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REST API Reference

NorthStar Controller 6.2 (February 4, 2021)

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NorthStar Controller 6.2 (2021-02-04)

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Working with NorthStar RESTful APIs

Use the Juniper NorthStar APIs to monitor and control your TE-LSPs.

The current API definitions can be found on the NorthStar API v2 page.

You can use the APIs and extensions after you authenticate through the authentication API.

The NorthStar RESTful APIs are designed to enable access over HTTP to most of the same data and analytics that are available to you from both the NorthStar GUI and the NorthStar CLI.

1. REST basics

Many NorthStar users have little or no prior experience developing programs or scripts that make use of use RESTful APIs. For this reason, we are providing a breif introduction designed to help you with some basics about REST and what it means to access data and functionality using common conventions associated with REST. In addition, we are providing a few simple code examples that illustrate common uses of specific APIs.

REST (REpresentational State Transfer) is a set of useful conventions and principals about transfer of information over the World Wide Web.

1.1. How you're already using REST

Many Web services are now using the principals of REST in their design.

When you type a URL into your browser, like http://example.net, your browser software creates an HTTP header that identifies:

• a desired action: GET ("get me this resource").

• a target machine (www.domain-name.com).

When you update your credit card information to an online account, your browser software creates an HTTP header with a payload that contains your form data;

The HTTP header identifies:

• a desired action: POST ("here's some update info").

• a target machine (www.domain-name.com).

The payload contains:

• form data to POST to a resource on the target machine.

1.1.1. Common HTTP verbs

The HTTP verbs (also known as methods) that are commonly used in RESTful requests are POST, GET, PUT, and DELETE. These are known as CRUD, for create, read, update, and

delete operations. Additional HTTP methods exist, but are used less frequently, including PATCH, OPTIONS and HEAD, among others, but these are not used in the NorthStar APIs

Below is a table summarizing some helpful information about common HTTP methods:

Table 1. CRUD

HTTP Verb	CRUD	Entire Collection (e.g. /customers)	Specific Item (e.g. /customers/{id})
POST	Create	201 (Created), 'Location' header with link to /customers/{id} containing new ID.	404 (Not Found), 409 (Conflict) if resource already exists..
GET	Read	200 (OK), list of customers. Use pagination, sorting and filtering to navigate big lists.	200 (OK), single customer. 404 (Not Found), if ID not found or invalid.
PUT	Update/Replace	404 (Not Found), unless you want to update/replace every resource in the entire collection.	200 (OK) or 204 (No Content). 404 (Not Found), if ID not found or invalid.
DELETE	Delete	404 (Not Found), unless you want to delete the whole collection—not often desirable.	200 (OK). 404 (Not Found), if ID not found or invalid.

1.2. Patterns for NorthStar RESTful Web services

RESTful Web services are commonly used for many familiar transactions over the Web, and their use is expanding.

RESTful requests to NorthStar will often follow patterns similar to the following request, which retrieves a full topology:

```
https://<pcs_ip>:8443/NorthStar/API/v2/tenant/1/topology/1
```

The data in a response message body can range from a single entry to thousands of lines, depending on the request. The following example illustrates the kind of data you might see returned in response to a topology request:

Figure 1. Example topology data

{"nodes":[{"topoObjectType":"node","topologyIndex":0,"name":"0840.0000.0105.02","nodeIndex":6,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"0840.0000.0105.03","nodeIndex":7,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"0840.0000.0106.02","nodeIndex":9,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.101","nodeIndex":1,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.102","nodeIndex":2,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.103","nodeIndex":3,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.104","nodeIndex":4,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.105","nodeIndex":5,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.106","nodeIndex":8,"AutonomousSystem":{"asNumber":84}},
{"topoObjectType":"node","topologyIndex":0,"name":"84.0.0.107","nodeIndex":10,"AutonomousSystem":{"asNumber":84}}],"links":
[{"topoObjectType":"link","topologyIndex":0,"name":"L111.1.84.1_111.1.84.2","linkIndex":12,"endZ":
{"topoObjectType":"interface","ipv4Address":{"topoObjectType":"ipv4","address":"111.1.84.2"},"protocols":{"RSVP":
{"bandwidth":"10G"}},"bandwidth":"10G","TEmetric":10,"TEcolor":0,"srlgs":[],"unreservedBw":
[10000000000,10000000000,10000000000,10000000000,10000000000,10000000000,10000000000,10000000000],"node":
{"topoObjectType":"node","name":"84.0.0.105"}}},
{"topoObjectType":"link","topologyIndex":0,"name":"L84.103.107.1_84.103.107.2","linkIndex":4,"endA":
{"topoObjectType":"interface","ipv4Address":{"topoObjectType":"ipv4","address":"84.103.107.1"},"protocols":{"RSVP":
{"bandwidth":"40G"}},"bandwidth":"40G","TEmetric":10,"TEcolor":0,"srlgs":[],"unreservedBw":

Figure 2. Common NorthStar RESTful requests/response patterns
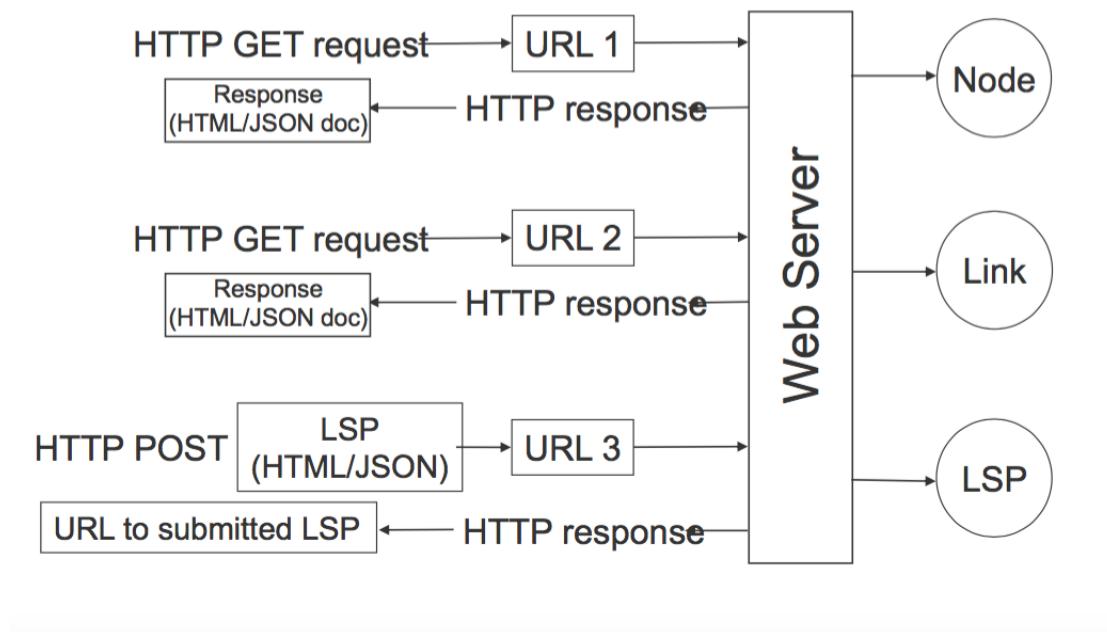
1. NorthStar Authentication

To access the NorthStar API from some environments, your application must use OAuth 2 authentication.

1.1. OAuth

OAuth 2 is an open authentication and authorization framework that orchestrates secure access to resources over HTTP. It delegates user authentication to the service that hosts the user account and grants authorization to specific third-party applications to access that account.

In the context of OAuth, the following terms are used as defined:

- *Resource.* Information or functionality available through a RESTful API.

- *Client.* The application requesting access on behalf of a user's account. Before it can get access, it must first be authorized by the user, and then the authorization must be validated by the API.

- *Resource owner.* The user who authorizes an application to access their account.

- *Authorization server.* Verifies the identity of the user, then issues access tokens to the application.

- *Resource server.* Hosts the APIs and the protected user accounts.

You can find illustrations that show how OAuth works from different points of view. Here is a protocol flow illustration that may help NorthStar users who have no prior experience provisioning OAuth:

Figure 1.1. OAuth Protocol Flow
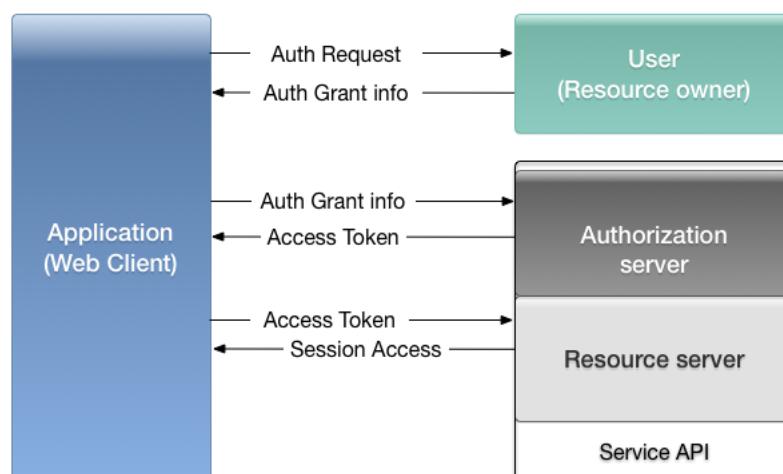
The NorthStar REST interface is the Authorization Server and Resource Server in the above illustration. The NorthStar Controller's administrator web interface is available for managing NorthStar users.

1.2. NorthStar Authentication API

Gets an authentication token that permits access to the NorthStar REST API. The token can be used in HTTP headers for subsequent RESTful requests for a period of time that you can set.

Method	URI	Description
POST	`/oauth2/token{?grant_type,user-name,password}`	Authenticates and generates a token.

1.2.1. Authenticate

Method	URI	Description
POST	`/oauth2/token{?grant_type,user-name,password}`	Authenticates and generates a token.

