ms)
- Per user concurrent query count exceed Currently xxx : Limit is yyy

In the case of the per user threshold being exceeded, other users will continue to have access to the NBI as normal.

Note that requests rejected by the rate limiter do not count in calculation of the threshold.

Configuration

Rate and size limiting is configured with properties defined in the table below. These properties can only be changed by a systems administrator and require restart of EPNM to take effect.

The properties can be edited in a file called *restconf-ratelimit.properties* located in the directory */opt/CSColumos/conf/restconf/*

| Property | Allowed Values | Default Value | Description |
|--|---|---------------|--|
| restconf.nbi.rateLimit.maxConcurrentQueries | A non-zero positive integer | 60 | This is the number of concurrent requests allowed for any given user |
| restconf.nbi.rateLimit.maxAllUserConcurrentQueries | A non-zero positive integer. Use -1 to disable the limiting of all user concurrent requests | 270 | This is the number of concurrent requests allowed for all users. |
| restconf.nbi.rateLimit.perUserThreshold | An integer. Use -1 to disable the limiting of per user requests. | 30 | This is the number of requests for any given user that can be handled in window size ms. |
| restconf.nbi.rateLimit.totalRequestThreshold | An integer. Use -1 to disable the limiting for total requests. | 120 | This is the number of total request that can be handled in window size ms. |
| restconf.nbi.rateLimit.windowSegments | An integer value such that windowSize / windowSegments is a whole number | 10 | This property is used internally to divide the window into segments. The number of segments determine the rate at which the window decrements the request counter. For example, with 10 segments in a 1000ms window, the count will be reduced every 100 ms by the number of counts held in the oldest segment. The count is increased immediately after |

| | | | |
|-----------------------------------|--|------|---|
| | | | receiving a new request. |
| restconf.nbi.rateLimit.windowSize | | 1000 | This property is the size of the sliding window used to count requests. |

1.12 Provisioning rate configuration

Overview

RESTCONF handles various service provisioning requests and number of requests that RESTCONF can accommodated can be configured.

Configuration

Provisioning requests rate are configured with properties defined in the table below. These properties can only be changed by a systems administrator and require EPNM restart to take effect.

The properties can be edited in a file called *restconf-config.properties* located in the directory */opt/CSColumos/conf/restconf/*

| Property | Allowed Values | Default Value | Description |
|----------------------|------------------------------|---------------|--|
| thread.corePoolSize | A non-zero positive integer | 50 | This is the number of threads spawned and ready for accepting provisioning requests. |
| thread.queueCapacity | A non-zero positive integer. | 100 | This is the number of provisioning requests can be kept in the queue when all the corePoolSize threads are actively running. |
| thread.maxPoolSize | A non-zero positive integer | 50 | This is the number of threads that will be spawned when the queueCapacity is exhausted during service provisioning requests. |

1.13 License

A Cisco EPN Manager NBI license is required to use RESTCONF NBI APIs. EPNM Advance License is required for following APIs

- /operations/v1/cisco-service-activation
- /data/v1/cisco-service-network:virtual-connection
- /data/v1/cisco-resource-network:virtual-connection-multi-layer-route
- /operations/v1/cisco-service-oam:service-oam-config
- /operations/v1/cisco-service-oam-ext:service-oam-config-ext
- /operations/v1/cisco-resource-activation:assign-shared-risk-resource-group
- /operations/v1/cisco-resource-activation:create-shared-risk-resource-group
- /operations/v1/cisco-resource-activation:delete-shared-risk-resource-group
- /operations/v1/cisco-resource-activation:unassign-shared-risk-resource-group
- /data/v1/cisco-service-network:customer-facing-service
- /data/v1/cisco-service-network:ipsla-profile
- /data/v1/cisco-service-network:network-interface
- /data/v1/cisco-service-profile:service-profile
- /operations/v1/cisco-service-action:restore-reroute
- /operations/v1/cisco-service-action:restore-revert
- /operations/v1/cisco-service-action:restore-upgrade
- /operations/v1/network-service:resync-service

Supported Use Cases and Interfaces

The table below lists the use cases supported in the Cisco EPN Manager RESTCONF NBI:

Table - Supported Cisco EPN Manager RESTCONF NBI Use cases

| Use case | API Path with Params |
|--|--|
| Retrieve List of Supported YANG Modules | |
| List All YANG Modules | /restconf/data/ietf-yang-library:modules-state |
| Retrieve Physical Inventory | |
| Get/Create Groups | /data/v1/cisco-resource-physical:group |
| Get/Update/Delete Group given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:group?fdn=<value> |
| Get All Nodes | /data/v1/cisco-resource-physical:node |
| Get Node given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:node?fdn=<value> |
| Get All Chassis | /data/v1/cisco-resource-physical:chassis |
| Get Chassis given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:chassis?fdn=<value> |
| Get All Equipment | /data/v1/cisco-resource-physical:equipment |
| Get Equipment given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:equipment?fdn=<value> |
| Get All Modules | /data/v1/cisco-resource-physical:module |
| Get Module given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:module?fdn=<value> |
| Get All Physical Connectors | /data/v1/cisco-resource-physical:physical-connector |
| Get Physical Connector given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-physical:physical-connector?fdn=<value> |
| Get All Optical Network Settings | /data/v1/cisco-resource-optical:optical-nesettings |
| Get All Optical Network Settings (Fully Distinguished Name) | /data/v1/cisco-resource-optical:optical-nesettings?node-fdn=<value> |
| Retrieve TerminationPoint Resource | |
| Get All TerminationPoints | /data/v1/cisco-resource-ems:termination-point |
| Get TerminationPoint given its FDN (Fully Distinguished Name) | /data/v1/cisco-resource-ems:termination-point?fdn=<value> |
| Get All Physical Termination Points | /data/v1/cisco-resource-ems:termination-point?type=PTP |
| Get All Physical Termination Points for Device | /data/v1/cisco-resource-ems:termination-point?type=PTP&ndFdn=<value> |
| Get All Floating Termination Points | /data/v1/cisco-resource-ems:termination-point?type=FTP |
| Get All Floating Termination Points for Device | /data/v1/cisco-resource-ems:termination-point?type=FTP&ndFdn=<value> |
| Get All Connection Termination Points | /data/v1/cisco-resource-ems:termination-point?type=CTP |
| Get All Connection Termination Points for Device | /data/v1/cisco-resource-ems:termination-point?type=CTP&ndFdn=<value> |
| Get Contained Connection Termination Points | /data/v1/cisco-resource-ems:termination-point?fdn=<value>&containedCTP=true |
| Get Contained In Use Connection Termination Points | /data/v1/cisco-resource-ems:termination-point?fdn=<value>&containedInUseCTP=true |
| Retrieve Topological Links | |
| Get All Topological links | /data/v1/cisco-resource-network:topological-link |
| Get a Topological Link given a FDN | /data/v1/cisco-resource-network:topological-link?fdn=<value> |
| Get a Topological Link given a topo-Layer | /data/v1/cisco-resource-network:topological-link?topo-layer=<value> |

| | |
|---|---|
| Retrieve Virtual Connection Resource | |
| Get All Virtual Connections | /data/v1/cisco-service-network:virtual-connection |
| Get All Virtual Connections for a specific type | /data/v1/cisco-service-network:virtual-connection?type=<value> |
| Get a Virtual Connection given its FDN (Fully Distinguished Name) | /data/v1/cisco-service-network:virtual-connection?fdn=<value> |
| Get All Virtual Connection referencing a given Termination point | /data/v1/cisco-service-network:virtual-connection?tpFdn=<value> |
| Multi Layer Trace | |
| Get Multi Layer Trace for a given vcFDN | /data/v1/cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=<value> |
| MPLSTE Explicit Path | |
| Get All MPLS TE Explicit Paths | /data/v1/cisco-resource-ems:mpls-te-explicit-path |
| Get an MPLS TE Explicit Path | /data/v1/cisco-resource-ems:mpls-te-explicit-path?path-ref=<value> |
| Retrieve Customer Facing Service Resource | |
| Get All Customer Facing Services of a given type | /data/v1/cisco-service-network:customer-facing-service?type=<value> |
| Get All Customer Facing Services of a given type and sub-type | /data/v1/cisco-service-network:customer-facing-service?type=<type value>&subtype=<sub-type value> |
| Get Customer Facing Services given its FDN | /data/v1/cisco-service-network:customer-facing-service?fdn=<value> |
| Get Planned Customer Facing Services | /data/v1/cisco-service-network:customer-facing-service?plannedServices=<true/false> |
| QoS Policy Retrieval | |
| Get All QoS Policies in a batch | /data/v1/cisco-qos:qos-policy |
| Get QoS Policy for a given FDN | /data/v1/cisco-qos:qos-policy?fdn=<value> |
| Get All QoS Policies for a given device | /data/v1/cisco-qos:qos-policy?ndFdn=<value> |
| QoS Profile Retrieval | |
| Get All QoS Profiles in a batch | /data/v1/cisco-qos:qos-profile |
| Get QoS Profile for an given FDN | /data/v1/cisco-qos:qos-profile?fdn=<value> |
| CLI Template Retrieval | |
| Get All CLI Template in a batch | /data/v1/cisco-resource-activation:cli-template |
| Get CLI Template for a given template name | /data/v1/cisco-resource-activation:cli-template?name=<cli-template-name> |
| Audit Log Retrieval | |
| Get All Audit Log Entries in a batch | /data/v1/cisco-audit:audit-log |
| Get filtered Audit Log Entries | /data/v1/cisco-audit:audit-log?attribute=filter-spec |
| Get sorted Audit Log Entries (+ or -) | /data/v1/cisco-audit:audit-log?.sort(+attribute) |
| Set Termination Point | |
| Set attributes on a Termination Point | /operations/v1/cisco-resource-activation:set-termination-point |
| Service Activation | |
| Provision a Service | /operations/v1/cisco-service-activation:provision-service |
| Modify a Service | /operations/v1/cisco-service-activation:modify-service |
| Terminate a Service | /operations/v1/cisco-service-activation:terminate-service |
| Roll a Service | /operations/v1/cisco-service-activation:roll-service |
| Customer CRUD | /data/v1/cisco-customer:customer |
| Standalone OAM Performance Test | |
| Execute Performance Test | /operations/v1/cisco-service-oam:service-oam-config |
| Get Performance Test Result | /operations/v1/cisco-service-oam:service-oam-config/{request-id} |
| Resource Activation | |

| | |
|---|--|
| Run CLI Configuration Template – TBC (Template Based Configuration) | /operations/v1/cisco-resource-activation:run-cli-configuration |
| CLI Configuration Template Run Status | /operations/v1/cisco-resource-activation:get-cli-configuration-run-status/{job-name} |
| MPLS TE explicit path - Create | /operations/v1/cisco-resource-activation:create-explicit-path |
| MPLS TE explicit path - Modify | /operations/v1/cisco-resource-activation:modify-explicit-path |
| MPLS TE explicit path - Terminate | /operations/v1/cisco-resource-activation:terminate-explicit-path |
| Performance Metrics | |
| Optical Power And Span Loss for Links | /data/v1/cisco-resource-network:perf-metrics |
| Alarm Retrieval | |
| Get All Alarms in a batch | /data/v1/cisco-rtm:alarm |
| Get All Alarms by given Node reference | /data/v1/cisco-rtm:alarm?nd-ref=<value> |
| Get All Alarms by given Termination point reference | /data/v1/cisco-rtm:alarm?tp-ref=<value> |
| Get All Alarms by given Equipment reference | /data/v1/cisco-rtm:alarm?eq-ref=<value> |
| Get All Alarms by given precieved severity | /data/v1/cisco-rtm:alarm?precieved-severity=<value> |
| Get All Alarms by given System Update Time | /data/v1/cisco-rtm:alarm?system-update-time=<value> |
| Get All Alarms by given IteratorId | /data/v1/cisco-rtm:alarm?.iteratorId=<value> |
| Alarm Handling | |
| Alarm Ack/UnAck/Clear/Delete | /data/v1/cisco-alarm:handle-alarm |
| Alarm to Service association | |
| Get All Alarms by Service name | data/v1/cisco-rtm:impacting-alarms-by-service?cfs-ref=<value> |
| Patch cord | |
| Create Patchcord | /operations/v1/cisco-resource-activation:create-patch-cord |
| Delete Patchcord | /operations/v1/cisco-resource-activation:delete-patch-cord |
| SRRG | |
| Get All SRRGs present in EPNM | /data/v1/cisco-resource-network:shared-risk-resource-group |
| Get SRRG by FDN | /data/v1/cisco-resource-network:shared-risk-resource-group?fdn=<value> |
| GetAll SRRG Pool | data/v1/cisco-resource-network:srrg-pool |
| Get SRRG Pool by fdn | data/v1/cisco-resource-network:srrg-pool?fdn=<value> |
| Get SRRG Pool by pool type reference | data/v1/cisco-resource-network:srrg-pool?pool-type-ref=<value> |
| Get All SRRG Pool Type | data/v1/cisco-resource-network:srrg-pool-type |
| Get SRRG Pool type by fdn | data/v1/cisco-resource-network:srrg-pool-type?fdn=<value> |
| Performance Metrics for Topological Link | |
| Get Performance metrics for a given Topological Link | /data/v1/cisco-resource-network:perf-metrics?tlFdn=<value> |
| MediaType Controller | |
| Get/Update MediaType Controller | /data/v1/cisco-nrf-controller:controller-port |
| LMP Link | |
| Create LMP Link | /operations/v1/cisco-resource-activation:Imp-link-resource |
| Delete LMP Link | /operations/v1/cisco-resource-activation:Imp-link-resource?fdn=<ImpFdn> |
| Retrieve LMP Link | / data/v1/cisco-resource-network:topological-link?fdn=< ImpFdn> |
| AINS – Automatic In-Service | |
| Equipment Reserve Operation/ AINS Equipment | /operations/v1/cisco-nrf-physical:reserve-equipment |

| | |
|--|--|
| Device Synchronization | |
| Device Synchronization | /operations/v1/cisco-nrf-physical:synchronize-node |
| Resync-service | |
| Resync-service | /operations/v1/network-service:resync-service |
| Service tests – OTDR, OAM, Ping and Trace | |
| OTDR | /restconf/operations/v1/cisco-network-resource-oam:network-resource-oam-config |
| LSP ping and traceroute | /restconf/operations/v1/cisco-service-oam:service-oam-config |
| CFM/PW ping and traceroute | /restconf/operations/v1/cisco-service-oam:service-oam-config-ext |

Optical TerminationPoint Layer Rates Name Change

Following is list of legacy and currently supported layer rates for optical TerminationPoint.

e.g.,

Legacy layer rate:

```
<ns9:fdn>MD=CISCO_EPNM!ND=cvg-frodo-  
235.cisco.com!CTP=name=ODU00/1/0/13;lr=LR_OCH_DATA_UNIT_0</ns9:fdn>
```

Currently supported layer rate:

```
<ns9:fdn>MD=CISCO_EPNM!ND=cvg-frodo-235.cisco.com!CTP=name=ODU00/1/0/13;lr=lr-och-data-unit-  
0</ns9:fdn>
```

For complete supported layer rate set, see [cisco-layer-rates.yang](#) and [cisco-optical-circuit-extensions.yang](#)

| Legacy Layer Rates (Until release 2.1) | Updated Layer Rates (Release 2.2 onwards) |
|--|---|
| LR_OCH_DATA_UNIT_0 | lr-och-data-unit-0 |
| LR_OCH_DATA_UNIT_1 | lr-och-data-unit-1 |
| LR_OCH_DATA_UNIT_1E | lr-och-data-unit-1e |
| LR_OCH_DATA_UNIT_1F | lr-och-data-unit-1f |
| LR_OCH_DATA_UNIT_2 | lr-och-data-unit-2 |
| LR_OCH_DATA_UNIT_2E | lr-och-data-unit-2e |
| LR_OCH_DATA_UNIT_2F | lr-och-data-unit-2f |
| LR_OCH_DATA_UNIT_3 | lr-och-data-unit-3 |
| LR_OCH_DATA_UNIT_3E1 | lr-och-data-unit-3e1 |
| LR_OCH_DATA_UNIT_3E2 | lr-och-data-unit-3e2 |
| LR_OCH_DATA_UNIT_4 | lr-och-data-unit-4 |
| LR_OCH_DATA_UNIT_C2 | lr-och-data-unit-c2 |
| LR_OCH_DATA_UNIT_FLEXIBLE | lr-och-data-unit-flex |
| LR_OCH_TRANSPORT_UNIT_0 | lr-och-transport-unit-0 |
| LR_OCH_TRANSPORT_UNIT_1 | lr-och-transport-unit-1 |
| LR_OCH_TRANSPORT_UNIT_1E | lr-och-transport-unit-1e |
| LR_OCH_TRANSPORT_UNIT_1F | lr-och-transport-unit-1f |
| LR_OCH_TRANSPORT_UNIT_2 | lr-och-transport-unit-2 |
| LR_OCH_TRANSPORT_UNIT_2E | lr-och-transport-unit-2e |
| LR_OCH_TRANSPORT_UNIT_2F | lr-och-transport-unit-2f |
| LR_OCH_TRANSPORT_UNIT_3 | lr-och-transport-unit-3 |
| LR_OCH_TRANSPORT_UNIT_3E1 | lr-och-transport-unit-3e1 |
| LR_OCH_TRANSPORT_UNIT_3E2 | lr-och-transport-unit-3e2 |
| LR_OCH_TRANSPORT_UNIT_4 | lr-och-transport-unit-4 |
| LR_OCH_TRANSPORT_UNIT_C2 | lr-och-transport-unit-c2 |
| LR_OPTICAL_CHANNEL | lr-optical-channel |
| LR_OPTICAL_MULTIPLEX_SECTION | lr-optical-multiplex-section |
| LR_OPTICAL_SECTION | lr-optical-section |
| LR_OPTICAL_TRANSMISSION_SECTION | lr-optical-transmission-section |
| LR_OPTICALPHYSICALSECTION | lr-optical-physical-section |
| LR_OPTICALPHYSICALSECTION_MULTILANE | lr-optical-physical-section-multilane |
| LR_PHYSICAL_OPTICAL | lr-optical-physical |
| LR_DSR_10GIGABIT_ETHERNET | lr-dsr-10gigabit-ethernet |
| LR_DSR_100GIGABIT_ETHERNET | lr-dsr-100gigabit-ethernet |
| LR_DSR_FAST_ETHERNET | lr-dsr-fast-gigabit-ethernet |
| LR_DSR_GIGABIT_ETHERNET | lr-dsr-gigabit-ethernet |

Optical TerminationPoint Layer Rates and associated attributes

Following is list of legacy and currently supported layer rates for optical TerminationPoint.

| Layer-rate | Terminationpoint attributes |
|---|---|
| lr-och-data-unit-0 | <u>oduk-attributes</u> bit-rate flex-bandwidth flex-tolerance flex-type gcc1 ls-ttp-present number-of-timeslots parent-timeslot position-seq-current-size tpn-value ts-g |
| lr-och-data-unit-1e, lr-och-data-unit-2 | <u>optical-attributes</u> optics-type framing-type port-mode mapping-mode <u>otn-odu-attributes</u> signal-degrade-ber-threshold signal-failure-ber-threshold <u>oduk-attributes</u> bit-rate flex-tolerance gcc1 ls-ttp-present number-of-timeslots parent-timeslot position-seq-current-size tpn-value |
| lr-och-data-unit-4 | <u>optical-timing-attributes</u> is-provide-synch is-sync-msg-enable admin-sync-status is-send-dus <u>otn-attributes</u> osnr <u>oduk-attributes</u> bit-rate flex-tolerance gcc1 is-ttp-present number-of-timeslots parent-timeslot position-seq-current-size tpn-value |
| lr-och-data-unit-c2 | <u>optical-timing-attributes</u> |

| | |
|--------------------------|--|
| | is-provide-synch is-sync-msg-enable is-send-dus <u>otn-attributes</u> osnr <u>otn-odu-attributes</u> signal-degrade-ber-threshold signal-failure-ber-threshold tti-mode <u>oduk-attributes</u> bit-rate flex-tolerance gcc1 is-ttp-present number-of-timeslots parent-timeslot position-seq-current-size tpn-value |
| lr-och-transport-unit-1e | <u>optical-attributes</u> optics-type framing-type port-mode mapping-mode <u>otn-attributes</u> gcc0 fec-mode signal-degrade-ber-threshold signal-failure-ber-threshold |
| lr-och-transport-unit-2 | <u>optical-timing-attributes</u> is-provide-synch is-sync-msg-enable admin-sync-status is-send-dus <u>otn-attributes</u> gcc0 fec-mode tti-sapi-sent tti-sapi-expected tti-dapi-sent tti-dapi-expected signal-degrade-ber-threshold signal-failure-ber-threshold |
| lr-och-transport-unit-4 | <u>optical-timing-attributes</u> is-provide-synch is-sync-msg-enable admin-sync-status is-send-dus <u>otn-attributes</u> gcc0 fec-mode osnr |

| | |
|---------------------------------|---|
| | <u>otn-odu-attributes</u> signal-degrade-ber-threshold signal-failure-ber-threshold bit-rate flex-tolerance gcc1 is-ttp-present number-of-timeslots parent-timeslot position-seq-current-size tpn-value |
| lr-och-transport-unit-c2 | <u>optical-timing-attributes</u> is-provide-synch is-sync-msg-enable is-send-dus <u>otn-attributes</u> gcc0 fec-mode osnr signal-degrade-ber-threshold signal-failure-ber-threshold |
| lr-optical-channel | <u>och-attributes</u> wavelength actual-wave-length |
| lr-optical-section | <u>optical-logo-attributes</u> noise noise-sigma pdl pmd drop-power <u>optical-attributes</u> optics-type framing-type port-mode mapping-mode <u>och-attributes</u> g709 |
| lr-optical-transmission-section | <u>optical-auto-laser-shutdown</u> mode recovery-pulse-interval recovery-pulse-duration <u>fiber-attributes</u> fiber-type length pdm input-attenuation output-attenuation channel-spacing channel-number domain span-validation |

| | |
|---------------------|---|
| lr-optical-physical | <u>optical-logo-attributes</u> noise noise-sigma pdl pmd drop-power |
|---------------------|---|

TerminationPoint default attributes

Following attributes are legacy attributes and will not be useful henceforth.

is-edge-point
is-promiscuous
is-span-monitored
duplex-mode
alias-name
flow-control

Optical Ethernet termination point and equivalent layer-rate

Optical Ethernet TerminationPoint of DWDM devices (e.g. NCS2k), layer-rate are aligned with packet ethernet TerminationPoint layer-rate, following table have the mapping

| Legacy Optical Ethernet Layer Rates (Until release 3.0) | Updated Optical Ethernet Layer Rates (Release 3.1 onwards) |
|---|--|
| lr-dsr-fast-gigabit-ethernet | lr-hundred-megabit-ethernet |
| lr-dsr-10gigabit-ethernet | lr-ten-gigabit-ethernet |
| lr-dsr-25gigabit-ethernet | lr-twentyfive-gigabit-ethernet |
| lr-dsr-40gigabit-ethernet | lr-forty-gigabit-ethernet |
| lr-dsr-100gigabit-ethernet | lr-hundred-gigabit-ethernet |
| lr-dsr-gigabit-ethernet | lr-gigabit-ethernet |

Example of an optical Termination Point FDN:

e.g : **MD=CISCO_EPNM!ND=cvg-bosshogg-101.cisco.com!CTP=name=HundredGigEctrIr0/0/0/2;lr=lr-hundred-gigabit-ethernet**

RESTCONF Interface Details

This section provides details about the supported RESTCONF interfaces.

1.14 YANG Module List Retrieval

This interface, defined by the RESTCONF specification, retrieves a list of YANG modules supported by Cisco EPN Manager. A YANG module defines how a portion of the data store is structured on the server. Use this information to discover the RESTCONF interfaces implemented on the server. See RFC 7895, Yang Module Library for more information about this interface.

Note: YANG modules are not to be confused with the Module object defined by EPN-M to model a line card.

| Resource | Description |
|-----------------------|--|
| modules-state | Retrieves list of interfaces exposing YANGs. |
| HTTP Method | Resource Path |
| GET | /restconf/data/ietf-yang-library:modules-state |
| Query Parameters | |
| None | |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more module descriptions of type model – see the RESTCONF Specification for details. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

Yang Module Data

| Name | Type | Description |
|--------|-------------------|---|
| Module | Container element | Holds the data for YANG module description. |

Request/Response

Request

GET /restconf/data/ietf-yang-library:modules-state HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Module States/response.xml](#)

1.15 RESTCONF Protocol Capabilities

As mandated in RESTCONF RFC 8040, Cisco EPN Manager supports an interface to retrieve the optional functions supported by the server. Cisco EPN Manager supports a limited form of the depth parameter (depth=1) to allow efficient retrieval of entities without traversing collections. It also reports that the server returns all populated leaf values (default values are not suppressed). This is part of the RESTCONF Monitoring Module described in Section 9.3 of RFC 8040.

| Resource | Description |
|-----------------------------|--|
| restconf-state/capabilities | Retrieves list of optional features. |
| HTTP Method | Resource Path |
| GET | /restconf/data/ietf-restconf-monitoring:restconf-state/capabilities |
| Query Parameters | |
| None | |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more capability URIs— see the RESTCONF RFC 8040 Section 9.1 for details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

Yang Module Data

| Name | Type | Description |
|------------------------|---------------|---|
| List a capability URIs | List elements | Describes optional feature support proved by server |

1.16 RESTCONF Stream Resources

As mandated in RESTCONF RFC 8040, Cisco EPN Manager supports an interface to retrieve the optional stream resources supported by the server. These resources are:

- Attribute Value Change (AVC) Notifications for create, update, and delete notifications of inventory data resources. See the section on notifications for details.
- Service Activation Notifications for results of service create, modify, and delete actions through the operations interface. See the section on notifications.
- Template-base Configuration Notifications for the results of configuration change request through the operation interface. See the section on notifications.
- All is a convenience interface to register for all notifications.

The notification received by the user are restricted by his/her permissions based on device access permitted by the user's virtual domain(s).

| Resource | Description |
|-----------------------------|--|
| restconf-state/capabilities | Retrieves list of supported streams. |
| HTTP Method | Resource Path |
| GET | /restconf/data/ietf-restconf-monitoring:restconf-state/streams |
| Query Parameters | |
| None | |
| Response Message | |

| | |
|-----------------------|---|
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more capability URIs – see the RESTCONF RFC 8040 Section 9.1 for details. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

Yang Module Data

| Name | Type | Description |
|------------------------|---------------|--|
| List a capability URIs | List elements | Describes optional feature support proved by server. |

1.17 Group Retrieval

This interface provides the operations required to retrieve the details of groups of nodes. Each group object contains identifying information and a list of Fully Distinguished Names of the nodes in the group. Nodes may appear in more than one group. Groups are created through the graphical user interface (GUI) and through this API. The Group may contain information about the physical location of the group by street address and/or latitude and longitude. The RESTCONF API also supports creating, updating, and deleting Groups. See RFC 8040 Sections 4.4, 4.5, and 4.7 for information about POST, PUT, and DELETE processing in RESTCONF.

| Resource | Description | |
|---|--|--|
| Group | Retrieves groups of the nodes in the system. | |
| HTTP Method | Resource Path | |
| GET, POST, PUT, DELETE | /data/v1/cisco-resource-physical:group | |
| Query Parameters | | |
| | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the group to retrieve. |
| name | String | Name of the group to retrieve (unique). |
| description | String | Description of the group to retrieve (not unique). |
| Message Body (POST, PUT) | | |
| Group | Group | Data to create or update the Group. |
| Authorization Required | 'Add Groups' for HTTP Methods GET, PUT, POST 'Modify Groups' for HTTP Methods GET, POST, PUT 'Delete Groups' for HTTP Methods GET, DELETE | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more groups of type group – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. | |

| | |
|----------------|--|
| | <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-physical-node.yang |

Group Data

| Name | Type | Description |
|-------|-------------------|---------------------------|
| Group | Container element | Holds the data for group. |

Get All Groups Request/Response

Request

GET /restconf/data/v1/cisco-resource-physical:group HTTP/1.1
Host: <epnm-host>
Accept: application/yang-data+xml
Authorization: Basic ...

Response

HTTP/1.1 200 OK
Server: <epnm-host>
Content-Type: application/yang-data+xml

- [samples/Get All Groups/response.xml](#)

1.18 Node Retrieval

This interface provides the operations required to retrieve node details. Each node object contains its own attributes and contains a list of the equipment instances contained within it. A node may contain the latitude and longitude of its physical location. Nodes are created through discovery of devices whose credentials are entered into the system through the graphical user interface (GUI). The RESTCONF API for nodes is read-only.

Note: Nodes were previously known as Managed Elements. The name was changed to align with the IETF standards.

| Resource | Description | |
|------------------------|---|---|
| Node | Retrieves the Nodes in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-physical:node | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the Node to retrieve. |
| name | String | Name of the Node to retrieve (unique). |
| description | String | Description of the Node to retrieve (not unique). |
| <attribute> | Varies | Uses any non-collection attribute to retrieve Node object(s). |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadChassis View Read and WriteCircuit or VC Provisioning | |

| | |
|---|--|
| | <ul style="list-style-type: none"> • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more Nodes of type node – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-physical-node.yang |

Node Data

| Name | Type | Description |
|------|-------------------|----------------------------|
| Node | Container element | Holds the data for a node. |

Get All Nodes Request/Response

1.18.1.1 Request

GET /restconf/data/v1/cisco-resource-physical:node HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

1.18.1.2 Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Nodes/response.xml](#)

1.19 Equipment Retrieval

This interface provides the operations required to retrieve equipment details. Each equipment object contains its own attributes and contains a list of FDN of the equipment instances contained within it. If it is contained within another equipment instance, the FDN of that instance is shown. Equipment may contain physical connectors

(explained below). Equipment is created through discovery on devices whose credentials are entered into the system through the graphical user interface (GUI). The RESTCONF API for equipment is read-only.

Note: Equipment is a super class of Chassis and Module. This interface retrieves Chassis, Module, and Equipment objects.

| Resource | Description | |
|---|--|--|
| Equipment | Retrieves the Equipment in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-physical:equipment | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the Equipment to retrieve. |
| name | String | Name of the Equipment to retrieve (not unique). |
| description | String | Description of the Equipment to retrieve (not unique). |
| <attribute> | Varies | Uses any non-collection attribute to retrieve Equipment object(s). |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadChassis View Read and WriteCircuit or VC ProvisioningCircuit or VC Monitoring and TroubleshootingNetwork TopologyNetwork Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more Equipment of type equipment – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-physical-equipment.yang | |

Equipment Data

| Name | Type | Description |
|-----------|-------------------|---|
| Equipment | Container element | Holds the data for an Equipment instance. |

Get All Equipment Request/Response

Request

GET /restconf/data/v1/cisco-resource-physical:equipment HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Equipment/response.xml](#)

1.20 Chassis Retrieval

This interface provides the operations required to retrieve Chassis details. Each Chassis object contains its own attributes and contains a list of FDN of the equipment instances contained within it. Typically, a chassis object is contained directly by a node and does not have a containing equipment FDN. Chassis are created through discovery on devices whose credentials are entered into the system through the graphical user interface (GUI). The RESTCONF API for chassis is read-only.

Note: Chassis is a subclass of Equipment. This interface retrieves only Chassis objects along with any additional attributes defined for Chassis.

| Resource | Description | |
|------------------------|--|--|
| Equipment | Retrieves the Chassis instances in the system | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-physical:chassis | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the Chassis to retrieve. |
| name | String | Name of the Chassis to retrieve (not unique). |
| description | String | Description of the Chassis to retrieve (not unique) |
| <attribute> | Varies | Uses any non-collection attribute to retrieve Chassis object(s). |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadChassis View Read and WriteCircuit or VC ProvisioningCircuit or VC Monitoring and TroubleshootingNetwork TopologyNetwork Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more Chassis of type chassis – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |

| | |
|---|--|
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-physical-equipment.yang |

Chassis Data

| Name | Type | Description |
|---------|-------------------|-------------------------------|
| Chassis | Container element | Holds the data for a Chassis. |

Get All Chassis Request/Response

Request

GET /restconf/data/v1/cisco-resource-physical:chassis HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Chassis/response.xml](#)

1.21 Module Retrieval

This interface provides the operations required to retrieve module details. Each module object contains its own attributes and contains a list of FDN of the equipment instances contained within it. Typically, a module object is contained within an equipment object and has a Containing equipment FDN. Equipment containing physical connectors (explained below) are often but not always Modules. Modules are created through discovery on devices whose credentials are entered into the system through the graphical user interface (GUI). The RESTCONF API for module is read-only.

Note: Module is sub class of Equipment. This interface retrieves only Module objects along with any additional attributes defined for Module.

| Resource | Description | |
|------------------|---|---|
| Module | Retrieves the Modules in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-physical:module | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the Module to retrieve. |
| name | String | Name of the Module to retrieve (not unique). |
| description | String | Description of the Module to retrieve (not unique). |
| <attribute> | Varies | Uses any non-collection attribute to retrieve Module object(s). |

| | |
|---|--|
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Chassis View Read • Chassis View Read and Write • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more Modules of type module – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-physical-equipment.yang |

Module Data

| Name | Type | Description |
|--------|-------------------|------------------------------|
| Module | Container element | Holds the data for a Module. |

Get All Modules Request/Response

Request

GET /restconf/data/v1/cisco-resource-physical:module HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Module/response.xml](#)

1.22 Physical Connector Retrieval

This interface provides the operations required to retrieve PhysicalConnector details. A physical connector represents a connector capable of transmitting signals or power. Each PhysicalConnector object contains its own attributes and the FDN of the equipment instance that contains it. Equipment containing PhysicalConnectors are often but not always Modules. PhysicalConnectors are created through discovery on devices whose credentials are entered into the system through the graphical user interface (GUI). The RESTCONF API for PhysicalConnectors is read-only.

Note: PhysicalConnector is not a subclass of Equipment.

| Resource | Description | |
|---|--|--|
| PhysicalConnector | Retrieves the PhysicalConnectors in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-physical:physical-connector | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the Module to retrieve. |
| name | String | Name of the PhysicalConnector to retrieve (not unique). |
| description | String | Description of the PhysicalConnector to retrieve (not unique). |
| <attribute> | varies | Uses any non-collection attribute to retrieve PhysicalConnector object(s). |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadChassis View Read and WriteCircuit or VC ProvisioningCircuit or VC Monitoring and TroubleshootingNetwork TopologyNetwork Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more PhysicalConnectors of type physical-connector – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-physical-equipment.yang | |

PhysicalConnector Data

| Name | Type | Description |
|--------------------|-------------------|---|
| physical-connector | Container element | Holds the data for a PhysicalConnector. |

Get All Physical Connectors Request/Response

Request

GET /restconf/data/v1/cisco-resource-physical:physical-connector HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Physical Connectors/response.xml](#)

1.23 Optical Network Element Settings

This interface provides the operations to retrieve the node type of optical devices. The node-fdn attribute identifies the associated node object. The node-type indicates the role of the device in an optical network. The node-type attribute was not added to the node object to avoid adding optical-specific information to node objects that are not optical devices.

By default, this interface returns the node object as well as the above two attributes. If you are not interested in the node information, you can suppress it with the ?depth=1 query string. (See example, below.)

| Resource | Description | |
|------------------------|---|--|
| OpticalNESettings | Retrieves the settings information for optical nodes in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-optical:optical-nesettings | |
| Query Parameters | | |
| Name | Type | Description |
| node-fdn | String | Fully Distinguished Name (FDN) of the associated node. |
| node-type | String | Optical node type, e.g.: ROADM (not unique). |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more OpticalNESetting objects of type optical-nesettings – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. | |

| | |
|---|--|
| | Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-resource-optical.yang |

Optical Network Element Settings Data

| Name | Type | Description |
|--------------------|-------------------|--|
| optical-nesettings | Container element | Holds the data for optical network elements settings |

Get All Optical Network Element Settings Request/Response

Request

GET /restconf/data/v1/cisco-resource-optical:optical-nesettings HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

- [samples/Get All Optical Network Element Settings/response.xml](#)

1.24 TerminationPoint Retrieval

This interface provides the operations required to retrieve TerminationPoint details.

| Resource | Description | |
|------------------|---|--|
| TerminationPoint | Retrieves TerminationPoints in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-ems:termination-point | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the terminationPoint to retrieve a single terminationPoint. FDN = 'MD=<CISCO_EPNM>!ND=<nodename>!<type>=<tpname> |
| type | String (CTP, PTP, FTP) | Type of the termination points to retrieve. |
| ndFdn | String | Fully Distinguished Name (FDN) of the Node. FDN = 'MD=<CISCO_EPNM>!ND=<nodename> |
| layerRate | String | Layer rate of the termination point to retrieve. |

| | | |
|---|---|---|
| | | e.g. Ir-ten-gigabit-ethernet |
| containedCTP | String(true/false) | Enables you to return Contained Connection Termination Points for a given Termination Point. |
| containedInUseCTP | String(true/false) | Enables you to return Contained In Use Connection Termination Points for a given Termination Point. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more terminationPoints of type termination-point – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TP.<number> are generated by this API. For example: TP.0004 for 'Invalid TerminationPoint - FDN: %s - name is missing.' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-termination-point.yang | |

TerminationPoint Data

| Name | Type | Description |
|------------------------------|-------------------|--|
| termination-point | Container element | Holds the data for physical and floating terminationPoint. |
| connection-termination-point | Container element | Holds the data for connection terminationPoint. |

Get All Physical Termination Points Request/Response

Request

GET /restconf/data/v1/cisco-resource-ems:termination-point?type=PTP HTTP/1.1

Response

- [samples/Get All Physical Termination Points/response.xml](#)

Get All Physical Termination Points for Device Request/Response

Request

GET /restconf/data/v1/cisco-resource-ems:termination-point?type=PTP&ndFdn=<Node FDN> HTTP/1.1

Response

- [samples/Get All Physical Termination Points for Device/response.xml](#)

Get All Floating Termination Points Request/Response

Request

GET /restconf/data/v1/cisco-resource-ems:termination-point?type=FTP HTTP/1.1

Response

- [samples/Get All Floating Termination Points/response.xml](#)

Get All Floating Termination Points for Device Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point?type=FTP&ndFdn=<Node FDN> HTTP/1.1

Response

- [samples/Get All Floating Termination Points for Device/response.xml](#)

Get All Connection Termination Points Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point?type=CTP HTTP/1.1

Response

- [samples/Get All Connection Termination Points/response.xml](#)

Get All Connection Termination Points for Device Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point?type=CTP&ndFdn=<Node FDN> HTTP/1.1

Response

- [samples/Get All Connection Termination Points for Device/response.xml](#)

Get Single Termination Point Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point? fdn=<Termination Point FDN> HTTP/1.1
e.g., Termination Point FDN = MD=CISCO_EPNM!ND=NCS4206-TEST-

-
- 120.33!CTP=name=CEM-PG57:16002;lr=lr-cem-grp
 - Host: <epnm-host>
 - Accept: application/yang-data+xml

Response

- [samples/Get_Single_Termination_Point/response.xml](#)

Get Contained Connection Termination Point Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point? fdn=<Termination Point FDN> &containedCTP=true HTTP/1.1
Ex Termination Point FDN = > MD=CISCO_EPNM!ND=NCS4206-TEST-120.33!PTP=name=SONET 0/5/6;lr=lr-dsr-oc48-and-stm16
Host: <epnm-host>
Accept: application/yang-data+xml

Response

- [samples/Get_Contained_Connection_Termination_Points/response.xml](#)

Get Contained in use Connection Termination Point Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point? fdn=<Termination Point FDN> &containedInUseCTP=true HTTP/1.1

Ex Termination Point FDN = > MD=CISCO_EPNM!ND=NCS4206-TEST-120.33!PTP=name=SONET 0/5/6;lr=lr-dsr-oc48-and-stm16
Host: <epnm-host>
Accept: application/yang-data+xml

Response

- [samples/Get_Contained_in_use_Connection_Termination_Points/response.xml](#)

Get All Termination Point for a Layer-Rate Request/Response

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point?layerRate=<layer rate value> HTTP/1.1
Ex: layerRate=lr-optical-section
Host: <epnm-host>
Accept: application/yang-data+xml

Response

- [samples/Get_All_Terminatin_Points_for_a_Layer_Rate/response.xml](#)

Get All Termination Point with MPLSTE attributes Response

TerminationPoint retrieval can expose MPLSTE attributes through getTerminationPoint API.

Request

- GET /restconf/data/v1/cisco-resource-ems:termination-point HTTP/1.1

Host: <epnm-host>
Accept: application/yang-data+xml

Response

- [samples/Get Tp With MPLSTE Attributes ISIS/response.xml](#)
- [samples/Get Tp With MPLSTE Attributes ISIS/response.json](#)
- [samples/Get Tp With MPLSTE Attributes OSPF/response.xml](#)
- [samples/Get Tp With MPLSTE Attributes OSPF/response.json](#)

Get Termination Point for AINS

Request

GET /restconf/data/v1/cisco-resource-ems:termination-point?fdn=<TpFdn> HTTP/1.1
Ex: fdn=TpFdn
Host: <epnm-host>
Accept: application/yang-data+xml

Response

- [Samples/Get Tp With Ains/response.xml](#)
- [Samples/Get Tp With Ains/response.json](#)

1.25 Set TerminationPoint

This interface provides the operations required to set attributes on a given TerminationPoint.

| Resource | Description |
|---|--|
| TerminationPoint | Set TerminationPoint |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-resource-activation:set-termination-point |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | The modified termination-point – see yang model for the data details. And result of modification on the feature. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TP.<number> are generated by this API. For example: TP.0029 for 'Set TerminationPoint Data Operation Failed: %s.' |

| | |
|----------------|---|
| | <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials RA.<number> - any tag starting with "RA." prefix for any internal errors like RA.0001=Operation is not supported. <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-termination-point.yang |

Set TerminationPoint Input Data

The table below provides the parameters that can be set on the Interfaces using the set-termination-point operation.