The Auth API is the entry point to all service APIs. To access the Auth API, you must know its URL.

Each request to NorthStar API requires the Bearer Authorization header. Clients obtain this token, along with the URL to other service APIs, by first authenticating against this URL with valid credentials.

The deployment determines how long expired tokens are stored. For example:

```
curl -u ${username}:${password} -X POST -
k -H "Content-Type: application/json" -d
'{"grant_type":"password","username":"'${username}'","password":"'${password}'
https://northstar.example.net:8443/oauth2/token
```
returns the following: `{ "access_token": "zRApShiOxoCcBiFGPRhISKAbaUACWQBRqMP-maq40/NU=","token_type": "Bearer"}`. Any subsequent assess should have the following HTTP header set: `"Authorization: 'Bearer zRApShiOxoCcBiFGPRhISK-AbaUACWQBRqMPmaq40/NU='"` set.

Normal response codes: 200

1.2.1.1. Request

This table shows the query parameters for the authenticate request:

Name	Type	Description
`grant_type`	String *(Required)*	
`username`	String *(Required)*	
`password`	String *(Required)*	

Example 1.1. Authenticate: JSON request

```
{"grant_type":"password","username":"admin","password":"myNewAdminPassword"}
```

1.2.1.2. Response

Example 1.2. Authenticate: JSON response

```
{ "access_token": "zRApShiOxoCcBiFGPRhISKAbaUACWQBRqMPmaq40/NU=","token_type":
"Bearer"}
```

2. NorthStar RESTCONF API

The RESTCONF API introduced in NorthStar 5.1 is a partially RFC8040-compliant endpoint that exposes a set of YANG Model using a REST-Like interface. NorthStar supports only JSON content type in this release. The RESTCONF API enables querying of topology, and management of TE-LSP. The Topology is read-only on the RESTCONF API. Tunnel RPCs operation are used to create and delete TE-LSPs.

Method	URI	Description
RESTCONF Endpoint		
RESTCONF HTTP Operations		
RESTCONF Query Data		
Authentication		
Supported YANG models		
Supported YANG operations		
POST	`/operations/ietf-te-operations:tunnel-atomic-create`	RPC ietf-te-operations:tunnel-atomic-create
POST	`/operations/ietf-te-operations:tunnel-atomic-delete`	RPC ietf-te-operations:tunnel-atomic-delete

2.1. RESTCONF Endpoint

The RESTCONF endpoint is exposed over SSL on the same server as the other NorthStar REST API. The default port is 8443. The Base path for RESTCONF is /restconf/. NorthStar provides the following subroutes:

- data

- operational

- operations

the data and operational in the context of the supported YANG module are equivalent.

2.1.1. URIs

An advantage of RESTful APIs is that the resources can be accessed using well-defined URLs. The models exposed using RESTCONF follow a hierarchical model described using YANG The resource location is fully described by the YANG model and RFC8040 Section 3.5.3. NorthStar supports this resource URL to access any part of the model served.

2.2. RESTCONF HTTP Operations

The Standard RESTCONF operations are defined in RFC8040 Section 4. NorthStar offers the following support

Table 2.1. NorthStar RESTCONF HTTP operations support

Verb	Supported	Description
OPTIONS	Yes	Determine which methods are supported by the server.

Verb	Supported	Description
GET	Yes	Retrieve data and metadata about a resource.
HEAD	Yes	The same as GET, but only the response headers are returned.
POST	Only for operations	Create a resource or invoke an RPC operation.
PUT	No	Create or replace a resource.
PATCH	No	Create or update (but not delete) various resources. Both plain HTTP patch (RFC 7589) and YANG patch (RFC 8072) are supported.
DELETE	No	Sent by a client to delete a target resource.

2.3. RESTCONF Query Data

RESTCONF defines query parameters in RFC8040 Section 4.8.

Table 2.2. NorthStar RESTCONF query parameters support

Query parameter	Supported	method	Possible Values	Description
content	No	GET, HEAD	all, config, nonconfig	Whether config and/or operational data is returned – default is all if content is not provided in the request
depth	No	GET, HEAD	Any positive integer value	Number of subtrees of configuration, relative to the resource, which are returned
fields	No	GET, HEAD	A semicolon-separated list of path string values	Request a subset of the content exposed by the resource or its children (e.g., id,other-elem/name to select only the ID and name of the other-elem child)
filter	No	GET, HEAD	XPath 1.0 expression to be evaluated in the root context.	Boolean notification filter for event stream resources.
insert	No	POST, PUT	first, last, before, after	Insertion mode for "ordered-by user" data resources.
point	No	POST, PUT	Path to the resource being used as insertion point.	Insertion mode for "ordered-by user" data resources.
start-time	No	GET, HEAD	Date and time following ietf-yang-type date-and-time type.	Replay buffer start time for event stream resources.
stop-time	No	GET, HEAD	Date and time following ietf-yang-type date-and-time type	Replay buffer stop time for event stream resources.
with-defaults	No	GET, HEAD	report-all, trim, explicit, report-all-tagged	Allows the content of a resource to be in-

Query parameter	Supported	method	Possible Values	Description
				cluded or excluded depending on whether the value is equal to the schema default

2.4. Authentication

NorthStar TOKEN authentication should be used to access the RESTCONF APIs endpoints.

2.5. Supported YANG models

2.5.1. ietf-network YANG Model

Access the NorthStar data model represented as ietf-network and extensions.

Method	URI	Description
GET	`/data/ietf-network:networks`	GET container ietf-network:networks.
GET	`/operational/ietf-network:networks`	GET container ietf-network:networks.

2.5.1.1. Get container ietf-network:networks

Method	URI	Description
GET	`/data/ietf-network:networks`	GET container ietf-network:networks.

Normal response codes: 200

2.5.1.1.1. Request

This operation does not accept a request body.