The PortConfig attribute in the request determines the group to which the attributes belong. The Sample Request/Response provided will give the different scenarios.

| Parameter Name | Type | Allowed Values | Description |
|--|--------|---|---|
| Port Config: SONET_PORT_CONFIG | | | |
| adminStatus | String | UP DOWN | Used to specify the admin status for the given TP. Can be set separately. |
| operStatus | String | UP DOWN | Specifies the operational status of the TP. Can be set separately. |
| loopBack | String | | Specifies the values to be set for the loopBack. Can be set separately. |
| portMode | ENUM | SONET ETHERNET OTN | Indicates the portMode for the TP. Can be set separately. |
| SONET Port Parameters portConf: SONET_PORT_CONFIG | | | |
| framing | String | AUTO_DETECT C_BIT M23 DSX1_ESF DSX1_SF M23 CRC CRC4 GFP GFP_F GFP_T HDLC NO_CRC NOT_APPLICABLE | Specifies the Framing for the TP. Has to be set with the clockSource value. Note: Cannot be set individually. |

| | | | |
|---|---------|--|---|
| | | UNFRAMED | |
| clockSource | String | LINE INTERNAL RECOVERED FREE_RUNNING ENHANCED | Specifies the clock source for the TP. Has to be set if framing is being set. Note: Cannot be set individually. |
| rate | String | OC3 OC12 OC48 OC192 | Indicates the rate to be set. Has to be set if clockSource and framing are being set. Note: Cannot be set individually. |
| loopBack | String | NETWORK NETWORK_LINE LOCAL NETWORK_PAYLOAD REMOTE REMOTE_LINE REMOTE_PAYLOAD | Indicates the loop back value to be set for the TP. Can be set separately. |
| SONET APS Parameters portConfig: SONET_PORT_CONFIG | | | |
| protectionGroupNumber | Integer | Range(0..255) | Mandatory for APS setting. |
| protectionRole | String | PRIMARY SECONDARY | Mandatory for APS setting. |
| protectionLoopBackIP | String | IP Address | Optional for APS setting. |
| protectionRevertiveTime | Integer | Range(1..255) | Optional for APS setting. |
| SONET LOP / HOP Parameters portConfig: SONET_LOP_CONFIG – for LOP SONET_HOP_CONFIG – for HOP | | | |
| mode | ENUM | Unframed, VT1.5, CT3, T3 | |
| loopBack | ENUM | LINE, NETWORK, REMOTE | |
| operStatus | ENUM | UP,DOWN | |
| adminStatus | ENUM | UP,DOWN | Changing “adminStatus” value is not supported for XE devices with software version 16.8 onward. |
| framing | ENUM | Auto-Detect, M23, C-Bit | |
| clockSource | ENUM | LINE, INTERNAL, RECOVERED, ENHANCED | |
| T1 / T3 Parameters portConfig: T1_PORT_CONFIG – for T1 T3_PORT_CONFIG – for T3 | | | |

| | | | |
|--|--------|---|--|
| loopBack | ENUM | LINE, NETWORK, REMOTE | |
| operStatus | ENUM | UP,DOWN | |
| adminStatus | ENUM | UP,DOWN | |
| framing | ENUM | Auto-Detect, M23, C-Bit | |
| clockSource | ENUM | LINE, INTERNAL, RECOVERED, ENHANCED | |
| Ethernet Parameters portConfig ETHERNET_PORT_CONFIG | | | |
| loopback | ENUM | NO_LOOPBACK, OTHER, INTERNAL, LINE, DROP | |
| adminStatus | ENUM | UP,DOWN | |
| speed | ENUM | AUTOSPEED | |
| duplexMode | ENUM | HALFDUPLEX,FULLDUPLEX | |
| ODU Port Config Parameters portConfig ODU_PORT_CONFIG | | | |
| gcc | String | True (DEFAULT), false (remove the controller). NOTE: This attribute is mandatory for setting ODU parameters. | |
| tsg | String | - | |
| ttiSent | String | - | |
| ttiSapiSent | String | - | |
| ttiDapiSent | String | - | |
| ttiOperatorSent | String | - | |
| ttiExpected | String | - | |
| ttiSapiExpected | String | - | |
| ttiDapiExpected | String | - | |
| ttiOperatorExpected | String | - | |
| SONET SDH Parameters portConfig SONET_SDH_PORT_CONFIG | | | |
| clockSource | ENUM | LOOP_TIMING, LOCAL_TIMING, LINE_TIMING, INTERNAL_TIMING | |
| Packet Termination Parameters portConfig ODU_PACKET_TERMINATION_PORT_CONFIG | | | |
| terminationMode | ENUM | ETHERNET | |
| mapping | ENUM | GMP | |
| Ethernet FlowControl Parameters portConfig ETHERNET_FLOWCONTROL_PORT_CONFIG | | | |
| flowControl | ENUM | BIDIRECTIONAL, EGRESS, INGRESS | |

| | | | |
|--|---------|--|--|
| WaveLength Parameters portConfig WAVELENGTH_PORT_CONFIG | | | |
| waveLength | Float | | |
| TTI Parameters portConfig TTI_PORT_CONFIG | | | |
| trcLevel | String | Permitted values: <ul style="list-style-type: none"> • J0 • TTI-SM • TTI-PM NOTE: This attribute is mandatory for setting tti. | |
| trcMode | String | Permitted values: <ul style="list-style-type: none"> • AUTO • AUTO-NO-AIS • MAN • MAN-NO-AIS • OFF NOTE: This attribute is mandatory for setting tti. | |
| ttiExpected | String | Free format. NOTE: This attribute is mandatory for setting tti. | |
| ttiSent | String | Free format. NOTE: This attribute is mandatory for setting tti. | |
| TCM Control Parameters portConfig TCM_CONTROL_PORT_CONFIG | | | |
| tcmId | Integer | Indicates the tandem connection monitoring field of the ODUk OH on which non-intrusive monitoring is performed. Valid values are integers from 1 to 6. | |
| tcmName | String | Tcm name | |
| tcmState | String | DISABLED, ENABLED | |
| perfMon | String | DISABLED, ENABLED | |
| signalDegradeBert | String | Signal degrade BER threshold - E_3, E4, E_5, D_6, E_7, E_8, and E_9. | |
| signalFailureBert | String | Signal failure BER threshold - E_3, E4, E_5, D_6, E_7, E_8, and E_9. | |
| ttiSent | String | Free format string. | |
| ttiSapiSent | String | Free format string. | |
| ttiDapiSent | String | Free format string. | |
| ttiOperatorSent | String | Free format string. | |
| ttiExpected | String | Free format string. | |

| | | | |
|--|--------|---|--|
| ttiSapiExpected | String | Free format string. | |
| ttiDapiExpected | String | Free format string. | |
| ttiOperatorExpected | String | Free format string. | |
| ALS Parameters portConfig ALS_PORT_CONFIG | | | |
| alsMode | ENUM | DISABLED, AUTO, MANUAL_RESTART, MANUAL_RESTART_FOR_TEST. | |
| alsRecoveryInterval | Float | Value Ranging from 2.0 to 100.0. | |
| alsRecoveryPulseWidth | Float | Value Ranging from 60 to 100. | |
| NNI Control Parameters portConfig NNI_CONTROLLER_PORT_CONFIG | | | |
| nniControl | | | |
| ttiMode | String | TTI Mode – one of the following values SM, PM, TCM_1, TCM_2, TCM_3, TCM_4, TCM_5, TCM_6. | |
| adminWeight | String | <0-65535> Admin weight value. | |
| Optical Payload Parameters portConfig OPTICAL_PAYLOAD_PORT_CONFIG | | | |
| portMode | ENUM | One of the following values: ETHERNET, ETHERNET_PACKET, FC, OTN, SDH, SONET, BREAKOUT and NONE (for removing breakout lane). NOTE: This attribute is mandatory along with laneNumber for identifying the lanes and its portMode. | |
| framing | ENUM | One of the following values: OPU0, OPU1, OPU1E, OPU2, OPU3, OPU3E1, OPU3E2, OPU4, OPU4FLEX, OPUFlex, OPU1F, OPU2F, OPUC2, OPUC4, PACKET and NONE (for removing breakout lane). | |
| mapping | String | One of the following values: | |

| | | | |
|---|---------|---|---|
| | | BMP, GMP, GFPP, GFPT, WIS. HDLC. HDLC_LEX, HDLC_X86, CBR, TRP, AMP and NONE (for removing breakout lane). | |
| rate | String | One of the following values: OC3, OC12, OC48, OC192, STM1, STM4, STM16, STM64, OC768, STM256, FC_1G, FC_2G, FC_4G, FC_8G, FC_10G, FICON_1G, FICON_2G, FICON_4G, ESCON, GIGE, GIGE_10, GIGE_40, GIGE_100, HDTV, GIB_5, IB, D1VIDEO, VIDEO_3G, DV6000, ETRCLO, ISCCOMPAT, ISC3PEER2R, ISC3PEER1G, ISC3PEER2G, ISC3STP1G, ISC3STP2G, PASSTHRU, DVBASI, ISC1, OCH, OTU2, OTU3, OTU4, OTU4C2, OTU1, ILK, SDSDI, HDSDI, FSTE, FC_16G, and NONE (for removing breakout lane). | |
| ODU Channelization portConfig ODU_CHANNELIZE_PORT_CONFIG | | | |
| channelize_ODU | Boolean | | Optional attribute should be set to 'True' for creating the channel and 'false' for removing ODU channel. |
| ODU_Channel | String | | Channel values eg: /ODU/0/1/2. |
| oduLayer | ENUM | | Possible values: ODU0, ODU1, ODU2, ODU-FLEX, ODU1E, ODU2E, ODU2F, ODU3, ODU3E1, ODU3E2. |
| tpn | NUMBER | | Tributary Port Number, possible values: 1-80. |
| tps | String | | Tributary Slots, Tributary slot string separated by (:) or (-) |

| | | | |
|---|---------|---|--|
| | | | from 1 to no of Time Slots in Parent ODU controller. Eg: 3:4 |
| Admin State portConfig ADMIN_STATE_PORT_CONFIG | | | |
| adminStatus | ENUM | UP, DOWN | Optical interfaceAdmin status can be either UP or DOWN. |
| Sonet SDH portConfig SONET_SDH_PORT_CONFIG | | | |
| clockSource | ENUM | LOCAL_TIMING, LINE_TIMING, INTERNAL_TIMING | |
| OTN portConfig OTN_PORT_CONFIG | | | |
| fec | ENUM | STANDARD,ENHANCED,ENHANCED_I_4,ENHANCED_I_7, STANDARD,ENHANCED,ENHANCED_I_4,ENHANCED_I_7 NONE | |
| payloadmap | ENUM | ASYNC,ODU, SYNC, NOTAPPLICABLE | |
| admssm | ENUM | SMC, DUS, PRS, RES, ST2, ST3E, STU, TNC, SETS, G811, G812L, G812T | |
| syncmsg | Boolean | True or false | |
| gG709 | Boolean | True or false | |
| gcc0 | Boolean | True or false | |
| sdber | ENUM | E_3,E_4,E_5,E_6, E_7,E_8, E_9 | |
| trcMode | String | Permitted values: <ul style="list-style-type: none"> AUTO AUTO-NO-AIS MAN MAN-NO-AIS OFF NOTE: This attribute is mandatory for setting tti. | |
| trcLevel | String | Permitted values: <ul style="list-style-type: none"> J0 TTI-SM TTI-PM NOTE: This attribute is mandatory for setting tti. | |
| ttiSapiSent | String | Free format string. | |

| | | | |
|--|--------|---|--|
| ttiDapiSent | String | Free format string. | |
| ttiOperatorSent | String | Free format string. | |
| ttiSapiExpected | String | Free format string. | |
| ttiDapiExpected | String | Free format string. | |
| ttiOperatorExpected | String | Free format string. | |
| BreakOut portConfig BREAKOUT_LANE_PORT_CONFIG | | | |
| portMode | ENUM | One of the following values: ETHERNET, FC, OTN, SDH, SONET, and NONE (for removing breakout lane). NOTE: This attribute is mandatory along with laneNumber for identifying the lanes and its portMode. | |
| framing | ENUM | NONE,OPU0,OPU1,OPU1E,OPU1F | |
| rate | ENUM | OC3, OC12, OC48, OC192, STM1, STM4, STM16, STM64 | |
| mapping | ENUM | BMP, GMP, GFPF, GFPT, WIS, HCLC, CBR, TRP, NONE | |
| laneNumber | Number | | |
| LoopBack portConfig LOOP_BACK_PORT_CONFIG | | | |
| loopBack | ENUM | NO_LOOPBACK, OTHER, INTERNAL, LINE, DROP | |

Note: The Set Termination Point is supported for Cisco NCS4xx, Cisco NCS2K, Cisco ASR903, Cisco ASR904, Cisco ASR907, and Cisco ASR920 family of devices.

Set TerminationPoint-SONET LOP

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point SONET LOP/request.xml](#)
- [samples/Set Termination Point SONET LOP/request.json](#)

Response

- [samples/Set Termination Point SONET LOP/response.xml](#)

Set TerminationPoint-SONET PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point

-
- [samples/Set Termination Point SONET PORT CONFIG/request.xml](#)
 - [samples/Set Termination Point SONET PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point SONET PORT CONFIG/response.xml](#)

Set TerminationPoint-T1 PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point T1 PORT CONFIG/request.xml](#)
- [samples/Set Termination Point T1 PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point T1 PORT CONFIG/response.xml](#)

Set TerminationPoint-ETHERNET PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point ETHERNET PORT CONFIG/request.xml](#)
- [samples/Set Termination Point ETHERNET PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point ETHERNET PORT CONFIG/response.xml](#)

Set TerminationPoint-NCS2K ETHERNET PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point NCS2K ETHERNET PORT CONFIG/request.xml](#)
- [samples/Set Termination Point NCS2K ETHERNET PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point NCS2K ETHERNET PORT CONFIG/response.xml](#)

Set TerminationPoint-ODU PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point ODU PORT CONFIG/request.xml](#)
- [samples/Set Termination Point ODU PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point ODU PORT CONFIG/response.xml](#)

Set TerminationPoint-OPTICAL PAYLOAD PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point OPTICAL PORT CONFIG/request.xml](#)
- [samples/Set Termination Point OPTICAL PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point OPTICAL PORT CONFIG/response.xml](#)

Set TerminationPoint-OTN PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point OTN PORT CONFIG/request.xml](#)
- [samples/Set Termination Point OTN PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point OTN PORT CONFIG/response.xml](#)

Set TerminationPoint-ADMIN STATUS PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/request.xml](#)
- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/response.xml](#)

Set TerminationPoint-ADMIN STATUS PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/request.xml](#)
- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point ADMIN STATUS PORT CONFIG/response.xml](#)

Set TerminationPoint-WAVELENGTH PORT CONFIG

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point WAVELENGTH PORT CONFIG/request.xml](#)
- [samples/Set Termination Point WAVELENGTH PORT CONFIG/request.json](#)

Response

- [samples/Set Termination Point WAVELENGTH PORT CONFIG/response.xml](#)

Set TerminationPoint-Enabling MPLS LockOut for BDI

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point Enabling MPLS LockOut for BDI/request.xml](#)
- [samples/Set Termination Point Enabling MPLS LockOut for BDI/request.json](#)

Response

- [samples/Set Termination Point Enabling MPLS LockOut for BDI/response.xml](#)

Set TerminationPoint-Enabling MPLS LockOut for BDI

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point Disabling MPLS LockOut for BDI/request.xml](#)
- [samples/Set Termination Point Disabling MPLS LockOut for BDI/request.json](#)

Response

- [samples/Set Termination Point Disabling MPLS LockOut for BDI/response.xml](#)

Set TerminationPoint of VCOP

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point of VCOP/request.xml](#)

Response

- [samples/Set Termination Point of VCOP/response.xml](#)

Set TerminationPoint for Fiber Attributes

Request

- POST /restconf/operations/v1 cisco-resource-activation:set-termination-point
- [samples/Set Termination Point for Fiber Attributes/request.xml](#)

Response

- [samples/Set Termination Point for Fiber Attributes/response.xml](#)

1.26 Set AINS

| Resource | Description |
|---------------------|--|
| cisco-resource-ains | This resource is used to set AINS for port. |
| HTTP Method | Resource Path |
| POST | restconf/operations/v1/cisco-resource-ains:auto-in-service |
| Authorization | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write |

| | <ul style="list-style-type: none"> MBC UI Framework Access Network Devices | |
|---|---|--|
| Name | Type | Description |
| tp-ref | String | Fully Distinguished Name (FDN) of the port for which set AINS need to be performed. |
| generic-admin-state | ENUM | <p>This attribute represents generic admin state of the port.</p> <p>Allowed values:</p> <ul style="list-style-type: none"> generic-admin-state-service generic-admin-state-auto-service generic-admin-state-maintenance generic-admin-state-disable |
| soak-time | Int-32 | <p>Indicates soak time value to be set for a port.</p> <p>Allowed values: multiple of 15 e.g., 15, 30, 45, ...</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format TP.<number> are generated by this API. For example: TP.0050 for 'Invalid value for generic-admin-state, valid values are %s.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0039=TerminationPoint with FDN - %s and Layer Rate - %s does not exist or is not associated with a Node in the current user's virtual domain. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials RA.<number> - any tag starting with "RA." prefix for any internal errors like RA.0001=Operation is not supported. <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> | |
| Yang file name | cisco-nrf-physical-port.yang | |

Request

- POST /restconf/operations/v1/cisco-resource-ains:auto-in-service
- [samples/AINS/setAINS/request.xml](#)
- [samples/AINS/setAINS/request.json](#)

Response

- [samples/AINS/setAINS/response.xml](#)
- [samples/AINS/setAINS/response.json](#)

1.27 Topological Link Retrieval

This interface provides the operations required to retrieve topological link details.

| Resource | Description | |
|---|---|--|
| Topological Link | Retrieves the Topological Links in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-network:topological-link | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fully Distinguished Name (FDN) of the topological to retrieve a single topological link. |
| topo-layer | | Use this filter to display filtered links based on the link type provided. Supported link types are : otu-link-layer, och-link-layer, ots-link-layer, oms-link-layer, ops-link-layer, odu-link-layer, tdm-layer, manual-link-layer, physical-link-layer, mpls-te-tunnel-layer, mpls-tp-tunnel-layer, mpls-te-tunnel-p2p-layer, mpls-te-tunnel-p2mp-layer, mpls-lsp-layer, mpls-link-layer, gre-tunnel-layer, ethernet-link-layer, lacp-link-layer, iccp-link-layer, lag-link-layer, pw-layer, atm-layer, frame-relay-layer, bgp-layer, isis-layer, ospf-layer. |
| .skipPerformanceMetrics | boolean | Use this filter to skip performance-metrics from the response. This filter skips a call to the device to get performance metrics data thus improving the API response time. |
| .skipFiberAttributes | boolean | Use this filter to skip fiber-attributes from the response. This improves the API response time. |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadCircuit or VC ProvisioningCircuit or VC Monitoring and TroubleshootingNetwork Topology | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more topological links of type topological-link – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TL.<number> are generated by this API. For example: TL.0053 – ‘Invalid Query Param skipPerformanceMetrics: <value>’ If error is from underlying framework/core modules error-app-tag format one of following: <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0068=Invalid Link Type was passed as filter: <value>. | |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | Cisco-topology.yang |

Topological Link Data

| Name | Type | Description |
|----------|-------------------|--------------------------------------|
| Topology | Container element | Holds the data for topological link. |

1.27.1.1 Topological Link Data details

The Topological-link container contains the following attributes mentioned in the table below:

| Parameter Name | Type | Description |
|-----------------|--------|---|
| fdn | String | Fully distinguished name of the topological Link. FDN = 'MD=<CISCO_EPNM>!TL=<tlname> Eg MD=CISCO_EPNM!TL=13.13.13.4-13.13.13.5 or Eg fdn=MD=CISCO_EPNM!TL=10.58.234.141:[WDMSIDE-A]--10.58.234.144:[WDMSIDE-A] |
| discovered-name | String | Name of the link alone without the complete FDN. Eg: 13.13.13.4-13.13.13.5 |
| oper-stat | String | |
| direction | String | Indicates the direction of the link. |
| type | String | Indicates the type of the topological link. [deprecated] |
| topo-layer | String | Indicates the layer of the topological link with possible values pw-layer mpls-te-tunnel-layer mpls-te-tunnel-p2p-layer mpls-te-tunnel-p2mp-layer mpls-lsp-layer mpls-link-layer mpls-tp-tunnel-layer cem-layer ethernet-link-layer lACP-link-layer iccp-link-layer odu-link-layer otu-link-layer och-link-layer ots-link-layer oms-link-layer ops-link-layer tdm-layer physical-link-layer atm-layer frame-relay-layer bgp-layer isis-layer ospf-layer gre-tunnel-layer |

| | | |
|----------------------------|--------|--|
| | | hdlc ip-sec-layer inter-chassis-control-layer bfd-layer manual-link-layer sr-te-layer unknown-layer Note: Refer to cisco-topology.yang model for complete and updated list. |
| link-type | String | This field will indicate if the topological links is either of the following: -internal-patch-cord -cross-connect -open-ended. |
| total-capacity | | Total link capacity assigned. |
| used-capacity | | Capacity utilized out of total link capacity. |
| member-of-ref | String | Applies to uni-directional links only. FDN of the container Bi-directional link, this Uni-directional link is part of. Not present if link is not part of any bi-directional link. |
| endpoint-list | | Complex contained to hold the list of Endpoints. |
| end-point | | Complex container to hold the endpoint information. |
| Endpoint-ref | String | FDN of the endpoint. Eg: MD=CISCO_EPNM!ND=SJ-NCS4206-21.cisco!CTP=name=BDI8-mpls layer;lr=lr-mpls |
| LOGO Attributes | | Set of attributes to indicate the optical attributes that derive the feasibility of a path. |
| noise | | Indicates the noise level of the link. |
| noise-sigma | | Indicates noise level variance of the link. |
| pdl | | Indicates polarization dependent loss of the link. |
| pmd | | Indicates polarization mode dispersion of the link. |
| fgdr-filter | | Indicates fgdr-Filter Group Delay Ripple of the link. |
| sf-filter | | Indicates self-filtering. |
| chromatic-dispersion | | Indicates chromatic dispersion of the link. |
| chromatic-dispersion-slope | | Indicates the chromatic dispersion slope of the link. |

Get All Topology

Request

- GET /restconf/data/v1/cisco-resource-network:topological-link HTTP/1.1

Response

- [samples/Get All Topology/response.xml](#)

Get a Topology

Request

- GET /restconf/data/v1/cisco-resource-network:topological-link?
fdn=MD=CISCO_EPNM!TL=10.10.1.80:[WDMSIDE-A]--10.10.1.81:[WDMSIDE-A]

Response

- [samples/Get a Topology/response.xml](#)

Get Topology Filter on Layer

Request

- <https://<epnm-host>/restconf/data/v1/cisco-resource-network:topological-link?topo-layer=manual-link-layer>
 - Host: <epnm-host>
 - Accept: application/yang-data+xml

Response

- [samples/Get Topology Filter on Layer/response.xml](#)

1.28 MPLS TE Explicit Path Retrieval

This interface provides the operations required to retrieve topological link details.

| Resource | Description | |
|---|--|--|
| MPLS TE Explicit Path | Retrieves the MPLS TE Explicit Paths in the system. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-ems:mpls-te-explicit-path | |
| Query Parameters | | |
| Name | Type | Description |
| path-ref | String | Fully Distinguished Name (FDN) of the explicit path to retrieve a single MPLS TE Explicit Path Path-ref=MD=CISCO_EPNM!ND=cvg-scapa-223.cisco.com!PATH=223-225_OTU4 Path-ref='MD=<CISCO_EPNM>!ND=<nodename>!<PATH>=<pathname> |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more MPLS TE Explicit Paths of type mpls-te-explicit-path. See the yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. | |

| | |
|----------------|--|
| | <p>Error tag with format PATH.<number> are generated by this API. For example: PATH.0001 for 'FDN was passed without TE Path Name.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following:</p> <ul style="list-style-type: none"> TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002 for 'Given LayerRate Value is Invalid'. FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-mpls-te-extension.yang |

MPLS TE Explicit Path Data

| Name | Type | Description |
|----------------------------|-------------------|---|
| mpls-te-explicit-path-type | Container element | Holds the data for mpls te explicit path. |

Get All MPLS TE Explicit Paths

Request

- GET /restconf/data/v1/cisco-resource-ems:mpls-te-explicit-path

Response

- [samples/Get All MPLS TE Explicit Paths/response.xml](#)

Get A MPLS TE Explicit Paths

Request

- GET /restconf/data/v1/cisco-resource-ems:mpls-te-explicit-path?path-ref=MD=CISCO_EPNM!ND=cvg-scapa-223.cisco.com!PATH=223-225_OTU4

Response

- [samples/Get a MPLS TE Explicit Paths/response.xml](#)

1.29 Virtual Connection Retrieval

This interface provides the operations required to retrieve virtual connection details. For Yang schema definitions, see cisco-virtualconnection.yang

| Resource | Description | |
|--------------------|---|-------------|
| Virtual Connection | Retrieves all Virtual Connections in the system or retrieve a specific set based on the input parameters. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-service-network:virtual-connection | |
| Query Parameters | | |
| Name | Type | Description |

| | | |
|---|---|---|
| type | String | Type of the virtual connection to retrieve. If not specified all types will be returned. Possible values: carrier-ethernet-vpn, tdm-cem, mpls-te-tunnel, , mpls-l3-vpn and optical. |
| fdn | String | Fully Distinguished Name (FDN) of the virtual connection to retrieve a single virtual connection. FDN = 'MD=<CISCO_EPNM>!VC=<vcname> |
| ndFdn | String | Fully Distinguished Name (FDN) of the Node. FDN = 'MD=<CISCO_EPNM>!ND=<nodename> |
| tpFdn | String | Fully Distinguished Name (FDN) of the termination-point. When this parameter is provided, all virtual connections that reference this termination-points will be returned. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more Virtual Connections of type virtual-connection. See the yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format VC.<number> are generated by this API. For example: VC.0001 for ‘Currently subType filter is not supported.’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-virtualconnection.yang | |

Virtual Connection Data

| Name | Type | Description |
|--------------------|-----------|--|
| virtual-connection | container | Container holds the virtual connection data. |

| Parameter Name | Type | Allowed Values | Description |
|----------------|--------|----------------|--|
| Fdn | String | | Fully distinguished name of the Virtual Connection. Eg: MD=CISCO_EPNM!VC=TRAIL-Do_NOT_DELETE_DEMO |

| | | | |
|-------------------------------|-----------|---|--|
| discovered-name | String | | Name of the link alone without the complete FDN. Eg: TRAIL-Do_NOT_DELETE_DEMO |
| admin-state | String | Up/Down | Indicates the admin state of the connection. |
| oper-state | String | Up Down Unavailable Partial Auto Up Up Not Protected | Indicates operational state of connection. |
| vc-id | String | | Its id of the virtual connection. |
| discovery-state | String | | Indicates the discovered state of the Connection/Service. Eg: discovery-resync, discovery-complete, discovery-missing, discovery-partial, discovery-unknown, discovery-not-applicable |
| Type | String | | It represents multi-layer technology , i.e. mpls-te tunnel, Carrier-E, etc. |
| sub-type | String | | Some Virtual Connections have different subtypes, i.e. Carrier-E EPL, Carrier-E EVPL, etc. |
| topology | String | | Define the topology; Default is point-to-point. |
| direction | String | bi-directional uni-directional | Direction of a circuit. |
| protection-type | String | | Protection type can be of type Y-cable, splitter, one-plus-one -this applies to TE Tunnel and CEM too. |
| protection-role | String | | working, protecting, restore |
| Termination point list | Container | | Virtual Connection termination point list. |
| termination-point | Container | | Container to show TP info in get VC |
| Fdn | String | | Fully distinguished name of the Virtual Connection. Eg: MD=CISCO_EPNM!VC=TRAIL-Do_NOT_DELETE_DEMO |
| discovered-name | String | | Name of the link alone without the complete FDN. Eg: TRAIL-Do_NOT_DELETE_DEMO |
| admin-state | String | Up/Down | Indicates the admin state of the connection. |
| oper-state | String | Up/Down | Indicates operational state of connection. |
| directionality | String | tp-source tp-sink tp-bidirectional | Base identity for VC for direction. |

| | | | |
|----------------------------|-----------|--|---|
| | | unknown | tp-bidirectional (for non-optical only) unknown (for optical services only) |
| is-edge-point | String | | Indicates if the TP is an edge point of at least one virtual network, i.e. if it is an end point of a potential inter-network topological link. |
| ce-tp | | | |
| outer-vlan-tp-id | String | | Outer virtual LAN termination point ID |
| untagged-default | String | true false | Default value for untagged services |
| sv-id-list | String | | SV ids list |
| cv-id-list | String | | VC ids list |
| vid-rewrite-oper | String | pop1, pop2, push1, push2 translate1-1, translate1-2, translate2-1 translate2-2 rewrite1-1 rewrite1-2 rewrite2-1 rewrite2-2 | VLAN id rewrite operations |
| rewrite-is-symmetric | String | true false | rewrite-is-symmetric value of the circuit |
| mtu | String | | MTU value for the service |
| Route name list | container | | Virtual Connection route names including protecting/standby routes. |
| route-name | String | | Indicates the route name used. |
| Te-tunnel | | | MPLS TE Tunnel specific attributes. |
| tunnel-id | String | | Indicates the TE tunnel ID |
| tunnel-source | String | | TE tunnel source IP |
| tunnel-destination | String | | TE tunnel destination IP |
| association-id | String | | TE tunnel association ID. Used for bi-directional TE tunnel association. |
| association-source-address | String | | Source IP of the associated TE tunnel. Applicable to bi-direction TE tunnel. |
| global-id | String | | global id (per Autonomous System) to enable MPLS TE tunnel source id unique globally. |
| co-routed-enabled | Boolean | | A flag indicates whether the bi-directional tunnels share the same MPLS LSP route. |

| | | | |
|-------------------------------|------------|--|--|
| protection-type | String | | This is obsolete. VC protection type is represented. |
| carried-by-vc-ref-list | | | Carried by Virtual Connection reference list |
| carried-by-vc-ref | String | | The underlying Virtual Connection references. ex. SR-TE, TE-Tunnel of an ELINE VC, optical VC |
| carrying-vc-ref-list | | | Carrying Virtual Connection reference list |
| carrying-vc-ref | String | | The top layer Virtual Connection references. ex. ELINE VC, top layer optical VC |
| sr-te-policy | | | SR TE Policy container |
| color | String | | color represents a SLA treatment; i.e. low latency, high latency. color, head end and endpoint are the unique identifier of the SR policy color. Color can be used to indicate a certain treatment (SLA, policy) provided by an SR Policy. Only one SR Policy with a given color C can exist between a given node pair (head-end (H), end-point (E)) |
| headend | Ip-address | | TE router id/ip of head device |
| endpoint | Ip-address | | TE router id/ip of destination device |
| binding-sid | Integer | | In practice all paths associated with the Sr policy should have the same BSID |
| candidate-path-list | | | for each SR policy there up to 1 - n candidate-paths |
| candidate-path | | | candidate-paths |
| path-name | String | | candidate path name |
| preference | Integer | | Higher preference # indicate lower preference |
| type | String | | dynamic, explicit or Dynamic with PCE(for inter domain path computation) |
| metric-type | String | | segment routing metric type |
| sids-list | | | for each candidate path, there's a segment ids list 1 and 0-m (SIDs list) |
| sids | | | Segment IDs |
| name | String | | segment IDs name |
| type | String | | dynamic, explicit or Dynamic with PCE(for inter domain path computation) |

| | | | |
|--------------------------------|-----------|--|---|
| state | String | | Discovered state : active, inactive. |
| metric-type | String | | segment routing metric type |
| weight | String | | There's a weight for each SIDs list). weight is for load balancing between (SIDs List) |
| sid-list | | | segment id in the entry list |
| sid | | | segment id |
| index | Integer | | index of the segment id in the entry list |
| sid | Integer | | SID id |
| description | String | | description of each SID id entry in the list |
| och-nc/och-cc/och-trail | Container | | These containers to hold DWDM OCH circuit specific attributes, which are defined below |
| restoration-type | String | none restore revert | Restoration type of optical service |
| restoration-status | String | none failed restored restoring revertible reverting | Restoration status of optical service |
| activation-state | String | | activation state |
| regeneration-allowed | Boolean | true false | Is Circuit should allow regeneration |
| upstream-power-offset | String | | offset of upstream channel |
| downstream-power-offset | String | | offset of downstream channel |
| path-policy | String | | path selection policy: ANY, LOGO |
| ignore-path-alarms | String | true/false | Optional parameter, when set the link port alarm status along the light path is ignored when creating a circuit. |
| circuit-diversity | String | | Diversity of circuit diversity |
| revert | String | manual auto none notApplicable | Revert type of a circuit |
| soak-time | String | | Period that the circuit on the restored path waits before switching to the original path after a failure is fixed |
| frequency | String | | Bandwidth in frequency. - Deprecated |
| wavelength | float | | wavelength in nm unit |
| width | String | | Bandwidth of the service |

| | | | |
|----------------------------------|---------|--|--|
| priority | String | High low priority1 priority 2 priority 3 priority 4 priority 5 priority | Prioritize the restoration operation for the failed OCH circuit. |
| optical-path-settings | String | | Optical path settings of a service |
| is-uni | Boolean | true false | flag indicating whether UNI should be configured |
| is-wson | Boolean | true false | Flag indicating whether it is a Wavelength Switched Optical Network circuit |
| is-mandatory-freq | Boolean | true false | Is frequency mandatory for this service -Deprecated |
| frequency-preference | String | | Bandwidth in frequency-preference for protected services -Deprecated |
| frequency-protected | String | | Bandwidth in frequency for protected services -Deprecated |
| frequency-protected-preference | String | | Bandwidth in frequency for protected preference services -Deprecated |
| is-mandatory-frequency-protected | Boolean | true false | Is frequency mandatory for this service -Deprecated |
| failure-reason | | | String |
| Och-Trail-Uni | | | DWDM OCH Trail UNI circuit specific attributes. |
| restoration-type | String | | restoration type, none, restore, revert |
| restoration-status | String | | restoration type, none, failed, restored, restoring, revertible, reverting |
| Tunnel-id | String | | reference to the odu tunnel id |
| source-address | String | | source ip address |
| signaled-name | String | | Reference to the lsp signal |
| set-uni-cfg | String | | OCH Trail UNI configuration indicator |
| och-nc-name | String | | Reference to OCH NC that is automatically created as a result of this OCH Trail UNI creation |
| diverse-from-tunnel-id | String | | Diverse from tunnel id |
| diverse-attribute-set-name | String | | Diverse attribute et name |
| preferred-wave-length | String | | This attribute is used to specify preferred wavelength. |
| manage-constraints | Boolean | | Boolean flag to specify if constraints need to be considered or not. |

| | | | |
|----------------------------|---------|---|---|
| | | | <p>Default value: false</p> <p>Note: while provisioning optical service using existing service profile containing constraints information, <manage-constraints> tag needs to be set to true.</p> |
| Is-unnumbered | Boolean | | |
| failure-reason | String | | Indicates the failure reason for DWDM OCH Trail UNI if any error exists during circuit provisioning |
| Odu-Uni | | | DWDM ODU UNI circuit specific attributs. |
| framing | String | | ODU framing |
| bit-rate | String | | Circuit-bitrate |
| tunnel-id | String | | Associated tunnel-id |
| source-address | String | | Reference to the protecting OCH Trail |
| diverse-from-tunnel-id | String | | Diverse from tunnel |
| Odu-Tunnel | | | DWDM ODU Tunnel circuit specific attributes. |
| framing | String | | ODU framing |
| bit-rate | String | | Circuit-bitrate |
| tunnel-id | | | String |
| source-address | String | | Reference to the protecting OCH Trail |
| diverse-from-tunnel-id | String | | Diverse from tunnel |
| signaled-name | String | | OTN tunnel signed name |
| record-route | String | true false | record-route specification |
| bandwidth | String | odu1,odu0, odu1e, odu1f, odu2,odu2e, odu2f, odu3, odu3e1, odu3e2, odu4, oduflex | ODU tunnel service bandwidth value |
| protection-profile | String | | Name of the protection profile applied on circuit |
| diverse-attribute-name | | | String |
| failure-reason | String | | Indicates the failure reason for DWDM OCH Trail UNI if any error exists during circuit provisioning |
| te-tunnel-path-option-list | String | | Container hold te tunnel path related attributes |

| | | | |
|-------------------------------|---------|--------------------------------|---|
| path-preference | String | | Circuit path preference between source and sink |
| protection-role | String | working-path protected-path | It gives data about the protection role of circuit path |
| path-type | String | EXPLICIT DYNAMIC | Shows circuit path type |
| lock-down | String | true false | Lock down value of a circuit |
| protected-by | String | | Circuit protected by value |
| explicit-path-name | String | | Explicit path name applied on the service |
| ce-tp | | | |
| outer-vlan-tp-id | String | | Outer virtual LAN termination point ID |
| untagged-default | String | true false | Default value for untagged services |
| sv-id-list | String | | SV ids list |
| cv-id-list | String | | VC ids list |
| vid-rewrite-oper | String | | Base Identity for VLAN id rewrite operations |
| rewrite-is-symmetric | String | true false | Attribute to specify if rewrite is to be symmetric or not. |
| mtu | String | | MTU value for the service |
| Route name list | | | |
| route-name | String | | Virtual Connection route names including protecting/standby routes. |
| Te-tunnel | | | |
| tunnel-id | | | String |
| tunnel-source | String | | TE tunnel source IP |
| tunnel-destination | String | | TE tunnel destination IP |
| association-id | String | | TE tunnel association ID. Used for bi-directional TE tunnel association. |
| association-source-address | String | | Source IP of the associated TE tunnel. Applicable to bi-direction TE tunnel. |
| global-id | String | | global id (per Autonomous System) to enable MPLS TE tunnel source id unique globally. |
| co-routed-enabled | Boolean | | A flag indicates whether the bi-directional tunnels share the same MPLS LSP route. |
| protection-type | String | | This is obsolete. VC protection type is represented. |
| carried-by-vc-ref-list | | | |
| carried-by-vc-ref | String | | Carried by Virtual Connection reference list |
| | | | The underlying Virtual Connection references. ex. SR- |

| | | | |
|-----------------------------|-----------|-------------------------------------|--|
| | | | TE, TE-Tunnel of an ELINE VC, optical VC |
| carrying-vc-ref-list | | | Carrying Virtual Connection reference list |
| carrying-vc-ref | String | | The top layer Virtual Connection references. ex. ELINE VC, top layer optical VC |
| path-type | String | | |
| lock-down | String | | |
| protected-by | String | | |
| explicit-path-name | String | | |
| evpn | Container | | Container to show EVPN related tags in get VC response. |
| bgp-attributes | Container | | Container to show EVPN BGP specific attribute values. |
| bgp-signaling-protocol | Boolean | true , false | Flag to indicate if EVPN is enabled or not. For EVPN its value should be "true". |
| is-auto-route-distinguisher | Boolean | true, false | This tag indicates if auto RD was enabled for the service or not. |
| route-distinguisher | String | Allowed values IP:num or num:num | This tag indicates the value of RD. |
| is-auto-route-target | Boolean | true, false | This tag indicates if auto RT was enabled for the service or not. |
| import-route-target | String | Allowed values IP:num or num:num | This tag shows the value of import RT |
| export-route-target | String | Allowed values IP:num or num:num | This tag shows the value of export RT |
| vpws-attributes | Container | | Container to show VPWS specific attribute values. |
| evpn-instance-id | Long | | This tag shows the value of EVI for the service. |
| aend-attachment-circuit-id | Long | | This tag shows the value of AEND AC id |
| zend-attachment-circuit-id | Long | | This tag shows the value of ZEND AC id |
| enable-control-word | Boolean | | Boolean flag to indicate of control word was enabled for the service or not. |
| L3VPN | | | L3vpn circuit related attributes. |
| address-family-list | Container | | Container list to show addressfamily attribute values |
| address-family | Container | | Container for address family details |
| address-family-type | Enum | IPV4_AF, IPV6_AF | Address family type supported for the service |
| max-routes | String | | Maximum number of routes present |

| | | | |
|-------------------------|------------|------------------|---|
| import-route-target | string | | Import route target value if present |
| Export-route-target | String | | Export route target value if present |
| Import-route-policy | String | | import route policy map, can be sr-policy |
| export-route-policy | String | | export route policy map, can be sr-policy |
| bgp-neighbor | Container | | Bgp neighbor details container |
| ip-address | Ip-address | Ipv4/ipv6 | BGP neighbor IP address |
| as-number | Number | | assigned AS number |
| local-as-number | Number | | local AS number |
| local-as-action | String | | local AS placement -prepend, replace, etc. |
| bgp-address-family-list | Container | | |
| bgp-address-family | Container | | |
| address-family | Enum | IPV4_AF, IPV6_AF | Address family type supported for the service |
| ingress-route-policy | String | | ingress route policy. Can be SR policy for XR |
| egress-route-policy | String | | egress route policy. Can be SR policy for XR |
| local-as-number | Number | | local AS number |
| local-as-action | String | | local AS placement -prepend, replace, etc. |

Get All Virtual Connection

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection HTTP/1.1

Response

- [samples/Get_All_Virtual_Connections/response.xml](#)

Get All Virtual Connection L3VPN

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?vcType=mpls-l3-vpn&.summary=**false**

Response

- [samples/Get_All_Virtual_Connections_L3VPN/response.xml](#)

Get a Single Virtual Connection

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?fdn=MD=CISCO_EPNM!VC=foo HTTP/1.1

Response

- [samples/Get a Single Virtual Connection/response.xml](#)

Get a Virtual Connection – L3VPN

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?
fdn=MD=CISCO_EPNM!VC=L3VPN-Full-mesh-both900_nbi_ospfv3_1

Response

- [samples/Get a Virtual Connection L3VPN/response.xml](#)

Get a Virtual Connection – L3VPN with SR Policy

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?
fdn=MD=CISCO_EPNM!VC=L3VPN-With-SR-Policy-25-A

Response

- [samples/Get a Virtual Connection L3VPN With SR Policy/response.xml](#)

Get All Virtual Connections - CE service

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?type=carrier-ethernet-
vpn&.maxCount=3

Response

- [samples/Get All Virtual Connections CE/response.xml](#)

Get a Virtual Connections - CE service

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?fdn=<VcFdn>

Response

- [samples/Get a Virtual Connection CE/response.xml](#)
- [samples/Get a Virtual Connection CE WithEVPN/response.xml](#)

Get All Virtual Connections - CEM service

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?type= tdm-cem&.maxCount=3

Response

- [samples/Get All Virtual Connections CEM/response.xml](#)

Get a Virtual Connections - CEM Service

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?fdn=MD=CISCO_EPNM!VC=CemLink%23CemPwLink%23CEMPW_6.6.6.22_25_6.6.6.41

Response

- [samples/Get a Virtual Connection CEM/response.xml](#)

Get ALL Virtual Connections – OPTICAL services

For Yang schema definition, see cisco-virtualconnection.yang and cisco-optical-circuit-extensions.yang for more details.

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?type=optical

Response

- [samples/Get All Virtual Connections OPTICAL/response.xml](#)

Get All Virtual Connections – With ServiceInfo Resync State

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?fdn=MD=CISCO_EPNM!VC=test-otu2-mr-mxp

Response

- [samples/Get All Virtual Connections With ServiceInfo Resync State/response.xml](#)

Get all Virtual Connection – OCHCC service with Oper state UpNotProtected

Request

- GET /restconf/data/v1/cisco-service-network:virtual-connection?fdn=MD=CISCO_EPNM!VC= VC=Y-CABLE-22-OTU2

Response

- [samples/Get All Virtual Connections With OperState UpNotProtected/response.xml](#)

Get all Virtual Connection – SR TE services for specific Node

Request

- GET /restconf/data/v1/cisco-service-network: virtual-connection?type=sr-te&ndFdn=<value>

Response

- [samples/Get All Virtual Connections With SR TE For NodeFdn/response.xml](#)

- [samples/Get All Virtual Connections With SR TE For NodeFdn/response.json](#)

Get a Virtual Connection – SR TE service

Request

- GET /restconf/data/v1/cisco-service-network: virtual-connection?
fdn=MD=CISCO_EPNM!VC=<sRTeServiceName>

Response

[samples/Get a Virtual Connection SRTE/response.xml](#)

1.30 Multi-Layer Trace Retrieval

This interface provides the operations required to retrieve multi-Layer trace for a given virtual connection. The interface can be used to retrieve the multi-layered routes for CEM, MPLS-TE-Tunnel, Optical and all the other supported virtual connections. For Yang schema definitions, see cisco-topology.yang

| Resource | Description | |
|---|---|---|
| Virtual Connection Route | Retrieves all Virtual Connections routes in the system or retrieve specific set based on the input parameters. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-network:virtual-connection-multi-layer-route | |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology | |
| Query Parameters | | |
| Name | Type | Description |
| vcFdn | String | Fully Distinguished Name (FDN) of the virtual connection for which the MLT should be retrieved. |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more connection (topological-link) of type virtual-connection-multi-layer-route – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TL.<number> are generated by this API. For example: TL.0002 – ‘Invalid input. VirtualConnection missing in the Fdn’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. | |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | Cisco-topology.yang |

Virtual Connection Multi-Layer Trace Data

| Name | Type | Description |
|---|-------------------|--|
| virtual-connection-multi-layer-route | Container element | Holds the data from multi-layer route. There will be one virtual-connection-multi-layer-route entry per layer. |
| topo-index | Integer | Indicates the index of the layer in the order. |
| topology-layer | | Indicates the name of the layer. Eg: och-link-layer, ops-link-layer, ots-link-layer. |
| protection-role | | Indicates the protection role of the path. |
| protection-state | | Indicates the protection state of the path. |
| tl-list | Container element | List of links for the given layer (represented by virtual-connection-multi-layer-route). |
| topological-link | Container element | Contains n number of topological-link entities as there are connections for the given layer. Both internal and external links are represented as topological-link. |
| tl-index | | Index of the topological link inside the given layer. |
| fdn | | FDN of the given topological link. FDN = 'MD=<CISCO_EPNM>!TL=<tlname> Eg MD=CISCO_EPNM!TL=13.13.13.4-13.13.13.5 |
| is-cc | | Indicates if the link is a cross connect or not. |
| direction | | Indicates if the link is uni-directional or bi-directional link. |
| endpoint-list | Container element | List of endpoints for the particular topological-link. |
| endpoint | Container element | Contains information about the endpoint of the topological-link. |
| endpoint-ref | String | FDN of the termination point. Eg: MD=CISCO_EPNM!ND=cvg-scapa-90.cisco.com!CTP=name=Optics0/1/0/3;lr=lr-optical-channel |
| directionality | String | Contains the direction of the TP. Eg: uni-direction, bi-direction. |

Get MLT for OCHTRAIL UNI service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=TRAIL-smadama-OCHCC-00A

Response

- [samples/Get a Virtual Connection Multi Layer Route OCHTRAIL UNI/response.xml](#)

Get MLT for MCH Group service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC= MCHG-MCHNC_42_44

Response

- [samples/Get a Virtual Connection Multi Layer Trace MCHGroup/response.xml](#)

Get MLT for OCHTrail UNI service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=OCHTrailUNI

Response

- [samples/Multi Layer Trace Retrieval for OCHTrail UNI/response.xml](#)

Get MLT for OPU over ODU service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=RestconfOPUOverODU

Response

- [samples/Multi Layer Trace Retrieval for OPU over ODU/response.xml](#)

Get MLT for ODUUNI Hairpin service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=ODUUNI_HP

Response

- [samples/Multi Layer Trace Retrieval for ODUUNI Hairpin/response.xml](#)

Get MLT for OCHCC service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=ODUUNI_HP

Response

- [samples/Multi Layer Trace Retrieval for OCHCC/request.xml](#)

Get MLT for OCHNC service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=OCHNC_21July2019_E3_Fi90A_preupgrade_DND

Response

- [samples/Multi Layer Trace Retrieval for OCHNC/request.xml](#)

Get MLT for CEM with MPLSTE service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=<cemServiceName>

Response

- [samples/Multi Layer Trace Retrieval for CEM With MPLSTE/response.xml](#)

Get MLT for CE with MPLSTE service

Request

- GET /restconf/data/v1/ cisco-resource-network:virtual-connection-multi-layer-route?vcFdn=MD=CISCO_EPNM!VC=<ceServiceName>

Response

- [samples/Multi Layer Trace Retrieval for CE With MPLSTE/response.xml](#)

1.31 Customer Facing Service Retrieval

This interface provides the operations required to retrieve Customer Facing Service (CFS) details which include the services provisioned for CE, CEM, MPLS-TE, L3VPN and all other supported virtual connections.

| Resource | Description | |
|-------------------------|--|--|
| Customer Facing Service | Retrieves all Customer Facing Services in the system or retrieve a specific set based on the input parameters. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-service-network:customer-facing-service | |
| Query Parameters | | |
| Name | Type | Description |
| type | String | Type of the CFS to retrieve. If not specified all types will be returned. Possible values: carrier-ethernet-vpn, tdm-cem, mpls-te-tunnel, and mpls-l3-vpn. |
| subType | String | Sub Type of the CFS to retrieve. If not specified all sub types will be returned. Should be used in conjunction with Type. |
| fdn | String | Fully Distinguished Name (FDN) of the CFS to retrieve a single virtual connection. |

| | |
|---|---|
| | FDN: MD=<CISCO_EPNM>!CFS=<cfsname> Eg:MD=CISCO_EPNM!CFS=TE Link _192.169.106.12_500_10.140.0.1 |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more customer facing services of type customer-facing-service – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format CFS.<number> are generated by this API. For example: CFS.0004 for 'Managed Element not found with FDN %s'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-customer-facing-service.yang |

Get CFS for a service

Request

- GET /restconf/data/v1/cisco-service-network:customer-facing-service?fdn=MD=CISCO_EPNM!CFS=<service_name>

Response

- [samples/Get_CFS/response.xml](#)

1.32 Network Interface Retrieval

This interface provides operations that retrieve network interface (UNI/ENNI) details. It can be used to retrieve network interfaces available in the system to provide them with provisioning input.

| Resource | Description |
|-------------------|---|
| Network Interface | Retrieves all Network Interfaces (UNI/ENNI) in the system or retrieve specific set based on the input parameters. |
| HTTP Method | Resource Path |
| GET | /data/v1/cisco-service-network:network-interface |

| Query Parameters | | |
|---|--|--|
| Name | Type | Description |
| Fdn | String | Fully Distinguished Name (FDN) of the NI to retrieve a single Network Interface. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more network interfaces of type network-interface – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format CFS.<number> are generated by this API. For example: CFS.0004 for ‘Managed Element not found with FDN %s’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-network-interface.yang | |

Get Network Interface

Request

- GET /restconf/data/v1/cisco-service-network:network-interface?fdn={fdn}

Response

- [samples/Get Network Interface/response.xml](#)

1.33 QoS Policy Retrieval

This API retrieves QoS policies in all devices in Cisco EPN Manager. This API can be used to get the FDN of the QoS policy which can be passed in the ingress/egress QoS policies in the order of the service that is being provisioned.

| Resource | Description |
|------------------|---|
| QoS Policy | Retrieves all QoS Policies in devices added to Cisco EPN Manager. |
| HTTP Method | Resource Path |
| GET | restconf/data/v1/cisco-qos:qos-policy |
| Query Parameters | |

| Name | Type | Description |
|---|---|--|
| Fdn | String (FDN Format) | Fully Distinguished Name (FDN) of the QoS Policy. Given this, a corresponding single QoS Policy will be returned. FDN = MD=<CISCO_EPNM>!ND=<nd_name>!POLICY_QOS=<policyname> Eg: MD=CISCO_EPNM!ND=ASR901-CSG-2-DOMAIN2.cisco.com!POLICY_QOS=money |
| nfFdn | String (FDN Format) | Fully Distinguished Name (FDN) of the device. Given this, all the QoS Policies for that device will be returned. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• QoS Profile Configuration Access | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more QoS Policies type qos-policy – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format QOS.<number> are generated by this API. For example: QOS.0010 for ‘No node with FDN %s in this user's virtual domain.’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-qos.yang | |

Request

- GET /restconf/data/v1/cisco-qos:qos-policy

Response

- [samples/Get_All_QoS_Policy_Retrieval/response.xml](#)

1.34 QoS Profile Retrieval

This API retrieves QoS profiles in Cisco EPN Manager. This API can be used to get the FDN of the QoS profile which can be passed as a user defined policy for the ingress/egress QoS policies in the order data of the provisioned service.

| Resource | Description | |
|---|--|---|
| QoS Profile | Retrieves all QoS Profile in Cisco EPN Manager. | |
| HTTP Method | Resource Path | |
| GET | restconf/data/v1/cisco-qos:qos-profile | |
| Query Parameters | | |
| Name | Type | Description |
| Fdn | String (FDN Format) | Fully Distinguished Name (FDN) of the QoS Profile. Given this, a corresponding QoS Profile will be returned FDN MD=<CISCO_EPNM>!PROFILE_QOS=<profilename>. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• QoS Profile Configuration Access | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more QoS Profiles of type qos-profile – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format QOS.<number> are generated by this API. For example: QOS.0001 for ‘QoS Profile RDN missing in FDN %s.’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-qos.yang | |

1.35 CLI Template Retrieval

This API retrieves CLI templates in Cisco EPN Manager. This API can be used to get the CLI template name and parameters which can be passed to run CLI configuration in resource activation.

| Resource | Description | |
|------------------|--|---|
| CLI Template | Retrieves all CLI template in Cisco EPN Manager. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-resource-activation:cli-template | |
| Query Parameters | | |
| Name | Type | Description |
| Name | String | CLI Template name; a corresponding CLI template will be returned. |

| | |
|---|---|
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Configure Templates |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more CLI template of type cli-template – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format RA.<number> are generated by this API. For example: RA.0104 for 'Error getting CLITemplate list: %s.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-resource-activation.yang |

Request

- GET /restconf/data/v1/cisco-resource-activation:cli-template?name=<template-name>

Response

- [samples/Get CLI Template by name/response.xml](#)
- [samples/Get CLI Template by name/response.json](#)

1.36 IPSLA Profile Retrieval

This API retrieves IPSLA profiles for L3VPN services in Cisco EPN Manager. This API can be used to get the FDN of the IPSLA profile which can be passed via L3VPN service provision.

| Resource | Description |
|-------------------------------|---|
| QoS Profile | Retrieves all ISPLA Profile in Cisco EPN Manager. |
| HTTP Method | Resource Path |
| GET | restconf/data/v1/cisco-service-network:ipsla-profile |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting |
| Query Parameters | |

| Response Message | |
|---|--|
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more IPSLA Profiles of type ipsla-profile – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-ipsla-profile.yang |

Get IPSLA Profile

Request

- restconf/data/v1/cisco-service-network:ipsla-profile

Response

- [samples/Get IPSLA Profile/response.xml](#)

1.37 Audit Log Retrieval

This API retrieves audit information about login attempts, data retrieval, and data modification by RESTCONF users. The audit subsystem logs data from both the UI and RESTCONF API. The element category with value RESTCONF identifies audit entries generated by RESTCONF API accesses.

The audit log is filterable on all attributes and can be sorted on all attributes.

| Resource | Description |
|------------------------|---|
| Audit Log | Retrieves all Audit Log in Cisco EPN Manager. |
| HTTP Method | Resource Path |
| GET | restconf/data/v1/cisco-audit:audit-log |
| Authorization Required | Both <ul style="list-style-type: none"> NB API Read View Audit Log Access |
| Query Parameters | |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more audit-logs – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body |

| | |
|---|--|
| | <ul style="list-style-type: none"> • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | audit-log.yang |

Get Audit Log

Request

- GET /restconf/data/v1/cisco-audit:audit-log

Response

- [samples/Get Audit Log/response.xml](#)
- [samples/Get Audit Log/response.json](#)

1.38 Resync Service

This API is used to re-synchronize a Circuit / VC to resolve discovery issues such as discovery state is down, or the link between the participating devices is missing, etc.

1.38.1 Resync Service Operation

| Operation | Description |
|--|---|
| resync-service | This operation is used to resync-service |
| HTTP Method | Resource Path |
| POST | /operations/v1/network-service:resync-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| resync-service-request | Container element |
| vc-ref-list | Virtual connection fdn list container |
| vc-ref | Virtual connection fdn. Only one vc-ref is supported |
| <ul style="list-style-type: none"> • Authorization Required | <p>One or more from following</p> <ul style="list-style-type: none"> • Circuit or VC Provisioning • Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |

| | |
|---|---|
| resync-service-response-list | Container element |
| resync-service-response | Resync service response |
| status | <p>Status of the request submitted. Possible values</p> <ul style="list-style-type: none"> • service-resync-started • service-already-in-resync • device-in-sync • device-not-accessible • service-not-exists • service-resync-status-unknown • service-resync-error • service-resync-not-supported • service-ref-not-unique |
| vc-ref | Virtual connection fdn |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message • 500 Internal Server Error - operation-failed <p>Please refer to RESTCONF standard status codes and standard error response data for further detail.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format VC.<number> are generated by this API. For example: VC.0017 for 'Invalid input. resync-service-request, vc-ref-list and vc-ref elements are mandatory.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |

1.38.2 Resync Service Operation

Request

- POST restconf/operations/v1/network-service:resync-service
- [samples/Resync_Service/request.xml](#)

Response

- [samples/Resync_Service/response.xml](#)

1.39 Service Activation

Operations

The following sub-sections provide the details of the operations that can be used for service activation.

1.39.1.1 Provision Service

| Operation | Description |
|---|---|
| Provision a Service | This operation can be used to provision a service. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-activation:provision-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type provision-service-request that contains the details of the service type and order-data and other related data – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return a provisioning response of type provision-service-response that contains the details of the execution which includes service reference details, device CLI details, etc. – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format PROV.<number> are generated by this API. For example: PROV.0024 for 'A service exist with same name.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none">• TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0004 =Invalid TerminationPoint - FDN: %s - name is missing.• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | <ul style="list-style-type: none">• cisco-service-activation.yang |

1.39.1.1.1 Provision Service Request

| Name | Type | Description |
|------|------|-------------|
|------|------|-------------|

| | | |
|---------------------------|-------------------------|---|
| provision-service-request | Container element | Holds the data for provisioning a service. |
| service-order-data | service-order-data type | Container holding the service order data – see the order data sections for details on each service type data. |

1.39.1.1.2 Provision Service Response

| Name | Type | Description |
|----------------------------|---------------------------------------|---|
| provision-service-response | Container element | Holds the data for provision service response. |
| customer-ref | String (FDN) | FDN of the service to be created. e.g., MD=CISCO_EPNM!CUSTOMER=Infrastructure |
| ni-ref | String (FDN) | FDN of the Network Interface (UNI/ENNI) e.g., MD=CISCO_EPNM!NI=<NI Name> |
| request-id | uuid | Request id to track the provisioning request. |
| service-name | String | Service name. |
| service-type | String | Service type. |
| service-subtype | String | Service subtype. |
| Preview | Boolean | Is preview true/false. |
| request-time | DateTime | Request time. |
| completion-time | DateTime | Completion time. |
| deploy-results | Container element | Holds the response for provision. |
| Result | Container element | Holds the response for provision. |
| node-ref | String (FDN) | FDN for the node. |
| State | String | Provisioning state. (SUCCESSFUL, FAILED, NOT_STARTED, NOT_APPLICABLE) |
| Info | String | Provision information. |
| Config | String | Device configuration. |
| Error | String | Error in provisioning. |
| rollback-config | String | Rollback Device configuration. |
| rollback-errors | String | Error in rollback provisioning. |
| work-flow-result | Container element | Holds the response for provision in case of Workflows. |
| cfs-ref | String (FDN) | FDN of the service to be created. |
| ni-ref | String (FDN) | FDN of the Network Interface (UNI/ENNI). |
| service-type | String | Service type. |
| work-flow-index | String | Workflow index. |
| work-flow-name | String | Workflow name. |
| Result | Container element in Workflow Results | Holds the response for provision in case of Workflows. |
| node-ref | String (FDN) | FDN for the node. |
| State | String | Provisioning state. (SUCCESSFUL, FAILED, NOT_STARTED, NOT_APPLICABLE) |
| Info | String | Provision information. |
| Config | String | Device configuration. |
| Error | String | Error in provisioning. |
| rollback-config | String | Rollback Device configuration. |
| rollback-errors | String | Error in rollback provisioning. |
| completion-status | String | Provisioning state. (SUCCESS, FAILED, PENDING, SUBMITTED). |
| Error | String | Error in provisioning. |

| | | |
|--------------------------|-------------------|---|
| validation-error | String | Validation Error in provisioning. |
| request-validation-error | String | Request Validation Error in provisioning. |
| test-ref | Container element | Holds the test id's for provision in case of service test included. |
| test-id | String | List of test id's invoked. |

1.39.1.2 Provision CEM Service Examples

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service/request.xml](#)
- [samples/Provision CEM Service/request.json](#)

Response

- [samples/Provision CEM Service/response.json](#)

Notification

- [samples/Provision CEM Service/notification.xml](#)

1.39.1.2.1 Provision CEM Service with uni-directional tunnel as preferred path Example

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service with uni directional tunnel as preferred path/request.xml](#)

Response

- [samples/Provision CEM Service with uni directional tunnel as preferred path/response.xml](#)

1.39.1.2.2 Provision CEM Service Consolidated: CEM+MPLS TE+BERT

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service Consolidated CEM MPLS TE BERT/request.xml](#)
- [samples/Provision CEM Service Consolidated CEM MPLS TE BERT/request.json](#)

Response

- [samples/Provision CEM Service Consolidated CEM MPLS TE BERT/response.json](#)

Notification

- [samples/Provision CEM Service Consolidated CEM MPLS TE BERT/notification.json](#)

1.39.1.2.3 Provision CEM Service with Service and Tunnel Profiles

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service

-
- [samples/Provision CEM Service with service and tunnel profiles/request.xml](#)
- Response*
- [samples/Provision CEM Service with service and tunnel profiles/response.xml](#)

1.39.1.2.4 Provision CEM Service with MPLS TE and LSP

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service with MPLS TE and LSP/request.xml](#)

Response

- [samples/Provision CEM Service with MPLS TE and LSP/response.xml](#)

1.39.1.2.5 Provision CEM Service with MPLS TE – RO to RO devices

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service with MPLS TE RO to RO devices/request.xml](#)

Response

- [samples/Provision CEM Service with MPLS TE RO to RO devices/response.xml](#)

1.39.1.2.6 Provision CEM Service with MPLS TE – RO to CO devices

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM Service with MPLS TE RO to CO devices/request.xml](#)

Response

- [samples/Provision CEM Service with MPLS TE RO to CO devices/response.xml](#)

1.39.1.2.7 Provision CEM Service with MPLS TE – CO to RO devices

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Modify CEM Service with MPLS TE CO to RO devices/request.xml](#)

Response

- [samples/Modify CEM Service with MPLS TE CO to RO devices/response.xml](#)

1.39.1.2.8 Provision CEM VC4 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM VC4 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM VC4 Service over SDH Controller/response.xml](#)

1.39.1.2.9 Provision CEM VC4-4c Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM VC4-4c Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM VC4-4c Service over SDH Controller/response.xml](#)

1.39.1.2.10 Provision CEM VC4-16c Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM VC4-16c Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM VC4-16c Service over SDH Controller/response.xml](#)

1.39.1.2.11 Provision CEM STS-1 Service over SONET Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM STS1 over SONET Controller/request.xml](#)

Response

- [samples/Provision CEM STS1 over SONET Controller/response.xml](#)

1.39.1.2.12 Provision CEM DS0 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM DS0 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM DS0 Service over SDH Controller/response.xml](#)

1.39.1.2.13 Provision CEM T1 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM T1 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM T1 Service over SDH Controller/response.xml](#)

1.39.1.2.14 Provision CEM T3 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM T3 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM T3 Service over SDH Controller/response.xml](#)

1.39.1.2.15 Provision CEM E1 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM E1 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM E3 Service over SDH Controller/response.xml](#)

1.39.1.2.16 Provision CEM E3 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM E3 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM E3 Service over SDH Controller/response.xml](#)

1.39.1.2.17 Provision CEM VC11 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM VC11 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM VC11 Service over SDH Controller/response.xml](#)

1.39.1.2.18 Provision CEM VC12 Service over SDH Controller

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM VC12 Service over SDH Controller/request.xml](#)

Response

- [samples/Provision CEM VC12 Service over SDH Controller/response.xml](#)

1.39.1.2.19 Provision CEM service with MSP 1+1 protection

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CEM SDH MSP VC12/request.xml](#)
- [samples/Provision CEM SDH MSP VC4/request.xml](#)

Response

- [samples/Provision CEM SDH MSP VC12/response.xml](#)
- [samples/Provision CEM SDH MSP VC4/response.xml](#)

1.39.1.2.20 Provision CEM service with SNCP protection

Request

POST /restconf/operations/v1/cisco-service-activation:provision-service

- [samples/Provision CEM SDH SNCP/request.xml](#)

Response

- [samples/Provision CEM SDH SNCP/response.xml](#)

1.39.1.2.21 Provision CEM e3 service over e3 controller

Request

POST /restconf/operations/v1/cisco-service-activation:provision-service

- [samples/Provision CEM e3 service over e3 controller/request.xml](#)

Response

- [samples/Provision CEM e3 service over e3 controller/response.xml](#)

1.39.1.2.22 Provision MPLS-TE Service

Request

POST /restconf/operations/v1/cisco-service-activation:provision-service

- [samples/Provision MPLS TE Service/request.xml](#)
- [samples/Provision MPLS TE Service/request.json](#)

Response

- [samples/Provision MPLS TE Service/response.xml](#)

1.39.1.2.23 Provision MPLS-TE Bidirectional Tunnel with LSP

Request

POST /restconf/operations/v1/cisco-service-activation:provision-service

- [samples/Provision MPLS TE Bidirectional Tunnel with LSP/request.xml](#)

Response

- [samples/Provision MPLS TE Bidirectional Tunnel with LSP/response.json](#)

1.39.1.2.24 Provision MPLS-TE Unidirectional Tunnel with Auto Bandwidth

Request

POST /restconf/operations/v1/cisco-service-activation:provision-service

- [samples/Provision MPLS TE Unidirectional Tunnel with Auto Bandwidth/request.xml](#)

Response

- [samples/Provision MPLS TE Unidirectional Tunnel with Auto Bandwidth/response.xml](#)

1.39.1.2.25 Provision MPLS-TE with existing bfd template

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision MPLS TE Service with Existing BFD/request.xml](#)

Response

- [samples/Provision MPLS TE Service with Existing BFD/response.xml](#)

1.39.1.2.26 Provision MPLS-TE with new bfd template

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision MPLS TE Service with New BFD/request.xml](#)

Response

- [samples/Provision MPLS TE Service with New BFD/response.xml](#)

1.39.1.2.27 Provision MPLS-TE with Flex-Lsp

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision MPLS TE Bidirectional Tunnel with FlexLsp/request.xml](#)

Response

- [samples/Provision MPLS TE Bidirectional Tunnel with FlexLsp/response.xml](#)

1.39.1.2.28 Provision CE Service

Note : While provisioning ELINE/ACCESS (EPL/EVPL) service we can either create UNIs/ENNIs along with service create or we can make use of existing UNIs/ENNIs during service create/modify.

Below tag should be used when an NBI user want to create UNIs/ENNIs during service create

```
<p:termination-point-list> → <p:termination-point-config> → <p:network-interface-name>
```

```
<p:network-interface-list> → <p:network-interface> → <p:name>  
<p:operation>add</p:operation>
```

Below tag should be used when an NBI user want to re-use existing UNIs/ENNIs during service create/modify.

```
<p:termination-point-list> → <p:termination-point-config> → <p:network-interface-ref>
```

```
<p:network-interface-list> → <p:network-interface> → <p:ref>  
<p:operation>update</p:operation>
```

1.39.1.2.29 Provision EPL Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EPL Service/request.xml](#)
- [samples/Provision EPL Service/request.json](#)

Response

- [samples/Provision EPL Service/response.xml](#)

Notification

- [samples/Provision EPL Service/notification.xml](#)

1.39.1.2.30 Provision EPL Service – EPL over Bi-Directional Tunnel

Request

- POST /restconf/operations/v1/cisco-service-activation: provision-service
- [samples/Provision EPL Service EPL Over Bi Directional Tunnel/request.xml](#)

Response

- [samples/Provision EPL Service EPL Over Bi Directional Tunnel/response.json](#)

1.39.1.2.31 Provision EPL with Profile

Request

- POST /restconf/operations/v1/cisco-service-activation: provision-service
- [samples/Provision EPL with Profile/request.xml](#)

Response

- [samples/Provision EPL with Profile/response.xml](#)

1.39.1.2.32 Provision EVPL Service – EVPL over Uni-directional Tunnel

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service EVPL over Uni Directional Tunnel/request.xml](#)

Response

- [samples/Provision EVPL Service EVPL over Uni Directional Tunnel/response.json](#)

1.39.1.2.33 Provision EVPL Service – EVPL with Pref Path UNI

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL with Pref Path UNI/request.xml](#)

Response

- [samples/Provision EVPL with Pref Path UNI/response.json](#)

1.39.1.2.34 Provision EVPL Service – EVPL Provide with Existing Tunnel

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service with Existing Tunnel/request.xml](#)

Response

- [samples/Provision EVPL Service with Existing Tunnel/response.json](#)

1.39.1.2.35 Provision EVPL with existing SR Policies

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision-SRPolicy-EVPL/EVPL-Request.xml](#)

Response

- [samples/Provision-SRPolicy-EVPL/EVPL-Response.xml](#)

1.39.1.2.36 Provision EVPL – EVPL with Modular QoS

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service EVPL Modular QoS/request.xml](#)

Response

[samples/Provision EVPL Service EVPL Modular QoS/response.xml](#)

1.39.1.2.37 Provision ELINE service with EVPN

In order to provision an ELINE service with EVPN, NBI input payload should have value as “bgp” for the “signaling-protocol” tag, otherwise it will go to default case i.e. ELINE service provisioning with/without pseudo wire settings.

Note:

1. ELINE service provisioning with EVPN is currently applicable only for regular EPL and EVPL services. ELINE hairpin, local connect and partial services with EVPN are currently not supported by EPNM.
2. ELINE service provisioning with EVPN currently support SR TE policies as preferred path in case “enable-static-preferred-path” is provided as “true” in the NBI payload. EPNM currently don’t support MPLS TE tunnels as preferred paths for EVPN based services.
3. When user tries to reuse the same evpn-instance-id for multiple services then they need to ensure that the values for input attributes route-distinguisher , import-route-target, export-route-target & enable-control-word are provided same as the value used for the

existing EVPN service , otherwise EPNM will throw an error during creation or modification of the service.

Below is the sample request and response for ELINE EVPL service provisioning.

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision-EVPL-With-EVPN/request.xml](#)
- [samples/Provision-EVPL-With-EVPN/request.json](#)

Response

- [samples/Provision-EVPL-With-EVPN/response.xml](#)

1.39.1.2.38 Provision EP-LAN Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EP LAN Service/request.xml](#)
- [samples/Provision EP LAN Service/request.json](#)

Response

- [samples/Provision EP LAN Service/response.json](#)

1.39.1.2.39 Provision EVP LAN Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVP LAN Service/request.xml](#)
- [samples/Provision EVP LAN Service/request.json](#)

Response

- [samples/Provision EVP LAN Service/response.xml](#)

1.39.1.2.40 Provision EVP LAN with HVPLS Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVP LAN with HVPLS Service/request.xml](#)

Response

- [samples/Provision EVP LAN with HVPLS Service/response.xml](#)

1.39.1.2.41 Provision EP-Tree Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EP Tree Service/request.xml](#)

-
- [samples/Provision EP Tree Service/request.json](#)

Response

- [samples/Provision EP Tree Service/response.json](#)

1.39.1.2.42 Provision EVP-Tree Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVP Tree Service/request.xml](#)
- [samples/Provision EVP Tree Service/request.json](#)

Response

- [samples/Provision EVP Tree Service/response.json](#)

1.39.1.2.43 Provision EVP-Tree H-VPLS

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVP Tree H VPLS/request.xml](#)

Response

- [samples/Provision EVP Tree H VPLS/response.json](#)

1.39.1.2.44 Provision Access EPL Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Access EPL Service/request.xml](#)
- [samples/Provision Access EPL Service/request.json](#)

Response

- [samples/Provision Access EPL Service/response.json](#)

1.39.1.2.45 Provision Access EVPL Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Access EVPL Service/request.xml](#)
- [samples/Provision Access EVPL Service/request.json](#)

Response

- [samples/Provision Access EVPL Service/response.json](#)

1.39.1.2.46 Provision QoS Profile Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision QoS Profile Service/request.xml](#)
- [samples/Provision QoS Profile Service/request.json](#)

Response

- [samples/Provision QoS Profile Service/response.json](#)

1.39.1.2.47 Provision UNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision UNI Service/request.xml](#)
- [samples/Provision UNI Service/request.json](#)

Response

- [samples/Provision UNI Service/response.json](#)

1.39.1.2.48 Provision ENNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision ENNI Service/request.xml](#)

Response

- [samples/Provision ENNI Service/response.json](#)

1.39.1.2.49 Provision CE Partial Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision CE Partial Service/request.xml](#)

Response

- [samples/Provision CE Partial Service/response.xml](#)

1.39.1.2.50 Provision EVPL Service Over Uni Directional Tunnel Between Remote Office to Remote Office Devices with MPLS Enabled

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service Over Uni Directional Tunnel Between Remote Office to Remote Office Devices with MPLS Enabled/request.xml](#)

Response

- [samples/Provision EVPL Service Over Uni Directional Tunnel Between Remote Office to Remote Office Devices with MPLS Enabled/response.xml](#)

1.39.1.2.51 Provision EVPL Service Over Uni Directional Tunnel Between Central Office to Remote Office Devices with MPLS Enabled

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service

-
- [samples/Provision EVPL Service Over Uni Directional Tunnel Between Central Office to Remote Office Devices with MPLS Enabled/request.xml](#)

Response

- [samples/Provision EVPL Service Over Uni Directional Tunnel Between Central Office to Remote Office Devices with MPLS Enabled/response.xml](#)

1.39.1.2.52 Provision EVPL Service Over Uni Directional Tunnel – NID to NID

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to NID/request.xml](#)

Response

- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to NID/response.xml](#)

1.39.1.2.53 Provision EVPL Service Over Uni Directional Tunnel – NID to Remote Building

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to Remote Building/request.xml](#)

Response

- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to Remote Building/response.xml](#)

1.39.1.2.54 Provision EVPL Service Over Uni Directional Tunnel – NID to Service Edge

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to Service Edge/request.xml](#)

Response

- [samples/Provision EVPL Service Over Uni Directional Tunnel NID to Service Edge/response.xml](#)

1.39.1.2.55 Provision EVPL Service with Autoroute Enabled

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision EVPL Service with Autoroute Enabled/request.xml](#)

Response

- [samples/Provision EVPL Service with Autoroute Enabled/response.xml](#)

1.39.1.2.56 Provision L3 Link

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3 Link/request.xml](#)
- [samples/Provision L3 Link/request.json](#)

1.39.1.2.57 Provision L3 Link with BGP routing protocol

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3 Link with BGP routing protocol/request.xml](#)
- [samples/Provision L3 Link with BGP routing protocol/request.json](#)

1.39.1.2.58 Provision L3 Link with ISIS routing protocol

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3 Link with ISIS routing protocol/request.xml](#)
- [samples/Provision L3 Link with ISIS routing protocol/request.json](#)

1.39.1.2.59 Provision L3VPN

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3VPN Service/request.xml](#)
- [samples/Provision L3VPN Service/request.json](#)

Response

- [samples/Provision L3VPN Service/response.xml](#)

Request with BGP IPv4

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3VPN BGP IPV4/request.xml](#)

Response

[samples/Provision L3VPN BGP IPV4/response.xml](#)

Request with BGP IPv6

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3VPN BGP IPV6/request.xml](#)

Response

[samples/Provision L3VPN BGP IPV6/response.xml](#)

Request with BGP OSPFv3

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision L3VPN OSPFV3/request.xml](#)

Response

- [samples/Provision L3VPN OSPFV3/response.xml](#)

1.39.1.2.60 Provision Optical Service OCHNC

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Optical Service/request.xml](#)
- [samples/Provision Optical Service/request.json](#)

Response

- [samples/Provision Optical Service/response.xml](#)

Notification

- [samples/Provision Optical Service/notification.xml](#)

1.39.1.2.61 Provision OCHTrail UNI

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision OCHTrail UNI/request.xml](#)
- [samples/Provision OCHTrail UNI/request.json](#)

Response

- [samples/Provision OCHTrail UNI/response.xml](#)

1.39.1.2.62 Provision OCHNC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision OCHNC Service/request.xml](#)
- [samples/Provision OCHNC Service/request.json](#)

Response

- [samples/Provision OCHNC Service/response.xml](#)

1.39.1.2.63 Provision OCHCC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision OCHCC Service/request.xml](#)
- [samples/Provision OCHCC Service/request.json](#)

Response

- [samples/Provision OCHCC Service/response.xml](#)

1.39.1.2.64 Provision OCHTrail Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision OCHTrail Service/request.xml](#)
- [samples/Provision OCHTrail Service/request.json](#)

Response

- [samples/Provision OCHTrail Service/response.xml](#)

1.39.1.2.65 Provision ODU_Tunnel Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision ODU Tunnel Service/request.xml](#)
- [samples/Provision ODU Tunnel Service/request.json](#)

Response

- [samples/Provision ODU Tunnel Service/response.xml](#)

1.39.1.2.66 Provision ODU_UNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision ODU UNI Service/request.xml](#)
- [samples/Provision ODU UNI Service/request.json](#)

Response

- [samples/Provision ODU UNI Service/response.xml](#)

1.39.1.2.67 Provision Mutually Diverse OCHTrail UNI

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Mutually Diverse OCHTrail UNI/request.xml](#)
- [samples/Provision Mutually Diverse OCHTrail UNI/request.json](#)

Response

- [samples/Provision Mutually Diverse OCHTrail UNI/response.xml](#)

1.39.1.2.68 Provision OPU Over ODU

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision OPU Over ODU/request.xml](#)
- [samples/Provision OPU Over ODU/request.json](#)

Response

- [samples/Provision OPU Over ODU/response.xml](#)

1.39.1.2.69 Provision ODU UNI Hairpin

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision ODU UNI Hairpin/request.xml](#)

Response

- [samples/Provision ODU UNI Hairpin/response.xml](#)

1.39.1.2.70 Provision Media Channel Group

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Media Channel Group/request.xml](#)

Response

- [samples/Provision Media Channel Group/response.xml](#)

1.39.1.2.71 Provision Media Channel NC

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Media Channel NC/request.xml](#)

Response

- [samples/Provision Media Channel NC/response.xml](#)

1.39.1.2.72 Provision Media Channel CC

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Media Channel CC/request.xml](#)

Response

- [samples/Provision Media Channel CC/response.xml](#)

1.39.1.2.73 Provision Media Channel Trail

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Media Channel Trail/request.xml](#)

Response

- [samples/Provision Media Channel Trail/response.xml](#)

1.39.1.2.74 Provision SR-TE service

Request

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Provision Sr-Te/request.xml](#)

Response

- [samples/Provision Sr-Te/response.xml](#)

1.39.1.3 Modify Service

| Operation | Description |
|-------------------------|--|
| Modify existing service | This operation can be used to modify existing service. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-activation:modify-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type modify-service-request that contains the details of the service type and order-data and other related data – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return a modify response of type modify-service-response that contains the details of the execution that includes service reference details, device cli details, etc. – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | <ul style="list-style-type: none">• cisco-service-activation.yang |

1.39.1.3.1 Modify Service Request

| Name | Type | Description |
|------------------------|-------------------------|---|
| modify-service-request | Container element | Holds the data for modifying an existing service. |
| cfs-ref | String (FDN) | FDN of the service to be modified. |
| ni-ref | String (FDN) | FDN of the Network Interface (UNI/ENNI) to be modified. This field is needed instead of cfs-ref in Network Interface (UNI/ENNI) modification case only. |
| service-order-data | service-order-data type | Container holding the service order data – see the order data sections for details on each service type data. |

1.39.1.3.2 Modify Service Response

| Name | Type | Description |
|----------------------------------|-------------------|---|
| modify-service-response | Container element | Holds the data for modify service response. |
| Refer Provision-service-response | | |

1.39.1.3.3 Modify CEM Service Example

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify CEM Service/request.xml](#)
- [samples/Modify CEM Service/request.json](#)

Response

- [samples/Modify CEM Service/response.json](#)

Notification

- [samples/Modify CEM Service/notification.xml](#)

1.39.1.3.4 Modify CEM Service with MPLS TE – RO to RO Devices

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify CEM Service with MPLS TE RO to RO devices/request.xml](#)

Response

- [samples/Modify CEM Service with MPLS TE RO to RO devices/response.xml](#)

1.39.1.3.5 Modify CEM Service with MPLS TE – RO to CO Devices

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify CEM Service with MPLS TE RO to CO devices/request.xml](#)

Response

- [samples/Modify CEM Service with MPLS TE RO to CO devices/response.xml](#)

1.39.1.3.6 Modify CEM Service with MPLS TE – CO to RO Devices

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify CEM Service with MPLS TE CO to RO devices/request.xml](#)

Response

- [samples/Modify CEM Service with MPLS TE CO to RO devices/response.xml](#)

1.39.1.3.7 Modify EPL Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service

-
- [samples/Modify EPL Service/request.xml](#)
 - [samples/Modify EPL Service/request.json](#)

Response

- [samples/Modify EPL Service/response.json](#)

1.39.1.3.8 Modify EVPL Service with EVPN

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify EPL With EVPN Service/request.xml](#)
- [samples/Modify EPL With EVPN Service/request.json](#)

Response

- [samples/Modify EPL With EVPN Service/response.json](#)

1.39.1.3.9 Modify ENNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify ENNI Service/request.xml](#)

Response

- [samples/Modify ENNI Service/response.json](#)

1.39.1.3.10 Modify L3 Link with OSPF routing protocol

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify L3 Link with OSPF routing protocol/request.xml](#)
- [samples/Modify L3 Link with OSPF routing protocol/request.json](#)

1.39.1.3.11 Modify L3 Link with BGP Routing Protocol

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify L3 Link with BGP routing protocol/request.xml](#)
- [samples/Modify L3 Link with BGP routing protocol/request.json](#)

1.39.1.3.12 Modify L3 Link with ISIS Routing Protocol

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify L3 Link with ISIS routing protocol/request.xml](#)
- [samples/Modify L3 Link with ISIS routing protocol/request.json](#)

1.39.1.3.13 Modify L3VPN Service (Add VRF)

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify L3VPN Service Add VRF/request.xml](#)
- [samples/Modify L3VPN Service Add VRF/request.json](#)

Response

- [samples/Modify L3VPN Service Add VRF/response.json](#)

1.39.1.3.14 Modify L3VPN Service (Modify VPN)

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify L3VPN Service Modify VPN/request.xml](#)

Response

- [samples/Modify L3VPN Service Modify VPN/response.xml](#)

1.39.1.3.15 Modify L3VPN Service (Modify VPN) with service MTU

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [sample/Modify L3VPN Service Modify VPN Service MTU/request.xml](#)
- [sample/Modify L3VPN Service Modify VPN Service MTU/request.json](#)

Response

- [samples/Modify L3VPN Service Modify VPN Service MTU/response.xml](#)
- [samples/Modify L3VPN Service Modify VPN Service MTU/response.json](#)

1.39.1.3.16 Modify Optical Service OCHNC

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Optical Service/request.xml](#)
- [samples/Modify Optical Service/request.json](#)

Response

- [samples/Modify Optical Service/response.xml](#)

Notification

- [samples/Modify Optical Service/notification.xml](#)

1.39.1.3.17 Modify OCHTrail UNI

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify OCHTrail UNI/request.xml](#)
- [samples/Modify OCHTrail UNI/request.json](#)

Response

- [samples/Modify_OCHTrail_UNI/response.xml](#)

1.39.1.3.18 Modify OCHNC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify_OCHNC_Service/request.xml](#)
- [samples/Modify_OCHNC_Service/request.json](#)

Response

- [samples/Modify_OCHNC_Service/response.xml](#)

1.39.1.3.19 Modify OCHCC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify_OCHCC_Service/request.xml](#)
- [samples/Modify_OCHCC_Service/request.json](#)

Response

- [samples/Modify_OCHCC_Service/response.xml](#)

1.39.1.3.20 Modify OCHTrail Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify_OCHTrail_Service/request.xml](#)
- [samples/Modify_OCHTrail_Service/request.json](#)

Response

- [samples/Modify_OCHTrail_Service/response.xml](#)

1.39.1.3.21 Modify ODU_Tunnel Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify_ODU_Tunnel_Service/request.xml](#)
- [samples/Modify_ODU_Tunnel_Service/request.json](#)

Response

- [samples/Modify_ODU_Tunnel_Service/response.xml](#)

1.39.1.3.22 Modify ODU_UNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify_ODU_UNI_Service/request.xml](#)

-
- [samples/Modify ODU UNI Service/request.json](#)

Response

- [samples/Modify ODU UNI Service/response.xml](#)

1.39.1.3.23 Modify OPU Over ODU

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify OPU Over ODU/request.xml](#)
- [samples/Modify OPU Over ODU/request.json](#)

Response

- [samples/Modify OPU Over ODU/response.xml](#)

1.39.1.3.24 Modify ODU UNI Hairpin

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify ODU UNI Hairpin/request.xml](#)

Response

- [samples/Modify ODU UNI Hairpin/response.xml](#)

1.39.1.3.25 Modify Media Channel Group

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Media Channel Group/request.xml](#)

Response

- [samples/Modify Media Channel Group/response.xml](#)

1.39.1.3.26 Modify Media Channel NC

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Media Channel NC/request.xml](#)

Response

- [samples/Modify Media Channel NC/response.xml](#)

1.39.1.3.27 Modify Media Channel CC

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Media Channel CC/request.xml](#)

Response

- [samples/Modify Media Channel CC/response.xml](#)

1.39.1.3.28 Modify Media Channel Trail

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Media Channel Trail/request.xml](#)

Response

- [samples/Modify Media Channel Trail/response.xml](#)

1.39.1.3.29 Modify SR-TE service

Request

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Modify Sr-Te/request.xml](#)

Response

- [samples/Modify Sr-Te/response.xml](#)

1.39.1.4 Terminate Service

| Operation | Description |
|----------------------------|--|
| Terminate existing Service | This operation can be used to terminate existing service. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-activation:terminate-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | Request data of type terminate-service-request that contains the details of the service type and service reference and other related data – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Response Data | Return a provisioning response of type terminate-service-response that contains the details of the execution that includes service reference details, device cli details, etc. – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK- Success with response message-body• 401, 403– Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | <ul style="list-style-type: none">• cisco-service-activation.yang |

1.39.1.4.1 Terminate Service Request

| Name | Type | Description |
|------|------|-------------|
|------|------|-------------|

| | | |
|---------------------------|-------------------|--|
| terminate-service-request | Container element | Holds the data for terminating the service. |
| cfs-ref | String (FDN) | FDN of the service to be terminated. |
| ni-ref | String (FDN) | FDN of the Network Interface (UNI/ENNI) to be terminated. This field is needed instead of cfs-ref in Network Interface (UNI/ENNI) termination case only. |

1.39.1.4.2 Terminate Service Response

| Name | Type | Description |
|----------------------------------|-------------------|--|
| terminate-service-response | Container element | Holds the data for terminating the service's response. |
| Refer Provision-service-response | | |

CEM, Optical and MPLS-TE service provisioning is supported through the set of operations defined as RESTCONF Operations. When the OSS client uses this interface for service provisioning, a set of CFS (Customer Facing Service) and RFS (Resource Facing Service) objects will be created or modified to handle the service management in Cisco EPN Manager.

The API provides support for provisioning the following services:

| Technology | Service Type | Service Sub Type |
|------------|----------------------|---|
| CE | carrier-ethernet-vpn | EPL, EVPL, ACCESS EPL, ACCESS EVPL, EP-LAN, EVP-LAN, EP-Tree, EVP-Tree |
| CEM | tdm-cem | T1, T3, E1, E3,VT1.5,OC1,OC3, OC12,OC48 |
| MPLS-TE | mpls-te-tunnel | Bidirectional, Unidirectional TE Tunnel, Layer 3 Link |
| L3VPN | mpls-l3-vpn | L3VPN |
| Optical | optical | OCHNC, OCHCC, OCHTrail, OCHTrail-UNI, OPU-Over-ODU, ODU_UNI, ODU_TUNNEL |

1.39.1.4.3 Terminate CEM Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate CEM Service/request.xml](#)
- [samples/Terminate CEM Service/request.json](#)

Response

- [samples/Terminate CEM Service/response.json](#)

Notification

- [samples/Terminate CEM Service/notification.xml](#)

1.39.1.4.4 Terminate CEM Service with MPLS TE

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate CEM Service with MPLS TE/request.xml](#)

Response

- [samples/Terminate CEM Service with MPLS TE/response.xml](#)

1.39.1.4.5 Terminate EPL Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate EPL Service/request.xml](#)
- [samples/Terminate EPL Service/request.json](#)

Response

- [samples/Terminate EPL Service/response.json](#)

1.39.1.4.6 Terminate EVPL Service Along with Tunnels

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate EVPL Service along with Tunnels/request.xml](#)
- [samples/Terminate EVPL Service along with Tunnels/request.json](#)

Response

1.39.1.4.7 Terminate ENNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate ENNI Service/request.xml](#)

Response

- [samples/Terminate ENNI Service/response.json](#)

1.39.1.4.8 Terminate L3 Link Service (OSPF/BGP/ISIS)

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate L3 Link Service/request.xml](#)

1.39.1.4.9 Terminate L3VPN

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate L3VPN/request.xml](#)
- [samples/Terminate L3VPN/request.json](#)

Response

- [samples/Terminate L3VPN/response.json](#)

1.39.1.4.10 Terminate Optical Service OCHNC

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Optical Service/request.xml](#)
- [samples/Terminate Optical Service/request.json](#)

Response

- [samples/Terminate Optical Service/response.xml](#)

Notification

- [samples/Terminate Optical Service/notification.xml](#)

1.39.1.4.11 Terminate OCHTrail UNI

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate OCHTrail UNI/request.xml](#)
- [samples/Terminate OCHTrail UNI/request.json](#)

Response

- [samples/Terminate OCHTrail UNI/response.xml](#)

1.39.1.4.12 Terminate OCHNC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate OCHNC Service/request.xml](#)

Response

- [samples/Terminate OCHNC Service/response.xml](#)

1.39.1.4.13 Terminate OCHCC Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate OCHCC Service/request.xml](#)

Response

- [samples/Terminate OCHCC Service/response.xml](#)

1.39.1.4.14 Terminate OCHTrail Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate OCHTrail Service/request.xml](#)
- [samples/Terminate_OCHTrail_Service/request.json](#)

Response

- [samples/Terminate OCHTrail Service/response.xml](#)

1.39.1.4.15 Terminate OCHTrail Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate ODU Tunnel Service/request.xml](#)
- [samples/Terminate ODU Tunnel Service/request.json](#)

Response

- [samples/Terminate ODU Tunnel Service/response.xml](#)

1.39.1.4.16 Terminate ODU_UNI Service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate ODU UNI Service/request.xml](#)

Response

- [samples/Terminate ODU UNI Service/response.json](#)

1.39.1.4.17 Terminate OPU Over ODU

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate OPU Over ODU/request.xml](#)
- [samples/Terminate OPU Over ODU/request.json](#)

Response

- [samples/Terminate OPU Over ODU/response.xml](#)

1.39.1.4.18 Terminate ODU UNI Hairpin

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate ODU UNI Hairpin/request.xml](#)

Response

- [samples/Terminate ODU UNI Hairpin/response.xml](#)

1.39.1.4.19 Terminate Media Channel Group

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Media Channel Group/request.xml](#)

Response

- [samples/Terminate Media Channel Group/response.xml](#)

1.39.1.4.20 Terminate Media Channel NC

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Media Channel NC/request.xml](#)

Response

- [samples/Terminate Media Channel NC/response.xml](#)

1.39.1.4.21 Terminate Media Channel CC

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Media Channel CC/request.xml](#)

Response

- [samples/Terminate Media Channel CC/response.xml](#)

1.39.1.4.22 Terminate Media Channel Trail

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Media Channel Trail/request.xml](#)

Response

- [samples/Terminate Media Channel Trail/response.xml](#)

1.39.1.4.23 Terminate SR-TE service

Request

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Terminate Sr-Te/request.xml](#)

Response

- [samples/Terminate Sr-Te/response.xml](#)

1.39.1.5 Roll Service

| Operation | Description |
|--|---|
| Roll from one service to another service | Given local connect CEM service as roll-from-service and CEM service between 2 devices as roll-to-service, delete the CEM roll-from-service and modify CEM roll-to-service connect moving Z endpoint to roll-from-service Z endpoint. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-activation:roll-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |

| | |
|-------------------------|---|
| Request Data | Request data of type modify-service-request that contains the details of the service type and order-data and other related data – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Circuit or VC Provisioning • Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return a modify response of type roll-service-response that contains the details of the execution that includes service reference details, device cli details, etc. – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | <ul style="list-style-type: none"> • cisco-service-activation.yang |

1.39.1.5.1 Roll Service Request

| Name | Type | Description |
|------------------------|-------------------------|---|
| modify-service-request | Container element | Holds the data for modifying an existing service. |
| cfs-ref | String (FDN) | FDN of the service to be modified. |
| ni-ref | String (FDN) | FDN of the Network Interface (UNI/ENNI) to be modified. This field is needed instead of cfs-ref in Network Interface (UNI/ENNI) modification case only. |
| service-order-data | service-order-data type | Container holding the service order data – see the order data sections for details on each service type data. |

1.39.1.5.2 Roll Service Response

| Name | Type | Description |
|----------------------------------|-------------------|---|
| modify-service-response | Container element | Holds the data for modify service response. |
| Refer Provision-service-response | | |

1.39.1.5.3 Roll Service Request/Response

Request

- [samples/Roll_Service/request.xml](#)

Response

- [samples/Roll_Service/response.json](#)

Notification

- [samples/Roll_Service/notification.json](#)

1.39.1.6 Force Terminate Service

| Operation | Description |
|----------------------------|--|
| Terminate existing Service | This operation can be used to force terminate delete failed services. It's not applicable to optical services currently. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-activation:terminate-service |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | Request data of type terminate-service-request that contains the details of the service type and service reference and other related data – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Provisioning Access |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Response Data | Return a provisioning response of type terminate-service-response that contains the details of the execution that includes service reference details, device cli details, etc. – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK- Success with response message-body• 401, 403– Authentication and Authorization errors.• 400 Bad Request- Invalid request message.• 500 Internal Server Error- operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-activation.yang |

1.39.1.6.1 Force Terminate Service Request

| Name | Type | Mandatory | Description |
|---------------------------|-------------------|-----------|--|
| terminate-service-request | Container element | Yes | Holds the data for terminating the service. |
| cfs-ref | String (FDN) | Yes | FDN of the service to be terminated. |
| service-name | String | No | Name of the service being deleted. |
| service-type | String | Yes | Service type of the service being deleted. |
| service-subtype | String | Yes | Service sub type of the service being deleted. |
| force-delete | Boolean | Yes | For force delete/terminate of a service value of this tag should be “true” or else EPNM will consider it as regular service terminate. |

1.39.1.6.2 Force Terminate Service Response

| Name | Type | Description |
|----------------------------------|-------------------|--|
| terminate-service-response | Container element | Holds the data for terminating the service's response. |
| Refer Provision-service-response | | |

CEM, Optical and MPLS-TE service provisioning is supported through the set of operations defined as RESTCONF Operations. When the OSS client uses this interface for service provisioning, a set of CFS (Customer Facing Service)

and RFS (Resource Facing Service) objects will be created or modified to handle the service management in Cisco EPN Manager.