2.5.1.1.2. Response

Example 2.1. Get container ietf-network:networks : JSON response

Response example:

```
{
    "network": [
        {
            "ietf-network-topology:link": [
                {
                    "link-id": "NorthStar-Live:link:L0110.1200.0010_11.11.0.
105_0110.1200.0014_11.11.0.106:fwd",
                    "source": {
                        "source-node": "NorthStar-Live:node:0110.1200.0010",
                        "source-tp": "NorthStar-Live:node:0110.1200.0010:11.
11.0.105"
                    },
                    "destination": {
                        "dest-node": "NorthStar-Live:node:0110.1200.0014",
                        "dest-tp": "NorthStar-Live:node:0110.1200.0014:11.11.
0.106"
                    },
                    "ietf-te-topology:te": {
                        "state": {
                            "oper-status": "up",
                            "te-link-attributes": {
                                "access-type": "point-to-point",
                                "admin-status": "up",
                                "interface-switching-capability": [
                                    {
                                        "encoding": "ietf-te-types:lsp-
encoding-packet",
                                        "switching-capability": "ietf-te-
types:switching-psc1"
                                    }
                                ],
                                "link-protection-type": "unprotected",
                                "max-link-bandwidth": "10000000",
                                "max-resv-link-bandwidth": "10000000",
                                "unreserved-bandwidth": [
                                    {
                                        "priority": 0,
                                        "bandwidth": "10000000"
                                    },
                                    {
                                        "priority": 1,
```

```
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 2,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 3,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 4,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 5,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 6,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 7,
                                    "bandwidth": "10000000"
                                }
                            ],
                            "te-default-metric": 70,
                            "te-srlgs": {
                                "value": [
                                    113
                                ]
                            }
                        }
                    }
                }
            },
            {
                "link-id": "NorthStar-Live:link:L0110.1200.0010_11.11.0.
105_0110.1200.0014_11.11.0.106:rvs",
                "source": {
                    "source-node": "NorthStar-Live:node:0110.1200.0014",
                    "source-tp": "NorthStar-Live:node:0110.1200.0014:11.
11.0.106"
                },
                "destination": {
                    "dest-node": "NorthStar-Live:node:0110.1200.0010",
                    "dest-tp": "NorthStar-Live:node:0110.1200.0010:11.11.
0.105"
                },
                "ietf-te-topology:te": {
                    "state": {
                        "oper-status": "up",
                        "te-link-attributes": {
                            "access-type": "point-to-point",
                            "admin-status": "up",
                            "interface-switching-capability": [
                                {
                                    "encoding": "ietf-te-types:lsp-
encoding-packet",
```

```
                                "switching-capability": "ietf-te-
types:switching-psc1"
                            }
                        ],
                        "link-protection-type": "unprotected",
                        "max-link-bandwidth": "10000000",
                        "max-resv-link-bandwidth": "10000000",
                        "unreserved-bandwidth": [
                            {
                                "priority": 0,
                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 1,
                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 2,
                                "bandwidth": "10000000"
                            },
                            {
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                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 4,
                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 5,
                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 6,
                                "bandwidth": "10000000"
                            },
                            {
                                "priority": 7,
                                "bandwidth": "10000000"
                            }
                        ],
                        "te-default-metric": 70,
                        "te-srlgs": {
                            "value": [
                                113
                            ]
                        }
                    }
                }
            }
        },
        {
            "link-id": "NorthStar-Live:link:L0110.1200.0010_11.11.0.
113_0110.1200.0014_11.11.0.114:fwd",
                "source": {
                    "source-node": "NorthStar-Live:node:0110.1200.0010",
                    "source-tp": "NorthStar-Live:node:0110.1200.0010:11.
11.0.113"
                },
                "destination": {
```

```
                                "dest-node": "NorthStar-Live:node:0110.1200.0014",
                                "dest-tp": "NorthStar-Live:node:0110.1200.0014:11.11.
0.114"
                            },
                            "ietf-te-topology:te": {
                                "state": {
                                    "oper-status": "up",
                                    "te-link-attributes": {
                                        "access-type": "point-to-point",
                                        "admin-status": "up",
                                        "interface-switching-capability": [
                                            {
                                                "encoding": "ietf-te-types:lsp-
encoding-packet",
                                                "switching-capability": "ietf-te-
types:switching-psc1"
                                            }
                                        ],
                                        "link-protection-type": "unprotected",
                                        "max-link-bandwidth": "10000000",
                                        "max-resv-link-bandwidth": "10000000",
                                        "unreserved-bandwidth": [
                                            {
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                                            },
                                            {
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                                            {
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                                            },
                                            {
                                                "priority": 6,
                                                "bandwidth": "10000000"
                                            },
                                            {
                                                "priority": 7,
                                                "bandwidth": "10000000"
                                            }
                                        ],
                                        "te-default-metric": 70,
                                        "te-srlgs": {
                                            "value": [
                                                113
                                            ]
```

```
                    }
                }
            }
        }
    },
    {
        "link-id": "NorthStar-Live:link:L0110.1200.0010_11.11.0.
113_0110.1200.0014_11.11.0.114:rvs",
        "source": {
            "source-node": "NorthStar-Live:node:0110.1200.0014",
            "source-tp": "NorthStar-Live:node:0110.1200.0014:11.
11.0.114"
        },
        "destination": {
            "dest-node": "NorthStar-Live:node:0110.1200.0010",
            "dest-tp": "NorthStar-Live:node:0110.1200.0010:11.11.
0.113"
        },
        "ietf-te-topology:te": {
            "state": {
                "oper-status": "up",
                "te-link-attributes": {
                    "access-type": "point-to-point",
                    "admin-status": "up",
                    "interface-switching-capability": [
                        {
                            "encoding": "ietf-te-types:lsp-
encoding-packet",
                            "switching-capability": "ietf-te-
types:switching-psc1"
                        }
                    ],
                    "link-protection-type": "unprotected",
                    "max-link-bandwidth": "10000000",
                    "max-resv-link-bandwidth": "10000000",
                    "unreserved-bandwidth": [
                        {
                            "priority": 0,
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                        {
                            "priority": 1,
                            "bandwidth": "10000000"
                        },
                        {
                            "priority": 2,
                            "bandwidth": "10000000"
                        },
                        {
                            "priority": 3,
                            "bandwidth": "10000000"
                        },
                        {
                            "priority": 4,
                            "bandwidth": "10000000"
                        },
                        {
                            "priority": 5,
                            "bandwidth": "10000000"
                        },
```

```
                                {
                                    "priority": 6,
                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 7,
                                    "bandwidth": "10000000"
                                }
                            ],
                            "te-default-metric": 70,
                            "te-srlgs": {
                                "value": [
                                    113
                                ]
                            }
                        }
                    }
                }
            },
            {
                "link-id": "NorthStar-Live:link:L0110.1200.0009_11.11.0.
65_0110.1200.0010_11.11.0.66:fwd",
                "source": {
                    "source-node": "NorthStar-Live:node:0110.1200.0010",
                    "source-tp": "NorthStar-Live:node:0110.1200.0010:11.
11.0.66"
                },
                "destination": {
                    "dest-node": "NorthStar-Live:node:0110.1200.0009",
                    "dest-tp": "NorthStar-Live:node:0110.1200.0009:11.11.
0.65"
                },
                "ietf-te-topology:te": {
                    "state": {
                        "oper-status": "up",
                        "te-link-attributes": {
                            "access-type": "point-to-point",
                            "admin-status": "up",
                            "interface-switching-capability": [
                                {
                                    "encoding": "ietf-te-types:lsp-
encoding-packet",
                                    "switching-capability": "ietf-te-
types:switching-psc1"
                                }
                            ],
                            "link-protection-type": "unprotected",
                            "max-link-bandwidth": "10000000",
                            "max-resv-link-bandwidth": "10000000",
                            "unreserved-bandwidth": [
                                {
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                                },
                                {
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                                    "bandwidth": "10000000"
                                },
                                {
                                    "priority": 2,
```

```
                                    "bandwidth": "10000000"
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                                {

                                    "priority": 6,
                                    "bandwidth": "10000000"
                                },
                                {

                                    "priority": 7,
                                    "bandwidth": "10000000"
                                }
                            ],
                            "te-default-metric": 10
                        }
                    }
                }
            },
            {
                "link-id": "NorthStar-Live:link:L0110.1200.0009_11.11.0.
65_0110.1200.0010_11.11.0.66:rvs",
                    "source": {
                        "source-node": "NorthStar-Live:node:0110.1200.0009",
                        "source-tp": "NorthStar-Live:node:0110.1200.0009:11.
11.0.65"
                    },
                    "destination": {
                        "dest-node": "NorthStar-Live:node:0110.1200.0010",
                        "dest-tp": "NorthStar-Live:node:0110.1200.0010:11.11.
0.66"
                    },
                    "ietf-te-topology:te": {
                    "state": {
                        "oper-status": "up",
                        "te-link-attributes": {
                            "access-type": "point-to-point",
                            "admin-status": "up",
                            "interface-switching-capability": [
                                {
                                    "encoding": "ietf-te-types:lsp-
encoding-packet",
                                    "switching-capability": "ietf-te-
types:switching-psc1"
                                }
                            ],
                            "link-protection-type": "unprotected",
                            "max-link-bandwidth": "10000000",
                            "max-resv-link-bandwidth": "10000000",
                            "unreserved-bandwidth": [
                                {
```

```
                                      "priority": 0,
                                      "bandwidth": "10000000"
                                },
                                {
                                      "priority": 1,
                                      "bandwidth": "10000000"
                                },
                                {
                                      "priority": 2,
                                      "bandwidth": "10000000"
                                },
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                    "state": {
                        "te-node-attributes": {
                            "name": "use1-sv2-spine1-sv2"
                        }
                    }
                }
            },
            {
                "node-id": "NorthStar-Live:node:0110.1200.0007",
                "ietf-te-topology:te-node-id": "11.12.0.7",
                "ietf-te-topology:te": {
                    "state": {
                        "te-node-attributes": {
                            "name": "use2-sv2"
                        }
                    }
                }
            },
            {
                "node-id": "NorthStar-Live:node:0110.1200.0008",
                "ietf-te-topology:te-node-id": "11.12.0.8",
                "ietf-te-topology:te": {
                    "state": {
                        "te-node-attributes": {
                            "name": "use2-sv2-spine2-sv2"
                        }
                    }
                }
            },
            {
                "node-id": "NorthStar-Live:node:0110.1200.0009",
                "ietf-te-topology:te-node-id": "11.12.0.9",
                "ietf-te-topology:te": {
                    "state": {
                        "te-node-attributes": {
                            "name": "use1-sv3"
                        }
                    }
                }
            }
```

```
            ],
            "server-provided": true
        }
    ]
}
```

2.5.1.2. Get container ietf-network:networks

Method	URI	Description
GET	`/operational/ietf-network:networks`	GET container ietf-network:networks.

Normal response codes: 200

2.5.1.2.1. Request

This operation does not accept a request body.

2.5.1.2.2. Response

See the /data example

This operation does not return a response body.

2.5.2. ietf-te YANG Model

Access the NortStar data model represented as ietf-te and extensions.

Method	URI	Description
GET	`/data/ietf-te:te`	GET container ietf-te:te.
GET	`/operational/ietf-te:te`	GET container ietf-te:te.

2.5.2.1. Get container ietf-te:te

Method	URI	Description
GET	`/data/ietf-te:te`	GET container ietf-te:te.

Normal response codes: 200

2.5.2.1.1. Request

This operation does not accept a request body.