The API provides support for Termination of the following services:

| Technology | Service Type | Service Sub Type |
|------------|----------------------|--|
| CE | carrier-ethernet-vpn | EPL, EVPL, ACCESS EPL, ACCESS EVPL, EP-LAN, EVP-LAN, EP-Tree, EVP-Tree |
| CEM | tdm-cem | t1, t3, e1,e3,vt1.5,oc1,oc3, oc12,oc48 , STS-1 , STS-3c , STS-12c , STS-48c , VC4 , VC4-4c, VC4-16c , vc11 and vc12. |
| MPLS-TE | mpls-te-tunnel | bi-directional-te-tunnel, uni-directional-te-tunnel , layer3-link |
| L3VPN | mpls-l3-vpn | L3VPN |

Force Terminate Sample Response:

- [samples/Force Terminate Service/response.xml](#)

1.39.1.7 *Save and Schedule service deployment (BETA VERSION)*

NBI supports service deployment which can be saved or scheduled to a specified time for all supported services except optical. This is applicable for provide, amend and terminate operations.

In order to schedule a service, NBI user needs to specify “deploy-schedule-time” tag along with “deploy-action” as “Scheduled” in the NBI input payload.

In order to save a service, “deploy-action” value should be specified as “Later” in NBI provide, amend or terminate payloads.

1.39.1.7.1 **Save and Schedule service deployment for provide operation**

1.39.1.7.1.1 *Request*

deploy-action: Scheduled

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Save Schedule Services/Evpl-DeploySchedule-Provide-Request.xml](#)
- [samples/Save Schedule Services/EPTree-DeploySchedule-Provide-Request.xml](#)

deploy-action: Later

- POST /restconf/operations/v1/cisco-service-activation:provision-service
- [samples/Save Schedule Services/Cem vc11 provision save request.xml](#)
- [samples/Save Schedule Services/Mpls-te-tunnel bi directional provide save request.xml](#)

1.39.1.7.1.2 Response

deploy-action: Scheduled

- [samples/Save Schedule Services/Evpl-DeploySchedule-Provide-Response.xml](#)
- [samples/Save Schedule Services/EPTree-DeploySchedule-Provide-Response.xml](#)

deploy-action: Later

- [samples/Save Deployment/Cem vc11 provision save response.xml](#)
- [samples/Save Deployment/Mpls-te-tunnel bi directional provision save response.xml](#)

1.39.1.7.2 Save and Schedule service deployment for amend operation

1.39.1.7.2.1 Request

deploy-action: Scheduled

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Save Schedule Services/Ce EPTree modify schedule request.xml](#)
- [samples/Save Schedule Services/Mpls-te-tunnel uni directional modify schedule request.xml](#)

deploy-action: Later

- POST /restconf/operations/v1/cisco-service-activation:modify-service
- [samples/Save Deployment/Ce Epl modify save request.xml](#)
- [samples/Save Deployment/Ce AccessEPL modify save request.xml](#)

1.39.1.7.2.2 Response

deploy-action: Scheduled

- [samples/Schedule Deployment/Ce EPTree modify schedule response.xml](#)
- [samples/Schedule Deployment/ Mpls-te-tunnel uni directional modify schedule response.xml](#)

deploy-action: Later

- [samples/Save Deployment/Ce Epl modify save response.xml](#)
- [samples/Save Deployment/Ce AccessEPL modify save response.xml](#)

1.39.1.7.3 Save and Schedule service deployment for terminate operation

1.39.1.7.3.1 Request

deploy-action: Scheduled

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Schedule Deployment/Cem t1 terminate schedule request.xml](#)
- [samples/Schedule Deployment/L3vpn terminate schedule request.xml](#)

deploy-action: Later

- [samples/Schedule Deployment/Cem t1 terminate save request.xml](#)
- [samples/Schedule Deployment/L3vpn terminate save request.xml](#)

1.39.1.7.3.2 Response

deploy-action: Scheduled

- POST /restconf/operations/v1/cisco-service-activation:terminate-service
- [samples/Save Deployment/L3vpn terminate schedule response.xml](#)
- [samples/Save Deployment/Cem t1 terminate schedule response.xml](#)

deploy-action: Later

- [samples/Save Deployment/L3vpn terminate save response.xml](#)
- [samples/Save Deployment/Cem t1 terminate save response.xml](#)

1.39.1.7.4 Manage Planned Services

NBI supports service re-deployment and cancel for the planned services.

In order to deploy a planned service, user needs to specify “action-type” tag as “Deploy” in the NBI input payload.

In order to cancel a planned service, user needs to specify “action-type” tag as “Cancel” in the NBI input payload.

| Name | Type | Mandatory | Description |
|--------------------------------|--------------|-------------------------------|---|
| manage-planned-service-request | Container | Yes | Container to hold manage planned services request parameters. |
| service-order-data | Container | Yes | Container to hold the service order data tags |
| cfs-ref | String (FDN) | Yes, if its service | FDN of the service to be managed. Ex: MD=CISCO_EPNM!CFS=<serviceName> |
| ni-ref | String (FDN) | Yes, if its network-interface | FDN of the Network Interface (UNI/ENNI) to be managed. Ex: MD=CISCO_EPNM!NI=<niName> |

| | | | |
|-----------------|--------|-----|---|
| service-name | String | No | Service name. |
| service-type | String | Yes | Service type. |
| service-subtype | String | Yes | Service subtype. |
| action-type | String | Yes | Possible values: <ul style="list-style-type: none"> • Deploy • Cancel |

Note: This API (manage-planned-service) is supported for the following services mentioned in the below table.

| Service Type | Service SubType |
|----------------------|---|
| mpls-te-tunnel | <ul style="list-style-type: none"> • uni-directional-te-tunnel • bi-directional-te-tunnel • layer3-link. |
| carrier-ethernet-vpn | <ul style="list-style-type: none"> • EP-Tree • Access EPL • Access EVPL |

1.39.1.7.4.1 Manage planned service (Deploy operation)

1.39.1.7.4.1.1 Request

POST /restconf/operations/v1/cisco-service-activation:manage-planned-service

- [samples/Save_Deployment/Mpls-te-tunnel_bi_directional_redeploy_request.xml](#)

1.39.1.7.4.1.2 Response

- [samples/Save_Deployment/Mpls-te-tunnel_bi_directional_redeploy_response.xml](#)

1.39.1.7.4.2 Manage planned service (Cancel operation)

1.39.1.7.4.2.1 Request

POST /restconf/operations/v1/cisco-service-activation:manage-planned-service

- [samples/Save_Deployment/Mpls-te-tunnel_uni_directional_cancel_request.xml](#)

1.39.1.7.4.2.2 Response

- [samples/Save_Deployment/Mpls-te-tunnel_uni_directional_cancel_response.xml](#)

Service Order Data

The following sub-sections provide the details of each service provisioning order data which is required in the provision and modify operations of the service activation interface as a POST data in a request object.

1.39.1.8 Service Order Data – Carrier Ethernet (CE)

The table below lists the Order Data elements and the supported values for carrier ethernet services. Note that the table below describes all the elements in service order data combined for service and endpoint configuration for all the CE services (ELINE, ELAN, ETREE, and EACCESS). See schema restconf-sai-carrier-ethernet.xsd for more details.

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|----------------|--|------------|----------------------------|---|
| service-name | String | Yes | No | All | Unique name to identify the circuit/VC. |
| service-description | String | No | Yes | All | Description of the VC that will help to identify the VC. |
| service-type | String | Yes | No | All | Service Type. Possible value: carrier-ethernet-vpn |
| service-subtype | String | Yes | No | All | Service SubType. Possible Values: EPL, EVPL, ACCESS EPL, ACCESS EVPL, EP-LAN, EVP-LAN, EP-Tree, EVP-Tree |
| customer-ref | String | No | No | All | Customer FDN. e.g., MD=CISCO_EPNM!CUSTOMER=<customer name> default value of CUSTOMER is "Infrastructure" |
| service-activate | Boolean | No | Yes | All | Activate Service. Default value is: true |
| deploy-action | String | No | No | All | This is the tag to specify deploy action in the payload. Default value : Deploy Possible Values : Preview , Deploy , Scheduled, Later |
| deploy-schedule-time | Date | No | No | All non-optical services | This tag is to specify deploy schedule time and applicable only when value of deploy action is "Scheduled". Supported format : yyyy-MM-ddThh:mm:ss-TZD e.g. 2018-10-25T09:10:00-00:00 |
| signaling-protocol | String | Yes, for EVPN based service provisioning | No | EPL, EVPL | This is to specify if signaling protocol to be used. Supported value : bgp If its value is "bgp" then that means service need to use EVPN during provisioning. |
| termination-point-list | List container | Yes | N/A | All | List of connection termination point configurations. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|----------------|--------------------------------|------------|----------------------------|--|
| network-interface-list | List container | Yes | N/A | All | List of network interface configurations. |
| forwarding-path | container | Yes | N/A | | List of Forward paths. |
| ce-data | container | Yes | N/A | All | Container for CE service configuration. |
| bundling | Boolean | yes | Yes | EVPL, EVP-LAN, EVP-TREE | Enables multiple VLANs on this VC. Multiple CE-VLAN IDs are bundled to one EVC. Default value: true |
| ccm-interval | String | Yes (when enable-cfm = true) | Yes | | Service-wide setting for all Maintenance Entities – e.g. 1 sec, 1 min , 10 min , 10 sec, 100 ms , 3.33 ms. default value : 1 sec |
| ce-vlan-id-preservation | Boolean | Yes | Yes | EVPL, EVP-LAN, EVP-TREE | CE-VLAN ID Preservation. Ensures that the CE-VLAN ID of an egress service frame is identical in value to the CE-VLAN ID of the corresponding ingress service frame. This must be enabled, if bundling is enabled. |
| ce-vlan-cos-preservation | Boolean | No | Yes | EVPL, EVP-LAN, EVP-TREE | CE-VLAN ID CoS Preservation. Ensures that the CE-VLAN CoS of an egress service frame is identical in value to the CE-VLAN CoS of the corresponding ingress service frame. The CoS markings are unaltered. |
| mtu-size | Integer | Yes | Yes | All | Service MTU. The maximum size, in bytes, of any frame passing through the VC. Values can be between 64 and 9216. The service MTU must be lower than or equal to the MTU defined on the UNI. |
| enable-cfm | Boolean | No | Yes | All | True/false for enable CFM. Default is 'true' |
| cfm-domain-name | String | No | Yes | All | This represent CFM domain name used. Default : EVC |
| cfm-domain-level | String | No | Yes | All | This represents CFM domain level. Possible value : 1 to 7 Default : 4 |
| configure-remote-mep | boolean | No | Yes | All | Flag to indicate for configuring remote mep or not. Default value : false. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|------------------------|-----------|------------|-------------------------------------|---|
| fault-management-map | FaultManagementMapType | No | N/A | All | Service OAM - Define the probe profiles between MEP Groups (groups of UNIs whose membership to a group is marked at each endpoint). See the entries in this container below in Fault Management Map Data. |
| max-uni-endpoints | Integer | No | No | All | Max UNI endpoints , default: 2 |
| vpn-id | Long | No | No | All | Vpn Id |
| auto-allocate-vlan-id | Boolean | No | Yes | EVPL, Access EVPL, EVPLAN, EVP-Tree | Indicator for auto allocation of VLAN Id, allowed values:true/false; Default value: false |

The table below lists the containers for Fault Management map entries applicable to different types of fault management maps:

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|-------------------------------|-----------|------------|----------------------------|--|
| fault-management-map | Container element | Yes | N/A | All | Container for Fault Management Map Entries. |
| Entry | Container element for entries | Yes | N/A | All | Zero or more elements of the Fault Management Map Entry. |
| Fault Management Map Entry Data | | Yes | N/A | All | Container of the entries for Fault Management Map. |
| from | String | Yes | Yes | All | Value should be one of - ENNI Z, UNI Z, UNI A, or ENNI A. The source of the traffic flow across the EVC/OVC. |
| to | String | Yes | Yes | All | Value should be one of - ENNI Z, UNI Z, UNI A, or ENNI A. The destination of the traffic flow across the EVC/OVC. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|-----------|-----------|------------|----------------------------|--|
| cos | String | Yes | Yes | All | <p>Values:</p> <ul style="list-style-type: none"> • EXTRA HIGH • HIGH • HIGHEST AVAILABLE • LOW • MEDIUM <p>The Class of Service identifier that should be associated with the frame.</p> |
| oam-profile | String | Yes | Yes | All | <p>Provide a name to the profile that can be identified for the set of OAM attributes that should be applied to the frame to enable performance monitoring.</p> <p>Note: This is just a label. The actual values should be passed through CChk, SEDM, DEDM, and SyLM elements mentioned below. For example:</p> <ul style="list-style-type: none"> – Performance Monitoring 1: Enables continuity check and synthetic loss measurement. (CChk=Yes, SEDM= No, DEDM=No, SyLM=Yes, SLM=No). – Performance Monitoring 2: Enables continuity check, synthetic loss measurement, and single-ended delay measurement (CChk=Yes, SEDM= Yes, DEDM=No, SyLM=Yes, SLM=No). – Performance Monitoring 3: Enables continuity check, synthetic loss measurement, and dual-ended delay measurement (CChk=Yes, SEDM= No, DEDM=Yes, SyLM=Yes, SLM=No). |

| Carrier Ethernet Service | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|--------------------------|--------------|-------------------------|------------|------------------------------|--|
| Order Data | | | | | |
| termination-point-list | Container | Yes | N/A | All | termination point list |
| termination-point-config | Container | Yes | N/A | All except UNI , QoS Profile | termination point config |
| tp-ref | String (FDN) | Yes | No | All | FDN of the port to use - set of RNDs that consists of MD, ME and PTP or FTP instance ids. For example: "MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-2.cisco.com!FTP=name=GigabitEthernet0/4;lr=lr-gigabit-ethernet " |
| directionality | Identity | Yes | No | All | source, sink, and bi-directional. |
| ingress-qos-policy-ref | String (FDN) | No | Yes | All except EVP-Tree | Ingress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| egress-qos-policy-ref | String (FDN) | No | Yes | All except EVP-Tree | Egress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| network-interface-name | String | Yes (for new UNI) | No | All | It's the name of the new NI being created Mandatory while creating new UNI e.g., any unique uni name like UniA , UniZ etc. |
| network-interface-ref | String (FDN) | Yes (for existing UNI) | No | All | It's the FDN of the existing NI being re-used. Mandatory while re-using existing UNI e.g., MD=CISCO_EPNM!NI=<name of the existing UNI> |
| ce-data | Container | Yes | N/A | All | Container for CE Endpoint configuration |
| l2-cp-profile | String | No | Yes | All except EVPL | Layer 2 Control Protocol Profile. Profile that determines how the various communication protocols are handled. Frames using the various protocols are tunneled, dropped, or peered. Refer to MEF 6.1 for details. Values: EPL, Access EPL: MEF Option1 or MEF Option2 Access EVPL: EVPL/EVP-LAN/EVP-Tree EP-LAN, EP-Tree: MEF EP-LAN/EP-Tree |

| | | | | | |
|-------------------|-----------|-----|-----|----------------------------|--|
| | | | | | EVP-LAN, EVP-Tree: MEF EVPL/EVP-LAN/EVP-Tree |
| untagged | Boolean | No | Yes | EVPL, EVP-LAN, EVP-TREE | Untagged – true/false. Preserves a VLAN ID for untagged traffic. If there is no bundling, only one VLAN is allowed, therefore, if the Untagged check box is selected, you cannot specify an additional VLAN ID. |
| mep-group | String | No | Yes | E-LAN | Name of the Mep Group – UNI A or UNI Z. For CFM configuration, specify the group to which this endpoint belongs. Based on your selection, a CFM service will be created and a MEP ID will be assigned. |
| service-vlan-list | String | No | Yes | Access EPL, EVPL | Service VLAN Id. |
| qinq-data | Container | Yes | N/A | EVPL, Access EVPL, EVP-LAN | QinQ Configuration |

The table below describes the different endpoint data types and lists the services, they are applicable to:

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|--------------|-----------|------------|----------------------------|---|
| network-interface-list | Container | Yes | N/A | All | Network Interface config list |
| network-interface | Container | Yes | N/A | All | Network Interface config. |
| operation | Enum | No | N/A | All | add, update, and remove. |
| ref | String (FDN) | No | No | All | FDN of the existing NI – set of RDNs that consists of MD and NI. Mandatory for Modify operation e.g., MD=CISCO_EPNM!NI=<name of the existing uni> |
| name | String | No | No | All | Name of the new NI to be created. Mandatory while creating new UNI e.g., name of the new uni like UniA , UniZ etc. |
| ce-data | Container | Yes | N/A | | Container for CE Network Interface configuration. |
| description | String | No | Yes | All | Description of the new NI to be created. |
| activate | Boolean | Yes | Yes | All | true/false for Activate NI. Default =true |
| designation | String | No | No | E-TREE | Possible Values: Root or Leaf. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|--------------|-----------|------------|----------------------------|---|
| use-p2-p-connection-with-root | Boolean | No | Yes | | Possible Values: true , false |
| ingress-qos-policy-ref | String (FDN) | No | No | All except EVP-Tree | Ingress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| egress-qos-policy-ref | String (FDN) | No | No | All except EVP-Tree | Egress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| mtu | Integer | Yes | No | All | The maximum transmission size, in bytes, of a packet passing through the interface. The MTU of the UNI must be greater than or equal to the MTU defined on the service level. MTU Value should be between 64 and 9216 Default value: 1522 |
| auto-negotiation | boolean | No | Yes | All | This is a flag to indicate of auto-negotiation. Possible values : false/true Default value : false |
| speed | String | No | No | All | Port speed. You can reduce the speed if this is supported on the port. The port speed provided has to be equal to or smaller than the speed of the port selected. |
| mode | String | Yes | No | All | Mode – values: <ul style="list-style-type: none"> • FULL DUPLEX—Uses simultaneous communication in both directions between the UNI and the customer’s access switch, assuming that both sides support full duplex. If one side does not support full duplex, the port will be brought down. • AUTO NEGOTIATION —Uses the mode that is agreed upon between the two devices, depending on what is supported. Full Duplex will be attempted but if one device does not support it, half duplex will be used. Default value: FULL DUPLEX |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|--------------|-----------|------------|----------------------------|---|
| enable-link-management | Boolean | No | Yes | All | Enable/disable IEEE 803.1ah Link Management (E-LMI) Enables the customer access switch to get information about this UNI, VLAN IDs, and services on the UNI, and so on. Default value: false |
| enable-link-oam | Boolean | No | No | All | Enables IEEE 803.1ah link operation and maintenance. If Link OAM is enabled, you will see events relating to the state of the link between this UNI and the customer's access switch. Default value: false NOTE: For LAG Ports this parameter should be set to false. |
| ce-vlan-id | String | No | No | EVPL, EVP-LAN, EVP-TREE | Untagged CE-VLAN ID – e.g. 1333. The ID of the CE-VLAN assigned to untagged traffic. |
| service-multiplexing | Boolean | No | No | EVPL, EVP-LAN, EVP-TREE | Allows multiple services to be provisioned on this UNI. Default value: true |
| bundling | Boolean | No | Yes | EVPL, EVP-LAN, EVP-TREE | UNI Allows Bundling. Allows the use of multiple VLANs for this UNI. Default value: false |
| designation | String | No | No | EP-TREE, EVP-TREE | Designation. Select the role of the UNI in the VC. Values: Root or Leaf. |
| operator-ref | String (FDN) | No | No | Access EPL, Access EVPL | FDN of the customer object – set of RDN types with MD, CUSTOMER. |
| protection-mechanism | String | No | No | Access EPL, Access EVPL | Protection Mechanism. Specify a protection mechanism if ENNI comprises of more than one port. Values: None, Link Aggregation, and other. |
| frame-format | String | No | No | Access EPL, Access EVPL | Frame Format Values: Double Tagged. |
| all-to-one-bundling | Boolean | No | No | | true or false. |

The table below describes the match and advanced criteria for the QinQ Configuration (applicable to only EVPL, Access EVPL, and EVP-LAN):

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|-------------------|-----------|------------|--------------------------------------|---|
| qinq-data | Container | Yes | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | QinQ Configuration |
| match-type | MatchTypeEnumType | Yes | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Possible Values: default, dot1q, dot1ad, and untagged. |
| vlan-id-list | String | Yes | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Outer VLANs. The VLAN or range of VLANs to be used for this service, e.g. 12 or 123-145, 155. |
| inner-vlan-id-list | String | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Inner VLANs The VLAN or range of VLANs to be used, e.g. 12 or 123-145, 155. |
| untagged | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Allow the service frames to be untagged (one service allowed per UNI). Default value: false |
| priority-tagged | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Mentions priority tagged or not Default value: false |
| match-exact | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Mentions do exact match or not Default value: false |
| vlan-cos | String | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Outer VLAN CoS e.g., any string value |
| inner-vlan-cos | String | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Inner VLAN CoS e.g., any string value |
| ether-type | EtherType | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Container for EtherType options that holds following elements: ipv4, ipv6, pppoeAll, pppoeDiscovery, and pppoeSession. |
| ipv4 | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Ethertype - ipv4 Default value = false |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|---------------------------|-----------|------------|--------------------------------------|---|
| qinq-data | Container | Yes | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | QinQ Configuration |
| ipv6 | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Ethertype -ipv6 Default value = false |
| pppoe-all | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Ethertype -pppoeAll Default value = false |
| pppoe-discovery | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Ethertype -pppoeDiscovery Default value = false |
| pppoe-session | Boolean | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Ethertype -pppoeSession Default value = false |
| rewrite-definition | rewrite-definition-type | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Container element for Rewrite Definition (Advanced Frame Manipulation). Contains the following elements: pop-operation, push-operation, translate-operation and none. |
| pop-operation | Container | No | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Pop action configuration container element. |
| push-operation | Container | No | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Push action configuration container element. |
| translate-operation | translate-operation-type | No | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Translate action configuration container element. |
| tag-count | tag-count-enum-type | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Values: one and two. Child element of pop-operation and push-operation. |
| tag-translation | Tag-translation-enum-type | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Values: one-to-one, one-to-two, two-to-one, two-to-two Child element of translate-operation. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|----------------------|-----------|------------|--------------------------------------|--|
| qinq-data | Container | Yes | N/A | EVPL, Access EVPL, EVP-LAN, EVP-Tree | QinQ Configuration |
| match-type | match-type-enum-type | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | Values: dot1q and dot1ad. Child element of push-operation, translate-operation. |
| inner-vlan-id | String | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | VLAN ID Child element of push-operation, translate-operation. |
| outer-vlan-id | String | No | Yes | EVPL, Access EVPL, EVP-LAN, EVP-Tree | VLAN ID Child element of push-operation, translate-operation. |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|-------------------------------|------------------------------------|------------|----------------------------|---|
| forwarding-path | Container element | Yes | N/A | EPL/EVPL over tunnel | Container for Forwarded Path entries. |
| pseudowire-settings | Container element for entries | No | N/A | EPL, EVPL | Container for Pseudowire Settings. |
| preferred-path-ref | String (FDN) | No | Yes | EPL, EVPL | Preferred Path reference for bi-directional-tunnel. e.g., MD=CISCO_EPNM!VC=<existing path name> where "existing path name" could be any value like "TE Link 301_6.6.6.6_0" |
| src-dest-preferred-path-ref | String (FDN) | Yes (for uni-directional tunnel) | Yes | EPL, EVPL | Preferred Path reference from source to destination e.g., MD=CISCO_EPNM!VC=<existing path name> where "existing path name" could be any value like "TE Link 301_6.6.6.6_0" |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|------------------------------------|------------------------------------|------------|----------------------------|---|
| dest-src-preferred-path-ref | String (FDN) | Yes (for uni-directional tunnel) | Yes | EPL, EVPL | Preferred Path reference from destination to source e.g., MD=CISCO_EPNM!VC=<existing path name> where “existing path name” could be any value like “TE Link 301_6.6.6.6_0” |
| enable-control-word | Boolean | No | Yes | EPL, EVPL | Enable Control Word Default value = true |
| fallback-to-ldp | Boolean | No | Yes | EPL, EVPL | Fallback to LDP Default value = false |
| interworking-option | String | No | Yes | EPL, EVPL | Interworking Option |
| service-bandwidth | Long | No | Yes | EPL | Service bandwidth |
| pw-bandwidth | String | No | Yes | EPL | Pseudowire bandwidth |
| mpls-te-data | Container element for mpls te data | No | N/A | EPL, EVPL | Container for MPLS TE See schema restconf-sai-mpls-te.xsd for more details. |
| te-tunnel-type | String | No | No | EPL, EVPL | Tunnel Type: values – uni-directional, bi-directional For EPL, default value is bi-directional For EVPL, default value is uni-directional |
| enable-fault-oam | Boolean | No | Yes | EPL, EVPL | Enable fault OAM True/False, Default is True |
| enable-autoroute | Boolean | No | Yes | EPL, EVPL | This attribute specifies whether to enable autoroute option Default value: false |
| enable-frr | Boolean | No | Yes | EVPL | Enable Fast Re-route. Applicable for uni-directional tunnel only |
| enable-auto-bandwidth | Boolean | No | Yes | EVPL | Enable Auto Bandwidth. Applicable for uni-directional tunnel only Default value : true |
| enable-lockdown | Boolean | No | Yes | EVPL | This attribute specifies whether to enable lockdown option |
| protection-type | Enum | Yes | Yes | EVPL | This attributes specifies protection type and allowed values are: Working, Protected, Working+Protected, Working+Restore, Working+Protected+Restore |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|--|---|------------|----------------------------|--|
| tunnel-setting | Container | Yes | N/A | EPL, EVPL | Container for tunnel settings. |
| affinity-bits | String (Range: 0x0-0xFFFFFFFF, Default: 0x0) | No | Yes | EPL, EVPL | Affinity Value |
| affinity-mask | String (Range: 0x0-0xFFFFFFFF, Default: 0x0) | No | Yes | EPL, EVPL | Affinity mask on desired link attributes. |
| bfd-settings | Container | No | N/A | EPL, EVPL | Container for bfd settings. |
| enable | Boolean | Yes | No | EPL, EVPL | Enable bfd. |
| is-new-bfd-template | Boolean | No | No | MPLS TE tunnels | This flag indicates if bfd-template is new or existing. Default value : false Possible values : true/false |
| bfd-template | String | Yes | No | MPLSTE tunnels | BFD Template name |
| min-interval | integer(Range: 15 to 200 Default: 100) | Yes | Yes | EPL, EVPL | The minimum control packet interval for BFD sessions in milliseconds. |
| multiplier | integer (default 3) | Yes | Yes | EPL, EVPL | Number of times a packet is missed before BFD declares the session down. |
| evpn-settings | Container | No | Yes | EPL, EVPL | Container for EVPN settings related inputs |
| bgp-settings | Container | No | Yes | EPL, EVPL | Container for EVPN bgp settings related attributes |
| is-auto-route-distinguisher | Boolean | Yes | Yes | EPL, EVPL | Boolean flag to indicate if auto RD need to be enabled or not. Default: true |
| route-distinguisher | String | Yes when is-auto-route-distinguisher = false | Yes | EPL , EVPL | Route distinguisher value Allowed format: "Num:Num" or "IPAddr:Num". |
| is-auto-route-target | Boolean | Yes | Yes | EPL, EVPL | Boolean flag to indicate auto RT need to be enabled or not. Default: true |
| import-route-target | String | Yes when is-auto-route-target = false | Yes | EPL , EVPL | Import route target value Allowed format: "Num:Num" or "IPAddr:Num". |
| export-route-target | String | Yes when is-auto-route-target = false | Yes | EPL , EVPL | Export route target value Allowed format: "Num:Num" or "IPAddr:Num". |
| vpws-settings | Container | No | Yes | EPL , EVPL | Container for EVPN service settings related tags |

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|--|-----------|-----------|------------|----------------------------|---|
| evpn-instance-id | String | No | Yes | EVP , EVPL | Ethernet VPN Id Allowed range: 1-65534 |
| aend-attachment-circuit-id | String | No | Yes | EPL , EVPL | A END attachment circuit ID Allowed range: 1-16777215 |
| zend-attachment-circuit-id | String | No | Yes | EPL , EVPL | Z END attachment circuit ID Allowed range: 1-16777215 |
| enable-static-preferred-path | Boolean | No | Yes | EPL , EVPL | Flag to indicate if user want to enable static preferred path or not. Default value: false |
| enable-control-word | Boolean | No | Yes | EPL , EVPL | Enable Control Word Default value = true |

The table below lists the containers for Y1731 test config entries applicable to different types of CE services.

| Carrier Ethernet Service Order Data | Data Type | Mandatory | Modifiable | Applicable to Service Type | Description |
|-------------------------------------|-----------|-----------|------------|----------------------------|--|
| y1731-test-config | Container | No | N/A | EPL, EVPL | Container for y1731 test data. Refer section 4.23.4.1.3 for details |
| y1731-result-list | Container | No | N/A | EPL,EVPL | Container for Y1731 result list |
| y1731-result-row | Container | No | N/A | EPL,EVPL | Container for Y1731 result row |
| service-ref | String | No | Yes | EPL,EVPL | service reference (fdn) for this test results. e.g., MD=CISCO_EPNM!CFS=CemLink#Con_26551659 |
| source-tp-ref | String | No | Yes | EPL,EVPL | source tp reference (fdn) e.g., MD=CISCO_EPNM!ND=SJ-NCS4216-23.CISCO!PTP=name=T1 0/5/21;lr=lr-t1 |
| destination-tp-ref | String | No | Yes | EPL,EVPL | destination tp reference (fdn) e.g., MD=CISCO_EPNM!ND=SJ-NCS4206-21.CISCO!PTP=name=T1 0/3/21;lr=lr-t1 |
| delay-result | Container | No | Yes | EPL,EVPL | Container for delay result |
| Availability | Int | No | Yes | EPL,EVPL | Availability |
| Status | String | No | Yes | EPL,EVPL | Status |
| two-way-delay | String | No | Yes | EPL,EVPL | Two Way Delay |
| two-way-delay-unit | String | No | Yes | EPL,EVPL | Two Way Delay Unit |

| | | | | | |
|------------------------------|------------------|-----------|------------|------------------|--|
| two-way-jitter | String | No | Yes | EPL,EVPL | Two Way Jitter |
| two-way-jitter-unit | String | No | Yes | EPL,EVPL | Two Way Jitter Unit |
| loss-result | Container | No | N/A | EPL,EVPL | Container for loss result |
| Availability | Int | No | Yes | EPL,EVPL | Availability |
| backward-flr | String | No | Yes | EPL,EVPL | Backward FLR |
| forward-flr | String | No | Yes | EPL,EVPL | Forward FLR |
| Status | String | No | Yes | EPL,EVPL | Status |
| y1564-test-config | Container | No | N/A | EPL, EVPL | Container for y1564 test data. Refer section 4.23.4.1.2 for details |
| y1564-result | Container | No | N/A | EPL,EVPL | Container of the Y1564 result |
| service-ref | String | No | Yes | EPL,EVPL | service reference (fdn) for this test results. e.g., MD=CISCO_EPNM!CFS=CemLink#Con_26551659 |
| source-tp-ref | String | No | Yes | EPL,EVPL | source tp reference (fdn) e.g., MD=CISCO_EPNM!ND=SJ-NCS4216-23.CISCO!PTP=name=T1 0/5/21;lr=lr-t1 |
| destination-tp-ref | String | No | Yes | EPL,EVPL | destination tp reference (fdn) e.g., MD=CISCO_EPNM!ND=SJ-NCS4206-21.CISCO!PTP=name=T1 0/3/21;lr=lr-t1 |
| source-device-name | String | No | Yes | EPL,EVPL | Source Device Name |
| destination-device-name | String | No | Yes | EPL,EVPL | Destination Device Name |
| source-eFP | Int | No | Yes | EPL,EVPL | Source EFP |
| destination-eFP | Int | No | Yes | EPL,EVPL | Destination EFP |
| Duration | String | No | Yes | EPL,EVPL | test duration |
| Timestamp | String | No | Yes | EPL,EVPL | Timestamp |
| Steps | String | No | Yes | EPL,EVPL | Steps |
| throughput | String | No | Yes | EPL,EVPL | Throughput |
| y1564-result-row-list | Container | No | N/A | EPL,EVPL | Container for Y1564 Result Row List |
| y1564-result-row | Container | No | N/A | EPL,EVPL | Container for Y1564 Result Row |
| Availability | String | No | Yes | EPL,EVPL | Availability |
| bytes-received | String | No | Yes | EPL,EVPL | bytes received |
| bytes-transmitted | String | No | Yes | EPL,EVPL | bytes transmitted |
| packets-size | String | No | Yes | EPL,EVPL | packet size |

| | | | | | |
|---------------------|--------|----|-----|----------|---------------------|
| packets-received | String | No | Yes | EPL,EVPL | packets received |
| packets-transmitted | String | No | Yes | EPL,EVPL | packets transmitted |
| Duration | String | No | Yes | EPL,EVPL | test duration |
| frame-loss | String | No | Yes | EPL,EVPL | frame loss |
| frame-loss-rate | String | No | Yes | EPL,EVPL | frame-loss-rate |
| configured-rate | Int | No | Yes | EPL,EVPL | configured-rate |
| actual-rate | Int | No | Yes | EPL,EVPL | actual rate |
| Range | String | No | Yes | EPL,EVPL | Range |
| Step | Int | No | Yes | EPL,EVPL | Step |

1.39.1.9 Service Order Data – CEM

See schema restconf-sai-cem.xsd for more details.

| CEM Service Order Data | Data Type | Mandatory | Modifiable | Description |
|------------------------|--------------|-----------|------------|---|
| service-type | String (CEM) | Yes | No | The type of service. |
| service-subtype | String | Yes | No | Service subtypes Supported values. t1,t3,e1,e3,vt1.5,STS-1, STS-3c,STS-12c, STS-48c,VC4,VC4-4c, VC4-16c,VC11, VC12, DS0 |
| service-template | String | No | Yes | The template to be associated with the service. |
| customer-ref | FDN | No | No | Customer FDN |
| service-name | String | Yes | No | A unique name for the service. |
| service-description | String | No | Yes | A unique description about the service. |
| service-activate | Boolean | No | Yes | Turn service on/off. |
| frame-type | Enum | No | No | CEM Framing Type. Possible values : CEP, SATOP, FRAMED_SATOP CESoPSN. <ul style="list-style-type: none"> For DS0 service – supported frame-type is CESoPSN. For T1 , T3 & E1 service – supported frame-types are SATOP, FRAMED_SATOP. For E3 service – supported frame-types are SATOP, FRAMED_SATOP & CEP. For STS-1 , STS-3c , STS-12c, STS-48c , vt1.5 , VC11 & VC12 – supported frame-type is CEP. For VC4 , VC4-4c & VC4-16c – supported frame-types is CEP. |

| | | | | |
|--------------------------------|---|-----|-----|---|
| | | | | |
| payload-size | Integer (Range: 92-960) | No | Yes | The number of bytes in the payload of each packet. |
| dejitter-buffer-size | Integer (Range: 1 - 32) | No | Yes | The size of the buffer, in milliseconds. |
| idle-pattern-length | Integer | No | Yes | |
| idle-pattern | String (Range: 0x0 to 0xFF, Default: 0xFF) | No | Yes | The idle pattern option specifies the idle pattern to transmit when the circuit goes down. |
| dummy-mode | Enum (last-frame, user-defined) | No | Yes | Dummy mode enables a bit pattern for filling in for lost or corrupted frames. |
| dummy-pattern | String (Range: 0x0 to 0xFF, Default: 0xFF) | No | Yes | User Define Dummy Pattern |
| rtp-header-enabled | Boolean | No | Yes | Enable RTP Header. |
| rtp-header-compression-enabled | Boolean | No | Yes | Enable RTP Compression. |
| termination-point-list | Container | Yes | N/A | termination point list |
| termination-point-config | Container | Yes | N/A | termination point config |
| tp-ref | String (FDN) | Yes | No | port reference FDN for working path controller. |
| ingress-qos-policy-ref | String (FDN) | No | Yes | QoS policy FDN for ingress policy in FDN format e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| egress-qos-policy-ref | String (FDN) | No | Yes | QoS policy FDN for egress policy in FDN format. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=TestQosProfile |
| working-path | PathType | Yes | No | Working path |
| protecting-path | PathType | No | No | Protection path |
| clock-source | String (Line, Internal) | No | Yes | Clock Source |
| recovered-clock | String (Adaptive Clock Recovery, Differential Clock Recovery) | No | Yes | Recovered Clock |
| higher-order-path | | | | |
| available-path-ref | String | Yes | No | High Order Path reference FDN. |

| | | | | |
|-----------------|--------|-----|----|---|
| available-paths | String | Yes | No | <p>Higer order available paths values</p> <p>For VC4: AU-4 1, AU-4 2,...,AU-4 48</p> <p>For VC4-4c: AU-4 1-4, AU-4 5-8,...,AU-4 45-48</p> <p>For VC4-16c : AU-4 1-16,...,AU-4 33-48</p> <p>For E1, T1, E3 , T3 , DS0, VC11 and VC12 :</p> <p>AU-4 1, TUG-3 1,</p> <p>AU-4 1, TUG-3 2,</p> <p>AU-4 1, TUG-3 3,</p> <p>AU-4 2, TUG-3 1,</p> <p>AU-4 2, TUG-3 2,</p> <p>AU-4 2, TUG-3 3,</p> <p>AU-4 3, TUG-3 1,</p> <p>AU-4 3, TUG-3 2,</p> <p>AU-4 3, TUG-3 3,</p> <p>AU-4 4, TUG-3 1,</p> <p>AU-4 4, TUG-3 2,</p> <p>AU-4 4, TUG-3 3,</p> <p>AU-4 5, TUG-3 1,</p> <p>AU-4 5, TUG-3 2,</p> <p>AU-4 5, TUG-3 3,</p> <p>AU-4 6, TUG-3 1,</p> <p>AU-4 6, TUG-3 2,</p> <p>AU-4 6, TUG-3 3,</p> <p>AU-4 7, TUG-3 1,</p> <p>AU-4 7, TUG-3 2,</p> <p>AU-4 7, TUG-3 3,</p> <p>AU-4 8, TUG-3 1,</p> <p>AU-4 8, TUG-3 2,</p> <p>AU-4 8, TUG-3 3,</p> <p>AU-4 9, TUG-3 1,</p> <p>AU-4 9, TUG-3 2,</p> <p>AU-4 9, TUG-3 3,</p> <p>AU-4 10, TUG-3 1,</p> <p>AU-4 10, TUG-3 2,</p> <p>AU-4 10, TUG-3 3,</p> <p>AU-4 11, TUG-3 1,</p> <p>AU-4 11, TUG-3 2,</p> <p>AU-4 11, TUG-3 3,</p> <p>AU-4 12, TUG-3 1,</p> <p>AU-4 12, TUG-3 2,</p> <p>AU-4 12, TUG-3 3,</p> <p>AU-4 13, TUG-3 1,</p> <p>AU-4 13, TUG-3 2,</p> <p>AU-4 13, TUG-3 3,</p> <p>AU-4 14, TUG-3 1,</p> <p>AU-4 14, TUG-3 2,</p> <p>AU-4 14, TUG-3 3,</p> <p>AU-4 15, TUG-3 1,</p> <p>AU-4 15, TUG-3 2,</p> <p>AU-4 15, TUG-3 3,</p> <p>AU-4 16, TUG-3 1,</p> <p>AU-4 16, TUG-3 2,</p> |
|-----------------|--------|-----|----|---|

| | | | | |
|-----------|--------|-----|----|---|
| | | | | AU-4 16, TUG-3 3, AU-3 1, AU-3 10, AU-3 11, AU-3 12, AU-3 13, AU-3 14, AU-3 15, AU-3 16, AU-3 17, AU-3 18, AU-3 19, AU-3 2, AU-3 20, AU-3 21, AU-3 22, AU-3 23, AU-3 24, AU-3 25, AU-3 26, AU-3 27, AU-3 28, AU-3 29, AU-3 3, AU-3 30, AU-3 31, AU-3 32, AU-3 33, AU-3 34, AU-3 35, AU-3 36, AU-3 37, AU-3 38, AU-3 39, AU-3 4, AU-3 40, AU-3 41, AU-3 42, AU-3 43, AU-3 44, AU-3 45, AU-3 46, AU-3 47, AU-3 48, AU-3 5, AU-3 6, AU-3 7, AU-3 8, AU-3 9 |
| path-mode | String | Yes | No | Mode of the path used Allowed values: STS-1, STS-3c, STS-12c, |

| | | | | |
|--------------------|--------|----|----|--|
| | | | | STS-48c, T3,E3, VT15, T1, E1, CT3, CT3_E1, VC11_T1, VC12_E1, UNFRAMED. VC4 over SDH controllers : VC4 VC4-4c over SDH controllers : VC4-4c VC4-16c over SDH controllers : VC4-16c DS0 over SDH controllers : VC12-E1 T1 over SDH controllers : VC11-T1 E1 over SDH controllers : VC12-E1 T3 over SDH controllers : T3 E3 over SDH controllers : E3 VC11 and VC12 over SDH controllers : VC1X |
| lower-order-path | String | | | Low Order Path |
| available-path-ref | String | No | No | Low Order Path reference DS0 over SDH controllers: TUG-2 1, E1 1 TUG-2 1, E1 2 TUG-2 1, E1 3 TUG-2 2, E1 1 TUG-2 2, E1 2 TUG-2 2, E1 3 TUG-2 3, E1 1 TUG-2 3, E1 2 TUG-2 3, E1 3 TUG-2 4, E1 1 TUG-2 4, E1 2 TUG-2 4, E1 3 TUG-2 5, E1 1 TUG-2 5, E1 2 TUG-2 5, E1 3 TUG-2 6, E1 1 TUG-2 6, E1 2 TUG-2 6, E1 3 TUG-2 7, E1 1 TUG-2 7, E1 2 TUG-2 7, E1 3 E1 over SDH controllers : TUG-2 1, E1 1 TUG-2 1, E1 2 TUG-2 1, E1 3 TUG-2 1, E1 4 TUG-2 2, E1 1 TUG-2 2, E1 2 TUG-2 2, E1 3 TUG-2 2, E1 4 TUG-2 3, E1 1 TUG-2 3, E1 2 TUG-2 3, E1 3 TUG-2 3, E1 4 TUG-2 4, E1 1 |

| | | | | |
|----------------------------|-------------------------------|-----|-----|---|
| | | | | TUG-2 4, E1 2 TUG-2 4, E1 3 TUG-2 4, E1 4 TUG-2 5, E1 1 TUG-2 5, E1 2 TUG-2 5, E1 3 TUG-2 5, E1 4 TUG-2 6, E1 1 TUG-2 6, E1 2 TUG-2 6, E1 3 TUG-2 6, E1 4 TUG-2 7, E1 1 TUG-2 7, E1 2 TUG-2 7, E1 3 TUG-2 7, E1 4 VC11 and VC 12 over SDH controllers : TUG-2 1, VC 1 TUG-2 1, VC 2 TUG-2 1, VC 3 TUG-2 1, VC 4 TUG-2 2, VC 1 TUG-2 2, VC 2 TUG-2 2, VC 3 TUG-2 2, VC 4 TUG-2 3, VC 1 TUG-2 3, VC 2 TUG-2 3, VC 3 TUG-2 3, VC 4 TUG-2 4, VC 1 TUG-2 4, VC 2 TUG-2 4, VC 3 TUG-2 4, VC 4 TUG-2 5, VC 1 TUG-2 5, VC 2 TUG-2 5, VC 3 TUG-2 5, VC 4 TUG-2 6, VC 1 TUG-2 6, VC 2 TUG-2 6, VC 3 TUG-2 6, VC 4 TUG-2 7, VC 1 TUG-2 7, VC 2 TUG-2 7, VC 3 TUG-2 7, VC 4 |
| ds0-time-slots | String | No | No | Comma separated ds0 time slot numbers. |
| forwarding-path | Container element | Yes | N/A | Container for Forwarded Path entries. |
| pseudowire-settings | Container element for entries | No | N/A | Container for Pseudowire Settings. |

| | | | | |
|------------------------------|--------------|-----|-----|---|
| preferred-path-ref | String (FDN) | Yes | Yes | Preferred Path reference, FDN of Bi-directional tunnel e.g., MD=CISCO_EPNM!VC=<existing path name> where “existing path name” could be any value like “TE Link 301_6.6.6.6_0” |
| enable-control-word | Boolean | No | Yes | Enable Control Word Default value = true |
| fallback-to-ldp | Boolean | No | Yes | Fallback to LDP Default value = false |
| interworking-option | String | No | Yes | Interworking Option Default value = could be left blank |
| service-bandwidth | Long | No | Yes | Interworking Option |
| pw-bandwidth | String | No | Yes | Service bandwidth |
| enable-static-preferred-path | Boolean | No | Yes | Flag to indicate if user want to enable static preferred path or not. Default value : false |
| mpls-te-data | Container | No | N/A | Container for MPLS TE See schema restconf-sai-mpls-te.xsd for more details. |
| te-tunnel-type | String | No | No | Tunnel Type: values – uni-directional, bi-directional For CEM. Default value: bi-directional |
| enable-fault-oam | Boolean | No | Yes | Enable fault OAM true/false. Default value: true |
| enable-frr | Boolean | No | Yes | Enable Fast Re-route. Applicable for uni-directional tunnel only Default value: false |
| enable-auto-bandwidth | Boolean | No | Yes | Enable Auto Bandwidth. Applicable for uni-directional tunnel only Default value: false |
| enable-autoroute | Boolean | No | Yes | This attribute specifies whether to enable autoroute option Default value: false |

| | | | | |
|---------------------|-----------|-----|-----|---|
| enable-lockdown | Boolean | No | Yes | This attribute specifies whether to enable lockdown option Default value: false |
| protection-type | Enum | No | Yes | This attributes specifies protection type and allowed values are: Working , Working+Protected, Working+Restore, Working+Protected+Restore Default value: Working |
| bfd-settings | Container | No | N/A | Container for bfd settings. |
| enable | Boolean | Yes | No | Enable BFD Default value: true |
| min-interval | integer | Yes | Yes | The minimum control packet interval for BFD sessions in milliseconds. Range: 15 to 200 Default value: 100 |
| multiplier | integer | Yes | Yes | Number of times a packet is missed before BFD declares the session down. Range: 3 to 50 Default value: 3 |