2.5.2.1.2. Response

Example 2.2. Get container ietf-te:te : JSON response

Response example:

```
{
    "tunnels": {
        "tunnel": [
            {
                "name": "dd 11.12.0.1",
                "identifier": 49,
                "config": {
                    "type": "ietf-te-types:tunnel-p2p",
                    "name": "dd 11.12.0.1",
                    "identifier": 49,
                    "lsp-priority-setup": 7,
                    "lsp-priority-hold": 7,
                    "admin-status": "ietf-te-types:state-up",
                    "source": "11.12.0.1",
                    "destination": "11.12.0.9"
                },
                "primary-paths": [
                    {
                        "name": "working",
                        "config": {
                            "name": "working",
                            "path-constraints": {
                                "metric-type": "path-metric-te",
                                "tiebreaker-type": "path-tiebreaker-maxfill"
                            },
                            "dynamic": [
                                null
                            ]
                        }
                    }
                ]
            },
            {
                "name": "short.1 11.12.0.1",
                "identifier": 50,
                "config": {
                    "type": "ietf-te-types:tunnel-p2p",
                    "name": "short.1 11.12.0.1",
                    "identifier": 50,
                    "lsp-priority-setup": 0,
                    "lsp-priority-hold": 0,
```

```
                    "admin-status": "ietf-te-types:state-up",
                    "source": "11.12.0.1",
                    "destination": "11.12.0.9"
                },
                "primary-paths": [
                    {
                        "name": "use1-sv3",
                        "config": {
                            "name": "use1-sv3",
                            "path-constraints": {
                                "metric-type": "path-metric-te",
                                "tiebreaker-type": "path-tiebreaker-maxfill"
                            },
                            "dynamic": [
                                null
                            ]
                        }
                    }
                ]
            },
            {
                "name": "long.1 11.12.0.1",
                "identifier": 51,
                "config": {
                    "type": "ietf-te-types:tunnel-p2p",
                    "name": "long.1 11.12.0.1",
                    "identifier": 51,
                    "lsp-priority-setup": 0,
                    "lsp-priority-hold": 0,
                    "admin-status": "ietf-te-types:state-up",
                    "source": "11.12.0.1",
                    "destination": "11.12.0.9"
                },
                "primary-paths": [
                    {
                        "name": "use1-sv3",
                        "config": {
                            "name": "use1-sv3",
                            "path-constraints": {
                                "metric-type": "path-metric-te",
                                "tiebreaker-type": "path-tiebreaker-maxfill"
                            },
                            "dynamic": [
                                null
                            ]
                        }
                    }
                ]
            },
            {
                "name": "tunnel-type=p2p&pce=174.59.0.12&tid=tunnel:15&id=15
    11.12.0.1",
                "identifier": 52,
                "config": {
                    "type": "ietf-te-types:tunnel-p2p",
                    "name": "tunnel-type=p2p&pce=174.59.0.12&tid=tunnel:15&id=
    15 11.12.0.1",
                    "identifier": 52,
                    "lsp-priority-setup": 3,
                    "lsp-priority-hold": 0,
```

```
                        "admin-status": "ietf-te-types:state-up",
                        "source": "11.12.0.1",
                        "destination": "11.12.0.9"
                    },
                    "state": {
                        "type": "ietf-te-types:tunnel-p2p",
                        "name": "tunnel-type=p2p&pce=174.59.0.12&tid=tunnel:15&id=
15 11.12.0.1",
                        "identifier": 52,
                        "admin-status": "ietf-te-types:state-up",
                        "source": "11.12.0.1",
                        "destination": "11.12.0.9"
                    },
                    "primary-paths": [
                        {
                            "name": "path=1&pce=174.59.0.12&tid=tunnel:15&id=15",
                            "config": {
                                "name": "path=1&pce=174.59.0.12&tid=tunnel:15&id=
15",
                                "path-constraints": {
                                    "metric-type": "ietf-te-types:path-metric-
igp",
                                    "cost-limit": 20000000,
                                    "tiebreaker-type": "path-tiebreaker-maxfill"
                                },
                                "dynamic": [
                                    null
                                ]
                            },
                            "state": {
                                "name": "path=1&pce=174.59.0.12&tid=tunnel:15&id=
15",
                                "lsp": [
                                    {
                                        "source": "11.12.0.1",
                                        "destination": "11.12.0.9",
                                        "tunnel-id": 17005,
                                        "lsp-id": 1,
                                        "extended-tunnel-id": "11.12.0.1",
                                        "type": "ietf-te-types:tunnel-p2p"
                                    }
                                ]
                            }
                        }
                    ]
                }
            ]
        },
        "lsps-state": {
            "lsp": [
                {
                    "source": "11.12.0.1",
                    "destination": "11.12.0.9",
                    "tunnel-id": 16996,
                    "lsp-id": 1,
                    "extended-tunnel-id": "11.12.0.1",
                    "type": "ietf-te-types:tunnel-p2p",
                    "lsp-protection-role": "working",
                    "oper-status": "ietf-te-types:state-up",
                    "origin-type": "ingress",
```

```
                "lsp-resource-status": "primary"
            },
            {

                "source": "11.12.0.1",
                "destination": "11.12.0.9",
                "tunnel-id": 16997,
                "lsp-id": 1,
                "extended-tunnel-id": "11.12.0.1",
                "type": "ietf-te-types:tunnel-p2p",
                "lsp-protection-role": "working",
                "oper-status": "ietf-te-types:state-up",
                "origin-type": "ingress",
                "lsp-resource-status": "primary"
            },
            {

                "source": "11.12.0.1",
                "destination": "11.12.0.9",
                "tunnel-id": 16998,
                "lsp-id": 1,
                "extended-tunnel-id": "11.12.0.1",
                "type": "ietf-te-types:tunnel-p2p",
                "lsp-protection-role": "working",
                "oper-status": "ietf-te-types:state-up",
                "origin-type": "ingress",
                "lsp-resource-status": "primary"
            },
            {

                "source": "11.12.0.1",
                "destination": "11.12.0.9",
                "tunnel-id": 17005,
                "lsp-id": 1,
                "extended-tunnel-id": "11.12.0.1",
                "type": "ietf-te-types:tunnel-p2p",
                "lsp-protection-role": "working",
                "oper-status": "ietf-te-types:state-up",
                "origin-type": "ingress",
                "lsp-resource-status": "primary"
            }
        ]
    }
}
```

2.5.2.2. Get container ietf-te:te

Method	URI	Description
GET	`/operational/ietf-te:te`	GET container ietf-te:te.

Normal response codes: 200

2.5.2.2.1. Request

This operation does not accept a request body.

2.5.2.2.2. Response

See the /data example

This operation does not return a response body.

2.5.3. ietf-yang-library YANG Model

The list of supported YANG models and their version is accessed through the following end-point.

Deviation: NorthStar does not support the features parameter.

Method	URI	Description
GET	`/data/ietf-yang-library:modules-state`	GET container ietf-yang-library:modules-state.
GET	`/operational/ietf-yang-library:modules-state`	GET container ietf-yang-library:modules-state.

2.5.3.1. Get container ietf-yang-library:modules-state

Method	URI	Description
GET	/data/ietf-yang-library:modules-state	GET container ietf-yang-library:modules-state.

Normal response codes: 200

2.5.3.1.1. Request

This operation does not accept a request body.

2.5.3.1.2. Response

Example 2.3. Get container ietf-yang-library:modules-state : JSON response

Response example:

```
{
    "module-set-id": "ac77dcbcf7bde64024c6f8950ef9ac3f",
    "module": [
        {
            "name": "ietf-inet-types",
            "namespace": "urn:ietf:params:xml:ns:yang:ietf-inet-types",
            "revision": "2013-07-15",
            "feature": [],
            "conformance-type": "implement"
        },
        {
            "name": "ietf-network",
            "namespace": "urn:ietf:params:xml:ns:yang:ietf-network",
            "revision": "2017-01-03",
            "feature": [],
            "conformance-type": "implement"
        },
        {
            "name": "ietf-yang-types",
            "namespace": "urn:ietf:params:xml:ns:yang:ietf-yang-types",
            "revision": "2013-07-15",
            "feature": [],
            "conformance-type": "implement"
        },
        {
            "name": "ietf-te-types",
            "namespace": "urn:ietf:params:xml:ns:yang:ietf-te-types",
            "revision": "2016-10-26",
            "feature": [
                "p2mp-te",
                "frr-te",
                "extended-admin-groups",
                "named-path-affinities",
                "named-extended-admin-groups",
                "named-srlg-groups",
                "named-path-constraints"
            ],
            "conformance-type": "implement"
        },
        {
```

```
                "name": "ietf-network-topology",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-network-topology",
                "revision": "2017-01-03",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-te-topology",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-te-topology",
                "revision": "2017-01-10",
                "feature": [
                    "nsrlg",
                    "te-topology-hierarchy",
                    "template"
                ],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-te",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-te",
                "revision": "2016-10-26",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-interfaces",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-interfaces",
                "revision": "2014-05-08",
                "feature": [
                    "arbitrary-names",
                    "pre-provisioning",
                    "if-mib"
                ],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-routing",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-routing",
                "revision": "2016-08-18",
                "feature": [
                    "multiple-ribs",
                    "router-id"
                ],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-rsvp",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-rsvp",
                "revision": "2016-10-29",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-mpls",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-mpls",
                "revision": "2016-07-05",
                "feature": [],
                "conformance-type": "implement"
            },
            {
```

```
                "name": "ietf-te-mpls-types",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-te-mpls-types",
                "revision": "2016-10-26",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-te-device",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-te-device",
                "revision": "2016-10-26",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-rsvp-te-mpls",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-rsvp-te-mpls",
                "revision": "2016-10-26",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-yang-library",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-yang-library",
                "revision": "2016-06-21",
                "feature": [],
                "conformance-type": "implement"
            },
            {
                "name": "ietf-te-operations",
                "namespace": "urn:ietf:params:xml:ns:yang:ietf-te-operations",
                "revision": "2016-12-08",
                "feature": [],
                "conformance-type": "implement"
            }
        ]
}
```

2.5.3.2. Get container ietf-yang-library:modules-state

Method	URI	Description
GET	`/operational/ietf-yang-library:modules-state`	GET container ietf-yang-library:modules-state.

Normal response codes: 200

2.5.3.2.1. Request

This operation does not accept a request body.

2.5.3.2.2. Response

See the /data example

This operation does not return a response body.

2.6. Supported YANG operations

NorthStar supports the following RESTCONF RPCs

Method	URI	Description
POST	`/operations/ietf-te-operations:tunnel-atomic-create`	RPC ietf-te-operations:tunnel-atomic-create
POST	`/operations/ietf-te-operations:tunnel-atomic-delete`	RPC ietf-te-operations:tunnel-atomic-delete

2.6.1. execute RPC ietf-te-operations:tunnel-atomic-create

Method	URI	Description
POST	`/operations/ietf-te-operations:tunnel-atomic-create`	RPC ietf-te-operations:tunnel-atomic-create

Execute the RPC calls ietf-te-operations:tunnel-atomic-create defined in ietf-te-operations. Atomic request for tunnel operation in case of cooperative operation. Requested tunnel is created in the datastore only if feasible; in other terms resources are available at the time of the RPC. The creation is done according to requested attributes: so if compute-only flag is present, no resources are allocated in the network. The tunnels, created using this RPC, are not ephemeral. In case of no path found or of failure no tunnel must be created both in the datastore and in the network: no resource must remain allocated. The RPC MUST return only when all the operations are concluded, also in the network if requested.