The table below lists the containers for BERT config entries applicable to different types of CEM services.

| CEM Service Order Data | Data Type | Mandatory | Modifiable | Description |
|-------------------------|--------------------|-----------|------------|--|
| bert-config | Container | No | N/A | Container for bert config. Refer section 4.23.4.1.1 for details |
| bert-result-list | Container | No | N/A | Container of the BERT Result List |
| bert-result | Container | No | N/A | Container of the BERT result |
| service-ref | String | No | N/A | FDN of the customer facing service |
| source-tp-ref | String | No | N/A | FDN of the source port. If not specified, takes source end tp-ref of the provisioning order data e.g. , MD=CISCO_EPNM!ND=SJ-NCS4216-23.CISCO!PTP=name=T1 0/5/21;lr=lr-t1 |
| destination-tp-ref | String | No | N/A | FDN of the destination port. If not specified, takes sink end tp-ref in the provisioning order data. e.g., MD=CISCO_EPNM!ND=SJ-NCS4206-21.CISCO!PTP=name=T1 0/3/21;lr=lr-t1 |
| unmanaged-destination | Boolean | No | Yes | “true” if destination is unmanaged. default “false” |
| direction | Enum (system,line) | No | Yes | Test direction |
| errors | Int | No | Yes | error count |
| duration | Int (minutes) | No | Yes | Duration in minutes |
| pattern | String | No | Yes | bert patterns. valid values: 0s, 1s, 2^11, 2^15, 2^20-0153, 2^20-QRSS, 2^23, alt-0-1 |

1.39.1.10 Service Order Data – UNI

The table below lists the Order Data elements and the supported values for UNI. Note that the table below describes all the elements in service order data combined for service and endpoint configuration for UNI. See schema restconf-sai-common.xsd for more details.

| UNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|--------------------------|----------------|-----------|------------|--|
| service-name | String | Yes | No | Unique name to identify the circuit/VC. |
| service-description | String | No | Yes | Description of the VC that will help to identify the VC. |
| service-type | String | Yes | No | Service Type. Possible value: carrier-ethernet-vpn |
| service-subtype | String | Yes | No | Service SubType. Possible Values: UNI |
| customer-ref | String | No | No | Customer FDN. e.g., D=CISCO_EPNM!CUSTOMER=<customer name> Default value of “customer name” is “Infrastructure” |
| service-activate | Boolean | No | Yes | Activate Service. Default value = true |
| termination-point-list | List container | Yes | N/A | List of connection termination point configurations. |
| termination-point-config | Container | Yes | N/A | termination point config |
| tp-ref | String (FDN) | Yes | No | FDN of the port to use - set of RNDs that consists of MD, ME and PTP or FTP instance ids. For example: “MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-2.cisco.com!FTP=name=GigabitEthernet0/4;lr=lr-gigabit-ethernet” |
| network-interface-name | String | No | No | Name of the new NI to be created. Mandatory while creating new UNI e.g., new uni name like UniA , UniZ etc. |
| network-interface-ref | String | No | No | Name of the existing NI to be re-used. Mandatory while using existing UNI e.g., MD=CISCO_EPNM!NI=<existing NI name> |
| network-interface-list | List container | Yes | N/A | List of network interface configurations. |
| network-interface | Container | Yes | N/A | Network Interface config. |
| ref | String (FDN) | No | No | FDN of the existing NI – set of RDNs that consists of MD and NI. Mandatory for Modify operation e.g., MD=CISCO_EPNM!NI=<existing uni name> Note: existing uni name value should be same as the one mentioned for “network-interface-ref”. |

| UNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|------------------------|--------------------------------|-----------|------------|---|
| name | String | No | No | Name of the new NI to be created. Mandatory while creating new UNI e.g., it's value should be same as the value mentioned for "network-interface-name" tag |
| ce-data | ce-data-network-interface-type | Yes | N/A | Container for CE Network Interface configuration. |
| description | String | No | Yes | Description of the new NI to be created. |
| activate | Boolean | Yes | Yes | true/false for Activate NI. Default value: true |
| ingress-qos-policy-ref | String (FDN) | No | No | Ingress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=<TestQosProfile> |
| egress-qos-policy-ref | String (FDN) | No | No | Egress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=<TestQosProfile> |
| mtu | Integer | Yes | No | The Maximum Transmission Size, in bytes, of a packet passing through the interface. The MTU of the UNI must be greater than or equal to the MTU defined on the service level. MTU Value should be between 64 and 9216 Default value: 1522 |
| speed | String | No | No | Port speed. You can reduce the speed if this is supported on the port. |
| mode | String | Yes | No | Mode – values: <ul style="list-style-type: none"> FULL DUPLEX—Uses simultaneous communication in both directions between the UNI and the customer's access switch, assuming that both sides support full duplex. If one side does not support full duplex, the port will be brought down. AUTO NEGOTIATION —Uses the mode that is agreed upon between the two devices, depending on what is supported. Full Duplex will be attempted but if one device does not support it, half duplex will be used. Default value: FULL DUPLEX |
| enable-link-management | Boolean | No | Yes | Enables the customer access switch to get information about this UNI, VLAN IDs, and services on the UNI, and so on. Default value = false |

| UNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|------------------------|-----------|-----------|------------|---|
| enable-link-oam | Boolean | No | No | Enables IEEE 803.1ah link operation and maintenance. If Link OAM is enabled, you will see events relating to the state of the link between this UNI and the customer's access switch. NOTE: For LAG Ports this parameter should be set to false. |
| ce-vlan-id | String | No | No | Untagged CE-VLAN ID – e.g. 1333. The ID of the CE-VLAN assigned to untagged traffic. |
| service-multiplexing | Boolean | No | No | Allows the UNI to participate in more than one EVC instance. Default value: true |
| bundling | Boolean | No | Yes | UNI Allows Bundling. Allows the use of multiple VLANs for this UNI. Default value: false |
| all-to-one-bundling | Boolean | No | No | true or false. Default value: false |

1.39.1.11 Service Order Data – ENNI

The table below lists the Order Data elements and the supported values for ENNI. Note that the table below describes all the elements in service order data combined for service and endpoint configuration for ENNI. See schema restconf-sai-common.xsd for more details.

| ENNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|--------------------------|----------------|-----------|------------|--|
| service-name | String | Yes | No | Unique name to identify the circuit/VC. |
| service-description | String | No | Yes | Description of the VC that will help to identify the VC. |
| service-type | String | Yes | No | Service Type. Possible value: carrier-ethernet-vpn |
| service-subtype | String | Yes | No | Service SubType. Possible Values: ENNI |
| customer-ref | String | No | No | Customer FDN. e.g., D=CISCO_EPNM!CUSTOMER=<customer name> Default value of “customer name” is “Infrastructure” |
| service-activate | Boolean | No | Yes | Activate Service. Default value = true |
| termination-point-list | List container | Yes | N/A | List of connection termination point configurations. |
| termination-point-config | Container | Yes | N/A | termination point config |

| ENNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|-------------------------|--------------------------------|-----------|------------|--|
| tp-ref | String (FDN) | Yes | No | FDN of the port to use - set of RNDs that consists of MD, ME and PTP or FTP instance ids. For example: "MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-2.cisco.com!FTP=name=GigabitEthernet0/4;lr=lr-gigabit-ethernet" |
| network-interface-name | String | No | No | Name of the new NI to be created. Mandatory while creating new ENNI e.g., new uni name like UniA , UniZ etc. |
| network-interface-ref | String | No | No | Name of the existing NI to be re-used. Mandatory while using existing ENNI e.g., MD=CISCO_EPNM!NI=<existing NI name> |
| network-interface-list | List container | Yes | N/A | List of network interface configurations. |
| network-interface | Container | Yes | N/A | Network Interface config. |
| ref | String (FDN) | No | No | FDN of the existing NI – set of RDNs that consists of MD and NI. Mandatory for Modify operation e.g., MD=CISCO_EPNM!NI=<existing uni name> Note: existing uni name value should be same as the one mentioned for "network-interface-ref". |
| name | String | No | No | Name of the new NI to be created. Mandatory while creating new ENNI e.g., it's value should be same as the value mentioned for "network-interface-name" tag |
| ce-data | ce-data-network-interface-type | Yes | N/A | Container for CE Network Interface configuration. |
| description | String | No | Yes | Description of the new NI to be created. |
| activate | Boolean | Yes | Yes | true/false for Activate NI. Default value: true |
| ingress-qos-policy-ref | String (FDN) | No | No | Ingress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=<TestQosProfile> |

| ENNI Service Order Data | Data Type | Mandatory | Modifiable | Description |
|-------------------------|--------------|-----------|------------|---|
| egress-qos-policy-ref | String (FDN) | No | No | Egress QOS Policy Reference. FDN of the existing QOS profile with MD, PROFILE_QOS RDNs. e.g., MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-3!POLICY_QOS=<TestQosProfile> |
| mtu | Integer | Yes | No | The Maximum Transmission Size, in bytes, of a packet passing through the interface. The MTU of the ENNI must be greater than or equal to the MTU defined on the service level. MTU Value should be between 64 and 9216 Default value: 1522 |
| speed | String | No | No | Port speed. You can reduce the speed if this is supported on the port. |
| mode | String | Yes | No | Mode – values: <ul style="list-style-type: none"> • FULL DUPLEX—Uses simultaneous communication in both directions between the UNI and the customer’s access switch, assuming that both sides support full duplex. If one side does not support full duplex, the port will be brought down. • AUTO NEGOTIATION —Uses the mode that is agreed upon between the two devices, depending on what is supported. Full Duplex will be attempted but if one device does not support it, half duplex will be used. Default value: FULL DUPLEX |
| enable-link-management | Boolean | No | Yes | Enables the customer access switch to get information about this ENNI, VLAN IDs, and services on the UNI, and so on. Default value = false |
| enable-link-oam | Boolean | No | No | Enables IEEE 803.1ah link operation and maintenance. If Link OAM is enabled, you will see events relating to the state of the link between this ENNI and the customer’s access switch. NOTE: For LAG Ports this parameter should be set to false. |
| ce-vlan-id | String | No | No | Untagged CE-VLAN ID – e.g. 1333. The ID of the CE-VLAN assigned to untagged traffic. |
| service-multiplexing | Boolean | No | No | Allows the ENNI to participate in more than one EVC instance. Default value: true |
| Bundling | Boolean | No | Yes | ENNI Allows Bundling. Allows the use of multiple VLANs for this ENNI. Default value: false |
| all-to-one-bundling | Boolean | No | No | true or false. Default value: false |

1.39.1.12 QoS policy support

- The device discovered QoS policy is supported for CEM provisioning: ingress-qos-policy-ref and egress-qos-policy-ref.
- It requires the QoS policy to be configured on the device and discovered in Cisco EPN Manager.
- This means on the CEM request service end, the QoS policy device should be the same as the network interface device.

1.39.1.13 Partial service support

- One of the “<termination-point-config>” in a CE or CEM provisioning request can be an Unmanaged endpoint.
- If both 2 “<termination-point-config>” are unmanaged, an error occurs.
- Use this XML structure for an unmanaged endpoint in the request:

```
<p:termination-point-config>
  <p:directionality>sink</p:directionality>
  <p:unmanaged-termination-point>
    <p:device-name>testabc2</p:device-name>
    <p:new-device>true</p:new-device>
    <p:device-ip-address>3.2.1.3</p:device-ip-address>
    <p:device-ldp-address>2.3.1.6</p:device-ldp-address>
    <p:vc-id>200</p:vc-id>
  </p:unmanaged-termination-point>
</p:termination-point-config>
```

 - <device-name> is mandatory. Use a string as a third party device name.
 - <directionality> is mandatory. Allowed values are source, sink and bidirectional
 - <new-device> is optional boolean tag and is used to indicate if device details passed is new or existing device.
 - If it is true, you also need to provide a <device-ip-address> which should not exist in Cisco EPN Manager.
 - If it is false, there is no need to provide a <device-ip-address>. However you need to provide the third party device with the same <device-name> that exists in Cisco EPN Manager.
 - <device-ip-address> is the management IP address of the third party device. When <new-device> is true, the <device-ip-address> should not exist in Cisco EPN Manager.
 - <device-ldp-address> is the LDP IP address on the third party LDP configuration.
 - <vc-id> is an integer for vc.

Note: if “new-device” is not provided by user in payload, then backend logic should be able to figure out if unmanaged device details provided by user is new or existing but device-name , device-ip-address and device-ldp-address has to be provided by user in the payload from EPNM 4.1 onward.

1.39.1.14 Service Order Data - MPLS Layer3 Link

See schema restconf-sai-l3link.xsd for more details.

| service-order-data - Order Data for MPLS-TE Service | | | | |
|---|--------|-----------|------------|--------------------------------|
| Service Configuration | | | | |
| Data | Type | Mandatory | Modifiable | Description |
| service-name | String | Yes | Yes | A unique name for the L3 Link. |
| service-description | String | No | Yes | Description of L3 Link. |

| | | | | |
|---------------------------------|-------------------------|------------|-----------|--|
| service-type | String (mpls-te-tunnel) | Yes | No | The type of service. |
| service-subtype | String (layer3-link) | Yes | No | Service subtypes. |
| l3-link-data | Container | Yes | No | Container for Layer3 link settings. |
| l2-discovery-protocol | String | Yes | Yes | L2 discovery protocol used for L3 Link. Possible values: NONE , CDP , LLDP and ALL Default: NONE |
| routing-protocol | String | Yes | No | Routing protocol value used for L3 Link. Possible values: OSPF , BGP and ISIS Default: OSPF |
| link-vlan | Integer | No | Yes | Link VLAN in the range from 1 to 4094. |
| enable-mpls-te | Boolean | No | Yes | This is a flag to enable MPLS TE on the L3 Link. Default value: false |
| termination-point-list | List container | Yes | No | List of termination point configurations. |
| termination-point-config | | Yes | No | Termination point config. |
| directionality | Enum | Yes | No | Values: source, sink, and bidirectional. |
| tp-ref | fdn | Yes | No | FDN - is device from/to where link is created. e.g., MD=CISCO_EPNM!ND=EPNNCS4216-120.20!FTP=name=GigabitEthernet0/2/0;lr=lr-gigabit-ethernet |
| ip-address | String | Yes | No | IP address of A or Z end. |
| subnet-mask | String | Yes | No | Subnet mask of A or Z end. Possible values: 8 to 31. |
| ingress-qos-policy-ref | fdn | No | Yes | Ingress QOS Policy Reference. FDN of the existing QOS profile with MD, POLICY_QOS RDNs. e.g., ingress-qos-policy-ref>MD=CISCO_EPNM!ND=EPASR907-120.22.SWIM.cisco.com!POLICY_QOS=<qos policy name> |
| egress-qos-policy-ref | fdn | No | Yes | Egress QOS Policy Reference. FDN of the existing QOS profile with MD, POLICY_QOS RDNs. e.g., MD=CISCO_EPNM!ND=EPASR907-120.22.SWIM.cisco.com!POLICY_QOS==<qos policy name> |
| L3-link-data | Container | Yes | No | Container for L3 Link Data. |
| enable-bv-interface | Boolean | No | No | This is a flag to enable bridge + virtual interface on the L3 Link. Default value: true |
| loopback-interface-ref | String | No | No | This is required only for OSPF and ISIS. Not applicable for BGP. e.g., MD=CISCO_EPNM!ND=EPNNCS4216-120.41!FTP=name=Loopback79;lr=lr-loopback |
| Ospf | Container | No | No | Container for OSPF data. Note: This tag is mandatory when value of "routing-protocol" is OSPF. |

| | | | | |
|---------------------|-----------|-----|-----|---|
| process-id | String | Yes | No | OSPF process ID configured on the device. |
| area | String | No | No | Allowed Value: '0' , NOTE: NCS4K supports only one OSPF instance and it should have area id is 0. |
| metric | String | No | Yes | OSPF link Path selection metric. Value within 1-65535 range. |
| enable-synce | Boolean | No | Yes | Flag to indicate synce enable or not for OSPF L3 Link. Default value: false |
| synce-bridge-domain | Boolean | No | No | Flag to indicate synce bridge domain or not for OSPF L3 Link. Default value: false |
| mpls-te | Container | No | No | Container for MPLS TE. See schema restconf-sai-mpls-te.xsd for more details. |
| te-metric | String | No | Yes | TE Tunnel path selection metric. Value within 1-65535 range. |
| te-attributes | String | No | Yes | TE related attributes values used for L3 Link. Possible values: 00, 03, 0 or 3. |
| is-percentage | Boolean | No | Yes | Flag indicate link bandwidth allocation in percentage. Default value: false |
| bandwidth-unit | String | No | Yes | This attribute specifies the associated transport link Bandwidth (Units in Kbps, Mbps or Gbps). |
| global-bandwidth | String | No | Yes | Total Bandwidth reserved for the interface in percentage or Bandwidth Unit for input. |
| subpool-bandwidth | String | No | Yes | Portion of bandwidth reserved for the interface in percentage or Bandwidth Unit for input. |
| Isis | Container | No | No | Container for ISIS data. Note: This tag is mandatory when value of "routing-protocol" is ISIS. |
| process-id | String | Yes | Yes | ISIS process id configured on the device. |
| Networks | String | Yes | No | Network Id configured on the device. |
| Metric | String | No | Yes | ISIS metric used for L3 Link. Value within 1-65535 range. |
| circuit-type | String | No | Yes | Circuit type used. Possible values: NONE ,Level-1, Level-2-only, Level-1-2 Default value: NONE |
| level1-metric | String | No | Yes | Level1 metric , it will be used only when value of "circuit-type" is Level-1 or Level-1-2 Value within 1-65535 range. |
| level2-metric | String | No | Yes | Level2 metric , it will be used only when value of "circuit-type" is Level-2-only or Level-1-2 Value within 1-65535 range. |
| authentication-mode | String | No | Yes | Authentication mode used. Possible values: HMAC_SHA1, HMAC_SHA256, HMAC_SHA384, HMAC_SHA512, HMAC_MD5, TEXT |

| | | | | |
|------------------------------|-----------|-----|-----|--|
| authentication-key-chain | String | No | Yes | Authentication key chain configured on the device. |
| authentication-for-send-only | Boolean | No | Yes | Flag to indicate authentication-for-send-only. Default value: false |
| enable-synce | Boolean | No | Yes | Flag to indicate synce enable or not. Default value: false |
| synce-bridge-domain | Boolean | No | No | Flag to indicate synce bridge domain or not. Default value: false |
| bgp | Container | No | No | Container for BGP data. Note: This tag is mandatory when value of “routing-protocol” is BGP. |
| bgp-as-number | String | Yes | No | Bgp as number configured on the device for BGP link. |
| route-policy | String | No | Yes | Route policy configured on the device used for BGP link. |
| route-reflector-client | Boolean | No | Yes | Flag to indicate route reflector client to be used or not. Default value: false |
| use-aigp | Boolean | No | Yes | Flag to indicate use-aigp or not. Default value: false |
| update-source-ref | String | No | Yes | Update source for BGP link. This should not be part of user input when value of “use-aigp” true. e.g., MD=CISCO_EPNM!ND=NCS4206-C!FTP=name=BD1!lr=lr-bridge |
| password-type | String | No | Yes | Password type used for BGP L3 Link. Possible values: Encrypted or PlainText Default value: Encrypted |
| Password | String | No | Yes | Password used for BGP L3 Link. |
| enable-mpls | Boolean | No | Yes | Flag to indicate enable mpls or not. Default value: false |
| enable-synce | Boolean | No | Yes | Flag to indicate enable synce or not. Default value: false |
| synce-bridge-domain | Boolean | No | No | Flag to indicate enable synce bridge domain or not. Default value: false |
| bfd-settings | Container | No | No | Container for BFD Settings. |
| bfd-template | String | No | Yes | Bfd template configured on selected device and port of L3 Link. |
| bfd-min-interval | String | No | No | Bfd min interval to be used for L3 Link. This tag should be used as input only when “bfd-template” is not used. Default value =100. |
| bfd-multiplier | String | No | Yes | Bfd multiplier to be used for L3 Link. This tag should be used as input only when “bfd-template” is not used. |
| bfd-fast-detect | Boolean | No | Yes | Flag to indicate bfd fast detect to be used or not for the L3 Link. This tag should be used as input only when “bfd-template” is not used. |

1.39.1.15 Service Order Data - MPLS-TE

See schema restconf-sai-mpls-te.xsd for more details.

| service-order-data - Order Data for MPLS-TE Service | | | |
|---|---------------------------------------|-----------|--|
| Service Configuration | | | |
| Data | Type | Mandatory | Description |
| service-type | String (mpls-te-tunnel) | Yes | The type of service. |
| service-subtype | String (Bidirectional TE Tunnel) | Yes | Service subtypes |
| service-template | String | No | The template to be associated with the service. |
| Customer | Fdn | Yes | Customer FDN |
| service-name | String | Yes | A unique name for the service. |
| service-description | String | No | A unique description about the service. |
| Tunnel Configuration | | | |
| Data | Type | | Description |
| termination-point-list | List container | Yes | List of connection termination point configurations. |
| directionality | Enum | Yes | Values: source, sink, and bidirectional. |
| nd-ref | Fdn | Yes | Source Node FDN - is device from where tunnel is created. |
| mpls-te-data | Container | No | Container for MPLS-TE data. |
| routing-process | Container | Yes | Container for routing details. |
| router-address | String | Yes | Routing process address for which MPLS TE router is enabled. |
| routing-process-id | String | Yes | Routing process id. |
| loopback-address | String | Yes | Loopback address. |
| Path Configuration | | | |
| forwarding-path | Container | No | Container for Forwarded Path entries. |
| mpls-te-data | Container | No | Container for MPLS-TE data. |
| te-tunnel-type | Enum(uni-directional, bi-directional) | No | Type of te tunnel |
| tunnel-service-profile-ref | String (FDN) | No | Service profile reference for tunnel. e.g. MD=CISCO_EPNM!PROFILE_SERVICE=TE-Bi |
| wrap-protection | Boolean | No | Wrap Protection |
| enable-fault-oam | Boolean | No | Enable fault OAM |
| enable-frr | Boolean | No | This attribute specifies whether to enable autoroute option. |
| enable-auto-bandwidth | Boolean | No | This attribute specifies whether to enable autobandwidth option. |
| enable-autoroute | Boolean | No | This attribute specifies whether to enable autoroute option. |
| enable-lockdown | boolean | No | This attribute specifies whether to enable lockdown option. |
| protection-type | Enum (Working, Working+Protected, | Yes | Type of MPLS Tunnel Path Protection. |

| | | | |
|----------------------------|--|---|--|
| | Working+Restore, Working+Protected+Restore) | | |
| tunnel-setting | | No | Container for tunnel settings. |
| global-id | Integer (Range:1-4294967295) | Yes (for bi-directional-tunnel), No (for uni-directional-tunnel) | ID used with association ID and source address to form bidirectional tunnel uniqueness. |
| affinity-bits | String (Range: 0x0-0xFFFFFFFF, Default: 0x0) | No | Affinity Value |
| affinity-mask | String (Range: 0x0-0xFFFFFFFF, Default: 0x0) | No | Affinity mask on desired link attributes. |
| setup-priority | Integer (Range:0-7, Default: 7) | No | Tunnel Setup Priority |
| hold-priority | Integer (Range:0-7, Default: 7) | No | Tunnel Hold Priority |
| enable-record-route | boolean | No | This attribute specifies whether to enable record route option. |
| bandwidth-pool-type | String (Global, Subpool, Empty) | Yes | This attribute specifies whether global or subpool bandwidth reservation is used |
| Bandwidth | Integer | Yes | This attribute specifies the associated transport tunnel Bandwidth |
| auto-bandwidth-frequency | Integer | No | This attribute specifies the auto bandwidth frequency. |
| max-bandwidth | String | No | This attribute specifies the associated transport tunnel max Bandwidth |
| bandwidth-change-frequency | string | Yes | This attribute specifies the bandwidth change frequency. Frequency range should be 300 to 604800 Default value : 300 |
| max-auto-bandwidth | string | No | This attribute specifies the maximum auto bandwidth. |
| min-auto-bandwidth | String | No | This attribute specifies the minimum auto bandwidth. |
| enable-bw-collection | string | No | This attribute specifies if auto bandwidth collection is enabled. Applicable only for Uni directional tunnel. |
| adjustment-threshold | Integer | No | This attribute specifies the auto bandwidth adjustment threshold. Applicable only for Uni directional tunnel. |
| overflow-limit | Integer | No | This attribute specifies the auto bandwidth overflow limit. Applicable only for Uni directional tunnel. |
| overflow-threshold | Integer | No | This attribute specifies the auto bandwidth overflow threshold. Applicable only for Uni directional tunnel. |
| BFD Settings | | | |
| bfd-settings | Container | No | Container for bfd settings. |

| | | | |
|--------------------------------|---|-----|--|
| Enable | Boolean | No | Enable bfd. |
| min-interval | integer(Range: 15 to 200 Default: 100) | Yes | The minimum control packet interval for BFD sessions in milliseconds. |
| multiplier | integer (default 3) | Yes | Number of times a packet is missed before BFD declares the session down. |
| MplsTe Path Options | | | |
| mpls-te-path-options | mpls-path-options | No | Container for MPLS-TE path options. |
| working-path | mpls-path | No | Container for working path. |
| protection-path | mpls-path | No | Container for protection path. |
| restore-path | mpls-path | No | Container for restore path. |
| Mpls Path | | | |
| new-lsp-attribute-list | Boolean | No | Specifies if the path uses a new or existing lsp path. Applicable only for Bi directional te tunnel. |
| lsp-attribute-list-name | String | | Name of the lsp attribute list. Applicable only for Bi directional te tunnel. |
| lsp-attributes | Mpls-lsp-attribute-type | | Container for the new LSP attribute configuration. Applicable only for Bi directional te tunnel. |
| enable-lockdown | Boolean | No | This attribute specifies whether to enable lockdown option on working-path, protection-path or *restore-path (*Only for XR devices). |
| enable-sticky | Boolean | No | This attribute specifies whether to enable sticky on working-path. |
| enable-non-revertive | Boolean | No | This attribute specifies whether to enable non-revertive on protection-path. |
| enable-srlg | Boolean | No | This attribute specifies whether to enable srlg on protected path. |
| Mpls lsp attribute type | | | |
| affinity-bits | String | No | This attribute specifies Affinity bits on desired link attributes |
| affinity-mask | String | No | This attribute specifies Affinity mask on desired link attributes |
| setup-priority | Int | No | This attribute specifies the associated transport tunnel Setup Priority. Range:0-7, Default: 7 |
| hold-priority | Int | No | This attribute specifies the associated transport tunnel Hold Priority. Range:0-7, Default: 7 |
| enable-record-route | boolean | no | This attribute specifies whether to enable record route option. |
| | | | |
| path-type | Enum (dynamic, explicit) | Yes | Path type enum |
| is-existing-path | Boolean | No | Choose a new or existing path option. |
| explicit-path-name | String | No | IP explicit path name. |
| explicit-path-hop | Container | No | Explicit path hop container. |
| node-ref | String | No | Node Fdn |

| | | | |
|----------------------|-------------------------|----|--------------------------------|
| interface-ip-address | String | No | Mpls interface ip address. |
| constraint-type | Enum (include, exclude) | No | Explicit path constraint type. |

1.39.1.16 Service Order Data - MPLS L3VPN

This section describes the order data required for provisioning MPLS L3VPN services.

See schema restconf-sai-mpls-l3vpn.xsd for more details.

| service-order-data - Order Data for MPLS L3VPN Service | | | |
|--|-----------------------|-------------------------|---|
| Service Configuration | | | |
| Data | Type | Mandatory | Description |
| service-type | String | Yes | The type of service. |
| service-subtype | String | Yes | Service sub type. Supported value: UNICAST. |
| service-activate | Boolean | No | Option to activate the service. |
| customer-ref | FDN | Yes for amend/terminate | Customer FDN. |
| service-name | String | Yes | Name for the service. |
| Vpn-id | String | Yes | VPN-ID for the service |
| service-profile-ref | String (FDN) | Yes | Service profile reference used to create a service. e.g. MD=CISCO_EPNM!PROFILE_SERVICE=CEM-Profile1 |
| service-description | String | No | Service description. |
| service-mtu | Integer(Default 1520) | Yes | Maximum Transmission Unit that interfaces can optimally process. |
| create-full-mesh | Boolean | No | Enables you to create a Full Mesh. |
| enter-full-mesh-prefix | Boolean | Yes | Allows you to enter full mesh prefix value from User Input. |
| full-mesh-prefix | Integer | Yes | The actual full mesh prefix value. |
| Route Target Allocation | | | |
| Data | Type | | Description |
| address-family | String | No | Address family- either IPv4 or IPv6. |
| route-target | String | No | Route target value for which the interface enables packets to pass through if they have the matching ID. |
| VRF Details | | | |
| vrf-device-name | String | Yes | Device FDN. |
| vrf-description | String | No | A unique description about the VRF. |
| vrf-name | String | Yes | The name for the VRF. |
| is-auto-rd | String | Yes | Auto Route Distinguisher, either true or false has to be provided |
| Route Targets | | | |
| ip-v4-route-target/ip-v6-route-target | String | No | The Route Target value. Needed if Route Target allocation was provided |

| | | | |
|---------------------------|--------------------------------------|-----|--|
| direction | Enum (Import/Export/Both/None) | No | Direction of the packet flow through the interface (based on the match with the route target ID). Needed if Route Target allocation was provided |
| Route Distribution | | | |
| protocol | Enum | No | Supported values are: OSPF, RIP, Connected, and Static. |
| metric | Boolean | No | Option to enable autoroute. Mandatory if OSPF protocol is selected |
| route-policy | String | No | Types of Routing Policy the VRF will use for Route Distribution. |
| routing-process-id | Integer | No | The process-id argument that identifies the OSPF process. Mandatory if OSPF protocol is selected |
| route-match-type | String | no | Only if OSPF protocol selected, one of the following values can be provided Internal External External 1 External 2 NSSA External NSSA External 1 NSSA External 2 LEVEL 1 LEVEL INTER-AREA Level 2 |
| UNI | | | |
| uni-name | String | Yes | Name of the UNI. |
| uni-ref | String | Yes | Uni fdn if using an existing UNI |
| port | String | Yes | Port ID as FDN. |
| device | String | Yes | Device name as FDN. |
| create-uni | Boolean | No | Value determines if new UNI is being created or existing UNI is being used. |
| vrf-name-select | String | Yes | To VRF under which the UNI is being created. |
| enable-link-oam | Boolean | no | To enable or disable Link Operations, Administration, and Maintenance. |
| service-multiplexing | Boolean | no | Allows multiple services to be provisioned on this UNI. |
| uni-duplex-mode | Enum (FULL DUPLEX/ AUTO NEGOTIATION) | No | Duplex mode setting. |
| sep-ipv6-address | IPv6 | No | Service end-point IPv6 address. |
| sep-outer-vlan | Integer | yes | Outer VLAN ID. |
| sep-ipv4-address | IPv4 | Yes | Service end-point IPv4 address. |
| sep-ipv4-subnet-mask | Integer | Yes | Subnet mask value. |
| sep-ipv6-subnet-mask | Integer | No | Subnet mask value. |

| | | | |
|--------------------------|------------------------|-----|--|
| uni-mtu | Integer | Yes | Maximum Transmission Unit that UNI can optimally process. |
| uni-description | String | No | A unique description about the UNI. |
| enable-link-management | Boolean | No | |
| existing-uni-id | Integer | No | If choosing the existing UNI instead of creating new UNI. |
| service-state | Boolean (default true) | Yes | Service state |
| use-irb | Boolean (default true) | no | Use integrated routing and bridging. |
| encapsulation | Enum | no | TAGGED UNTAGGED DEFAULT. |
| Termination Point | | | |
| termination-point-list | Container | Yes | N/A |
| termination-point-config | Container | Yes | N/A |
| tp-ref | String (FDN) | Yes | Termination-point FDN |
| nd-ref | String (FDN) | Yes | Node FDN |
| network-interface-name | String | Yes | Network interface name |
| l3vpn-data | Container | Yes | Container for l3vpn data |
| hsrp | Container | Yes | Container for hsrp data |
| group-number | Integer | Yes | HSRP group number. |
| priority | Integer | Yes | HSRP priority or weight of using this among the members. |
| virtual-ip-address | IP-address | Yes | Virtual ip address of either ipv4 or ipv6. |
| authentication-key | String | No | The authentication key can be up to 8 characters in length; the default string is cisco. The authentication key is carried in all HSRP messages. |
| hello-timer | Integer | No | HSRP hello timer. |
| hold-timer | Integer | No | HSRP hold timer. |
| min-delay-interval | Integer | No | The minimum delay that is applied after any subsequent interface up event (if the interface flaps). |

| | | | |
|----------------------------------|------------------------|-----|---|
| reload-delay-interval | Integer | No | The reload delay that is applied after the first interface up event. |
| preempt-min-delay | Integer | No | Set to cause the local router to postpone taking over the active role for the shown number of seconds. |
| preempt-reload-delay | Integer | No | Set to cause the local router to postpone taking over the active role after a reload for the number of seconds shown. |
| | | | |
| Routing Protocol Settings | | | |
| device-ref | String | Yes | String |
| vrf | String | Yes | String |
| routing-protocol-type | ENUM | Yes | BGP OSPF OSPFv3 |
| address-family | ENUM | Yes | IPv4 IPv6 |
| authentication-type | ENUM | No | MD5 |
| password-type | String | No | Applicable only for BGP routing-protocol-type Possible values : 1. Plain Text 2. Encrypted |
| password | String | No | String |
| authentication-type | String | No | Applicable only for OSPFv3 KEYCHAIN is the value currently supported |
| key-chain | String | no | String |
| BGP Neighbors | | | |
| neighbor-address | IP Address | Yes | IP address of the neighbor- either IPv4 or IPv6. |
| neighbor-as | Integer (1-65536) | Yes | Autonomous System number of the neighbor. |
| ingress-rp | String | No | |
| egress-rp | String | No | |
| local-as | Integer (1-65536) | No | Local Autonomous system number. |
| as-action | String | no | - |
| OSPF Process Information | | | |
| router-id | IP Address | Yes | IP address of the neighbor- either IPv4 or IPv6. |
| area-id | Integer (0-4294967295) | Yes | Range between 0-4294967295. |
| domain-type | Hexadecimal | No | 0x0005 0x0105 0x0205 0x8005 |

| | | | |
|--------------|-------------|-----|--|
| domain-value | Hexadecimal | yes | Hexadecimal number less than or equal to 6 Octet |
|--------------|-------------|-----|--|

| | IPSLA Details | | |
|----------------------------------|---------------|--|--|
| operation-name | String | yes | Name of the IPSLA name. |
| operation-vrf | String | yes | - |
| operation-source-port-ref | integer | Yes | please give the value between 1024 and 65535 |
| operation-destination-port-ref | String | Yes | Port FDN |
| ipsla-operation-type | String | yes | UDP ECHO, ICMP ECHO, ICMP JITTER, and UDP JITTER. |
| operation-source-device-ref | String | yes | - |
| reaction-action-variable | String | No | CONNECTION LOSS, RTT, TIMEOUT ERROR, and VERIFY ERROR. |
| reaction-action-type | Enum | no | NONE, TRAP AND TRIGGER, TRAP ONLY, and TRIGGER ONLY. |
| reaction-upper-threshold-value | String | no | Reaction action type will be triggered when this upper threshold value is breached. |
| operation-destination-device-ref | Integer | yes | please give the value between 1024 and 65535 |
| reaction-lower-threshold-value | String | no | Reaction action type will be triggered when this lower threshold value is breached. |
| reaction-threshold-type | String | yes | AVERAGE, CONSECUTIVE, IMMEDIATE, NEVER, X out of Y occurrences. |
| average-number-value | Integer | No Yes when reaction-threshold-type is AVERAGE | Determines the average number of entities. |
| consecutive-n-values | Integer | No Yes when reaction-threshold-type is CONSECUTIVE | The threshold breach is applied for n entities. Yes when reaction-threshold-type is CONSECUTIVE |
| reaction-x-axis-values | Integer | No Yes when reaction-threshold-type is X out of Y occurrences | Determines the number of occurrence out of Y. |
| reaction-y-axis-values | Integer | No Yes when reaction-threshold-type is X out of Y occurrences | Determines the total occurrence of the given entity. |

| | | | |
|------------------------|---------|----|--|
| simple-frequency-value | Integer | no | Indicates the periodicity of this SLA (how frequently this check should be performed). Please enter the value between 5 and 604800 seconds |
| simple-life-time-value | Integer | no | Indicates that if the event does not occur, the check will be performed after the time (in milli seconds) specified in this value. Please enter the value between 0 and 2147483647 seconds |
| simple-age-out-value | Integer | no | Indicates the maximum time in milliseconds until when this IPSLA should function. Please enter the value between 0 and 2073600 seconds |
| start-now | Boolean | no | Indicates that the execution can start immediately. |
| start-time | Integer | no | Indicates that the execution must start after the given number of seconds. |

1.39.1.17 Service Order Data – Optical

The table below lists the Order Data elements and the supported values for optical services. Note that the table below describes all the elements in the service order data combined for service and endpoint configuration for all the optical services (OCHNC, OCHCC, OCHTrail, OCHTRAIL_UNI, OPU_OVER_ODU, ODU_TUNNEL and ODU_UNI). See schema restconf-sai-optical.xsd for more details.

Spectrum Switch Optical Network (SSON) – Media Channels: Purpose of the feature is the optimization of the use of optical bandwidth. That is obtained by creating services without spare "guard" band within, delegating Control Plane SW in the device to choose the exact frequencies to be used. (For example: MCHG, MCHNC, MCHCC and MCHTrail)

Services can use Media Channels, that can use multiple individual carriers of different frequencies splitting the payloads coming from client ports into multiple channels when the single channel cannot transport the entire required bandwidth (For example a 500Gb payload split into two 250Gb Trunk ports).

| Optical Service Order Data | Data Type | Applicable to Service Type | Modifiable | Description |
|----------------------------|-----------|----------------------------|------------|--|
| service-name | String | All | yes | Unique name to identify the circuit/VC. |
| service-description | String | All | yes | Description of the VC that will help to identify the VC. |
| service-type | String | All | No | Service Type. Possible value: |

| | | | | |
|------------------------|---------------------------|---------------------------|---|---|
| | | | | optical – for Optical Services explicit-path – for MPLS TE Explicit Path |
| service-subtype | String | All | No | Service SubType. Possible Values: OCHNC, OCHCC, OCHTrail, OCHTRAIL_UNI, ODU_TUNNEL and ODU_UNI – for Optical Services mplste-explicit-path – for MPLS TE Explicit Path |
| customer-ref | String | | Yes | Customer FDN. |
| mutual-diverse | Boolean | OCHTRAIL_UNI | No | For mutual Diverse from one another. |
| diverse-from-name | String | OCHTRAIL_UNI | No | Diverse from Service name. |
| diverse-from-cfs-ref | FDN | OCHTRAIL_UNI and ODU_UNI | No | Diversing current Service from the service which have the same AEND owning Entity value. |
| service-activate | Boolean | true/false | Yes | Activate Service. |
| direction | String | ALL | No | Service/Circuit direction. Possible Values: BIDIRECTIONAL, UNIDIRECTIONAL |
| optical-data | optical-data-service-type | | N/A | Container for OPTICAL service configuration. |
| termination-point-list | List container | All | N/A | List of connection termination point configurations. |
| path-diversity | container | OCHNC, OCHCC and OCHTrail | N/A | This container is applicable only for the services of type OCHNC, OCHCC and OCHTrail. |
| constraints | container | All OCH and MCH service | N/A | Constraints container will holds list of constraint values to be applied for a particular service. |
| constraint | container | All OCH and MCH service | Yes, only for OCHTrail, MCHTrail and OCHTrail Uni Service | This Constraint will hold set of attributes which can be applied on a constraint. |

The table below describes the optical data types and lists the services they are applicable to:

| Optical Service Order Data | Data Type | Applicable to Service Type | Modifiable | Description |
|----------------------------|-----------|----------------------------|------------|---|
| state-type | Boolean | All | Yes | This attribute represents generic state type of the service. Possible Values: IN_SERVICE, OUT_OF_SERVICE, UP, DOWN |
| admin-state | Boolean | All | Yes | This attribute represents generic admin state of the. Possible Values: IN_SERVICE, OUT_OF_SERVICE, UP, DOWN |
| uni | Boolean | All | No | UNI Allows Bundling. Allows the use of multiple VLANs for this UNI. |
| label | String | All | Yes | Label for service provisioning. |
| protection | String | All | No | Protection Mechanism for service provisioning. |

| | | | | |
|---|---------|--|-----|---|
| validation | Boolean | OCHNC, OCHCC, OCHTrail and OCHTRAIL_UNI | No | True or false. |
| optical-threshold | String | OCHNC, OCHCC, OCHTrail and OCHTRAIL_UNI | No | Optical Threshold for service provisioning. |
| optical-threshold-protected | String | OCHNC, OCHCC and OCHTrail. | No | Optical Threshold Protected for service provisioning. |
| up-stream-channel-power-offset | String | OCHNC, OCHCC and OCHTrail. | No | Up Stream Channel Power Offset for service provisioning. |
| down-stream-channel-power-offset | String | OCHNC, OCHCC and OCHTrail. | No | Down Stream Channel Power Offset for service provisioning. |
| ignore-path-alarm | Boolean | OCHNC, OCHCC and OCHTrail. | Yes | True or false. |
| allow-regeneration | Boolean | OCHNC, OCHCC, OCHTrail and OCHTRAIL_UNI | Yes | True or false. |
| restoration | String | OCHNC, OCHCC, OCHTrail and OCHTRAIL_UNI | Yes | Restoration for service provisioning. |
| revert | String | OCHNC, OCHCC and OCHTrail. | Yes | Revert for service provisioning. |
| soak-time | String | OCHNC and OCHTrail. | Yes | Soak Time for service provisioning. |
| priority | String | OCHNC, OCHCC, OCHTrail and OCHTRAIL_UNI | Yes | Priority for service provisioning. |
| validation-restoration | String | OCHNC, OCHCC and OCHTrail. | Yes | Validation Restoration for service provisioning. |
| optical-threshold-restoration | String | OCHNC, OCHCC and OCHTrail. | Yes | Optical Threshold Restoration for service provisioning. |
| optical-threshold-restoration-protected | String | OCHNC, OCHCC and OCHTrail. | Yes | Optical Threshold Restoration Protected for service provisioning. |
| frequency | String | OCHNC and OCHTrail. | No | Frequency for service provisioning. (deprecated) |
| width | String | OCHNC and OCHTrail. | No | Width for service provisioning. |
| frequency-required | Boolean | OCHNC and OCHTrail. | No | True or false. (deprecated) |
| frequency-protected | String | OCHNC and OCHTrail. | No | Frequency Protected for service provisioning. (deprecated) |
| width-protected | String | OCHNC and OCHTrail. | No | Width Protected for service provis(deprecated)ioning. |

| | | | | |
|------------------------------|---------|----------------------------------|-----|--|
| frequency-protected-required | Boolean | OCHNC and OCHTrail. | No | True or false. (deprecated) |
| open-end | Boolean | OCHTrail, ODU_TUNNEL and ODU_UNI | No | True or false. |
| record-route | Boolean | ODU_TUNNEL and ODU_UNI | yes | True or false. |
| otn-service-type | String | ODU_TUNNEL and ODU_UNI | Yes | OTN Service Type for service provisioning. |
| bandwidth | String | ODU_TUNNEL and ODU_UNI | yes | Bandwidth for service provisioning. |
| framing-type | String | ODU_TUNNEL and ODU_UNI | No | Framing Type for service provisioning. |
| bit-rate | String | ODU_TUNNEL and ODU_UNI | No | Bit Rate for service provisioning. |
| protection-profile | String | ODU_TUNNEL and ODU_UNI | No | Protection Profile for service provisioning. |
| client-port-status | Enum | OCHCC and MCHCC | No | Applicable values Ex: UP and DOWN. 1. UP for create/provision a service 2. DOWN for delete/terminate a service |