Normal response codes: 200

2.6.1.1. Request

Example 2.4. execute RPC ietf-te-operations:tunnel-atomic-create: JSON request

NorthStar has additional restrictions, described by the following schema:

```
{"id":"ietf-te-operations-deviation.json","title":"NS
restrictions","$schema":"http://json-schema.org/draft-04/schema#",
"$ref":"ietf-te-operations-deviation.json#/definitions/tunnelConfig",
"definitions":{"tunnelConfig":{"type":"object","required":["name","source",
"destination","identifier"],"additionalProperties":true,"properties":
{"identifier":{"type":"integer"},"source":{"type":"string"},"destination":
{"type":"string"},"type":{"type":"string","enum":["ietf-te-types:tunnel-
p2p"]},"admin-status":{"type":"string","enum":["ietf-te-types:state-up"]},
"lsp-protection-type":{"type":"string","enum":["lsp-prot-unprotected","lsp-
prot-reroute-extra","lsp-prot-reroute","ietf-te-types:lsp-prot-unprotected",
"ietf-te-types:lsp-prot-reroute-extra","ietf-te-types:lsp-prot-reroute"]}}}}}
```

Request example:

```
{
 "input": {
  "tunnel-request": [
   {
    "id": "11",
    "config": {
     "identifier": 15,
     "name": "tunnel-type=p2p&pce=174.59.0.12&tid=tunnel:15&id=15",
     "source": "11.12.0.1",
     "destination": "11.12.0.9",
     "lsp-priority-setup": 3,
     "lsp-priority-hold": 0,
     "te-bandwidth": {
      "psc": "SZiWgA=="
     }
```

```
     },
     "primary-paths": [
      {
       "config": {
        "name": "path=1&pce=174.59.0.12&tid=tunnel:15&id=15",
        "preference": 1,
        "dynamic": [
         null
        ],
        "path-constraints": {
         "cost-limit": 20000000,
         "metric-type": "ietf-te-types:path-metric-igp"
        }
       }
      }
     ]
    }
   ]
  }
}
```

2.6.1.2. Response

Example 2.5. execute RPC ietf-te-operations:tunnel-atomic-create: JSON response

Response example:

```
{
    "output": {
        "response": [
            {
                "id": "11",
                "source": "11.12.0.1",
                "destination": "11.12.0.9",
                "tunnel-name": "tunnel-type=p2p&pce=174.59.0.12&tid=tunnel:15&
id=15 11.12.0.1",
                "tunnel-identifier": 52,
                "primary-paths": [
                    {
                        "state": {
                            "name": "path=1&pce=174.59.0.12&tid=tunnel:15&id=
15",
                            "path-constraints": {
                                "metric-type": "ietf-te-types:path-metric-
igp",
                                "cost-limit": 20000000
                            },
                            "dynamic": [
                                null
                            ]
                        }
                    }
                ]
            }
        ]
    }
}
```

2.6.2. execute RPC ietf-te-operations:tunnel-atomic-delete

Method	URI	Description
POST	`/operations/ietf-te-operations:tunnel-atomic-delete`	RPC ietf-te-operations:tunnel-atomic-delete

Execute the RPC calls ietf-te-operations:tunnel-atomic-delete defined in ietf-te-operations. The RPC is an Atomic request for tunnel operation in case of cooperative operation. Requested tunnel is removed in the datastore only if feasible; The RPC MUST return only when all the operations are concluded, also in the network if requested.

Normal response codes: 200

2.6.2.1. Request

NorthStar has additional restrictions, described by the following schema:

```
            {"id":"ietf-te-operations-deviation.json","title":"NS
 restrictions","$schema":"http://json-schema.org/draft-04/schema#",
"$ref":"ietf-te-operations-deviation.json#/definitions/tunnelConfig",
"definitions":{"tunnelConfig":{"type":"object","required":["name","source",
"destination","identifier"],"additionalProperties":true,"properties":
{"identifier":{"type":"integer"},"source":{"type":"string"},"destination":
{"type":"string"},"type":{"type":"string","enum":["ietf-te-types:tunnel-
p2p"]},"admin-status":{"type":"string","enum":["ietf-te-types:state-up"]},
"lsp-protection-type":{"type":"string","enum":["lsp-prot-unprotected","lsp-
prot-reroute-extra","lsp-prot-reroute","ietf-te-types:lsp-prot-unprotected",
"ietf-te-types:lsp-prot-reroute-extra","ietf-te-types:lsp-prot-reroute"]}}}}}
```

This operation does not accept a request body.

2.6.2.2. Response

This operation does not return a response body.

3. NorthStar API v1

The Juniper Networks NorthStar API enables querying of topology, management of topology planning parameters, and management of TE-LSP.

You can access the API through the NorthStar server (for example, northstar.example.net) through HTTP port 8091 and HTTPS port 8443, using the following base URLs:

- http://northstar.example.net:8091/NorthStar/API/

- https://northstar.example.net:8443/NorthStar/API/

In our examples, we use HTTP, however the same functionality is available over HTTPS.

All of the NorthStar RESTful APIS use JSON-formatted data that conforms to the JSON-Schema specification. The main schema is topology_v2.json, but it contains links to the other data types. All schema can be found in this archive. Common data types are described in common.json. The following kinds of data are accessible and can be manipulated using the RESTful API:

- Nodes: communication endpoints.

- Links: lines or channels through which data is transmitted.

- Topology: A collection of nodes and links.

- TE-LSPs: Traffic-engineered label-switched paths.

Method	URI	Description
Topology		
GET	`/v1/tenant/{tenant_id}/topology`	List available topologies.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}`	Lists topological elements. The example shows three nodes, and two point-to-point links between node 11 and node 8. One node is PCEP-enabled (node 8, name 62.0.0.104) and one node is a pseudo node (node 2). Pseudo nodes do not have router-ids in their respective protocol object and have the pseudoNode attribute set to TRUE.
DELETE	`/v1/tenant/{tenant_id}/topology/{topology_id}`	Deletes all the topology planned data. The information acquired through BGP-LS reappears immediately.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/status/pce`	Retrieves the status of the PCEP protocol adapter component.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/status/topologyAcquisition`	Retrieves the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/status/pathComputationServer`	Retrieves the status of the Path Computation Server component.
Node		
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/nodes`	Retrieves the full list of nodes.
POST	`/v1/tenant/{tenant_id}/topology/{topology_id}/nodes`	Creates a planned node. The request must follow the schema node.json#/definitions/createNode .
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/nodes/search{?name,hostName,AS,queryType}`	Searchs the node list based on the URI parameters. For example, search?name=62.0.0.101 must return one node.

Method	URI	Description
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Retrieves details of a node.
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Updates a node. The request must follow the schema node.json#/definitions/updateNode .
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Deletes a Node. You cannot delete a live node; it reappears on the next update from Topology server.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}	Retrieves the history for a Node.
Links		
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links	Retrieves the full list of links.
POST	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links	Creates a planned link. The accepted and mandatory parameters are described by the schema link.json#/definitions/createLink .
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/search{?name,address,queryType}	Searches the Link list based on the URI parameters. For example, search?name=62.101.105 must return one Link.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}	Retrieves the details for a link.
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}	Updates a planned Link. The accepted and mandatory parameters are described by the schema link.json#/definitions/updateLink .
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}	Deletes a link. Live links reappear on the next update from the Topology server.
GET	/v1/tenant/{tenant_id}/topol-ogy/{topology_id}/links/{linkIndex}/history{?start,end}	Retrieves the history for a Link.
TE-LSPs		
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps	Retrieve the full list of TE-LSPs.
POST	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps	Creates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/createLSP .
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{?name,from,operationalStatus,query-Type}	Searches the LSP list based on the URI parameters. For example, search?name=62.101.105 should return one Link.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Retrieves the details for a TE-LSP.
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Updates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/updateLSP .
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Requests a TE-LSP to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.
POST	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk	Creates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/createLSPOrRespon-seList .
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk	Updates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/lspListUpdate .
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk	Requests a list of TE-LSPs to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegat-

Method	URI	Description
		ed LSPs cannot be deleted from NorthStar. They must be deleted in the node.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}	Retrieves the history for a TE-LSP.
Device Profiles	
GET	/v1/tenant/{tenant_id}/net-conf/profiles	Get all Profiles.
POST	/v1/tenant/{tenant_id}/net-conf/profiles	Create new profiles.
PUT	/v1/tenant/{tenant_id}/net-conf/profiles	Update profiles.
DELETE	/v1/tenant/{tenant_id}/net-conf/profiles	Delete profiles.
POST	/v1/tenant/{tenant_id}/net-conf/netconfCollection/liveNetwork	Creates a new collection.
GET	/v1/tenant/{tenant_id}/net-conf/netconfCollection/{id}	Gets the Status of a collection job.
Transport Topology acquisition	
GET	/v1/tenant/{tenant_id}/transport-Controllers	Retrieves the full list of transport controllers. The schema describing the response is transportController.json#/defini-tions/transportControllerList .
POST	/v1/tenant/{tenant_id}/transport-Controllers	Creates transport controller. The request must follow the schema transportController.json#/definitions/createTrans-portController .
GET	/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}	Retrieves the details for a transport controller configura-tion.
PUT	/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}	Updates a transport controller. The request must follow the schema transportController.json#/definitions/update-TransportController . The parameters are the same as for transport controller creation. A change of parameter will trigger a reconnection to the transport controller using the new parameters.
DELETE	/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport con-troller are not deleted. You must delete them manually, if required.
Transport Topology devices	
GET	/v1/tenant/{tenant_id}/transport-ControllerGroups	Retrieves the full list of transport controller groups. The schema describing the response is transportControllerEndpoint.json#/definitions/transport-ControllerGroupList .
POST	/v1/tenant/{tenant_id}/transport-ControllerGroups	Creates a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/defi-nitions/transportControllerGroupDescription .
DELETE	/v1/tenant/{tenant_id}/transport-ControllerGroups	Deletes a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/defi-nitions/transportControllerGroupDescription .
GET	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Retrieves a transport controller group, which is a list of devices. The schema describing the response is transportControllerEndpoint.json#/definitions/transport-ControllerGroup . The password are set by empty strings.
POST	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Creates devices in the group. The request must follow the schema transportControllerEndpoint.json#/defini-tions/transportControllerGroup .