The table below describes the different endpoint data types and lists the services they are applicable to:

| Optical Service Order Data | Data Type | Applicable to Service Type | Is Mandatory | modifiable | Description |
|----------------------------|----------------------------------|----------------------------|--------------|------------|---|
| termination-point-list | Termination point-list container | All | Yes | No | termination point list |
| termination-point-config | container | All | Yes | No | termination point configuration |
| tp-ref | String (FDN) | All | Yes | No | FDN of the port to use - set of RNDs that consists of MD, ME and PTP or FTP instance ids. For example: "MD=CISCO_EPNM!ND=M6-234-248!FTP=name=PCHAN-2-14-RX;lr=LR_PHYSICAL_OPTICAL" |
| directionality | Identity | All | Yes | NO | source, sink, and bi-directional |
| optical-data | optical-data- | For All Optical services | Yes | | Container for All OPTICAL services Ex: OCHCC, OCHNC, OCHTrail, ODU Tunnel, ODU UNI and OCHTrail Uni etc. |
| ochnc-data | container | OCHNC | Yes | No | OCHNC service container |
| ochcc-data | container | OCHCC | Yes | No | OCHCC service container |
| och-trail-data | container | OCHTrail | Yes | No | OCHTrail service container |
| och-trail-uni-data | container | OCHTRAIL_UNI | Yes | No | OCHTRAIL_UNI service container |
| odu-tunnel-data | container | ODU_TUNNEL | Yes | No | ODU_TUNNEL service container |
| odu-uni-data | container | ODU_UNI | Yes | No | ODU_UNI service container |

| Optical Service Order Data | Data Type | Applicable to Service Type | Is Mandatory | modifiable | Description |
|--|-----------|----------------------------|---|------------|--|
| drop-port-ref | String | OCHNC | Yes | No | FDN of the port to use as drop port – set of RNDs that consists of MD, ME and PTP or FTP instance ids. For example: “MD=CISCO_EPNM!ND=M6-234-248!FTP=name=PCHAN-2-14-RX;lr=LR_PHYSICAL_OPTICAL” |
| diverse-from-path-ref | String | OCHNC, OCHCC and OCHTrail | Yes, if ‘path-diversity’ is provided in payload | No | FDN value for service to use diverse-path, Ex :MD=CISCO_EPNM!CFS=TRAIL-OCHCC_10GIGE_MXP_1 |
| constraint-type | Enum | OCHNC, OCHCC and OCHTrail | Yes, if ‘path-diversity’ is provided in payload | No | Possible Values: LOOSE and STRICT |
| diversity-type | Enum | OCHNC, OCHCC and OCHTrail | Yes, if ‘path-diversity’ is provided in payload | No | Possible Values: NE, LINK and SRRG |
| constraint | String | All OCH and MCH services | No | No | Name of the constraint |
| link-fdn | String | All OCH and MCH services | Yes, if constraint-type is LINK | No | FDN of TL , Ex : MD=CISCO_EPNM!TL=10.225.120.39:[WDMSIDE-B]--10.225.120.41:[WDMSIDE-A] Note: The order of the link can be specified whether the link hop is from A->Z or vice-versa. |
| nd-ref | String | All OCH and MCH services | Yes, if constraint-type is NODE | No | FDN of Node, Ex : MD=CISCO_EPNM!ND=tcc200 |
| constraint-type | Enum | All OCH and MCH services | Yes, if Constraints are part of payload | No | LINK, NODE |
| as | Enum | All OCH and MCH services | Yes, if Constraints are part of payload | Yes | INCLUDE, EXCLUDE and INCLUDE_REGEN |
| route | Enum | All OCH and MCH services | Yes, if Constraints are part of payload | Yes | Possible values are ‘WORK’, ‘PROTECTED’, ‘WORK_RESTORE’, ‘PROTECTED_RESTORE and ‘WORK_AND_PROTECTED’ (Deprecated) |
| Media Channels - spectrum switched optical network (SSON) | | | | | |
| mch-group-data | container | MCHG | Yes, for MCHGroup | No | Hold’s List of mchgroup service attributes |
| mchcc-data | container | MCHCC | Yes, for MCHCC | No | Holds List of mchcc service attributes |
| mchnc-data | container | MCHNC | Yes, for MCHNC | No | Holds List of mchnc service attributes |

| Optical Service Order Data | Data Type | Applicable to Service Type | Is Mandatory | modifiable | Description |
|-----------------------------|-----------|----------------------------|---|------------|--|
| mch-trail-data | container | MCHTrail | Yes, for MCHTrail | No | Holds List of mchtrail service attributes |
| width | float | All MCH services | Yes | No | Default value is 50.0 |
| auto-provisioning | Enum | All MCH services | Yes, for all MCH services | No | TRUE/FALSE |
| central-wavelength-required | Enum | All MCH services | Yes, only if "auto-provisioning" set FALSE. | No | TRUE/FALSE |
| central-wavelength | Float | All MCH services | Yes, only if "auto-provisioning" set FALSE. | No | Values range: 1528.773 To :1566.723 |
| containing-mchg | String | All MCH services | No | No | MCH Group service id, this will take as group for the currently creating MCH service |

1.39.1.18 Service Order Data – SR-TE

See schema restconf-sai-sr-te.xsd for more details.

| service-order-data - Order Data SR-TE Service Service Configuration | | | | |
|--|---------|-----------|------------|---|
| Data | Type | Mandatory | Modifiable | Description |
| service-template | String | No | Yes | The template to be associated with the service. |
| customer-ref | FDN | No | Yes | Customer FDN e.g. MD=CISCO_EPNM!CUSTOMER=Infrastructure |
| service-name | String | Yes | No | A unique name for the service. |
| service-type | String | Yes | No | The type of service. e.g. sr-te |
| service-description | String | No | Yes | A unique description about the service. |
| service-activate | Boolean | No | Yes | Boolean flag to indicate if service to be activated or not. |
| deploy-action | String | No | No | This is the input parameter using which user can specify if service provisioning request need to be run in preview, deploy mode or should be saved or scheduled for future. Possible values: Preview , Deploy , Later , Scheduled Default value: Deploy |

| | | | | |
|----------------------------|-----------|-----|-----|--|
| deploy-schedule-time | Date | No | No | This tag is to specify deploy schedule time and applicable only when value of deploy-action is "Scheduled". Supported format : yyyy-MM-ddThh:mm:ss-TZD e.g. 2018-10-25T09:10:00-00:00 |
| sr-data | Container | Yes | N/A | Container to specify SR policy related input tags. |
| policy-name | String | Yes | No | A unique name for the SR Policy. |
| headend-device-ref | String | Yes | No | Source end device FDN e.g., MD=CISCO_EPNM!ND=<deviceName> |
| color | String | Yes | No | Indicates color attribute associated to headend-device-ref Allowed range: 1 to 4294967295 If user don't pass its value in the payload then it is fetched from resource pool maintained by EPNM. |
| endpoint-device-ref | String | Yes | No | SINK end device FDN e.g., MD=CISCO_EPNM!ND=<deviceName> |
| delete-unused-segment-list | Boolean | NO | No | Boolean flag to indicate if un used segment list should be removed or not during SR Policy Amend and terminate operations Default value: false |
| binding-sid | | | | Binding SID value Allowed range: 16 to 1048575 |
| candidate-path-list | Container | Yes | N/A | Container to specify candidate path list related input attributes |
| bandwidth | String | No | Yes | Bandwidth value for candidate path Allowed range: 1 to 4294967295 kbps Note: NBI support this value in Kbps unit only, if user want to specify Mbps or Gbps, then they need to convert it in Kbps and specify converted value in the input payload. |
| preference | String | Yes | Yes | Input tag to specify preference for candidate path. Allowed range: 1 to 65535 |
| autoroute-settings | Container | No | N/A | Container to specify auto route settings details. |
| autoroute-metric-mode | Enum | No | Yes | Tag to specify auto route metric mode Allowed values: constant, relative |
| autoroute-metric | String | No | Yes | Tag to specify auto route metric value For autoroute-metric-mode = constant Allowed range: 1 to 2147483647 For autoroute-metric-mode = relative Allowed range: -10 to 10 |
| allow-all-prefixes | Boolean | No | Yes | Boolean flag to indicate if all prefixes should be allowed or not. |

| | | | | |
|----------------------------|----------------|-------------------------------------|-----|---|
| | | | | Possible value: true/false Default value: true |
| ip-prefix-list | List container | Yes , if allow-all-prefixes = false | N/A | List container to specify list of ip-prefix values |
| ip-prefix | String | Yes | Yes | Tag to specify ip prefix value Allowed format: <ip>/24 e.g., 192.168.1.1/24 |
| affinity-operations | Container | No | N/A | Container to specify affinity operations related inputs |
| affinity-operation | Enum | No | Yes | Input tag to indicate affinity operation value Possible values: exclude-any, include-any, include-all |
| affinity-name | List Container | No | N/A | Container to specify affinity name details It can have multiple name and bit-position values. |
| name | String | No | Yes | Name to Exclude/Include Affinity in Path Constraints These names are usually existing names. |
| bit-position | String | No | Yes | Bit Position for Affinity Name in Path Constraints |
| path-type | Enum | Yes | Yes | Input tag to indicate candidate path value Possible values: explicit, dynamic, dynamic-pce. |
| explicit | Container | Yes, if path-type= EXPLICIT | Yes | Container to specify explicit path related input tags. |
| new-segment-list | Boolean | No | Yes | Flag to indicate if segment list is new or existing Possible values: true/false |
| segment-list-name | String | Yes | Yes | Segment List Name for Path Details |
| weight | String | Yes | Yes | Input tag to specify explicit path weight Allowed range : 1 to 4294967295 |
| sid-list | Container | Yes, if path-type= EXPLICIT | Yes | Container to specify SID related inputs |
| id | String | Yes | Yes | Index of Segment |
| device-ref | String | Yes | Yes | Device Reference of Segment e.g., MD=CISCO_EPNM!ND=<deviceName> |
| segment-type | Enum | Yes | Yes | Input tag to specify segment type Possible values: node-sid, adjacency-sid |
| interface | Container | Yes | Yes | Container to specify interface value |
| name | String | Yes | Yes | Input tag to specify input tag name e.g., Loopback0 this value is for device name mentioned in device-ref |
| label | String | Yes | Yes | Input tag to specify value of label Value for this field is calculated based on device-ref, interface and name field values. |

| | | | | |
|---------------------------------|-----------|------------------------------------|-----|---|
| dynamic | Container | Yes, if path-type=DYNAMIC | Yes | Container to specify dynamic path related inputs |
| metric-type | Enum | Yes | Yes | Input tag to specify metric type Possible values: igp, latency, te, hop-count |
| metric-margin-type | Enum | No | Yes | Metric Margin Type for Path Details Possible values: absolute, relative |
| metric-margin-value | String | No | Yes | Metric Margin Value for Path Details. Allowed range: 0 to 2147483647 |
| max-sid-limit | String | No | Yes | Max SID Limit for Path Details Allowed range: 1 to 255 |
| dynamic-pce | Container | Yes, if path-type=DYNAMIC_WITH_PCE | Yes | Container to specify dynamic with PCE path related inputs |
| metric-type | Enum | Yes | Yes | Input tag to specify metric type Possible values: igp, latency, te, hop-count |
| metric-margin-type | Enum | No | Yes | Metric Margin Type for Path Details Possible values: absolute, relative |
| metric-margin-value | String | No | Yes | Metric Margin Value for Path Details. Allowed range: 0 to 2147483647 |
| max-sid-limit | String | No | Yes | Max SID Limit for Path Details Allowed range: 1 to 255 |
| path-constraints-details | Container | No | N/A | Container to specify path constraints details related input tags. |
| sid-algorithm | String | No | Yes | Input tag to specify sid-algorithm value Allowed range: 128 to 255 |
| disjoint-group-type | Enum | No | Yes | Input tag to specify disjoint-group-type values. Possible values: link, node, srlg, srlg-node. |
| disjoint-group-id | String | No | Yes | Input tag to specify disjoint-group-id value. |
| disjoint-sub-group-id | String | No | Yes | Input tag to specify disjoint-sub-group-id value. |

Templates Support

The following sub-sections provide the details of service provisioning with template support in the order which is required in the provision and modify operations of the service activation interface as a POST data in a request object.

The table below lists the Template Order Data elements and the supported values for any service.

| Template Order Data | Data Type | Applicable to Service Type | Description |
|---------------------|-------------------------|----------------------------|---|
| service-templates | | All | Container for Templates service configuration. |
| service-template | | All | Container for Template service configuration. |
| type | template-type-enum-type | All | Type. Possible value: preconfig , postconfig |
| name | String | All | Template name. |

| Template Order Data | Data Type | Applicable to Service Type | Description |
|---------------------|-----------|----------------------------|---|
| usage | String | All | Template Usage. Eg: Service Create Only Service Create Modify Service Create Delete Service Create Modify Delete Service Modify Only Service Delete Only |
| variables | | All | Container for Variables configuration. |
| variable | | All | Container for Variable configuration. |
| name | String | All | Name of the template for NBI request. You can give any name e.g., xyz |
| value | String | All | Name of the created template that you want to use in your NBI input request. |
| required | String | All | To indicate if it's required or not. Possible values "Yes" or "No" |
| description | String | | Variable Description. |

1.39.1.19 Template Request Example

POST /restconf/operations/v1/cisco-service-provision:provision-service HTTP/1.1

Host: <epnm-host>

Content Type: application/yang.operation+xml

- <samples/Template Request Example/request.xml>

Service Performance Test Support

The following sections provide the details of service performance test support.

The Service Performance Test can be conducted standalone as well as part of service provisioning.

1.39.1.20 Standalone Service Performance Test Execution

Restconf NBI supports standalone performance test execution.

| Operation | Description |
|------------------------|---|
| service-oam-config | This operation is to run service performance test, including BERT, Y1564 and Y1731 performance test. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-oam:service-oam-config |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | Request data of type service-oam-config that contains the details of the service performance test. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |

| | |
|------------------|---|
| Response Data | Return response of type service-oam-results that contains the information of the service performance test which can be used to retrieve the service performance test result. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-oam.yang |

1.39.1.20.1 Request for BERT

| Name | Type | Description |
|-----------------------|-------------------|--|
| service-oam-config | Container element | Holds service test config data |
| bert-config | Container element | Holds bert test config data |
| service-ref | String (FDN) | CFS fdn |
| source-tp-ref | String (FDN) | source tp fdn |
| destination-tp-ref | String (FDN) | destination tp fdn |
| unmanaged-destination | String | the destination is unmanaged or not: true or false |
| direction | String | test traffic direction: system or line |
| errors | String | Inject Errors, value range 0 to 255 |
| duration | String | Test duration time in minutes, value between 1 to 14400 |
| pattern | String | BERT pattern, valid value: 0s, 1s, 2^9, 2^11, 2^15, 2^23, 2^31, 2^20-O151, 2^20-O153 |

1.39.1.20.2 Request for Y1564

| Name | Type | Description |
|--------------------|-------------------|--|
| service-oam-config | Container element | Holds service test config data |
| Y1564-test-config | Container element | Holds Y1564 test config data |
| service-ref | String (FDN) | CFS fdn |
| source-tp-ref | String (FDN) | source tp fdn |
| destination-tp-ref | String (FDN) | destination tp fdn |
| is-one-way | Boolean | is one way test flag |
| duration | int | Time duration for traffic generation in secs. |
| is-custom-rates | Boolean | mode selection <ul style="list-style-type: none"> When is-custom-rates = true, attribute <i>rates</i> should be used When is-custom-rates = false, attributes <i>eir-rate</i> / <i>cir-rate</i> should be used |
| rates | String | Bytes to send in <u>kbps</u> . Ex: 1000 <u>kbps</u> |
| eir-rate | int | EIR rate value in kbps |
| cir-rate | int | CIR rate value in kbps |

| | | |
|---------------------|-------------------|--|
| is-step-load-cir | Boolean | In mode of CIR/EIR, points if requires additional 3 rates for 25% 50% and 75% from CIR value |
| packet-size | int | Packet size in bytes |
| ip-type | String | Possible Values: IPv4, IPv6 |
| inner-tag | Container element | Holds inner vlan data |
| vlan-id | String | Vlan id. Allowed Values: 1 to 4094 |
| outer-tag | Container element | Holds outer vlan data |
| vlan-id | String | Vlan id. Allowed Values: 1 to 4094 |
| acceptable-flr | int | Acceptance criteria for Frame Lost |
| acceptable-ftd | int | Acceptance criteria for Delay |
| acceptable-fdv | int | Acceptance criteria for <u>Jitter</u> |
| is-unmanaged-me3600 | Boolean | In case of unmanaged destination, points if type of unmanaged device is ME3600 |

1.39.1.20.3 Request for Y1731

| Name | Type | Description |
|--------------------|-------------------|--|
| service-oam-config | Container element | Holds service test config data |
| Y1731-test-config | Container element | Holds Y1731 test config data |
| service-ref | String (FDN) | CFS fdn |
| source-tp-ref | String (FDN) | source tp fdn |
| destination-tp-ref | String (FDN) | destination tp fdn |
| is-loss-required | Boolean | is loss required test flag |
| is-delay-required | Boolean | is delay required test flag |
| cos | String | cos value |
| probe-length | int | probe length in seconds |
| burst-interval | int | Burst interval in seconds |
| packet-count | int | Packet count |
| packet-size | int | Packet size in bytes |
| packet-interval | int | Packet interval in milli-secs |
| duration | int | Time duration for traffic generation in mins |

1.39.1.20.4 Response

| Name | Type | Description |
|---------------------|-------------------|--|
| service-oam-results | Container element | Holds the data for response of template execution. |
| request-id | String | request-id which is to get performance test result |
| service-ref | String | CFS fdn |
| test-ids | String | test id |

1.39.1.20.5 Standalone BERT Test

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config
- [samples/Standalone BERT Test/request.xml](#)
- [samples/Standalone BERT Test/request.json](#)

Response

- [samples/Standalone BERT Test/response.xml](#)

1.39.1.20.6 Standalone Y1564 Test

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config
- [samples/Standalone Y1564 Test/request.xml](#)
- [samples/Standalone Y1564 Test/request.json](#)
- [samples/Standalone Y1564 Test/request custom rate true.json](#)
- [samples/Standalone Y1564 Test/request custom rate false.json](#)

Response

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/<request-id>
- [samples/Standalone Y1564 Test/response.json](#)
- [samples/Standalone Y1564 Test/response custom rate true.json](#)
- [samples/Standalone Y1564 Test/response custom rate false.json](#)

1.39.1.20.7 Standalone Y1731 Test

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config
- [samples/Standalone Y1731 Test/request.xml](#)
- [samples/Standalone Y1731 Test/request.json](#)

Response

- [samples/Standalone Y1731 Test/response.json](#)

1.39.1.20.8 LSP ping request and response.

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config
- [samples/LSP Ping/request.xml](#)
- [samples/LSP Ping/request.json](#)

Response

- [samples/LSP Ping/response.json](#)

1.39.1.20.9 LSP traceroute request and response

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config
- [samples/LSP Traceroute/request.xml](#)
- [samples/LSP Traceroute/request.json](#)

Response

- [samples/LSP Traceroute/response.json](#)

Note: LSP ping and traceroute service test is applicable for those CE and CEM services which is not passing through unidirectional/bidirectional tunnels.

1.39.1.20.10 PW Ping and Traceroute

| Operation | Description |
|------------------------|--|
| service-oam-config | This operation is to run PW ping and Traceroute |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-oam:service-oam-config |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type service-oam-config-ext that contains the details of the service performance test. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return response of type service-oam-results that contains the information of the service performance test which can be used to retrieve the service performance test result. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-oam-ext.yang |

Request

| Name | Type | Description |
|------------------------|-------------------|---|
| service-oam-config-ext | Container element | Holds service test config data |
| pw-ping | Container element | Holds PW ping config data |
| service-ref | String (FDN) | CFS fdn |
| service-state-role | Enum | Values supported <ul style="list-style-type: none">• active• protected |
| from-tp-ref | String (FDN) | source tp fdn |

Response

| Name | Type | Description |
|---------------------|-------------------|--|
| service-oam-results | Container element | Holds the data for response of template execution. |
| request-id | String | request-id which is to get performance test result |
| service-ref | String | CFS fdn |

Note: PW ping and traceroute service test is applicable for CE and CEM services. For EVPN based CE services it's not applicable.

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config-ext
- [samples/PW Ping and Traceroute/request.xml](#)
- [samples/PW Ping and Traceroute/request.json](#)
- [samples/PW Ping and Traceroute/request.2.xml](#)
- [samples/PW Ping and Traceroute/request.2.json](#)
- [samples/PW Ping and Traceroute/Pw-ping-with-endpoints-request.json](#)
- [samples/PW Ping and Traceroute/Pw-traceroute-with-endpoints-request.json](#)

Response

- [samples/PW Ping and Traceroute/response.xml](#)
- [samples/PW Ping and Traceroute/response.2.json](#)
- [samples/PW_Ping_and_Traceroute/Pw-ping-with-endpoints-response.json](#)
- [samples/PW_Ping_and_Traceroute/Pw-traceroute-with-endpoints-response.json](#)

1.39.1.20.11 CFM Ping

| Operation | Description |
|------------------------|--|
| service-oam-config | This operation is to run CFM Ping |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-oam:service-oam-config-ext |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | Request data of type service-oam-config-ext that contains the details of the service performance test. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Response Data | Return response of type service-oam-results that contains the information of the service performance test which can be used to retrieve the service performance test result. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message. |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-oam-ext.yang |

Request

| Name | Type | Description |
|------------------------|-------------------|--|
| service-oam-config-ext | Container element | Holds service test config data |
| cfm-ping | Container element | Holds CFM-Ping config data |
| service-ref | String (FDN) | CFS fdn |
| service-state-role | Enum | Values supported <ul style="list-style-type: none"> active protected |
| from-tp-ref | String (FDN) | source tp fdn |
| to-tp-ref | String (FDN) | destination tp fdn |

Response

| Name | Type | Description |
|---------------------|-------------------|--|
| service-oam-results | Container element | Holds the data for response of template execution. |
| request-id | String | request-id which is to get performance test result |
| service-ref | String | CFS fdn |

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config-ext
- [samples/CFM Ping/request.xml](#)
- [samples/CFM Ping/request.json](#)
- [samples/CFM Ping/Cfm-ping-with-endpoints-request.xml](#)

Response

- [samples/CFM Ping/response.json](#)
- [samples/CFM Ping/Cfm-ping-with-endpoints-response.xml](#)

1.39.1.20.12 CFM Traceroute

| Operation | Description |
|------------------------|---|
| service-oam-config | This operation is to run CFM Traceroute |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-oam:service-oam-config-ext |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type service-oam-config-ext that contains the details of the service performance test. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> Circuit or VC Provisioning Circuit or VC Monitoring and Troubleshooting |
| Response Message | |

| | |
|-----------------------|---|
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return response of type service-oam-results that contains the information of the service performance test which can be used to retrieve the service performance test result. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-oam-ext.yang |

Request

| Name | Type | Description |
|------------------------|-------------------|--|
| service-oam-config-ext | Container element | Holds service test config data |
| cfm-traceroute | Container element | Holds CFM Traceroute config data |
| service-ref | String (FDN) | CFS fdn |
| service-state-role | Enum | Values supported <ul style="list-style-type: none"> active protected |
| from-tp-ref | String (FDN) | source tp fdn |
| to-tp-ref | String (FDN) | destination tp fdn |

Response

| Name | Type | Description |
|---------------------|-------------------|--|
| service-oam-results | Container element | Holds the data for response of template execution. |
| request-id | String | request-id which is to get performance test result |
| service-ref | String | CFS fdn |

Request

- POST /restconf/operations/v1/cisco-service-oam:service-oam-config-ext
- [samples/CFM Traceroute/request.xml](#)
- [samples/CFM Traceroute/request.json](#)
- [samples/CFM Traceroute/Cfm-traceroute-with-endpoints-request.xml](#)

Response

- [samples/CFM Traceroute/response.json](#)
- [samples/CFM Traceroute/Cfm-traceroute-with-endpoints-response.xml](#)

Note: CFM ping and traceroute service test is applicable for CE and CEM services with CFM enabled on them.

1.39.1.21 Standalone Service Performance Test Retrieval

This API retrieves standalone service performance test result in Cisco EPN Manager.

| Resource | Description |
|----------|--|
| | Retrieves standalone service performance test result in Cisco EPN Manager. |

| HTTP Method | Resource Path | |
|-----------------------|--|--|
| GET | operations/v1/cisco-service-oam:service-oam-config/{request-id} | |
| Path Parameters | | |
| Name | Type | Description |
| request-id | String | The request-id which in the response of standalone service performance test execution. Given this, the performance test result will be returned. |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or 1 service-oam-results – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Yang file name | cisco-service-oam.yang | |

1.39.1.21.1 GET Test Result for BERT

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/bert-config\$4250249

Response

- [samples/GET Test Result for BERT/response.json](#)

1.39.1.21.2 GET Test Result for Y1564

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/y1564-test-config\$154136052\$15413605

Response

- [samples/GET Test Result for Y1564/response.json](#)

1.39.1.21.3 GET Test Result for Y1731

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/y1731-test-config\$154136052\$15413605

Response

- [samples/GET Test Result for Y1731/response.json](#)

1.39.1.21.4 LSP Ping and Trace – GET Ping Details

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/[mpls-lsp-ping/1006?check-ready=true](#)

Response

- [samples/LSP Ping And Trace GET Ping Details/response.xml](#)

1.39.1.21.5 GET LSP Traceout Details

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config/[mpls-lsp-trace-route/1006?check-ready=true](#)

Response

- [samples/LSP Ping And Trace GET Ping Details/response.xml](#)

1.39.1.21.6 GET PW Ping and Traceroute

| Resource | Description | |
|-----------------------|--|--|
| | Retrieves standalone service performance test result in Cisco EPN Manager. | |
| HTTP Method | Resource Path | |
| GET | operations/v1/cisco-service-oam:service-oam-config-ext/{request-id} | |
| Path Parameters | | |
| Name | Type | Description |
| request-id | String | The request-id which in the response of standalone service performance test execution. Given this, the performance test result will be returned. |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or 1 service-oam-results – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Yang file name | cisco-service-oam-ext.yang | |

Request

- GET /restconf/operations/v1/cisco-service-oam:service-oam-config-ext/pw-ping/<request-id>
- GET /restconf/operations/v1/cisco-service-oam-ext:service-oam-config-ext/pw-trace-route/<request-id>

Response

- [samples/GET PW Ping and Traceroute/response.xml](#)
- [samples/GET PW Ping and Traceroute/response.2.xml](#)
- [samples/GET_PW_Ping_and_Traceroute/Pw-ping-with-endpoints-get-response.json](#)
- [samples/GET_PW_Ping_and_Traceroute/Pw-traceroute-with-endpoints-get-response.json](#)

1.39.1.21.7 GET CFM Ping

Request

- GET /restconf/operations/v1/cisco-service-oam-ext:service-oam-config-ext/cfm-ping/<request-id>

Response

- [samples/GET CFM Ping/response.xml](#)
- samples/GET_CFM_Ping/Cfm-ping-with-endpoints-get-response.xml

1.39.1.21.8 GET CFM Traceroute

Request

- GET /restconf/operations/v1/cisco-service-oam-ext:service-oam-config-ext/cfm-traceroute/<request-id>

Response

- [samples/CFM Traceroute/response.json](#)
- samples/CFM_Traceroute /Cfm-traceroute-with-endpoints-get-response.xml

Consolidated Provisioning Support

The consolidated provisioning is supported in Cisco EPN Manager service activation. In one provision request, user can do the following 3 tasks together:

- Provisioning MPLS TE tunnel, providing <mpls-te-data>
- Provisioning CE or CEM, providing <ce-data> or <cem-data>
- Executing service performance test, providing < service-oam-config>

The following scenario are supported:

- mpls-te, ce, Y1731
- mpls-te, ce, Y1564
- mpls-te, cem, BERT

Each service-order-data sub-section such as mpls-te, ce, cem are the same as when those used in non-consolidated fashion.

Please find consolidated provisioning example in chapter 7.

Service Profile Support

Service Profiles contain pre-defined provisioning request (order data) that can be used in provisioning each circuit/VC type.

In NBI Provisioning request, a service profile reference can be used to get provisioning request data to be used in the provisioning. If the provisioning data is provided in the request along with the service profile reference, but the user provided data and the data stored in the service profile gets merged with user provided data overriding the profile data before the request is sent to execute provisioning.

Service profile can be created using EPNM Service Profile wizard GUI. For more information on how to create the service profile please refer to EPNM User and Administrative Guide under section “Create Circuit/VC Profiles”.

Typical workflow to use the NBI with service profiles is

1. Create service profile using EPNM Service Profile wizard GUI
2. Retrieve the service profile details using Service Profile Retrieval NBI
3. Use the FDN of the service profile (retrieved from the retrieval NBI) as a service profile reference in the NBI provisioning request.
4. Add any data to NBI provisioning request to override what is there in the service profile

5. Execute provision nbi with service profile reference.

1.39.1.22 Service Profile Reference

When using the service profile reference in the NBI service provisioning request, the immune required data that is need is

1. Service type
2. Service subtype
3. Service name

Sample provisioning request with service profile:

- [samples/Service Profile Reference/request.xml](#)

1.39.1.23 Service Profile Provision

Request

- [samples/Service Profile Provision/request.1.xml](#)
- [samples/Service Profile Provision/request.1.json](#)
- [samples/Service Profile Provision/request.2.xml](#)
- [samples/Service Profile Provision/request.2.json](#)

1.39.1.24 Service Profile Retrieval

This API retrieves Service Profiles in Cisco EPN Manager. This API can be used to get the FDN of the Service Profile which can be passed in the service profile reference (as FDN) in service provision request.

| Resource | Description | |
|------------------------|--|---|
| Service Profile | Retrieves all Service Profiles added in Cisco EPN Manager. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/ cisco-service-profile:service-profile | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String (FDN Format) | Fully Distinguished Name (FDN) of the Service Profile. Given this, a corresponding single Service will be returned. FDN: MD=<CISCO_EPNM>!PROFILE_SERVICE=<profilename>. |
| type | String | Service type for which the service profiles will be retrieved. If not specified all service profiles for all service types will be returned. Possible values: carrier-ethernet-vpn, tdm-cem, mpls-te-tunnel, layer3-link, mpls-l3-vpn,optical |
| subtype | String | Service subtype for which the of the CFS to retrieve. If not specified all sub types will be returned. Should be used in conjunction with Type. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | Contains 0 or more Service Profiles of type service-profile – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message. | |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Yang file name | cisco-service-profile.yang |

1.39.1.25 *Get All Service Profiles*

Request

- GET /restconf/data/v1/cisco-service-profile:service-profile HTTP

Response

- [samples/Get All Service Profiles/response.xml](#)

1.40 Customer CRUD

Customer resource path to create, retrieve, update, and delete Customer values.

Retrieve Customer

| Resource | Description | |
|---|---|--|
| Customer | Customer resource that is used in the provisioning order data. Retrieves the Customer resource. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-customer:customer/{name} | |
| Path Parameters | | |
| Name | Type | Description |
| Name | String | Customer Name – to retrieve a single customer resource. Without this parameter, all Customers will be retrieved. |
| Authorization Required | One or more from following <ul style="list-style-type: none">Circuit or VC Provisioning | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more customer resources of type customer – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0060 = Cannot determine customer id for name %s - multiple customers found with the name.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials | |

| | |
|----------------|--|
| | For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-customer.yang |

1.40.1.1 *Get All Customers*

Request

- GET /restconf/data/v1/cisco-customer:customer

Response

- [samples/Get All Customers/response.xml](#)

Create Customer

| Resource | Description |
|---|---|
| Customer | Creates a Customer Resource - Customer resource that is used in the provisioning order data. |
| HTTP Method | Resource Path |
| POST | /data/v1/cisco-customer:customer/ |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type customer that contains the details of the customer – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Circuit or VC Provisioning |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | No response if the operation succeeds. Error message is displayed if the operation fails. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0007 = Cannot Create Customer with name = %s - %s • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-customer.yang |

Request

- [samples/Create Customer/request.xml](#)

- [samples/Create Customer/request.json](#)

Update Customer

| Resource | Description | |
|---|---|---|
| Customer | Update the customer - Customer resource that is used in the provisioning order data. | |
| HTTP Method | Resource Path | |
| PUT | /data/v1/cisco-customer:customer/{name} | |
| Path Parameters | | |
| Name | Type | Description |
| Name | String | Name of the customer which will be updated. |
| Request Message | | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json | |
| Request Data | Request data of type customer that contains the details of the customer – see yang model for the data details. | |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning | |
| Response Message | | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json | |
| Response Data | No response if the operation succeeds. Error messages is displayed if the operation fails. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0009=Cannot Update Customer with name = %s - %s• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-customer.yang | |

Request

- [samples/Update Customer/request.xml](#)
- [samples/Update Customer/request.json](#)

Delete Customer

| Resource | Description |
|----------|---|
| Customer | Deletes the Customer - Customer resource that is used in the provisioning order data. |

| HTTP Method | Resource Path | |
|---|---|--|
| DELETE | /data/v1/cisco-customer:customer/{name} | |
| Path Parameters | | |
| Name | Type | Description |
| Name | String | Name of the customer for the delete operation. |
| Authorization Required | One or more from following <ul style="list-style-type: none">Circuit or VC Provisioning | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | Error response or no data | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0010=Cannot Delete Customer with name = %s - %sCORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-customer.yang | |

Request

- PUT /restconf/data/v1/cisco-customer:customer/MyCustomer

Response

HTTP/1.1 200 OK

Server: <epnm-host>

Content-Type: application/yang-data+xml

1.41 Resource Activation

RESTCONF NBI supports the setting up of the resource level configuration using various operations like Termination Point Configuration, Template Based Configuration (TBC), and Model Based Configuration (MBC). The operations listed below are supported as part of Resource Activation.

Operations

1.41.1.1 CLI Configuration Execution

Restconf NBI supports configuration using CLI Templates. Invoking this NBI will run the CLI Configuration in the template on the target device with the set of parameters applied.

| Operation | Description |
|-----------------------|--|
| run-cli-configuration | This operation can be used to run cli configuration using templates. |

| | |
|---|---|
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-resource-activation:run-cli-configuration |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type run-cli-configuration that contains the details of the template to run. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Configure Templates • View Job |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return response of type config-response that contains the details of the job executing the cli configuration which can be used to check the status. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format RA.<number> are generated by this API. For example: RA.0088 for 'Error occurred in MBC config service creation - [%s], transcript - [%s]'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-resource-activation.yang |

1.41.1.1.1 Run CLI Configuration Request

| Name | Type | Description |
|-----------------------|-------------------|---|
| run-cli-configuration | Container element | Holds the data for template details. |
| template-name | String | Template Name of which the CLI template to be configured on devices. |
| last-job-name | String | Last failed job name for which template execution need to be retried. |
| is-retry | Boolean | Boolean flag to indicate if template execution needs to be retried or not. Default: false |
| target-list | List | List of device target of which the CLI template to be deployed. |

| | | |
|----------------|-------------------|---|
| Target | Container element | Holds the target deploy information including device and corresponding configuration parameters |
| node-ref | String (FDN) | FDN of the device where the cli from the template gets executed. |
| parameter-list | List | List of name/value pairs for the parameters for the template. |
| Name | String | Name of the parameter. |
| Value | String | Value of the parameter. |

1.41.1.1.2 Run CLI Configuration Response

| Name | Type | Description |
|-----------------|-------------------|---|
| config-response | Container element | Holds the data for response of template execution. |
| job-name | String | Name of the job executing the template – can be used to check the status. |
| Message | String | A message from job execution. |

1.41.1.1.3 Run CLI Template

Request

- POST /restconf/operations/v1/cisco-resource-activation:run-cli-configuration
- [samples/Run CLI Template/request.xml](#)

Response

- [samples/Run CLI Template/response.xml](#)

1.41.1.1.4 Run CLI Template with retry

Request

- POST /restconf/operations/v1/cisco-resource-activation:run-cli-configuration
- [samples/Run cli template with retry/request.xml](#)
- [samples/Run cli template with retry/request.json](#)

Response

- [samples/Run cli template with retry/response.xml](#)
- [samples/Run cli template with retry/response.json](#)

1.41.1.1.5 Resource_Configuration-Create

Request

- POST /restconf/ operations/v1/cisco-resource-activation:create-config
- [samples/Resource Configuration Create/request.xml](#)
- [samples/Resource Configuration Create/request.json](#)

Response

- [samples/Resource Configuration Create/response.xml](#)

1.41.1.1.6 Resource_Configuration-Modify

Request

- POST /restconf/ operations/v1/cisco-resource-activation:create-config
- [samples/Resource Configuration Modify/request.xml](#)
- [samples/Resource Configuration Modify/request.json](#)

Response

- [samples/Resource Configuration Modify/response.xml](#)

1.41.1.1.7 Resource_Configuration-Delete

Request

- POST /restconf/ operations/v1/cisco-resource-activation:create-config
- [samples/Resource Configuration Delete/request.xml](#)
- [samples/Resource Configuration Delete/request.json](#)

Response

- [samples/Resource Configuration Delete/response.xml](#)

1.41.1.2 CLI Configuration Run Status Retrieval

Restconf NBI to get the status of the Templates based CLI Configuration which is scheduled to execute.

| Operation | Description |
|----------------------------------|--|
| get-cli-configuration-run-status | This operation can be used to check the status of the CLI template execution. |
| HTTP Method | Resource Path |
| GET | /operations/v1/cisco-resource-activation:get-cli-configuration-run-status/{job-name} |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request path parameter | job-name: of the CLI template execution |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Configure Templates• View Job |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Return response of type config-response that contains the details of the job executing the cli configuration which can be used to check the status. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

| | |
|---|--|
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format RA.<number> are generated by this API. For example: RA.0003 for 'Please provide job name.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-resource-activation.yang |

1.41.1.2.1 Response

| Name | Type | Description |
|--------------------|-------------------|---|
| config-response | Container element | Holds the data for response. |
| job-status | Container element | Holds the job status of the CLI template execution. |
| job-name | String | Name of the job executing the template. |
| run-id | String | ID number of the job execution. |
| run-status | String | The job execution status which could be SCHEDULED, RUNNING, or COMPLETED. |
| status | String | The job execution result status which could be SUCCESS or FAILED. |
| duration | String | Time on CLI template job execution. |
| start-time | String | Time that the job started to run. |
| completion-time | String | Time that the job finished. |
| deploy-result-list | List | List of CLI template deploy result. |
| deploy-result | Container element | Holds the deploy result on each target device |
| node-ref | String (FDN) | FDN of the device where the cli from the template gets executed. |
| transcript | String | CLI config let commands executed on the device. |
| message | String | Exception message. |

1.41.1.2.2 CLI Template Run Status

Request

- GET /restconf/operations/v1/cisco-resource-activation:get-cli-configuration-run-status/JobCliTemplateDeployIOSDevices08_18_56_526_PM_02_10_2017 HTTP/1.1

Response

- [samples/CLI Template Run Status/response.xml](#)

1.41.1.2.3 GET CLI Template

Request

- GET /restconf/data/v1/cisco-resource-activation:cli-template HTTP/1.1

Response

- [samples/Get CLI Template/response.xml](#)

1.42 MPLS TE Explicit Path Create/ Modify/ Terminate

MPLS TE Explicit path create/ modify and terminate are supported through a set of operations defined as RESTCONF operations. Support for creating, modifying and deleting an Optical MPLS TE Explicit path is provided. The mpls-te-explicit-path-request type wrapper object is used for these operations.

| Operation | Description |
|---|---|
| create-explicit-path modify-explicit-path terminate-explicit-path | This operation can be used to create/ modify/ terminate an MPLS TE Explicit Path. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-resource-activation:create-explicit-path /operations/v1/cisco-resource-activation:modify-explicit-path /operations/v1/cisco-resource-activation:terminate-explicit-path |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | mplste-explicit-path-type |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Returns if the MPLS TE Explicit path is created created/ modified/ terminated successfully. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format RA.<number> are generated by this API. For example: RA.0096 for 'MPLSTE explicit path service Provision failed -- "%s: %s' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-mpls-te-extension.yang |

MPLS TE Explicit Path Data

| mplste-explicit-path-type | Data Type | Description |
|---------------------------|-----------|--|
| node-ref | String | On the node where the explicit path will be provisioned (4K device). |
| path-name | String | Explicit path name |
| path-hop | PathHop | Ordered list of Path Hop with constraints. |

MPLS TE Explicit Path Entry Data

Each Path entry contains the fields described in the table below:

| path-entries | Data Type | Description |
|-----------------------|-----------|--|
| node-ref | String | FDN of a device (eg: MD=CISCO_EPNM!ND=NCS2006-239-20) making up explicit path. |
| constraint-level-type | String | Path Constraint level Type, Possible Values: <ul style="list-style-type: none">• strict• loose• none |
| constraint-type | String | Path Constraint Type; Possible Values: <ul style="list-style-type: none">• next• include• exclude• srlg |
| tp-ref | String | FDN of PTP/CTP (ODU Controller) making up explicit path. (Eg: MD=CISCO_EPNM!ND=NCS2006-239-20!FTP=name=PCHAN-2-34-RX;lr=lr-optical-channel) This fields is applicable only for Path Constraint type 'strict'. |

MPLS TE Explicit Path Create

Request

- POST /restconf/operations/v1/cisco-resource-activation:create-explicit-path
HTTP/1.1
- [samples/MPLS TE Explicit Path Create/request.xml](#)
- [samples/MPLS TE Explicit Path Create/request.json](#)

Response

- [samples/MPLS TE Explicit Path Create/response.xml](#)

MPLS TE Explicit Path Modify

Request

- POST /restconf/operations/v1/cisco-resource-activation:modify-explicit-path
HTTP/1.1

- [samples/MPLS TE Explicit Path Modify/request.xml](#)
- [samples/MPLS TE Explicit Path Modify/request.json](#)

Response

- [samples/MPLS TE Explicit Path Modify/response.xml](#)

MPLS TE Explicit Path Terminate

Request

- POST /restconf/operations/v1/cisco-resource-activation:delete-explicit-path
HTTP/1.1
- [samples/MPLS TE Explicit Path Terminate/request.xml](#)
- [samples/MPLS TE Explicit Path Terminate/request.json](#)

Response

- [samples/MPLS TE Explicit Path Terminate/response.xml](#)

1.43 MPLS TE Tunnel Computed Path via WAE PCE

This operation allows a user to compute a list of MPLS TE tunnel paths between two devices using a configured WAE server as the Path Compute Engine (PCE). A resulting computed path can be used for MPLS TE tunnel service provisioning.

| Resource | Description | |
|-------------------------------|--|--|
| Computed Path | Computes list of MPLS TE tunnel paths between the specified endpoints | |
| | | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-network:computed-path | |
| | | |
| Request Parameters | | |
| Name | Type | Description |
| | | |
| source-endpoint-ref | String | FDN of the source endpoint. Eg: MD=CISCO_EPNM!ND=EPNCS4206-32 |
| | | |
| destination-endpoint-ref | String | FDN of the destination endpoint. Eg: MD=CISCO_EPNM!ND=EPNCS4009-120-162 |
| | | |
| vc-type | String | VC type allowed values: mpls-te-tunnel |
| | | |
| vc-subtype | String | VC Subtype allowed values: uni-directional-te-tunnel bi-directional-te-tunnel layer3-link |
| | | |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write | |

| | |
|---|--|
| | <ul style="list-style-type: none"> Virtual connection Provisioning Virtual connection Monitoring and Troubleshooting Network Topology Network Topology Edit Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | Returns list of computed paths if computed successfully, empty list if no paths are found, or error on failure |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format CP.<number> are generated by this API. For example: CP.0001 for 'Source node name or destination node name is null.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-computed-path.yang |

Request

- POST /restconf/operations/v1/cisco-resource-network:computed-path HTTP/1.1
- [samples/MPLS TE Wae Computed Path/request.xml](#)
- [samples/MPLS TE Wae Computed Path/request.json](#)

Response

- [samples/MPLS TE Wae Computed Path/response.xml](#)
- [samples/MPLS TE Wae Computed Path/response.json](#)

1.44 Protection Profile Retrieval

Protection Profile can retrieve all the protection profile values, with the protection profile fdn a matching protection profile will be also be retrieved if available.

| Resource | Description |
|--------------------|---|
| protection-profile | Retrieves all Protection Profile in devices added to Cisco EPN Manager. |
| HTTP Method | Resource Path |
| GET | restconf/data/v1/cisco-resource-ems:protection-profile |
| Query Parameters | |

| Name | Type | Description |
|---|--|--|
| fdn | String (FDN Format) | Fully Distinguished Name (FDN) of the Protection Profile. Given this, a corresponding single Protection Profile will be returned. FDN = MD=<CISCO_EPNM>!ND=<nd_name>!PPF=<profilename> Eg: MD=CISCO_EPNM!ND=cvg-scapa-229.cisco.com!PPF=123 |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read,• Chassis View Read and Write,• Circuit or VC Monitoring and Troubleshooting• Circuit or VC Provisioning• Network Topology• Network Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more Protection Profile type protection-profile | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-protection-profile.yang | |

Get All Protection Profile

Request

- GET /restconf/data/v1/cisco-resource-ems:protection-profile

Response

- [samples/Get All Protection Profile/response.xml](#)

Get a Protection Profile

Request

- GET /restconf/data/v1/cisco-resource-ems:protection-profile?fdn=MD=CISCO_EPNM!ND=cvg-scapa-229.cisco.com!PPF=123

Response

- [samples/Get a Protection Profile/response.xml](#)

1.45 Protection Profile Create/ Modify/ Terminate

Protection Profile create/ modify and terminate are supported through a set of operations defined as RESTCONF operations.

| Operation | Description |
|---|--|
| create-protection-profile modify-protection-profile delete-protection-profile | This operation can be used to create/ modify/ terminate an Protection Profile. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-resource-activation:create-protection-profile /operations/v1/cisco-resource-activation:modify-protection-profile /operations/v1/cisco-resource-activation:delete-protection-profile |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Returns if the MPLS TE Explicit path is created created/ modified/ terminated successfully. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format RA.<number> are generated by this API. For example: RA.0114 for 'protection-profile-ref is unavailable, please provide' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-protection-profile.yang |

Protection Profile request Data

| Name | Data Type | Description |
|------------------------|-----------|---|
| protection-profile-ref | String | FDN of a protection profile(eg: MD=CISCO_EPNM!ND=cvg-scapa-221.cisco.com!PPF=Test_PPF_profile_name4) |
| profile-name | String | Protection Profile name (optional) |
| protection-type | String | Protection Type; Possible Values: <ul style="list-style-type: none">• ONE_PLUS_ONE_BDIR_APS• ONE_PLUS_ONE_UNIDIR_APS• ONE_PLUS_ONE_UNIDIR_NO_APS• ONE_PLUS_ONE_PLUS_R_BIDIR_APS• YCABLE• SPLITTER• PSM• NONE |
| protection-mode | String | Protection mode Type; Possible Values: <ul style="list-style-type: none">• REVERTIVE• NON_REVERTIVE |
| vc-mode | String | vc mode Type; Possible Values: <ul style="list-style-type: none">• VC_MODE_I• VC_MODE_N• VC_MODE_S |
| tcm-id | String | Tcm-id; Possible Values: <ul style="list-style-type: none">• TCM1• TCM2• TCM3• TCM4• TCM5• TCM6• NONE |
| hold-of-timer | Integer | Hold of timer will accept the number |
| wait-to-restore-timer | Integer | Will accept numbers in multiples of 60 |

Protection Profile Create

Request

- POST /restconf/operations/v1/cisco-resource-activation:create-protection-profile
- [samples/Protection Profile Create/request.xml](#)
- [samples/Protection Profile Create/request.json](#)

Response

- [samples/Protection Profile Create/response.xml](#)

Protection Profile Modify

Request

- POST /restconf/operations/v1/cisco-resource-activation:modify-protection-profile
- [samples/Protection Profile Modify/request.xml](#)
- [samples/Protection Profile Modify/request.json](#)

Response

- [samples/Protection Profile Modify/response.xml](#)

Protection Profile Terminate

Request

- POST /restconf/operations/v1/cisco-resource-activation:delete-protection-profile
- [samples/Protection Profile Terminate/request.xml](#)
- [samples/Protection Profile Terminate/request.json](#)

Response

- [samples/Protection Profile Terminate/response.xml](#)

1.46 Patchcord Create/ Delete

Patch cord create/ modify and terminate are supported through a set of operations defined as RESTCONF operations.