Method	URI	Description
PUT	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Updates devices in the group. The request must follow the schema transportControllerEndpoint.json#/defini-tions/transportControllerGroup .
DELETE	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Deletes devices from the group. The request must follow the schema transportControllerEndpoint.json#/defini-tions/transportControllerGroup .
High Availability		
GET	/v1/tenant/{tenant_id}/highAvail-ability/hosts	Get the status of all the nodes and processes of the cluster. .
GET	/v1/tenant/{tenant_id}/highAvail-ability/zkstatus	Get the status of all the zookeeper clusters. .
GET	/v1/tenant/{tenant_id}/highAvail-ability/highAvailability	Retrieves the list of preferences.
PUT	/v1/tenant/{tenant_id}/highAvail-ability/highAvailability	Sets the node preferences.
POST	/v1/tenant/{tenant_id}/highAvail-ability/stepdown	Triggers a switchover.

3.1. Topology

The corresponding schema is: topology.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/topologies [GET: get a list of topologies]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id> [GET: get all Nodes and Links]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/status [GET: get all NorthStar components Status]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/status/multilayerTopology [GET: get multi-layer topology status]

Method	URI	Description
GET	/v1/tenant/{tenant_id}/topology	List available topologies.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}	Lists topological elements. The example shows three nodes, and two point-to-point links between node 11 and node 8. One node is PCEP-enabled (node 8, name 62.0.0.104) and one node is a pseudo node (node 2). Pseudo nodes do not have router-ids in their respective protocol object and have the pseudoNode attribute set to TRUE.
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}	Deletes all the topology planned data. The information acquired through BGP-LS reappears immediately.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pce	Retrieves the status of the PCEP protocol adapter component.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/status/topology-Acquisition	Retrieves the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pathCompu-tationServer	Retrieves the status of the Path Computation Server component.

3.1.1. Gets list of topologies

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topology`	List available topologies.

Normal response codes: 200

3.1.1.1. Request

This table shows the URI parameters for the gets list of topologies request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.1.2. Response

Example 3.1. Gets list of topologies: JSON response

```
[
    {
        "topologyIndex": 1,
        "topoObjectType": "topology"
    }
]
```

3.1.2. Get topological elements

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}`	Lists topological elements. The example shows three nodes, and two point-to-point links between node 11 and node 8. One node is PCEP-enabled (node 8, name 62.0.0.104) and one node is a pseudo node (node 2). Pseudo nodes do not have router-ids in their respective protocol object and have the pseudoNode attribute set to TRUE.

Normal response codes: 200

3.1.2.1. Request

This table shows the URI parameters for the get topological elements request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.2.2. Response

Example 3.2. Get topological elements: JSON response

```
{
    "links": [
        {
            "endA": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.104.107.1",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.104",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": {"bandwidth": 10000000000}
                },
                "srlgs": [{"srlgValue": 407 }],
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616,
9989999616, 9489999872, 9489999872, 9489999872, 9489999872  ]
            },
```

```
            "endZ": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.104.107.2",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.107",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [ { "srlgValue": 407 }]
                    },
                    "RSVP": {"bandwidth": 10000000000 }
                },
                "srlgs": [{"srlgValue": 407}],
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616,9989999616,9489999872]
            },
            "linkIndex": 6,
            "name": "L62.104.107.1_62.104.107.2",
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
        },
        {
            "endA": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.114.117.1",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.104",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": { "bandwidth": 10000000000 }
                },
                "srlgs": [{"srlgValue": 407} ],
                "topoObjectType": "interface",
                "unreservedBw": [ 10000000000, 10000000000, 10000000000,
10000000000, 10000000000, 10000000000, 10000000000, 10000000000]
            },
            "endZ": {
```

```
                        "TEcolor": 0,
                        "TEmetric": 10,
                        "bandwidth": 10000000000,
                        "ipv4Address": {
                            "address": "62.114.117.2",
                            "topoObjectType": "ipv4"
                        },
                        "node": {
                            "name": "62.0.0.107",
                            "topoObjectType": "node",
                            "topologyIndex": 1
                        },
                        "protocols": {
                            "ISIS": {
                                "TEMetric": 10,
                                "level": "L2",
                                "srlgs": [{"srlgValue": 407}]
                            },
                            "RSVP": {"bandwidth": 10000000000}
                        },
                        "srlgs": [{"srlgValue": 407}],
                        "topoObjectType": "interface",
                        "unreservedBw": [9600000000,600000000,9600000000,9600000000,
9600000000,9600000000,9600000000,9600000000]
                    },
                    "linkIndex": 7,
                    "name": "L62.114.117.1_62.114.117.2",
                    "operationalStatus": "Up",
                    "topoObjectType": "link",
                    "topologyIndex": 1
                }
        ],
        "nodes": [
            {
                "AutonomousSystem": {"asNumber": 62},
                "hostName": "vmx104-62",
                "layer": "IP",
                "name": "62.0.0.104",
                "nodeIndex": 8,
                "protocols": {
                    "ISIS": {
                        "TERouterId": "62.0.0.104",
                        "area": "490062",
                        "isoAddress": "0620.0000.0104",
                        "routerId": "62.0.0.104"
                    },
                    "PCEP": {
                        "pccAddress": "62.0.0.104"
                    }
                },
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            {
                "AutonomousSystem": {"asNumber": 62},
                "hostName": "vmx105-62-p107",
                "layer": "IP",
                "name": "62.0.0.107",
                "nodeIndex": 11,
                "protocols": {
```

```
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
                    "isoAddress": "0620.0000.0107",
                    "routerId": "62.0.0.107"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
{
    "topoObjectType": "node",
    "topologyIndex": 1,
    "name": "0620.0000.0101.02",
    "nodeIndex": 2,
        "AutonomousSystem": {"asNumber": 62},
    "layer": "IP",
    "pseudoNode": true,
    "protocols": {
 "ISIS": { }
    }
}
    ],
    "topoObjectType": "topology",
    "topologyIndex": 1
}
```

3.1.3. Delete the Topology

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}`	Deletes all the topology planned data. The information acquired through BGP-LS reappears immediately.

Normal response codes: 204

3.1.3.1. Request

This table shows the URI parameters for the delete the topology request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.4. Get PCEP protocol adapter status

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pce`	Retrieves the status of the PCEP protocol adapter component.

Normal response codes: 200

3.1.4.1. Request

This table shows the URI parameters for the get pcep protocol adapter status request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.4.2. Response

Example 3.3. Get PCEP protocol adapter status: JSON response

```
{
  "status": "PCE is up.",
  "statusTimestamp": 1462420202128,
  "statusTimestampTime": "2016-05-05T03:50:02.128Z",
  "component": "PCE"
}
```

3.1.5. Get BGP-LS protocol adapter status

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/status/topology-Acquisition`	Retrieves the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.

Normal response codes: 200

3.1.5.1. Request

This table shows the URI parameters for the get bgp-ls protocol adapter status request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.5.2. Response

Example 3.4. Get BGP-LS protocol adapter status: JSON response

```
{
  "status": "Connected to NTAD: 11.105.199.2 port: 450",
  "statusTimestamp": 1462420201513,
  "statusTimestampTime": "2016-05-05T03:50:01.513Z",
  "component": "Topology acquisition"
}
```

3.1.6. Get Path Computation Server status

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pathCompu-tationServer`	Retrieves the status of the Path Computation Server component.

Normal response codes: 200

3.1.6.1. Request

This table shows the URI parameters for the get path computation server status request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.1.6.2. Response

Example 3.5. Get Path Computation Server status: JSON response

```
{
  "status": "Active Path Stat: 28 up 2 down 0 detoured 0 being provisioned.
 Link Stat: 14 up 0 down. Node Stat: 8 active nodes, 5 PCC nodes",
  "statusTimestamp": 1462530967295,
  "statusTimestampTime": "2016-05-06T10:36:07.295Z",
  "component": "Path Computation Server"
}
```

3.2. Node

Node API. The API allows access to the nodes retrieved through BGP-LS and planned nodes.

The corresponding schema is: node.json . The operations are:

• https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/nodes [GET : get all nodes, POST : create a new node]

• https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/nodes/search URL parameters : name, AS, queryType=OR [GET : search nodes (name/as)]

• https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/nodes/<nodeIndex> [GET : get node, POST :modify node , DELETE]

• https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/nodes/<nodeIndex>/history [GET]

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Retrieves the full list of nodes.
POST	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Creates a planned node. The request must follow the schema node.json#/definitions/createNode .
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/search{?name,hostName,AS,queryType}`	Searchs the node list based on the URI parameters. For example, search?name=62.0.0.101 must return one node.
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Retrieves details of a node.
PUT	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Updates a node. The request must follow the schema node.json#/definitions/updateNode .
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Deletes a Node. You cannot delete a live node; it reappears on the next update from Topology server.
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}`	Retrieves the history for a Node.

3.2.1. Get Nodes

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Retrieves the full list of nodes.

Normal response codes: 200

3.2.1.1. Request

This table shows the URI parameters for the get nodes request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.2.1.2. Response

Example 3.6. Get Nodes: JSON response

```
[
    {
        "AutonomousSystem": {"asNumber": 62},
        "layer": "IP",
        "name": "0620.0000.0101.02",
        "nodeIndex": 2,
        "protocols": {
            "ISIS": {}
        },
 "pseudoNode": true,
        "topoObjectType": "node",
        "topologyIndex": 1
    },
    {
        "AutonomousSystem": {"asNumber": 62},
        "hostName": "vmx101-62",
        "layer": "IP",
        "name": "62.0.0.101",
        "nodeIndex": 1,
        "protocols": {
            "ISIS": {
                "TERouterId": "62.0.0.101",
                "area": "490062",
                "isoAddress": "0620.0000.0101",
                "routerId": "62.0.0.101"
            },
            "PCEP": {
                "pccAddress": "62.0.0.101"
            }
        },
        "topoObjectType": "node",
        "topologyIndex": 1
```

```
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p105",
            "layer": "IP",
            "name": "62.0.0.105",
            "nodeIndex": 9,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.105",
                    "area": "490062",
                    "isoAddress": "0620.0000.0105",
                    "routerId": "62.0.0.105"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p106",
            "layer": "IP",
            "name": "62.0.0.106",
            "nodeIndex": 10,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.106",
                    "area": "490062",
                    "isoAddress": "0620.0000.0106",
                    "routerId": "62.0.0.106"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p107",
            "layer": "IP",
            "name": "62.0.0.107",
            "nodeIndex": 11,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
                    "isoAddress": "0620.0000.0107",
                    "routerId": "62.0.0.107"
                }
            },
"topology": {
    "coordinates": {
 "type": "Point",
 "coordinates": [-0.025,-49.459999]
    }
}
            "topoObjectType": "node",
            "topologyIndex": 1
        }
]
```

3.2.2. Create a planned Node

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Creates a planned node. The request must follow the schema node.json#/definitions/createNode .

Normal response codes: 201

3.2.2.1. Request

This table shows the URI parameters for the create a planned node request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

Example 3.7. Create a planned Node: JSON request

The following JSON sample shows the minimum required information to add a planned node. The Following parameters are required:

Table 3.1. Create Node Required Attributes

Attribute	Type	Description	Fixed
name	string	No	Node Name
topologyIndex	integer	Yes	1
topoObjectType	string	Yes	node

The following parameters can be set:

- Name

- Autonomous System

- management address

- hostName

- nodeType

- design paramater: canFail

- Node coordinates

```
{
    "name": "PlannedNode",
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

3.2.2.2. Response

Example 3.8. Create a planned Node: JSON response

```
{
    "layer": "IP",
    "name": "PlannedNode",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

3.2.3. Search Nodes

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/search{?name,hostName,AS,queryType}`	Searchs the node list based on the URI parameters. For example, search?name=62.0.0.101 must return one node.

Normal response codes: 200

3.2.3.1. Request

This table shows the URI parameters for the search nodes request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This table shows the query parameters for the search nodes request:

Name	Type	Description
`name`	String *(Optional)*	Filters on node name. The parameter is treated as a regular expression. Simple strings such as 62.0.0.101 are accepted. Javasript regexp (for example, /^62/) is also accepted.
`hostName`	Int *(Optional)*	Filters on hostname
`AS`	Int *(Optional)*	Filters on AS number
`queryType`	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If queryType is set to OR, node is included in the result if any of the query parameters matches.

3.2.3.2. Response

Example 3.9. Search Nodes: JSON response

```
[
    {
        "AutonomousSystem": {"asNumber": 62},
        "layer": "IP",
        "name": "0620.0000.0101.02",
        "nodeIndex": 2,
        "protocols": {
            "ISIS": {}
        },
 "pseudoNode": true,
        "topoObjectType": "node",
        "topologyIndex": 1
    },
    {
        "AutonomousSystem": {"asNumber": 62},
        "hostName": "vmx101-62",
        "layer": "IP",
```

```
            "name": "62.0.0.101",
            "nodeIndex": 1,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.101",
                    "area": "490062",
                    "isoAddress": "0620.0000.0101",
                    "routerId": "62.0.0.101"
                },
                "PCEP": {
                    "pccAddress": "62.0.0.101"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p105",
            "layer": "IP",
            "name": "62.0.0.105",
            "nodeIndex": 9,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.105",
                    "area": "490062",
                    "isoAddress": "0620.0000.0105",
                    "routerId": "62.0.0.105"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p106",
            "layer": "IP",
            "name": "62.0.0.106",
            "nodeIndex": 10,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.106",
                    "area": "490062",
                    "isoAddress": "0620.0000.0106",
                    "routerId": "62.0.0.106"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p107",
            "layer": "IP",
            "name": "62.0.0.107",
            "nodeIndex": 11,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
```

```
                "isoAddress": "0620.0000.0107",
                "routerId": "62.0.0.107"
            }
        },
"topology": {
    "coordinates": {
 "type": "Point",
 "coordinates": [-0.025,-49.459999]
    }
}
        "topoObjectType": "node",
        "topologyIndex": 1
    }
]
```

3.2.4. Get a single Node

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Retrieves details of a node.

Normal response codes: 200

3.2.4.1. Request

This table shows the URI parameters for the get a single node request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This operation does not accept a request body.

3.2.4.2. Response

Example 3.10. Get a single Node: JSON response

```
{
    "AutonomousSystem": {
        "asNumber": 62
    },
    "hostName": "vmx101-62",
    "layer": "IP",
    "name": "62.0.0.101",
    "nodeIndex": 1,
    "protocols": {
        "ISIS": {
            "TERouterId": "62.0.0.101",
            "area": "490062",
            "isoAddress": "0620.0000.0101",
            "routerId": "62.0.0.101"
        },
        "PCEP": {
            "pccAddress": "62.0.0.101"
        }
    },
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

3.2.5. Update Node properties

Method	URI	Description
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Updates a node. The request must follow the schema node.json#/definitions/updateNode .

Normal response codes: 202

3.2.5.1. Request

This table shows the URI parameters for the update node properties request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{topologyId}	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
{nodeIndex}	Int	The unique nodeIndex.

Example 3.11. Update Node properties : JSON request

```
{
    "layer": "IP",
    "name": "PlannedNode",
    "hostName" : "plannedNode.domain.example.com",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1,
}
```

3.2.5.2. Response

Example 3.12. Update Node properties : JSON response

```
{
    "layer": "IP",
    "name": "PlannedNode",
    "hostName" : "plannedNode.domain.example.com",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1,
}
```

3.2.6. Delete a node

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Deletes a Node. You cannot delete a live node; it reappears on the next update from Topology server.

Normal response codes: 204

3.2.6.1. Request

This table shows the URI parameters for the delete a node request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This operation does not accept a request body.

3.2.7. Retrieve the Node event history

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}`	Retrieves the history for a Node.

The history contains a list of timestamped (unix timestamp) events for the node resource.

Normal response codes: 200

3.2.7.1. Request

This table shows the URI parameters for the retrieve the node event history request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This table shows the query parameters for the retrieve the node event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include only the events with timestamps beginning at and after the specified starting timestamp.
`end`	Int *(Optional)*	End timestamp: Include only the events with timestamps before (but not including) the ending timestamp.

3.2.7.2. Response

Example 3.13. Retrieve the Node event history: JSON response

```
[
    {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
     "asNumber": 62
},
"layer": "IP",
"protocols": {
     "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
     }
},
"hostName": "vmx101-62",
"timestamp": 1427130726939
    },
```

```
    {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
    "asNumber": 62
},
"layer": "IP",
"protocols": {
    "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
    }
},
"hostName": "vmx101-62",
"timestamp": 1427130727025
    },
    {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
    "asNumber": 62
},
"layer": "IP",
"protocols": {
    "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
    }
},
"hostName": "vmx101-62",
"timestamp": 1427135395317
    },
    {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
    "asNumber": 62
},
"layer": "IP",
"protocols": {
    "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
    }
},
"hostName": "CHI",
"topology": {
    "coordinates": {
```

```
    "type": "Point",
    "coordinates": [
        4.29167,
        2.9
    ]
        }
},
    "timestamp": 1427168112286
        }
]
```

3.3. Links

The corresponding schema is: link.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/links [GET : get all links, POST: create link]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/links/search URL parameters : name, address, queryType=OR [GET : search links)]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/links/<linkId> [GET: get property, PUT: modify link, DELETE]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topology/<topology-id>/links/<linkId>/history [GET]

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/links`	Retrieves the full list of links.
POST	`/v1/tenant/{tenant_id}/topology/{topology_id}/links`	Creates a planned link. The accepted and mandatory parameters are described by the schema link.json#/definitions/createLink .
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/links/search{?name,address,queryType}`	Searches the Link list based on the URI parameters. For example, search?name=62.101.105 must return one Link.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/links/{linkIndex}`	Retrieves the details for a link.
PUT	`/v1/tenant/{tenant_id}/topology/{topology_id}/links/{linkIndex}`	Updates a planned Link. The accepted and mandatory parameters are described by the schema link.json#/definitions/updateLink .
DELETE	`/v1/tenant/{tenant_id}/topology/{topology_id}/links/{linkIndex}`	Deletes a link. Live links reappear on the next update from the Topology server.
GET	`/v1/tenant/{tenant_id}/topology/{topology_id}/links/{linkIndex}/history{?start,end}`	Retrieves the history for a Link.

3.3.1. Get Links

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Retrieves the full list of links.

Normal response codes: 200

3.3.1.1. Request

This table shows the URI parameters for the get links request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.3.1.2. Response

Example 3.14. Get Links: JSON response

The example shows three links:

- One point-to-point link (link #6, named "L62.104.107.1_62.104.107.2").

- Two broadcast links (link 1 and 8). Broadcast links do not have protocols on one end (pseudo node end).

Broadcast links for MPLS-TE is not supported.