The internal patchcord is treated as a topological link. The RDN type is “TL”.

| Operation | Description |
|---|--|
| create-patch-cord delete-patch-cord | This operation can be used to create/ delete internal Patchcords on NCS2K |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-resource-activation:create-patch-cord /operations/v1/cisco-resource-activation:delete-patch-cord |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Returns if the Patch cord is created created/ deleted successfully. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format RA.<number> are generated by this API. For example: RA.0023 for 'A End Node should match the Z End Node. Patch cord should be created on the same Node' If error is from underlying framework/core modules error-app-tag format one of following |

| | |
|----------------|--|
| | <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-topology.yang |

Patchcord Create Request Data

| Name | Data Type | Description |
|--------------|-----------|--|
| node-ref | String | FDN of the node on which the patch cord is to be created. |
| a-end-tp-ref | String | FDN of the A End Termination point for the patchcord. |
| z-end-tp-ref | String | FDN of the Z End Termination point for the patchcord. |
| direction | String | Indicates the direction; Possible values: BIDIRECTIONAL UNIDIRECTIONAL |
| Wavelength | String | Wavelength; Possible values: NA |

Patchcord Delete Request Data

| Name | Data Type | Description |
|----------------|-----------|---|
| node-ref | String | FDN of the node on which the patch cord is to be created. |
| patch-cord-ref | String | FDN of the patchcord. Eg: MD=CISCO_EPNM!TL=10.58.234.141:PSLINE-1-14-10-TX--10.58.234.141:PSLINE-1-1-10-RX |

Patch Cord Create

Request

- POST /restconf/operations/v1/cisco-resource-activation:create-patch-cord HTTP/1.1
- [samples/Patch Cord Create/request.xml](#)
- [samples/Patch Cord Create/request.json](#)

Response

- [samples/Patch Cord Create/response.xml](#)
- [samples/Patch Cord Create/response.json](#)

Patch Cord Delete

Request

- POST /restconf/operations/v1/cisco-resource-activation:delete-patch-cord HTTP/1.1
- [samples/Patch Cord Delete/request.xml](#)
- [samples/Patch Cord Delete/request.json](#)

Response

- [samples/Patch Cord Delete/response.xml](#)
- [samples/Patch Cord Delete/response.json](#)

Patch Cord Retrieval

Request

The Patch cord is treated as a Topological Link. An attribute in the topological Link response (link-type) indicates if the link is an internal patch cord. The value “internal-patch-cord” will indicate if the link is a patch cord.

- GET /restconf/data/v1/cisco-resource-network:topological-link?fdn=<value>
HTTP/1.1

Response

- [samples/Patch Cord Retrieval/response.xml](#)
- [samples/Patch Cord Retrieval/response.json](#)

1.47 Shared Risk Resource Assign Link and Node

Shared Risk Resource Assign and Un-Assign Link and Node

| Resource | Description | |
|---------------------------------------|--|---|
| Shared Risk Resource Group Attributes | Assigns a given Node /Link to an SRRG specified by the resource Pool Name . | |
| HTTP Method | Resource Path | |
| POST | / restconf/operations/v1/cisco-resource-activation:assign-shared-risk-resource-group | |
| Query Parameters | | |
| Name | Type | Description |
| srrg-id | String | Unique SRRG ID. The SRRG ID is a unique field. |
| fdn | String | FDN of the SRRG. Eg: MD=CISCO_EPNM!SRRG=2222. Where SRRG is indicator. The value in this field is the same as present in srrg-id field. |
| user-label | String | The user defined name assigned to the SRRG. This field is not unique. |
| name | String | Name to be configured for the SRRG |
| resource-pool-ref | String | Resource pool reference, Eg : MD=CISCO_EPNM!SRRGPL=pool1 |
| resource-fdn-list | List container | Contains list of resource-fdns |
| resource-fdn | String | Resource value as fdn, Eg: MD=CISCO_EPNM!ND=NCS2006-234-42 |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Network Topology• Circuit or VC Provisioning | |
| Response Messae | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |

| | |
|---|--|
| Response Data | 0 or more SRRG resources of type SRRG Attributes – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format TL.<number> are generated by this API. For example: TL.0005 - 'For SRRG Create, User-Label is mandatory and cannot be empty'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-srrg.yang |

Create a SRRG

- POST /restconf/operations/v1/cisco-resource-activation:create-shared-risk-resource-group HTTP/1.1

Request

- [samples/Create a SRRG Link/request.xml](#)

Response

- [samples/Create a SRRG Link/response.xml](#)

Assign SRRG to a Link

- POST /restconf/operations/v1/cisco-resource-activation:assign-shared-risk-resource-group HTTP/1.1

Sample Request

- [samples/Assign a SRRG to a Link/request.xml](#)

Sample Response

- [samples/Assign a SRRG to a Link/response.xml](#)

Assign SRRG to a Node

Request

- [samples/Assign a SRRG to a Node/request.xml](#)

Response

- [samples/Assign a SRRG to a Node/response.xml](#)

1.48 Shared Risk Resource UnAssign Node and Link

UnAssign SRRG to a Link

- POST /restconf/operations/v1/cisco-resource-activation:unassign-shared-risk-resource-group HTTP/1.1

Request

- [samples/UnAssign SRRG to a Link/request.xml](#)

Response

- [samples/UnAssign SRRG to a Link/response.xml](#)

UnAssign SRRG to a Node

Request

- [samples/UnAssign SRRG to a Node/request.xml](#)

Response

- [samples/UnAssign SRRG to a Node/response.xml](#)

1.49 Shared Risk Resource Group (SRRG) – Retrieval

The SRRGs are created on EPNM. The URL allows a user to retrieve the list of SRRGs, or a given SRRG by specifying the FDN of the SRRG

Shared Risk Resource Group Retrieval Data

| Name | Type | Description |
|------------|--------|---|
| srrg-id | String | Unique SRRG ID. The SRRG ID is a unique field. |
| fdn | String | FDN of the SRRG. Eg: MD=CISCO_EPNM!SRRG=2222. Where SRRG is indicator. The value in this field is the same as present in srrg-id field. |
| user-label | String | The user defined name assigned to the SRRG. This field is not unique. |
| name | String | The display name configured for the SRRG |

Shared Risk Resource Group Retrieval

| Resource | Description |
|---------------------------------------|---|
| Shared Risk Resource Group Attributes | SRRG Attributes will be retrieved. |
| HTTP Method | Resource Path |
| GET | /restconf/data/v1/cisco-resource-network:shared-risk-resource-group?fdn=<value> |

| Query Parameters | | |
|---|---|---|
| Name | Type | Description |
| Fdn | String | FDN of the SRRG. Eg: MD=CISCO_EPNM!SRRG=2222. Where SRRG is indicator. The value in this field is the same as present in srrg-id field. |
| Authorization Required | One or more from following <ul style="list-style-type: none">Network Topology | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more SRRG resources of type SRRG Attributes – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format TL.<number> are generated by this API. For example: TL.0025 – 'Error: SRRG Configuration is required. '</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none">TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is InvalidFW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> | |
| Yang file name | cisco-srrg.yang | |

1.49.1.1 GET SRRG Retrieval

Request

- For All SRRGs: GET /restconf/data/v1/cisco-resource-network:shared-risk-resource-group HTTP/1.1
- For a given SRRG FDN: GET /restconf/data/v1/cisco-resource-network:shared-risk-resource-group?fdn=<value> HTTP/1.1

Response

- [samples/GET_SRRG_Retrieval/response.xml](#)

1.49.1.2 GET SRRG Retrieval with tIFdn Filter

Request

- GET /restconf/data/v1/cisco-resource-network:shared-risk-resource-group?tIFdn=MD=CISCO_EPNM!TL=10.10.1.84:[WDMSIDE-A]--10.10.1.85:[WDMSIDE-B]

Response

- [samples/GET SRRG Retrieval with tIFdn Filter/response.xml](#)

1.49.1.3 GET SRRG Pools List

| Resource | | Description |
|---|---|--|
| Shared Risk Resource Group Attributes | | SRRG Pool Attributes will be retrieved. |
| HTTP Method | | Resource Path |
| GET | | /restconf/data/v1/cisco-resource-network:srrg-pool |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String(fdn) | FDN of the SRRG Pool. Eg: MD=CISCO_EPNM!SRRGPL=FUTURE_3 Where SRRGPL is indicator. The value in this field is the name of the srrg pool. |
| pool-type-ref | String(fdn) | FDN of the SRRG Pool type. Eg: MD=CISCO_EPNM!SRRGPT=FUTURE Where SRRGPT is indicator. The value in this field is the name of the srrg pool type ref. |
| Authorization Required | | One or more from following <ul style="list-style-type: none">Network Topology |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more SRRG resources of type SRRG Pool Attributes – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TL.<number> are generated by this API. For example: TL.0034 – 'Resource pool name in FDN is not valid: FDN: %s.' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid | |

| | |
|----------------|--|
| | <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-srrg.yang |

Shared Risk Resource Group Pool Retrieval Data

| Name | Type | Description |
|--------------------|-------------|--|
| fdn | String(fdn) | FDN of the SRRG Pool. Eg: MD=CISCO_EPNM!SRRGPL=FUTURE_3 Where SRRGPL is indicator. The value in this field is the name of the srrg pool. |
| name | String | Name of the SRRG Pool |
| range-start | String | The start range of the pool |
| range-end | String | The end range of the pool |
| type-id | String | Type of the srrg Pool |
| pool-type-ref | String(fdn) | FDN of the SRRG Pool type reference. Eg: MD=CISCO_EPNM!SRRGPT=FUTURE |
| resource-group-ref | String(fdn) | FDN of the group reference. Eg: MD=CISCO_EPNM!SRRGR=All Locations |

Request

- `/restconf/data/v1/cisco-resource-network:srrg-pool`

Response

- [samples/GET SRRG Pool List/response.xml](#)

1.49.1.4 GET SRRG Pools List by FDN

Request

- `/restconf/data/v1/cisco-resource-network:srrg-pool?fdn=<fdn>`

Response

- [samples/GET SRRG Pool List by FDN/response.xml](#)

1.49.1.5 GET SRRG Pools based on Pool Type

| Resource | Description | |
|---------------------------------------|---|---|
| Shared Risk Resource Group Attributes | SRRG Pool Types will be retrieved. | |
| HTTP Method | Resource Path | |
| GET | /restconf/data/v1/cisco-resource-network:srrg-pool-type | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String(fdn) | FDN of the SRRG Pool Type. Eg: MD=CISCO_EPNM!SRRGPT=ROADM Degree |
| Authorization Required | One or more from following | |

| | |
|---|---|
| | <ul style="list-style-type: none"> Network Topology |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more SRRG resources of type SRRG Pool Type Attributes – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format TL.<number> are generated by this API. For example: TL.0042 – 'Invalid SRRG Pool Type Name in FDN %s'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-srrg.yang |

Shared Risk Resource Group Pool Retrieval Data

| Name | Type | Description |
|-------------|-------------|---|
| fdn | String(fdn) | FDN of the SRRG Pool. Eg: MD=CISCO_EPNM!SRRGPT=ROADM Degree |
| name | String | Name of the SRRG Pool |
| range-start | String | The start range of the pool |
| range-end | String | The end range of the pool |
| type-id | String | Type of the srrg Pool |

Request

- `/restconf/data/v1/cisco-resource-network:srrg-pool-type`

Response

- [samples/GET SRRG Pool Type/response.xml](#)

1.50 LAG Operations

The LAG operations supported are Create, Delete, Assign ports to LAG groups and Un-Assign ports from LAG groups.

LAG Create

This operation creates a LAG group identified by the user label and configuration provided.

| Resource | Description | |
|---|--|---|
| LAG config attributes | Creat LAG groups . | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-activation:create-lag | |
| Input Parameters | | |
| Name | Type | Description |
| user-label | String | Name of the LAG group to be created |
| channel-group-id | String | Indicates the unique identifier to be used for creating the LAG. The channel group id gets suffixed to the user-label upon successful creation of LAG |
| control-mode | String | Indicates if the LAG is either lacp or pagp. The allowed values are: <div><ul style="list-style-type: none">▪ lacp▪ pagp</div> |
| node-ref | String | The FDN of the node on which the LAG group has to be created. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices | |
| Response Messae | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | The data indicating the name of the LAG, the status and raw configuration returned upon a successful creation of LAG. | |
| Output Parameters | | |
| Name | Type | Description |
| user-label | String | The user label provided for the LAG creation request |
| Status | String | SUCCESS or FAILURE |
| raw-config | String | The raw configuration applied on the device for creating the LAG. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format RA.<number> are generated by this API. For example: RA.0068 – ‘Mandatory node-ref is missing ’ | |

| | |
|----------------|--|
| | <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-lag.yang |

Request

- POST URL: <https://{ServerIP}/restconf/operations/v1/cisco-resource-activation:create-lag>
- [samples/LAG Create/request.xml](#)

Response

- [samples/LAG Create/response.xml](#)

LAG Delete

This operation deletes a LAG identified by the FDN provided as query parameter to the LAG deletion URL.

| Resource | Description | |
|------------------------|---|--|
| LAG FDN | Deletes the LAG group identified by the LAG FDN. The LAG FDN follows the same naming convention as the termination point . | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-activation:delete-lag | |
| Query Parameters | | |
| Name | Type | Description |
| Fdn | String | <p>FDN of the LAG that has to be deleted. The LAG FDN is similar to termination point FDN.</p> <p>Eg: https://{server-ip}/restconf/operations/v1/cisco-resource-activation:delete-lag?fdn=MD=CISCO_EPNM!ND=tmh-chn-mvso-asr9k-2.cisco.com!FTP=name=Bundle-Ether26;lr=lr-lag-fragment</p> |
| Authorization Required | <p>One or more from following</p> <ul style="list-style-type: none">Chassis View Read and WriteMBC UI Framework AccessNetwork Devices | |
| Response Messae | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |

| | | |
|---|---|---|
| Response Data | The data indicating the name of the LAG, the status and raw configuration returned upon a successful creation of LAG. | |
| Output Parameters | | |
| Name | Type | Description |
| user-label | String | The user label provided for the LAG deletion request |
| Status | String | SUCCESS or FAILURE |
| raw-config | String | The raw configuration applied on the device for deleting the LAG. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format RA.<number> are generated by this API. For example: RA.0068 – 'Mandatory node-ref is missing '</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none">TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is InvalidFW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentialsFor complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-lag.yang | |

Request

POST URL: <https://{ServerIP}/restconf/operations/v1/cisco-resource-activation:delete-lag?fdn=MD=CISCO EPNM!ND=tmh-chn-mvso-asr9k-2.cisco.com!FTP=name=Bundle-Ether26;lr=lr-lag-fragment>

Response

- [samples/LAG_Delete/response.xml](#)

LAG Assign

This operation assigns member ports to a given LAG.

| | | |
|-----------------------|---|-------------|
| Resource | Description | |
| LAG config attributes | Assigns member ports to LAG groups . | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-activation:assign-lag-member | |
| Input Parameters | | |
| Name | Type | Description |

| | | |
|---|--|---|
| user-label | String | Name of the LAG group to which the member ports are to be assigned |
| channel-group-id | String | Indicates the channel group ID that gets suffixed to the user-label |
| control-mode | String | Indicates if the LAG is either lacp or pagp. The allowed values are: <div><ul style="list-style-type: none">▪ lacp▪ pagp</div> |
| lacp-mode | String | Identifies the modes based on the control-mode. The supported values are : -For control-mode lacp, the modes are - active and - passive. |
| pagp-mode | String | -For control-mode pagp, the modes are - auto - desirable and - on |
| node-ref | String | The FDN of the node to which the member ports have to be added |
| lag-member-list | | Contains a list of member port FDNs to un-assign from the LAG group. Contains a list of “member” elements |
| member | | Describes the member attributes, contains the mode of the member and the member-ref |
| member-ref | String | FDN of the termination point to be assigned to the LAG |
| lacp-mode | String | If the control mode is lacp, the lacp-mode s allowed. |
| pagp-mode | String | If the control mode is pagp, the pagp-mode is allowed. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read and Write• MBC UI Framework Access• Network Devices | |
| Response Messae | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | The data indicating the name of the LAG, the status and raw configuration returned upon a successful creation of LAG. | |
| Output Parameters | | |
| Name | Type | Description |
| user-label | String | The user label provided for the LAG creation request |
| Status | String | SUCCESS or FAILURE |
| raw-config | String | The raw configuration applied on the device for un assigning the member ref from the LAG. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. | |

| | |
|----------------|--|
| | <p>Error tag with format RA.<number> are generated by this API. For example: RA.0068 – 'Mandatory node-ref is missing '</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-lag.yang |

Request

- POST URL: <https://{ServerIP}/restconf/operations/v1/cisco-resource-activation:assign-lag-member>
- [samples/LAG_Assign/request.xml](#)

Response

- [samples/LAG_Assign/response.xml](#)

LAG Un-Assign

This operation un-assigns member ports from the LAG.

| Resource | Description | |
|-----------------------|---|---|
| LAG config attributes | Un Assigns member ports from a LAG group | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-activation:unassign-lag-member | |
| Input Parameters | | |
| Name | Type | Description |
| user-label | String | Name of the LAG group to be created |
| channel-group-id | String | Unique identifier that will be suffixed to the user label of the LAG |
| control-mode | String | Indicates if the LAG is either lacp or pagp. The allowed values are: <ul style="list-style-type: none">▪ lacp▪ pagp |
| lacp-mode | String | Identifies the modes based on the control-mode. The supported values are : -For control-mode lacp, the modes are - active and - passive. |
| pagp-mode | String | -For control-mode pagp, the modes are - auto - desirable and |

| | | |
|---|--|---|
| | | - on |
| node-ref | String | The FDN of the node to which the member ports have to be added |
| lag-member-list | | Contains a list of member port FDNs to un-assign from the LAG group. Contains a list of “member” elements |
| member | | Describes the member attributes, contains the mode of the member and the member-ref |
| member-ref | String | FDN of the termination point to be un-assigned from the LAG |
| lacp-mode | String | If the control mode is lacp, the lacp-mode s allowed. |
| pagp-mode | String | If the control mode is pagp, the pagp-mode is allowed. |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Network Topology• MBC UI Framework Access• Network Devices | |
| Response Messae | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | The data indicating the name of the LAG, the status and raw configuration returned upon a successful creation of LAG. | |
| Output Parameters | | |
| Name | Type | Description |
| user-label | String | The user label provided for the LAG creation request |
| Status | String | SUCCESS or FAILURE |
| raw-config | String | The raw configuration applied on the device for un assigning the member ref from the LAG. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format RA.<number> are generated by this API. For example: RA.0068 – ‘Mandatory node-ref is missing ’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">• TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-lag.yang | |

Request

- POST URL: <https://{ServerIP}/restconf/operations/v1/cisco-resource-activation:unassign-lag-member>
- [samples/LAG UnAssign/request.xml](#)

Response

- [samples/LAG UnAssign/response.xml](#)

1.51 Performance Metrics Retrieval on Topological Link- Optical Span Loss

| Resource | Description | |
|---|--|---|
| Topological Link metrics | Performance Metrics for the given topological Link. | |
| HTTP Method | Resource Path | |
| GET | /restconf/data/v1/cisco-resource-network:perf-metrics?tIfdn=<value> | |
| Query Parameters | | |
| Name | Type | Description |
| tIfdn | String | FDN of the Topological Link on which the Performance Metrics has to be retrieved. Eg: /restconf/data/v1/cisco-resource-network:perf-metrics?tIfdn=MD=CISCO_EPNM!TL=10.58.234.42:[WDMSIDE-B]--10.58.234.55:[WDMSIDE-A] |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Network Topology• Network Topology Edit | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | The Performance metrics for the given Topological Link. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format PREF.<number> are generated by this API. For example: PREF.0001 – 'Missing input. Topological Link is mandatory for performance metrics'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none">• TP.<number> - any tag starting with "TP." prefix for any internal errors like TP.0002=Given LayerRate Value is Invalid• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> | |

| | |
|----------------|----------------------------------|
| Yang file name | cisco-performance-analytics.yang |
|----------------|----------------------------------|

Performance Metrics for Topological Link Retrieval Data

The Performance metrics is retrieved for a given topological Link. The current support is for retrieving the Span Loss associated with the end points of a given topological Link. The Link FDN is given as filter parameter for the URL.

| Name | Type | Description |
|--------------------------|----------------|---|
| topological-link-metrics | Complex Object | Container Object |
| span-loss-direction | String | Indicates the direction of the Span; Possible values: A to Z Z to A |
| span-loss-value | Float | The span loss value |
| Span-loss-type | String | Indicates the span loss type. Possible values: OSC, Channel |

Request

- GET /restconf/data/v1/cisco-resource-network:perf-metrics?tIFdn=<value>
HTTP/1.1

Response

- [samples/Performance Metrics for Topological Link Retrieval/response.xml](#)

1.52 Alarm Retrieval

Alarm Retrieval through Restconf with various filters.

| Resource | Description | |
|------------------------|---|--|
| Alarm | Alarm resource which will retrieves all the alarms and retrieves alarms based on filters. | |
| HTTP Method | Resource Path | |
| GET | /restconf/data/v1/cisco-rtm:alarm?{filter} | |
| Query Parameters | | |
| Name | Type | Description |
| tp-ref | String | Alarms with the matching termination point reference will be retrieved MD=<CISCO_EPNM>!ND=<nodenmae>!CTP=name=OTU20/6/0/7;lr=lr-och-transport-unit-2 |
| nd-ref | String | Alarms with the matching node reference will be retrieved MD=<CISCO_EPNM>!ND=<nodenname> |
| eq-ref | String | Alarms with the matching equipment reference will be retrieved MD=<CISCO_EPNM>!ND=<nodenname>!EQ=<name=PWR-B;partnumber=15454-M6-DC> |
| Perceived-severity | String | Alarms with the matching perceived severity will be retrieved, possible severity values consist of (critical, major, minor, warning, cleared, intermittent |
| Ack-Status | String | Acknowledge state of the alarms will contain possible values (acknowledged, unacknowledged) |
| Authorization Required | One or more from following <ul style="list-style-type: none">View Alerts and Events | |

| Response Message | |
|---|--|
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format AL.<number> are generated by this API. For example: AL.0003 for 'ME RDN cannot be null.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-alarms.yang |

Alarm data type

| alarm -type | Data Type | Description |
|--------------------|--------------------------|--|
| Alarm | Container element | Container element holds the information about Alarm |
| alarm-identifier | Container element | Holds event, resource and cause associated to the alarm |
| Description | String | Description of the Alarm |
| Category | String | Category of alarm like Optical |
| source-object-ref | Fdn String | FDN for the Source device associated with Alarm (Eg: MD=CISCO_EPNM!ND=ncs2006-239-72 or MD=CISCO_EPNM!ND=NCS4009-Automation!CTP=name=OTU20/6/0/7;lr=lr-och-transport-unit-2 or MD=CISCO_EPNM!ND=ncs2006-239-72!EQ=name=PWR-B;partnumber=15454-M6-DC) |
| source-object-name | String | Source device name associated with the Alarm |
| node-ref | String | Device name associated with the Alarm |
| cause-type | String | Cause Type will have possible values <ul style="list-style-type: none"> • root-cause • symptom • cause-unknown |
| ack-state | String | Acknowledge state of the Alarm will contain possible values <ul style="list-style-type: none"> • acknowledged • unacknowledged |

| alarm -type | Data Type | Description |
|-----------------------------|------------------|---|
| remote-interface-ip-address | String | Device ip address associated with Alarm |
| perceived-severity | String | Alarm severity with the following possible values <ul style="list-style-type: none"> cleared indeterminate minor major critical warning |
| system-received-time | String | Alarm occurred time |
| system-update-time | String | Last updated time of the alarm |
| node-event-time | String | Device timestamp of the alarm |
| probable-cause | String | Probable cause of the alarm |
| service-affecting | String | Indicates if the alarm is service affecting coming directly from NCS 2K devices. Possible values <ul style="list-style-type: none"> service-affecting non-service-affecting service-affecting-unknown |
| service-impacting | String | Indicates if the alarm is service impacting through EPNM Service Impact Analysis. Possible values <ul style="list-style-type: none"> service-impacting non-service-impacting service-impacting-unknown |
| Note | container | Note details related to the Alarm |
| action-performed | String | Action performed on the alarm with the following possible values <ul style="list-style-type: none"> alarm-clear alarm-acknowledge alarm-unacknowledge alarm-delete alarm-anotate alarm-action-unknown |
| impacted-objects | fdn - String | List of impacted services related to alarm Eg: MD=CISCO_EPNM!CFS=OCHNC_Passive_2 |
| root-cause-alarm-identifier | Container | Root cause event identifier |
| user-defined-fields | Container | User defined fields associated with alarm |

Alarm Identifier type

| Alarm-identifier | Data Type | Description |
|------------------|-----------|-----------------------|
| event-identifier | String | Alarm id of the Alarm |

| Alarm-identifier | Data Type | Description |
|---------------------|------------|--|
| resource-object-ref | Fdn String | FDN for the Resource object reference device associated with Alarm (Eg: MD=CISCO_EPNM!ND=ncs2006-239-72 or MD=CISCO_EPNM!ND=NCS4009-Automation!CTP=name=OTU20/6/0/7;lr=lr-och-transport-unit-2 or MD=CISCO_EPNM!ND=ncs2006-239-72!EQ=name=PWR-B;partnumber=15454-M6-DC) |
| probable-cause | String | Probable cause of the alarm |

Note type

| Note | Data Type | Description |
|------------|-----------|--|
| creator-id | String | Note creator possibly username |
| Text | String | Note text – Add Details like Alarm Ack etc. here |
| note-time | String | time stamp when note created |

Root-cause-alarm-identifier

| Type | Data Type | Description |
|------------------|-----------|-----------------------|
| event-identifier | String | Alarm id of the Alarm |

User-Defined-Fields

| Type | Data Type | Description |
|--------------------|-----------|---|
| user-defined-field | Container | Container will hold user defined field's label and value related to alarm |
| Label | String | Label of User defined field associated with alarm |
| Value | String | value of User defined field associated with alarm |

Get All Alarms

Request

- GET /restconf/data/v1/cisco-rtm:alarm

Response

- [samples/Get All Alarm/response.xml](#)

Get All Alarms with User Defined Fields

Alarm retrieval will expose User defined fields associated with respective alarms in the get All alarm API

Request

- GET /restconf/data/v1/cisco-rtm:alarm

Response

- [samples/Alarms With UDF Product id product name/response.xml](#)

-
- [samples/Alarms With UDF Product id product name/response.json](#)

Get All Alarm by Tp-Ref

Request

- GET /restconf/data/v1/cisco-rtm:alarm?tp-ref=MD=CISCO_EPNM!ND=232!CTP=name=Optics0/4/0/11;lr=lr-optical-section

Response

- [samples/Get All Alarm By TP Ref/response.xml](#)

Get All Alarm by Nd-Ref

Request

- GET /restconf/data/v1/cisco-rtm:alarm?nd-ref=MD=CISCO_EPNM!ND=ONS15454-4

Response

- [samples/Get All Alarm By Nd Ref/response.xml](#)

Get All Alarm by Eq-Ref

Request

- GET /restconf/data/v1/cisco-rtm:alarm?eq-ref=MD=CISCO_EPNM!ND=ONS15454-44!EQ=name=SLOT-1-5

Response

- [samples/Get All Alarm By Eq Ref/response.xml](#)

Get All Alarm by Perceived Severity

Request

- GET restconf/data/v1/cisco-rtm:alarm?perceived-severity=major

Response

- [samples/Get All Alarm By Perceived Severity/response.xml](#)

Get All Alarm by Alarm Acknowledgement Status

Request

- GET restconf/data/v1/cisco-rtm:alarm?ack-status=acknowledged

Response

- [samples/Get All Alarm By Ack Status/response.xml](#)

Get All Alarm by Scope

Alarm retrieval can be done with a scope, scope implies creating a new virtual domain or even with a existing domain creating a new user and assign a single or multiple Network Element to the same user in EPNM GUI.

Use the newly created username/password in the rest-client and retireve alarm with following rest url:

GET /restconf/data/v1/cisco-rtm:alarm?nd-ref=MD=CISCO_EPNM!ND=NCS4k-A

Request

- GET restconf/data/v1/cisco-rtm:alarm

Response

- [samples/Get All Alarm By Scope/response.xml](#)

Get All Alarm by System-Update Time

Alarms can be retrieved using system-update-time. The alarms with system-update-time greater than or equal to the time will be retrieved.

Request

- GET/restconf/data/v1/cisco-rtm:alarm?system-update-time=2018-06-19 08:47:17.641

Response

- [samples/Get All Alarm By System Update Time/response.xml](#)

Get Alarm by Iterator Id

Request

- GET/restconf/data/v1/cisco-rtm:alarm?.iteratorId=5685737

Response

- [samples/Get All Alarm By Iterator Id/response.xml](#)

Alarm Handling

Alarm Handling capability allows to Acknowledge/ UnAcknowledge/ Clear and Delete alarms

Host: <epnm-host>

Accept: application/yang-data+xml

<p:action-performed>alarm-acknowledge</p:action-performed>

<p:action-performed>alarm-unacknowledge</p:action-performed>

<p:action-performed>alarm-clear</p:action-performed>

<p:action-performed>alarm-delete</p:action-performed>

Request

- PUT /restconf/data/v1/cisco-alarm:handle-alarm
- [samples/Alarm Handling/request.xml](#)

Response

- [samples/Alarm Handling/response.xml](#)

Alarm to Service Association

Alarms related to a service can be retrieved by the CFS-Ref

Request

- GET /restconf/data/v1/cisco-rtm:impacting-alarms-by-service?cfs-ref=<value>

Response

- [samples/Alarm to Service Association/response.xml](#)

Get All Alarms with root-cause

To retrieve all alarms with cause-type as root-cause in the system.

| Resource | Description |
|---|---|
| Alarm | Alarm resource which will retrieves all the alarms and retrieves alarms based on filters. |
| HTTP Method | Resource Path |
| GET | /restconf/data/v1/cisco-rtm:alarm-with-root-cause |
| Authorization Required | One or more from following <ul style="list-style-type: none">• View Alerts and Events |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format AL.<number> are generated by this API. For example: AL.0003 for 'ME RDN cannot be null.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none">• FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.• CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-alarms.yang |

Host: <epnm-host>

Accept: application/yang-data+xml

Request

- GET /restconf/data/v1/cisco-rtm:alarm-with-root-cause

Response

- [samples/Alarms With Root Cause/response.xml](#)

Get All symptom alarms with root-cause

To retrieve all symptom alarms associated with a single root cause alarm.

| Resource | Description | |
|---|---|---|
| Alarm | Alarm resource which will retrieves all the alarms with root-cause. | |
| HTTP Method | Resource Path | |
| POST | /data/v1/cisco-rtm:alarm-with-root-cause | |
| Input Parameters | | |
| Name | Type | Description |
| alarm-request | | Alarm request container which takes alarm-list as input |
| alarm-identifier | | |
| event-identifier | String | Alarm id of the Alarm |
| resource-object-ref | Fdn String | FDN for the Resource object reference device associated with Alarm (Eg: MD=CISCO_EPNM!ND=ncs2006-239-72) |
| probable-cause | String | Probable cause of the alarm |
| Authorization Required | One or more from following <ul style="list-style-type: none">View Alerts and Events | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format AL.<number> are generated by this API. For example: AL.0003 for ‘ME RDN cannot be null.’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-alarms.yang | |

Host: <epnm-host>

Accept: application/yang-data+xml

Request

- POST /restconf/data/v1/cisco-rtm:alarm-with-root-cause

- [samples/Alarm Symptom Alarms With Root Cause/request.xml](#)

Response

[samples/Alarm Symptom Alarms With Root Cause/response.xml](#)

Get All Alarms with symptom

To retrieve all alarms with cause-type as symptom in the system.

| Resource | Description |
|---|--|
| Alarm | Alarm resource which will retrieves all the alarms and retrieves alarms based on filters. |
| HTTP Method | Resource Path |
| GET | /restconf/data/v1/cisco-rtm:alarm-with-symptom |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • View Alerts and Events |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format AL.<number> are generated by this API. For example: AL.0003 for 'ME RDN cannot be null.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-alarms.yang |

Host: <epnm-host>

Accept: application/yang-data+xml

Request

- GET /restconf/data/v1/cisco-rtm:alarm-with-symptom

Response

- [samples/Alarms With Symptom/response.xml](#)

Get root-cause alarm with symptom alarm

To retrieve the root-cause alarm associated with a single symptom alarm.

| Resource | Description | |
|---|---|---|
| Alarm | Alarm resource which will retrieves all the alarms with symptom. | |
| HTTP Method | Resource Path | |
| POST | /data/v1/cisco-rtm:alarm-with-symptom | |
| Input Parameters | | |
| Name | Type | Description |
| alarm-request | | Alarm request container which takes alarm-list as input |
| alarm-identifier | | |
| event-identifier | String | Alarm id of the Alarm |
| resource-object-ref | Fdn String | FDN for the Resource object reference device associated with Alarm (Eg: MD=CISCO_EPNM!ND=ncs2006-239-72) |
| probable-cause | String | Probable cause of the alarm |
| Authorization Required | One or more from following <ul style="list-style-type: none">View Alerts and Events | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format AL.<number> are generated by this API. For example: AL.0003 for 'ME RDN cannot be null.' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-alarms.yang | |

Host: <epnm-host>

Accept: application/yang-data+xml

Request

- POST /restconf/data/v1/cisco-rtm:alarm-with-symptom
- [samples/Alarm Root Cause Alarms With Symptom/request.xml](#)

Response

<samples/Alarm Root Cause Alarms With Symptom/response.xml>

1.53 Controller Port

Controller Port resource path to retrieve and update media type controller mode.

Retrieve ControllerPort

| Resource | Description | |
|---|--|---|
| ControllerPort | Retrieves the Controller Port. | |
| HTTP Method | Resource Path | |
| GET | /data/v1/cisco-nrf-controller:controller-port | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String (FDN Format) | Fully Distinguished Name (FDN) of the. Given this, a corresponding single Controller Port will be returned. FDN = MD=<CISCO_EPNM>!ND=<nd_name>!CTRLP =<name> Eg: MD=CISCO_EPNM!ND=NCS4206-146.4!CTRLP=MediaType 0/4/0 |
| ndFdn | String (FDN Format) | Fully Distinguished Name (FDN) of the device. Given this, all the controller ports of this device are returned |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View Read and WriteMBC UI Framework AccessNetwork Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more controller port resources of type controller-port – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Response Data | No response if the operation succeeds. Error message is displayed if the operation fails. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format CTRL.<number> are generated by this API. For example: CTRL.0005 for 'Requires controller port fdn.' | |

| | |
|----------------|--|
| | <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang File Name | cisco-nrf-controller.yang |

Get Controller Port

Request

- GET https://{host}/restconf/data/v1/cisco-nrf-controller:controller-port

Response

- [samples/Get_Controller_Port/response.xml](#)

Update ControllerPort – MediaType Controller Mode

| Resource | Description |
|---|--|
| ControllerPort | Update the controller port – controller-port, specifically the MediaType Controller's mode can be updated |
| HTTP Method | Resource Path |
| PUT | /data/v1/cisco-nrf-controller:controller-port |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | <p>Request data of type controller-port that contains the details of the controller-port – see yang model for the data details.</p> <p>NOTE: only "mode" of the MediaType controller can be updated.</p> <p>See example request/response sections for api invocation and data</p> |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | No response if the operation succeeds. Error messages is returned if the operation fails. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format CTRL.<number> are generated by this API. For example: CTRL.0006 for 'Controller port not found with fdn: %s'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> |

| | |
|----------------|--|
| | <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to Error! Bookmark not defined.</p> |
| Yang File Name | cisco-nrf-controller.yang |

Update Controller Port – MediaType Controller Mode

Request

- PUT /restconf/data/v1/cisco-nrf-controller:controller-port
- [samples/Update Controller Port/request.xml](#)

1.54 LMP Link Create / Delete / Retrieval

LMP Link creation and deletion are done via., POST operations. LMP Links can be created between NCS2K and NCS4K or NCS4K and NCS4K nodes.

LMP Link creation requires the source and destination endpoints (Termination point FDN) to be specified.

LMP Link deletion requires the LMP Link FDN to be passed as a query parameter to the DELETE URL.

LMP Link retrieval is similar to regular topological link retrieval. The Topological Link retrieval URL is provided with the LMP Link FDN as query parameter.

LMP Link Create

| Resource | Description | |
|--------------------------|---|--|
| LMP Attributes | Creates an LMP Link between the specified endpoints | |
| HTTP Method | Resource Path | |
| POST | /restconf/operations/v1/cisco-resource-activation:imp-link-resource | |
| Input Parameters | | |
| Name | Type | Description |
| topo-link-create-request | | LMP Link Creation request container |
| source-endpoint | | |
| endpoint-ref | String | FDN of the source endpoint of the LMP. Eg: MD=CISCO_EPNM!ND=NCS2KE-235-159!PTP=name=PSLINE-5-1-11-RX;lR=LR_PHYSICAL_OPTICAL |
| dest-endpoint | | |
| endpoint-ref | String | FDN of the destination endpoint of the LMP Eg: MD=CISCO_EPNM!ND=NCS2KE-235-159!PTP=name=PSLINE-5-1-11-RX;lR=LR_PHYSICAL_OPTICAL |
| Authorization Required | One or more from following <ul style="list-style-type: none">Network Topology | |

| | | |
|---|---|--|
| | <ul style="list-style-type: none">Network Topology Edit | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | Result : Indicating the creation as CREATED / FAILED Message: | |
| | Type | Description |
| Result | String | CREATED / FAILED |
| message | String | For success case: LMP Link is created Successfully For error condition (Internal Error on Server) : Preconditions not met For API call error : LMP Link creation failed |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TL.<number> are generated by this API. For example: TL.0045 - 'LMP Link creation failed: <value>' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-topology.yang | |

LMP Link Delete

| | | |
|------------------------|---|-----------------------------------|
| Resource | Description | |
| LMP Attributes | Deletes an LMP Link specified as an URL parameter | |
| HTTP Method | Resource Path | |
| DELETE | /restconf/operations/v1/cisco-resource-activation:imp-link-resource | |
| Query Parameters | | |
| Name | Type | Description |
| Fdn | String | FDN of the LMP link to be deleted |
| Authorization Required | One or more from following <ul style="list-style-type: none">Network TopologyNetwork Topology Edit | |
| Response Messae | | |

| | | |
|---|--|--|
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | Result : Indicating the creation as CREATED / FAILED Message: | |
| | Type | Description |
| Result | String | DELETED / FAILED |
| Message | String | For success case: LMP Link is deleted Successfully For error condition (Internal Error on Server) : Preconditions not met For API call error : LMP Link deletion failed |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format TL.<number> are generated by this API. For example: TL.0046 - 'LMP Link deletion failed: <value>' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-topology.yang | |

LMP Link Create Request / Response

- POST /restconf/operations/v1/cisco-resource-activation:imp-link-resource

Request

- [samples/LMP Link Create/request.xml](#)

Response

- [samples/LMP Link Create/response.xml](#)

LMP Link Delete Request / Response

Request

- POST /restconf/operations/v1/cisco-resource-activation:imp-link-resource?fdn=MD=CISCO_EPNM!TL=10.58.235.85:49--10.58.235.159:2130706710

Response

- [samples/LMP Link Delete/response.xml](#)

LMP Link Retrieval

LMP Link is treated similar to a Topological Link. The Link can be retrieved by specifying the FDN of the Topological Link with the topological link retrieval URL.

Request

- GET URL : <https://{server IP}/restconf/data/v1/cisco-resource-network:topological-link?fdn=MD=CISCO EPNM!TL=10.58.235.159:2130706714--10.58.235.221:505>

Reponse

- [samples/LMP Link Retrieval/response.xml](#)

1.55 PCE Computation Path

This interface returns optical paths computed between two NCS 2K optical trunk ports, over which an OCH-CC or OCH-NC circuit can be created.

Request

- GET /restconf/data/v1/cisco-resource-network:vc-path?src-tp-fdn=<Source TP FDN>&dest-tp-fdn=<Destination TP FDN>

Response

- [samples/PCE Computation Path/response.xml](#)
- [samples/PCE Computation Path/response.json](#)

1.56 OTDR Link Scan

Optical Time Domain Reflectometry is used to provide information about basic characteristic of the Optical fiber among Optical nodes, like Insertion Loss and concentrate point of reflection.

OTDR Scan will be performed on a given topological link. The API is asynchronous in nature. This will initiate a onetime OTDR scan on the OTDR equipment associated with the topological link. The test id associated with the scan will be returned to the user.

The user can download the OTDR SOR file by sending request on the file download URL (e.g., [GET /restconf/operations/v1/cisco-network-resource-oam:network-resource-oam-config/otdr-scan-test-sor-file/{test-id}?check-ready=true](#)) with the test id associated to the last scan. The SOR file contain details of the last scan. The User will require a third party SOR file reader to read the SOR file.

TFTP protocol need to be enabled on the EPNM server to download the scan details(SOR) from devices(NCS1001).

NOTE: The default scan mode supported is 'Hybrid'

| Sl.no | Name | Type | Description |
|-------|------------------------------|-----------|--------------------------------|
| 1 | network-resource-oam-request | Container | Holds input request parameters |
| 2 | tl-ref | String | FDN of the topological Link |

| | | | |
|---|------------------|-------|--|
| 3 | scan-direction | QName | Indicates the scan direction to use: Allowed values: a-tx-to-z-rx – Translates to TX a-rx-to-z-tx – Translates to RX z-tx-to-a-rx – Translates to TX z-rx-to-a-tx – Translates to RX |
| 4 | distance-profile | QName | Indicates the allowed distance profile parameters: Allowed values: scan-auto-mode scan-expert-mode scan-event scan-zone-one (0-1 Km) scan-zone-two (0-25 Km) scan-zone-three (0-80 Km) scan-zone-four (full span) |

Request

- POST /restconf/operations/v1/cisco-network-resource-oam:network-resource-oam-config
- [samples/OTDR Link Scan/request.xml](#)

Response

- [samples/OTDR Link Scan/response.json](#)

Getting SOR file

URL to Download SOR file:

- GET /restconf/operations/v1/cisco-network-resource-oam:network-resource-oam-config/otdr-scan-test-sor-file/1001?check-ready=true

When Not Ready

- [samples/Getting SOR File/not_ready.json](#)

When Ready

- [samples/Getting SOR File/when_ready.txt](#)

NOTE: The OTDR file retrieved via., RESTCONF API will be in .zip format, user needs to unzip the file to get OTDR SOR file.

1.57 AINS - Automatic In-Service

NCS42xx and ASR9xx platforms shall support to manage equipment and port state model in two modes in default, namely Transport mode and router mode.

In “Transport mode” system shall support subset of generic state requirements for Network Elements (NEs) as per GR1093. In “Router mode” system shall support Cisco standard representation for Equipment and port model.

“Transport mode” is super set of “Router mode”.

| Operation | Description |
|---|---|
| Automatic In-Service | This operation to support managing equipment and port state |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-nrf-physical:reserve-equipment |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | provision-equipment-request |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View Read and WriteMBC UI Framework AccessNetwork Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Returns provision-equipment-response. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format PRE.<number> are generated by this API. For example: PRE.0019 for ‘Error, found null payload.’ If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx |
| Yang file name | cisco-nrf-physical.yang |

Below table gives details about input request arguments:

Provision Equipment Request

| Sl.no | Name | Type | Description |
|-------|------|------|-------------|
|-------|------|------|-------------|

| | | | |
|---|---------------------------|-----------|--------------------------------|
| 1 | reserve-equipment-request | Container | Holds input request parameters |
| 2 | nd-ref | String | FDN of the network device |
| 3 | parent-resource-name | String | Slot Names for the AINS |
| 4 | product-id | String | Product Id for the AINS |

Provision Equipment Response

| Sl.no | Name | Type | Description |
|-------|----------------------------|-----------|---------------------------|
| 1 | reserve-equipment-response | Container | Holds response parameters |
| 2 | Result | Container | Result container |
| 3 | Staus | String | Status of the operation |

Request

- [POST /restconf/data/v1/cisco-nrf-physical:reserve-equipment](#)
- [samples/AINS Automatic In Service/request.xml](#)

Response

- [samples/AINS Automatic In Service/response.xml](#)

1.58 Equipment Operations – Reserve, Reload, Provision

NCS2K platforms shall support the ability to reserve/pre-provision a card slot. For cards that already exist, users will have the ability to set the card mode by provisioning the card. Finally, a user may also choose to reload the card.

| Operation | Description |
|------------------------|---|
| Equipment Operation | This operation is to support managing equipment reserve/unreserve. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-nrf-physical:reserve-equipment |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | reserve-equipment-request |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Chassis View Read and Write • MBC UI Framework Access • Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Response Data | Returns reserve-equipment-response. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

| | |
|---|--|
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format PRE.<number> are generated by this API. For example: PRE.0019 for 'Error, found null payload.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-nrf-physical.yang |

Reserve Equipment

Below is the required inputs to reserve/pre-provision a NCS2K device.

| Sl.no | Name | Type | Description |
|-------|---------------------------|-----------|--------------------------------|
| 1 | reserve-equipment-request | Container | Holds input request parameters |
| 2 | nd-ref | String | FDN of the network device |
| 3 | parent-resource-name | String | Slot location of the card |
| 4 | product-id | String | Product Id for the card |
| 5 | resource-type | String | MODULE |

Reserve Equipment Response

| Sl.no | Name | Type | Description |
|-------|----------------------------|-------------|---|
| 1 | reserve-equipment-response | Container | Holds reserve equipment response parameters |
| 2 | nd-ref | String | FDN of the network device |
| 3 | parent-resource-name | String | Slot location of the card |
| 4 | product-id | String | Product Id for the card |
| 5 | resource-type | String | MODULE |
| 6 | resource-ref | String(fdn) | Resource reference FDN Eg: MD=CISCO_EPNM!ND=NCS2006-239-56!EQ=name=SLOT-2-8 |

Request

- [POST /restconf/data/v1/cisco-nrf-physical:reserve-equipment](#)
- [samples/Reserve Equipment/request.xml](#)

Response

- [samples/Reserve Equipment/response.xml](#)

Unreserve Equipment

The payload is exactly the same as Reserve Equipment. For response, you will receive a 200 message on success. The only difference is that you must change the payload to be:

```
<p:unreserve-equipment-request>
```

Reload Equipment

This api allows a user to reload an already provisioned card on an NCS2K device.

Request

- [POST /restconf/data/v1/cisco-nrf-physical:reload-equipment](#)
- [samples/Unreserve Equipment/request.xml](#)

Response

- 200 Response on success.

Provision Equipment (Card Mode)

Allows a user to set the card operating mode for a card. For available card operating modes, see the yang file.

Request

- [POST /restconf/data/v1/cisco-nrf-physical:provision-equipment](#)
- [samples/Provision Equipment Card Mode/request.xml](#)

Response

- [samples/Provision Equipment Card Mode/response.xml](#)

Unprovision Equipment (Card Mode)

Allows a user to delete the card mode for a specific card. Request and response are essentially the same. Main difference being change from provision to unprovision:

```
<p:unprovision-equipment-response />
```

and operation from “create” to “delete”

Request

- [POST /restconf/data/v1/cisco-nrf-physical:unprovision-equipment](#)
- [samples/UnProvision Equipment Card Mode/request.xml](#)

Response

- [samples/UnProvision Equipment Card Mode/response.xml](#)

Provision Card Configuration(Create)

Allows a user to set the setting trunk bit , client bit rate on different card mode. For available card modes, see the yang file.

| Sl.no | Name | Type | Description |
|-------|--------------|-------------|--|
| 1 | resource-ref | String(FDN) | Node ref of the node being used. e.g. MD=CISCO_EPNM!ND=EPNNCS4206-120.19 |

| | | | |
|---|-----------------|--------|---|
| 2 | card-mode | String | Supported Card Mode (Muxponder, Muxponder slice or Regen). Muxponder—In this mode, both trunk ports are configured with the same trunk rate. The client-to-trunk mapping is in a sequence. Muxponder slice—In this mode, each trunk port is configured independent of the other with different trunk rates. The client-to-trunk mapping is fixed. For Trunk 0, the client ports are 2 through 7. For Trunk 1, the client ports are 8 through 13. Regeneration Mode - In Regeneration (Regen) mode, the OTN signal is received on a trunk port and the regenerated OTN signal is sent on the other trunk port of the line card and the other way round. |
| 3 | slice-number | String | Indicates slice to which card mode is to be configured |
| 4 | client-bit-rate | String | Client data rate to be supported |
| 5 | trunk-bit-rate | String | Trunk data rate to be supported |

Request

- [POST /restconf/data/v1/ cisco-nrf-physical:provision-card-configuration](#)
- [samples/Card Mode Configuratioin Create/request.xml](#)

Response

[samples/Card Mode Configuratioin Create/response.xml](#)

Provision Card Configuration(Delete)

Allows a user to set the setting trunk bit , client bit rate on different card mode. For available card modes, see the yang file.

| Resource | Description |
|-------------------------|--|
| Card Configuration | Card Configuration Delete |
| HTTP Method | DELETE |
| DELETE | restconf/operations/v1/cisco-nrf-physical:provision-card-configuration?{fdn} |
| Response Message | |

| | |
|-----------------------|---|
| Response Content Type | application/xml, application/yang.data+xml, application/json, application/yang.data+json |
| Response Data | The provision-card-configuration-response — see yang model for the data details. And result of modification on the feature. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

- [POST /restconf/data/v1/ cisco-nrf-physical:provision-card-configuration](#)
- [samples/Card Mode Configuratioin Delete/request.xml](#)

Response

- [samples/Card Mode Configuratioin Delete/response.xml](#)

Provision Card Configuration(Retrieval)

Allows a user to Retrieve Card Configuration by resource FDN. For available card modes, see the yang file.

| Resource | Description |
|-------------------------|---|
| Card Configuration | Card Configuration Delete |
| HTTP Method | GET |
| DELETE | restconf/operations/v1/cisco-nrf-physical:provision-card-configuration?{fdn} |
| Response Message | |
| Response Content Type | application/xml, application/yang.data+xml, application/json, application/yang.data+json |
| Response Data | The provision-card-configuration-response — see yang model for the data details. And result of modification on the feature. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

Response

- [samples/Card Mode Configuratioin Retrieve/response.xml](#)

Pluggable Port Operations

Pluggable Port interface provides the operations required to put attributes on a given Network Device

Pluggable Port Retrieval

| Resource | Description | |
|---|---|---|
| Pluggable Port | Pluggable Port retrieval Operation | |
| HTTP Method | Resource Path | |
| GET | /restconf/operations/v1/cisco-nrf-physical:pluggable-port?fdn={} | |
| Query Parameters | | |
| Name | Type | Description |
| fdn | String | Fdn to retrieve an single pluggable port MD=<CISCO_EPNM>!ND=<nodenmae>!EQ=name=PPM-8-9 |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View ReadChassis View Read and WriteCircuit or VC ProvisioningCircuit or VC Monitoring and TroubleshootingNetwork TopologyNetwork Devices | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | 0 or more alarm resources of type alarm – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format AL.<number> are generated by this API. For example: AL.0003 for 'ME RDN cannot be null.' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none">FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found.CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx | |
| Yang file name | cisco-nrf-physical.yang | |

| Parameter Name | Type | Allowed Values | Description |
|---------------------------------|--------|-----------------------------------|---------------|
| Provision Pluggable Port | | | |
| resource-ref | string | Equipment Fdn | Equipment FDN |
| port-number | string | Numbers with a specified format | Ex 9-1 |
| port-conf-type | string | OC192, OTU2, 10G Ethernet LAN Phy | |

Request

- GET /restconf/operations/v1/cisco-nrf-physical:pluggable-port?fdn={}

Response

- [samples/Pluggable Port Retrieve/response.xml](#)
- [samples/Pluggable Port Retrieve/response.json](#)

The following table below provides the parameters that can be put on the Network device using the POST operation with **cisco-nrf-physical:pluggable-port**

Pluggable Port Create

| Resource | Description |
|-----------------------|---|
| Pluggable Port Create | Pluggable Port Create |
| HTTP Method | Resource Path |
| POST | /restconf/operations/v1/cisco-nrf-physical:pluggable-port |
| Response Message | |
| Response Content Type | application/xml, application/yang.data+xml, application/json, application/yang.data+json |
| Response Data | The provision pluggable port response – see yang model for the data details. And result of modification on the feature. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

Request

- POST /restconf/operations/v1/cisco-nrf-physical:pluggable-port
- [samples/Pluggable Port Create/request.xml](#)
- [samples/Pluggable Port Create/request.json](#)

Response

- [samples/Pluggable Port Create/response.xml](#)
- [samples/Pluggable Port Create/response.json](#)

Pluggable Port Delete

| Resource | Description |
|-----------------------|--|
| Pluggable Port Delete | Pluggable Port Delete |
| HTTP Method | Resource Path |
| DELETE | /restconf/operations/v1/cisco-nrf-physical:pluggable-port |
| Response Message | |
| Response Content Type | application/xml, application/yang.data+xml, application/json, application/yang.data+json |
| Response Data | The provision pluggable port response – see yang model for the data details. And result of modification on the feature. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

Request

- DELETE /restconf/operations/v1/cisco-nrf-physical:pluggable-port
- [samples/Pluggable Port Delete/request.xml](#)
- [samples/Pluggable Port Delete/request.json](#)

Response

- [samples/Pluggable Port Delete/response.xml](#)
- [samples/Pluggable Port Delete/response.json](#)

1.59 Protection Switch Action

Automatic protection switching (APS) is a protection mechanism for SONET networks that enables SONET connections to switch to another SONET circuit when a circuit failure occurs. A protect interface serves as the backup interface for the working interface. When the working interface fails, the protect interface quickly assumes its traffic load.

| Operation | Description |
|------------------------|--|
| protection-switch | This operation can be used to apply protection switch to service. |
| HTTP Method | Resource Path |
| POST | /operations/v1/cisco-service-action:protection-switch |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | protection-switch-service-action-request |
| Authorization Required | One or more from following <ul style="list-style-type: none">Chassis View Read and WriteMBC UI Framework AccessNetwork Devices |
| Response Message | |

| | |
|---|--|
| Response Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Response Data | Returns protection-switch-service-action-response. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Application Error Codes (error-app-tag) | <p>Response with error condition provides error tag in error-app-tag element.</p> <p>Error tag with format CFS.<number> are generated by this API. For example: CFS.0003 for 'Error in calling Optical Protection Switch Service: %s'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. • CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | Cisco-service-action.yang |

Protection-switch-service-action-request

| attribute | Data Type | Description |
|-----------------|-------------|--|
| vc-ref | String(fdn) | Fdn of the service Eg: MD=CISCO_EPNM!CFS=AGELMO_OCHNC-PSM-PROTECTED_CTC |
| action-type | Enum | Accepts following values <ul style="list-style-type: none"> • force-switch • manual-switch • clear • lockout • clearlockout |
| protection-role | Enum | Accepts following values <ul style="list-style-type: none"> • working-path • protect-path • restore-path |

Protection-switch-service-action-response

| attribute | Data Type | Description |
|-----------|-------------|---|
| vc-ref | String(fdn) | Fdn of the service Eg: MD=CISCO_EPNM!CFS=AGELMO_OCHNC-PSM-PROTECTED_CTC |
| status | String | Status of the operation with following values COMPLETED ACTION_FAILED |

| attribute | Data Type | Description |
|----------------------|-------------|---|
| result | String | Result of the operation |
| node-ref | String(fdn) | Fdn of the node Eg: MD=CISCO_EPNM!ND=454A-234-50 |
| device-configuration | String | Actual device configuration when the operation is applied to the device |

Force Switch on Working Path

Request

[POST /restconf/data/v1/cisco-service-action:protection-switch](#)

- [samples/Force Switch on Working Path/request.xml](#)

Response

- [samples/Force Switch on Working Path/response.xml](#)

Force switch on Protected Path

Request

- [POST /restconf/data/v1/cisco-service-action:protection-switch](#)
- [samples/Force Switch on Protected Path/request.xml](#)

Response

- [samples/Force Switch on Protected Path/response.xml](#)

Lockout on Working Path

1.59.1.1 *Request*

[POST /restconf/data/v1/cisco-service-action:protection-switch](#)

- [samples/Lockout on Working Path/request.xml](#)

1.59.1.2 *Response*

- [samples/Lockout on Working Path/response.xml](#)

Manual switch on working path

Request

- [POST /restconf/data/v1/cisco-service-action:protection-switch](#)
- [samples/Manual Switch on Working Path/request.xml](#)

Response

- [samples/Manual Switch on Working Path/response.xml](#)

Manual switch on Protected path

Request

- [POST /restconf/data/v1/cisco-service-action:protection-switch](#)
- [samples/Manual Switch on Protected Path/request.xml](#)

Response

- [samples/Manual Switch on Protected Path/response.xml](#)

Clear Action –Protection Switch

Request

- [POST /restconf/data/v1/cisco-service-action:protection-switch](#)
- [samples/Clear Action Protection Switch/request.xml](#)

Response

- [samples/Clear Action Protection Switch/response.xml](#)

1.60 Service Action

The set of operations defined under service action can be used to perform revert, upgrade restore and re-route an optical service. The Operation type supported is PUT. The user has to provide the VC FDN as an argument to the service action URL.

| Resource | Description | |
|---|--|--|
| Virtual Connection | The service action specified by the URL is performed on the VC provided as a query parameter to the URL. The | |
| HTTP Method | Resource Path | |
| PUT | restconf/operations/v1/cisco-service-action:restore-revert restconf/operations/v1/cisco-service-action:restore-upgrade restconf/operations/v1/cisco-service-action:restore-reroute | |
| Query Parameters | | |
| Name | Type | Description |
| vcFdn | String | The Virtual Connection FDN on which the service action has to be performed MD=<CISCO_EPNM>!VC=Trail-OCH-Test Eg: restconf/operations/v1/cisco-service-action:restore-revert ?vcFdn= MD=<CISCO_EPNM>!VC=Trail-OCH-Test |
| Authorization Required | One or more from following <ul style="list-style-type: none">• Circuit or VC Provisioning | |
| Response Message | | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json | |
| Response Data | The service action result with the configuration command will be returned on a successful operation, else a result indicating the failure of service action will be returned. The response will be of type service-action-response – see yang model for the data details. | |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. | |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. | |

| | |
|----------------|--|
| | <p>Error tag with format CFS.<number> are generated by this API. For example: CFS.0016 for 'Error when executing restore revert operation: %s.'</p> <p>If error is from underlying framework/core modules error-app-tag format one of following</p> <ul style="list-style-type: none"> FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang File Name | cisco-service-action.yang |

Service Action Restore-Revert

This operation allows a user to perform a manual revert of a service. The query parameter input should be a valid VC FDN.

- **Pre-Condition:** The restoration status of the service should be RESTORED & REVERTIBLE for the manual revert operation to succeed.
- **Post-Condition:** On successful completion of the switchRoute (manual Revert), the service will go back to its original path. The restoration status will change to NONE.

Request

- PUT /restconf/operations/v1/cisco-service-action:restore-revert?vcFdn=MD=CISCO_EPNM!VC=TRAIL-100G_final

Response

- [samples/Service Action Restore Revert/response.xml](#)

Service Action Restore-Upgrade

This operation allows a user to perform an upgrade and restore a service. The query parameter input should be a valid VC FDN.

- **Pre-Condition:** The restoration status of the service should be RESTORED or RESTORED & REVERTIBLE.
- **Post-Condition:** On successful completion of setIntendedRoute (upgradeRestore), the current restoration path will be set as the working path. Restoration Status will be set to NONE.

Request

- PUT /restconf/operations/v1/cisco-service-action:restore-upgrade?vcFdn=MD=CISCO_EPNM!VC=TRAIL-100G_final

Response

- [samples/Service Action Restore Upgrade/response.xml](#)

Service Action Restore-Reroute

This operation allows a user to perform a re-route of the Virtual connection if there is an alternate path existing. The query parameter input should be a valid VC FDN. There is no pre-condition required for this operation.

- **Pre-Condition:** The restoration status of the service should be RESTORED or RESTORED & REVERTIBLE.

Request

- PUT /restconf/operations/v1/cisco-service-action:restore-reroute?vcFdn=MD=CISCO_EPNM!VC=TRAIL-c-e_new_2

1.61 Provision 5G slot mode to EOWYN Line card

This API helps operator to provision 5G slot mode in Eowyn line card. Details about input request argument are explained in the table below:

| Sl.no | Name | Type | Description |
|-------|----------------|-------------|--|
| 1 | node-ref | String(FDN) | Node ref of the node being used. e.g. MD=CISCO_EPNM!ND=EPNNCS4206-120.19 |
| 2 | operating-mode | Container | Container for the possible modes |
| 3 | Mode | String | Indicates mode to be used. Allowed values are: EQ_MODE_10G EQ_MODE_5G EQ_MODE_TXPP_10G EQ_MODE_TXP_10G EQ_MODE_TXP_100G EQ_MODE_RGN_10G EQ_MODE_RGN_100G EQ_MODE_MXP_10_10G EQ_MODE_MXP_2x40G EQ_MODE_LOW_LATENCY EQ_MODE_FANOUT_10_10G EQ_MODE_OC3 EQ_MODE_OC12 EQ_MODE_T1 EQ_MODE_E1 EQ_MODE_NONE EQ_MODE_8G EQ_MODE_8G_1G EQ_MODE_8G_10G EQ_MODE_8G_2G EQ_MODE_ONE_10G EQ_MODE_16G_10G EQ_MODE_16G_10G_OS EQ_MODE_18G EQ_MODE_18G_OS EQ_MODE_16G EQ_MODE_16G_OS EQ_MODE_17G EQ_MODE_17G_OS EQ_MODE_4_PORTS_ONLY |

| | | | |
|----------------|---------------|-------------------------|---------------------------------|
| 4 | resource-name | String | Slot to be used e.g. slot0/3 |
| Yang file name | | cisco-nrf-physical.yang | |

Request

- POST /restconf/data/v1/cisco-nrf-physical:provision-equipment
- [samples/Provision 5G Slot Mode to EOWYN Line Card/request.xml](#)

Response

HTTP/1.1 201 Created

Server: <epnm-host>

Content-Type: application/yang.operation+xml

- [samples/Provision 5G Slot Mode to EOWYN Line Card/response.xml](#)

1.62 Device Synchronization

This API synchronize the device managed by EPNM to the device on the network.

| Resource | Description |
|---|--|
| Node | Synchronize the node in EPNM to the device on the network. |
| HTTP Method | Resource Path |
| POST | /restconf/operations/v1/cisco-nrf-physical:synchronize-node |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Request Data | Request data of type synchronize-node-request – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> • Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more response of type synchronize-node-response – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> • 200 OK - Success with response message-body • 401, 403 – Authentication and Authorization errors. • 400 Bad Request - Invalid request message. • 500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |
| Application Error Codes (error-app-tag) | Response with error condition provides error tag in error-app-tag element. Error tag with format SYNC.<number> are generated by this API. For example: SYNC.0003 for 'Errors encountered synchronizing nodes' If error is from underlying framework/core modules error-app-tag format one of following <ul style="list-style-type: none"> • FW.<number> - any tag starting with "FW." prefix for any internal errors like FW.0081=Service name %s is not found. |

| | |
|----------------|---|
| | <ul style="list-style-type: none"> CORE.<number> - any tag starting with "Core." prefix for any internal errors like CORE.0009=Bad credentials <p>For complete list of error-app-tag and error message refer to EPNM 4.1 NB API Error Codes Reference.xlsx</p> |
| Yang file name | cisco-nrf-physical.yang |

Device Synchronization Request/Response

Request

- [samples/Device Synchronization/request.xml](#)
- [samples/Device Synchronization/request.json](#)

Response

- [samples/Device Synchronization/response.xml](#)
- [samples/Device Synchronization/response.json](#)

1.63 Node Configuration - Set Admin State

This API allows to set admin state of the multiple devices managed by EPNM to the devices on the network. The request payload must be correct, otherwise it results in failure. It shows error message which needs to be corrected before sending the request. It does not allow partial execution. It results in success or failure.

| Resource | Description |
|------------------------|--|
| Node | Configure the node in EPNM to the device on the network. |
| HTTP Method | Resource Path |
| POST | /restconf/operations/v1/cisco-nrf-physical:set-node-configuration |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Request Data | Request data of type node-configuration-request – see yang model for the data details. |
| Authorization Required | One or more from following <ul style="list-style-type: none"> Network Devices |
| Response Message | |
| Response Content Type | application/xml, application/yang-data+xml, application/json, application/yang-data+json |
| Response Data | 0 or more response of type node-configuration-response – see yang model for the data details. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. <p>Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details.</p> |
| Yang file name | cisco-nrf-physical.yang |

Node Configuration – Admin State Request/Response

Request

- [samples/Set Admin State/request.xml](#)
- [samples/Set Admin State/request.json](#)

Response

- [samples/Set Admin State/response.xml](#)
- [samples/Set Admin State/response.json](#)

Troubleshooting

The table below provides some issues you might encounter when setting up the OSS integration layer. It also describes the steps to troubleshoot each issue.

| Problem Description | Indication | Probable Cause | Troubleshooting Procedure |
|---|---|---|---|
| No response to HTTP GET request | Client reports it could not get any response to the query (server is not listening at port). | Server is down. SSL certificate not installed. | Verify that server is up by logging through GUI. Install SSL certificate on server. Then examine logs/console.log for errors. |
| 401 or 403 | Server returns 404 Not Found and "No service was found." | The credentials are incorrect. | Verify that a basic Authorization header with valid user/password is included in the request. |
| Module not found | Server returns 500 Internal Server Error and an error message stating that the module was not found. | The URL is incorrect. | Issue a ../restconf/vi/modules request to get a list of supported URLs and correct the URL in the request. |
| Invalid column | Server returns 500 Internal Server Error and an error message stating that "x is not a valid column in the database". | The query arguments contain an invalid column name, pagination directive, or sorting directive. | Correct the column or directive in the query parameters. |
| No content | Server returns 204 No Content and no message body. | The query arguments or the URL do not match any objects. | Alter the URL or the query parameters to match one or more objects. |
| Data are returned in the wrong format | Expected XML format and retrieved JSON. Expected JSON format and retrieved XML. | Accept header missing or incorrect in the request. | Specify application/<desired format> in the Accept header. |
| Server error with no error message | Sent a valid URL and server returns a 500 Internal Server Error with no error message field. | Unsupported format in Accept header. | Specify supported format in the Accept header. |
| Server returns an array with no records | Server returns 200 OK and a body with an empty of the requested object type. | No objects of the requested type in the database. | Verify that services that generate this type of object are provisioned in Cisco EPN Manager. |

YANG Schema for Cisco EPN Manager RESTCONF NBI Data Modules

Download Yang and XSD Schema files.

1.64 Yang Modules

List Supported Yang Modules

Request

GET /restconf/data/ietf-yang-library:modules-state HTTP/1.1

Host: <epnm-host>

Accept: application/yang-data+xml

Authorization: Basic ...

Response

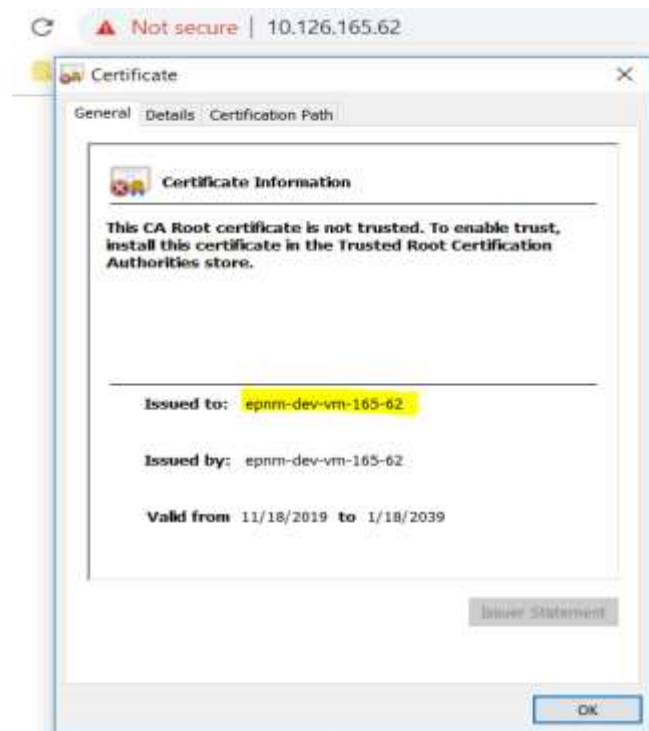
- [samples/List Supported Yang Modules/response.xml](#)

Notifications

Currently, notifications are supported using two different mechanisms:

- Connection-oriented notifications, using websockets
- Connectionless notifications

Note : While subscribing for notification, use same host name as configured in the certificate of that particular EPNM server. Please refer below screen shot for more clarity.



1.65 Supported notification types

- Inventory notifications - supported via both connection-oriented and connectionless mechanisms. This is disabled by default.
- Alarm notifications - supported via both connection-oriented and connectionless mechanisms. This is disabled by default.
- Service Activation notifications - supported via both connection-oriented and connectionless mechanisms
- Template-execution notifications – supported via both connection-oriented and connectionless mechanisms
- High-Availability (HA) notifications - supported only via connectionless notifications since a persistent connection cannot be expected during the course of a failover or failback.
- “all” – you may provide the value “all” to listen for all notifications listed above

All the above notifications share the same schema.

1.66 Enabling Inventory and Alarm Notifications

By default, inventory and alarm notifications are disabled. To enable them, open the file located at:

-
- /opt/CSCOlumos/conf/restconf/restconf-config.properties
- To enable inventory notifications, set the property below to 'true':

- epnm.restconf.inventory.notifications.enabled=true

To enable alarm notifications, set the property below to 'true':

- epnm.restconf.alarm.notifications.enabled=true

1.67 Notification Subscription Count Limits

These values are configurable from the server at:

- /opt/CSCOlumos/conf/restconf/restconf-config.properties
 - You will then need to restart EPNM for these changes to take effect.

Configurable Limits and their default Values:

- epnm.restconf.notification.subscription.limit=250
 - Represents the total number of allowed subscriptions regardless of topics
- epnm.restconf.notification.inventory.subscription.limit=50
 - Represents the total number of allowed inventory subscriptions
- epnm.restconf.notification.alarm.subscription.limit=50
 - Represents the total number of allowed alarm subscriptions
- epnm.restconf.notification.service.activation.subscription.limit=50
 - Represents the total number of allowed service activation subscriptions
- epnm.restconf.notification.template.execution.subscription.limit=50
 - Represents the total number of allowed template execution subscriptions
- epnm.restconf.notification.all.subscription.limit=50
 - Represents the total number of allowed subscriptions with the topic "all"

1.68 Notification URLs

Connection-Less

/restconf/data/v1/cisco-notifications:subscriptions/

Connection-Oriented (Websocket)

- </restconf/streams/v1/inventory>
- </restconf/streams/v1/alarm>
- </restconf/streams/v1/service-activation>
- </restconf/streams/v1/template-execution>
- </restconf/streams/v1/all>

1.69 Connection-oriented Notifications

The following is the workflow in the case of "connection-oriented" inventory notifications:

- The client subscribes to a predefined URL using a websocket client using basic authentication through a secure HTTPS channel.
 - **URL:** <https://<epnm-server-fully-qualified-domain-name>/restconf/streams/v1/{notification-type}.xml | .json>

- where {notification-type} can be either "inventory" or "service-activation" or "alarm" or "template-execution"
- and appending the url with ".xml" will result in notifications serialized to xml format and ".json" will result in notifications serialized to json
- Filters are optional and may be provided as a query parameter:
 - [/restconf/streams/v1/{notification-type}{.xml|.json}?{filterType1}={filterValue1}&{filterType2}={filterValue2}](#)
 - filter values should be URI encoded
 - productType=Cisco ASR 4000 should be encoded as: productType=Cisco%20ASR%204000
- **Authentication:** Basic auth
- If the client has provided all required information and if the provided user passes the authorization phase, a secure connection channel is established between the Cisco EPN Manager server and the client.
- Once the connection is established, the same connection will be kept alive throughout the lifecycle of the application.
 - the lifecycle here is governed by the following cases:
 - until the client disconnects from the server
 - until the server goes down either for maintenance or during a failover.
- As long as the connection is kept alive, a notification of type push-change-update is sent from the Cisco EPN Manager server to all clients that are listening for notifications.
- The yang schema for the cisco-yang-push has been included above.

A sample client for subscribing and listening to connection-oriented notifications is provided in the next section. Connectionless notifications can be received by any REST service accepting an XML or JSON payload via a POST request.

1.70 Connectionless Notifications

The following is the workflow in the case of "connectionless" notifications:

- The user is expected to a REST webservice that is capable of accepting XML and/ or JSON payloads as a POST request. This REST service is the endpoint to which the Cisco EPN Manager restconf notifications framework publishes notifications to.
- User subscribes to notifications by providing the REST service endpoint along with the topic to subscribe to. In this case, the topic will be "inventory"
 - **URL:** <https://{server}/restconf/data/v1/cisco-notifications:subscription>
 - **Method:** POST
 - **Authentication:** Basic Authentication
 - **Example Payload:**
 - [samples/notifications/connection_less_request.xml](#)
 - [samples/notifications/connection_less_request.json](#)
- where,
 - the endpoint-url is a REST service capable of accepting XML or JSON payloads as a POST request deployed in {server} at {port} using {context}. The notifications are then sent as POST payload to this endpoint-url. The REST service can then handle the notifications from the incoming POST message in any way that is desired.
 - {topic} can be either "inventory", "service-activation", "alarm", "template-execution" or "ha"
- There can be any number of subscriptions to the same type of notification.
- To get the list of notifications that the current user has access to, the following request can be used:
 - **URL:** <https://{server}/restconf/data/v1/cisco-notifications:subscription>
 - **Method:** GET
 - **Authentication:** Basic Authentication

-
- **NOTE:** "root" user can see subscriptions made by any user while any non-root user can see only notification details that they subscribed to.
 - [samples/notifications/subscription_retrieval.xml](#)
 - To get details of a single subscription:
 - **URL:** /restconf/data/v1/cisco-notifications:subscription/{subscription-id}
 - **Method:** GET
 - **Authentication:** Basic Authentication
 - To delete a subscription:
 - **URL:** /restconf/data/v1/cisco-notifications:subscription/{subscription-id}
 - **Method:** DELETE
 - **Authentication:** Basic Authentication

1.71 Notification Filters

Filter Support

Filters are supported for the following notification types:

- Inventory
- Alarms

Filter Notes

These are some things to look out for when using notifications:

- When using connection-oriented filters, the filter value should be properly URI encoded when using filter values with spaces
- Example: productType=Cisco ASR 4000 should be encoded as: productType=Cisco%20ASR%204000
- For connection-less, since the value is read as a string, it is ok to provide the space:
"push.value": "Cisco ASR 4000"

Virtual Domain Filters

Notifications are filtered based on virtual domain users. This will happen automatically when you specify the user/password information when subscribing.

- **NOTE:** "root" user can see subscriptions made by any user while any non-root user can see only notification details that they subscribed to.

elementType Filters

Notifications of the provided elementType will only be sent when this filter is provided. The filter value will correspond to the yang container element name.

The following are the current supported elementTypes filter values:

- customer
- customer-facing-service
- equipment
- ipsla-profile-details
- link-aggregation-group
- ni
- node
- physical-connector
- qos-profile
- shared-risk-resource-group
- shared-risk-resource-group-pool
- shared-risk-resource-group-pool-type
- termination-point

- topological-link
- virtual-connection
- virtual-connection-multi-layer-route-list

Subscribing with multiple elementType filters is supported. A subscription with the filters below will receive both RC_Node notifications AND Equipment notifications.

- elementType=RC_Node&elementType=Equipment

Sample Connection-less subscription

[samples/notifications/subscription payload.json](#)

Sample Connection-oriented subscription

[/restconf/streams/v1/inventory.json?elementType=physical-connector](#)

[/restconf/streams/v1/inventory.json?elementType=node&elementType=physical-connector](#)

Device Level Filters

Device level filters are applicable for the following notification types

- inventory
- alarms

The following filters may be used when looking for notifications that match a certain device property

- productType
- productFamily
- productSeries
- group
- ndFdn

A list of all supported product type/series/family may be found by accessing the “Supported Devices” page in EPNM. This page may be accessed with the URL:

- https://{server}/webacs/welcomeAction.do?commandType=abridgedShell#href=applications/swim/supported_devices/supportedDevices.html

Filters of the same key will be treated as an OR operation while filters with different keys will be treated as an AND operation when.

- productType=Cisco ASR 9000&productType=Cisco ASR 4000&productFamily=Routers
 - A subscription with the above filters will only send notifications that have a productFamily value of Routers AND a productType of either Cisco ASR 9000 OR Cisco ASR 4000

Sample Connection-less subscription

[samples/notifications/subscription payload producttype.json](#)

Sample Connection-oriented subscription

<https://{server}/restconf/streams/v1/inventory.json?productType=Cisco%20ASR%204000&productFamily=Routers>

Inverse Filters

Inverse filters are a way of applying the NOT operation on a specified filter. This lets you say you want notifications for everything that is NOT a specific topic. Inverse filters apply to all available filters.

Sample Inverse Filters – This will give you all notifications that are NOT Cisco ASR 4000 notifications.

```
{
  "push.endpoint-url": "http://10.155.124.143:7081/notifications",
  "push.topic": "inventory",
  "push.format": "json",
  "push.filters": [
    {
      "push.key": "productType",
      "push.value": "!Cisco ASR 4000"
    }
  ]
}
```

```
| }
```

1.72 Inventory Notifications

Inventory notifications in Cisco EPN Manager restconf is supported for three types of operations:

- **CREATE**
 - when a device is added to Cisco EPN Manager
 - when a service was provisioned on one or more devices that created an object in the system.
 - In this case, the entire object that was created is sent as part of the notification.
- **MODIFY/ UPDATE/ AVC (Attribute Value Change)**
 - when a device or object that exists in the system is updated.
 - In this case, the object identified by its FDN (fully distinguished name) along with the properties that were changed are sent as part of the notification.
- **DELETE**
 - when a device or object is deleted from the system.
 - Only the FDN (fully distinguished name) of the object that was deleted is sent as part of the notification.

| HTTP Method | Resource Path |
|-------------------------------|--|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Websocket | /restconf/streams/v1/inventory [.xml .json] |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation +xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following for /restconf/streams/v1/template-execution[.xml .json] <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices All of the following for /restconf/data/v1/cisco-notifications:subscription <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices• View Alerts and Events Configure Templates One or more from following |

Inventory Notification - Examples

1.72.1.1 Create notification

- [samples/notifications/create_notification.xml](#)

1.72.1.2 Update Notification

- [samples/notifications/update_notification.xml](#)

1.72.1.3 Delete Notification

- [samples/notifications/delete_notification.xml](#)

1.73 Service-Activation Notifications

When a call to provision a service is made, it is not possible to guarantee a timely response - this may be dependent on the load on the system currently among other factors. Due to this uncertainty, the Cisco EPN Manager server, upon receiving a request to provision a service, sends out a response to the user immediately after submitting the task for provisioning. The actual completion/ failure status of the provisioning task is sent out as a notification to the subscribed clients.

The response obtained by the client is expected to contain the following information:

- The Service ID - a unique ID that was created for that particular request. Audit trails for this task can be done using this ID.
- The name of the service that was submitted
- The type of deploy-action (Preview or Deploy)
- The type of the operation (Provision, Modify, Terminate)
- The status of the operation (SUBMITTED if successfully submitted, the status is updated based on operation status and moved SUBMITTED -> PENDING -> SUCCESS | FAILED.
- A generic notification URL (for connection-oriented notifications only) - to receive notifications on the status of any provisioning task. This URL is predefined and can be subscribed to even before submitting the provisioning task
 - **URL:** [https://<epnm-server-fully-qualified-domain-name>/restconf/streams/v1/service-activation\[.xml | .json\]](#)
 - where appending the url with .xml will result in notifications serialized to xml and .json will result in notifications serialized to json
 - **Authentication:** Basic auth

For connectionless notifications, the workflow of subscribing and receiving notifications is the same as that of inventory notifications, except the "topic" has to be "service-activation". The same endpoint that receives inventory notifications may be used to receive service-activation notifications.

A sample client for subscribing and listening to connection-oriented notifications is provided in the next section. Connectionless notifications can be received by any REST service accepting an XML or JSON payload via a POST request.

| HTTP Method | Resource Path |
|------------------------|--|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Websocket | /restconf/streams/v1/service-activation[.xml .json] |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following for /restconf/streams/v1/template-execution[.xml .json] <ul style="list-style-type: none">• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting All of the following for /restconf/data/v1/cisco-notifications:subscription <ul style="list-style-type: none">• Chassis View Read• Chassis View Read and Write• Circuit or VC Provisioning• Circuit or VC Monitoring and Troubleshooting• Network Topology• Network Devices• View Alerts and Events |

- Configure Templates

1.74 Alarm Notifications

Alarm notifications are sent out for the following events:

1. When an alarm is created.
2. When an alarm is assigned to a user.
3. When an alarm is acknowledged.
4. When a user adds notes to the alarm

For connectionless notifications, the workflow of subscribing and receiving notifications is the same as that of inventory notifications, except the "topic" has to be "alarm". The same endpoint that receives inventory notifications may be used to receive service-activation notifications.

A sample client for subscribing and listening to connection-oriented notifications is provided in the next section. Connectionless notifications can be received by any REST service accepting an XML or JSON payload via a POST request.

Alarms may be filtered by device properties as specified in section 8.5.3. You may specify filters in an alarm subscription the same way you would with an inventory subscription.

Sample Alarm Connection-less subscription with filters

[samples/notifications/subscription_alarm_filters.json](#)

Sample Alarm Connection-Oriented Subscription

`https://{server}/restconf/streams/v1/alarm.json?productType=Cisco%20ASR%204000&productFamily=Routers`

Alarm Specific Filters

Alarms also have 2 filters exclusively available to them:

- category
- severity
- probable-cause
 - [samples/notifications/alarm_probable_cause_enums.txt](#)
- cause-type
 - symptom
 - root-cause
 - cause-unknown

This filters are applied the same as device level filters.

1.74.1.1 Severity Filter Notes

- When specifying a filter like critical, you will also received the corresponding clear alarm when that critical alarm is cleared.
- **Sample Alarm Connection-less subscription with Filters**
 - [samples/notifications/subscription_alarm_filters.json](#)

| HTTP Method | Resource Path |
|------------------------|---|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Websocket | /restconf/streams/v1/alarm [.xml .json] |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following for /restconf/streams/v1/template-execution[.xml .json] <ul style="list-style-type: none"> • View Alerts and Events |

| | |
|--|--|
| | All of the following for /restconf/data/v1/cisco-notifications:subscription <ul style="list-style-type: none"> • Chassis View Read • Chassis View Read and Write • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices • View Alerts and Events • Configure Templates |
|--|--|

1.75 Template Execution Notifications

Notifications are also sent out to subscribed clients when a job that was executed through the Restconf NBI completes execution. Due to the asynchronous nature of these jobs, an immediate response is not guaranteed and users are encouraged to subscribe to template-execution notifications.

For connectionless notifications, the workflow of subscribing and receiving notifications is the same as that of inventory notifications, except the "topic" has to be "template-execution". The same endpoint that receives inventory notifications may be used to receive service-activation notifications.

| HTTP Method | Resource Path |
|------------------------|---|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Websocket | /restconf/streams/v1/template-execution[.xml .json] |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | One or more from following for /restconf/streams/v1/template-execution[.xml .json] <ul style="list-style-type: none"> • Configure Templates All of the following for /restconf/data/v1/cisco-notifications:subscription <ul style="list-style-type: none"> • Chassis View Read • Chassis View Read and Write • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices • View Alerts and Events • Configure Templates |

1.76 All Notifications

It is possible to subscribe to receive all notifications. Please note that this will generate a lot of notifications.

| HTTP Method | Resource Path |
|------------------------|---|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Websocket | /restconf/streams/v1/all[.xml .json] |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | All of the following <ul style="list-style-type: none"> • Chassis View Read • Chassis View Read and Write |

| | |
|--|--|
| | <ul style="list-style-type: none"> • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices • View Alerts and Events • Configure Templates |
|--|--|

1.77 High-Availability Notifications

HA notifications are sent for:

- Failover: when the secondary becomes active
- Failback: when the primary becomes active again.

Sample HA Notifications

1.77.1.1 Failover

- [samples/notifications/ha.failover.xml](#)

1.77.1.2 Failback

- [samples/notifications/ha.failback.xml](#)

| HTTP Method | Resource Path |
|------------------------|---|
| POST | /restconf/data/v1/cisco-notifications:subscription |
| Request Message | |
| Request Content Type | application/xml, application/yang.operation+xml, application/json, application/yang.operation+json |
| Authorization Required | All of the following <ul style="list-style-type: none"> • Chassis View Read • Chassis View Read and Write • Circuit or VC Provisioning • Circuit or VC Monitoring and Troubleshooting • Network Topology • Network Devices • View Alerts and Events • Configure Templates |

1.78 Notifications Client

The notifications client that is supported by Cisco EPN Manager restconf should ideally be supporting web-sockets. The recommendation is to use a client that works with "Atmosphere framework".

Sample client code

- [samples/notifications/notification_client_code.txt](#)

1.79 Notifications Schema

- [samples/notifications/notification_schema.yang](#)

Software Image Management (SWIM)

1.80 Job Details

Operations

The following sub-sections provide the details of the operations that can be used for retrieving the job details for swim jobs.

Service

| Operation | Description |
|-----------------------|--|
| Job Details by Id | This operation is used to retrieve the job details. |
| HTTP Method | Resource Path |
| GET | webacs/api/v1/op/swim/image/jobDetailsById/{jobId} |
| Request Message | |
| Request Content Type | |
| Request Data | Request data of type Long that contains the job Id. |
| Response Message | |
| Response Content Type | application/json |
| Response Data | Return a data of type SwimDashboardJobDetailsDTO that contains the details of job for given job Id. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF RFC 8040 for status codes and standard error response data for more details. |

1.80.1.1 Service Request

| Name | Type | Description |
|-------|------|-------------|
| jobId | Long | The Job Id |

1.80.1.2 Service Response

| Name | Type | Description |
|-----------------------------------|-------------------|-------------------------------------|
| SwimDashboardJobDetailsDTO | Container element | Holds the data for swim job details |

1.81 Collection Service

Operations

The following sub-sections provide the details of the operations that can be used for importing images to EPNM.

Service

| Operation | Description |
|--------------------------|---|
| Image collection Service | This operation can be used to import image to EPNM. |
| HTTP Method | Resource Path |
| POST | webacs/api/v1/op/swim/image/collect |
| Request Message | |
| Request Content Type | application/json |

| | |
|-------------------------|---|
| Request Data | Request data of type CollectionJobDTO that contains the details of the job scheduler, job specification, job type, job name, username and description. |
| Response Message | |
| Response Content Type | application/json |
| Response Data | Return a provisioning response of SwimJobResultDTO that contains job Id and job status. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

1.81.1.1 Service Request

| Name | Type | Description |
|-------------------------|-------------------|---|
| CollectionJobDTO | Container element | Holds data for the details of the job scheduler, job specification, job type, job name, username and description. |

1.81.1.2 Service Response

| Name | Type | Description |
|-------------------------|-------------------|---|
| SwimJobResultDTO | Container element | Holds the data for job schedule result. |

1.82 Commit Service

Operations

The following sub-sections provide the details of the operations that can be used to commit change in the device.

Service

| Operation | Description |
|-------------------------|---|
| Commit Service | This operation can be used to commit the changes on IOS-XR device |
| HTTP Method | Resource Path |
| POST | webacs/api/v1/op/swim/image/commit |
| Request Message | |
| Request Content Type | application/json |
| Request Data | Request data of type SwimCommitJobDTO that contains the details of the job scheduler, job specification, job type, job name, username and description. |
| Response Message | |
| Response Content Type | application/json |
| Response Data | Return a provisioning response of SwimJobResultDTO that contains job Id and job status. |
| HTTP Status Code | <ul style="list-style-type: none"> 200 OK - Success with response message-body 401, 403 – Authentication and Authorization errors. 400 Bad Request - Invalid request message. 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

1.82.1.1 Service Request

| Name | Type | Description |
|------------------|-------------------|---|
| SwimCommitJobDTO | Container element | Holds data for the details of the job scheduler, job specification, job type, job name, username and description. |

1.82.1.2 Service Response

| Name | Type | Description |
|------------------|-------------------|---|
| SwimJobResultDTO | Container element | Holds the data for job schedule result. |

1.83 Distribution Service

Operations

The following sub-sections provide the details of the operations that can be used to copy image to cisco device.

Service

| Operation | Description |
|-----------------------|--|
| Distribution Service | This operation can be used to copy image to cisco devices. |
| HTTP Method | Resource Path |
| POST | webacs/api/v1/op/swim/image/distribute |
| Request Message | |
| Request Content Type | application/json |
| Request Data | Request data of type SoftwareImageDistributionDTO contains the details of the job scheduler, job specification, job type, job name, username and description. |
| Response Message | |
| Response Content Type | application/json |
| Response Data | Return a provisioning response of SwimJobResultDTO that contains job Id and job status. |
| HTTP Status Code | <ul style="list-style-type: none">200 OK - Success with response message-body401, 403 – Authentication and Authorization errors.400 Bad Request - Invalid request message.500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

1.83.1.1 Service Request

| Name | Type | Description |
|------------------------------|-------------------|---|
| SoftwareImageDistributionDTO | Container element | Holds data for the details of the job scheduler, job specification, job type, job name, username and description. |

1.83.1.2 Service Response

| Name | Type | Description |
|------------------|-------------------|---|
| SwimJobResultDTO | Container element | Holds the data for job schedule result. |

1.84 Activation Service

Operations

The following sub-sections provide the details of the operations that can be used to install or activate image.

Service

| Operation | Description |
|-----------------------|--|
| Activation Service | This operation can be used to add/install/remove image. |
| HTTP Method | Resource Path |
| POST | webacs/api/v1/op/swim/image/activate |
| Request Message | |
| Request Content Type | application/json |
| Request Data | Request data of type SoftwareImageDistributionDTO contains the details of the job scheduler, job specification, job type, job name, username and description. |
| Response Message | |
| Response Content Type | application/json |
| Response Data | Return a provisioning response of SwimJobResultDTO that contains job Id and job status. |
| HTTP Status Code | <ul style="list-style-type: none">• 200 OK - Success with response message-body• 401, 403 – Authentication and Authorization errors.• 400 Bad Request - Invalid request message.• 500 Internal Server Error - operation-failed. Please refer to RESTCONF standard status codes and standard error response data for more details. |

1.84.1.1 Service Request

| Name | Type | Description |
|-------------------------------------|-------------------|---|
| SoftwareImageDistributionDTO | Container element | Holds data for the details of the job scheduler, job specification, job type, job name, username and description. |

1.84.1.2 Service Response

| Name | Type | Description |
|-------------------------|-------------------|---|
| SwimJobResultDTO | Container element | Holds the data for job schedule result. |

References

RESTCONF Specification

YANG Specification