```
[
    {
        "endA": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.104",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
                },
                "RSVP": {"bandwidth": 10000000000 }
            },
            "srlgs": [{"srlgValue": 407}]
```

```
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9489999872, 9489999872, 9489999872, 9489999872]
        },
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.107",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
                },
                "RSVP": {"bandwidth": 10000000000}
            },
            "srlgs": [{"srlgValue": 407}]
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616, 9489999872]
        },
        "linkIndex": 6,
        "name": "L62.104.107.1_62.104.107.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
"endA": {
    "node": {
 "topoObjectType": "node",
 "name": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.101",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
```

```
                        "level": "L2",
                        "srlgs": [{"srlgValue": 100}]
                    },
                    "RSVP": {"bandwidth": 40000000000}
                },
                "srlgs": [{"srlgValue": 100}]
                "topoObjectType": "interface",
                "unreservedBw": [39990001664, 39489998848, 39489998848,
39489998848, 39489998848, 39489998848, 39489998848, 39489998848]
            },
            "linkIndex": 1,
            "name": "L_62.101.105.1",
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
    },
    {
"endA": {
    "node": {
 "topoObjectType": "node",
 "name": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.105",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2"
                },
                "RSVP": {"bandwidth": 40000000000}
            },
            "topoObjectType": "interface",
            "unreservedBw": [39570001920, 39570001920, 39570001920,
39070003200, 38570004480, 38570004480, 38570004480, 38570004480]
        },
        "linkIndex": 8,
        "name": "L_62.101.105.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    }
]
```

3.3.2. Create a planned Link

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Creates a planned link. The accepted and mandatory parameters are described by the schema link.json#/definitions/createLink .

Normal response codes: 201

3.3.2.1. Request

This table shows the URI parameters for the create a planned link request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

Example 3.15. Create a planned Link: JSON request

The example shows the creation of a numbered 40G planned link between node 62.0.0.102 and PlannedNode.

Table 3.2. Create Link Required Attributes

Attribute	Type	Description	Fixed
endA/node	string	No	Link source node
endZ/node	string	No	Link destination node
topologyIndex	integer	Yes	1
topoObjectType	string	Yes	link

```
{
    "topoObjectType": "link",
    "topologyIndex": 1,
    "endA": {
"topoObjectType": "interface",
"node": {
    "topoObjectType": "node","name": "62.0.0.102","topologyIndex": 1
},
"ipv4Address": { "topoObjectType": "ipv4","address": "62.102.166.1"},
"bandwidth": 40000000000,
"TEmetric": 10,
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
}
    },
    "endZ": {
"topoObjectType": "interface",
"node": {
    "topoObjectType": "node", "name": "PlannedNode","topologyIndex": 1
},
```

```
    "ipv4Address": { "topoObjectType": "ipv4","address": "62.102.166.2"},
    "bandwidth": 40000000000,
    "TEmetric": 10,
    "protocols": {
        "RSVP": {
     "bandwidth": 40000000000
        }
    }
        }
}
```

3.3.2.2. Response

Example 3.16. Create a planned Link: JSON response

```
{
    "topoObjectType": "link",
    "topologyIndex": 1,
    "name": "L62.102.166.1_62.102.166.2",
    "operationalStatus": "Planned",
    "linkIndex": 16,
    "endA": {
"topoObjectType": "interface",
"ipv4Address": {"topoObjectType": "ipv4","address": "62.102.166.1"},
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
},
"bandwidth": 40000000000,
"node": {"topoObjectType": "node","name": "62.0.0.102","topologyIndex": 1}
    },
    "endZ": {
"topoObjectType": "interface",
"ipv4Address": {"topoObjectType": "ipv4","address": "62.102.166.2"},
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
},
"bandwidth": 40000000000,
"node": {"topoObjectType": "node","name": "PlannedNode","topologyIndex": 1}
    }
}
```

3.3.3. Search Links

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/search{?name,address,queryType}`	Searches the Link list based on the URI parameters. For example, search?name=62.101.105 must return one Link.

Normal response codes: 200

3.3.3.1. Request

This table shows the URI parameters for the search links request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This table shows the query parameters for the search links request:

Name	Type	Description
name	String *(Optional)*	Filters on the link name. The parameter is treated as a regular expression. Simple strings such as L62 are accepted. Javasript regexp (for example, /^L62/) is also accepted
address	String *(Optional)*	Filters based on the link address (endA/ipv4Address/address and endZ/ipv4Address/address).
queryType	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If the queryType is set to OR, link is included in the result if any of the query parameters matches.

3.3.3.2. Response

Example 3.17. Search Links: JSON response

```
[
    {
        "endA": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.104",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
```

```
                },
                "RSVP": {"bandwidth": 10000000000 }
            },
            "srlgs": [{"srlgValue": 407}]
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9489999872, 9489999872, 9489999872, 9489999872]
        },
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.107",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
                },
                "RSVP": {"bandwidth": 10000000000}
            },
            "srlgs": [{"srlgValue": 407}]
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616, 9489999872]
        },
        "linkIndex": 6,
        "name": "L62.104.107.1_62.104.107.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
"endA": {
    "node": {
 "topoObjectType": "node",
 "name": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.101",
                "topoObjectType": "node",
                "topologyIndex": 1
```

```
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 100}]
                },
                "RSVP": {"bandwidth": 40000000000}
            },
            "srlgs": [{"srlgValue": 100}]
            "topoObjectType": "interface",
            "unreservedBw": [39990001664, 39489998848, 39489998848,
39489998848, 39489998848, 39489998848, 39489998848, 39489998848]
        },
        "linkIndex": 1,
        "name": "L_62.101.105.1",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
"endA": {
    "node": {
 "topoObjectType": "node",
 "name": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.105",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2"
                },
                "RSVP": {"bandwidth": 40000000000}
            },
            "topoObjectType": "interface",
            "unreservedBw": [39570001920, 39570001920, 39570001920,
39070003200, 38570004480, 38570004480, 38570004480, 38570004480]
        },
        "linkIndex": 8,
        "name": "L_62.101.105.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    }
]
```

3.3.4. Get a single Link

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Retrieves the details for a link.

Normal response codes: 200

3.3.4.1. Request

This table shows the URI parameters for the get a single link request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This operation does not accept a request body.

3.3.4.2. Response

Example 3.18. Get a single Link: JSON response

```
{
    "endA": {
        "TEcolor": 0,
        "TEmetric": 10,
 "delay" : 600,
        "bandwidth": 40000000000,
        "ipv4Address": {
            "address": "62.103.107.1",
            "topoObjectType": "ipv4"
        },
        "node": {
            "name": "62.0.0.103",
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        "protocols": {
            "ISIS": {
                "TEMetric": 10,
                "level": "L2"
            },
            "RSVP": {
                "bandwidth": 40000000000
            }
        },
        "topoObjectType": "interface",
        "unreservedBw": [39970000896, 39970000896, 39970000896, 39469998080,
39469998080, 39469998080, 39469998080, 39469998080]
    },
    "endZ": {
        "TEcolor": 0,
```

```
            "TEmetric": 10,
            "delay": 600,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.103.107.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "name": "62.0.0.107",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2"
                },
                "RSVP": {
                    "bandwidth": 40000000000
                }
            },
            "unreservedBw": [39289999360, 38790000640, 38790000640, 38790000640,
38790000640, 38790000640, 38790000640, 38790000640]
        },
        "linkIndex": 4,
        "name": "L62.103.107.1_62.103.107.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
}
```

3.3.5. Update Link

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Updates a planned Link. The accepted and mandatory parameters are described by the schema link.json#/definitions/updateLink .

Normal response codes: 202

3.3.5.1. Request

This table shows the URI parameters for the update link request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

Example 3.19. Update Link : JSON request

The following example sets the link delay for the link L62.103.107.1_62.103.107.2

```
{
    "topoObjectType":"link", "topologyIndex":1,
    "linkIndex":4,
    "endA":{
"topoObjectType":"interface",
"ipv4Address" : {"topoObjectType":"ipv4","address":"62.103.107.1"},
"protocols":{
    "ISIS" : {
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.103","topologyIndex":1}
    },"endZ" : {
"topoObjectType":"interface",
"ipv4Address":{"topoObjectType":"ipv4","address":"62.103.107.2"},
"protocols":{
    "ISIS":{
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
```

```
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.107","topologyIndex":1}
    }
}
```

3.3.5.2. Response

Example 3.20. Update Link : JSON response

```
{
    "topoObjectType":"link", "topologyIndex":1,
    "name":"L62.103.107.1_62.103.107.2",
    "linkIndex":4,
    "operationalStatus": "Up",
    "endA":{
"topoObjectType":"interface",
"ipv4Address" : {"topoObjectType":"ipv4","address":"62.103.107.1"},
"protocols":{
    "ISIS" : {
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.103","topologyIndex":1}
    },"endZ" : {
"topoObjectType":"interface",
"ipv4Address":{"topoObjectType":"ipv4","address":"62.103.107.2"},
"protocols":{
    "ISIS":{
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.107","topologyIndex":1}
    }
}
```

3.3.6. Delete a Link

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Deletes a link. Live links reappear on the next update from the Topology server.

Normal response codes: 204

3.3.6.1. Request

This table shows the URI parameters for the delete a link request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This operation does not accept a request body.

3.3.7. Retrieve the Link event history

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topol-ogy/{topology_id}/links/{linkIndex}/history{?start,end}`	Retrieves the history for a Link.

The history contains a list of timestamped (unix timestamp) events for the link resource.

Normal response codes: 200

3.3.7.1. Request

This table shows the URI parameters for the retrieve the link event history request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This table shows the query parameters for the retrieve the link event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include only events with timestamps beginning at and after the specified starting timestamp.
`end`	Int *(Optional)*	End timestamp: Include only events with timestamps before (but not including) the ending timestamp.

3.3.7.2. Response

Example 3.21. Retrieve the Link event history: JSON response

```
[
    {
 "topoObjectType": "link",
 "topologyIndex": 1,
 "name": "L62.103.107.1_62.103.107.2",
 "operationalStatus": "Up",
 "linkIndex": 4,
 "endA": {
     "topoObjectType": "interface",
     "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.1" },
     "protocols": {
 "ISIS": {
     "TEMetric": 10,
     "level": "L2",
     "metric": 10
 },
 "RSVP": {"bandwidth": 40000000000}
     },
     "bandwidth": 40000000000,
     "TEmetric": 10,
```

```
      "TEcolor": 0,
      "unreservedBw": [40000000000,40000000000,40000000000,40000000000,
40000000000,40000000000,40000000000,40000000000],
      "node": {"topoObjectType": "node","name": "62.0.0.103","topologyIndex":
 1}
 },
 "endZ": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.2"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
  },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39469998080,38969999360,38470000640,38470000640,
37970001920,37970001920,37970001920,37970001920],
      "node": {"topoObjectType": "node","name": "62.0.0.107","topologyIndex":
 1}
 },
 "timestamp": 1427129349771
     },
     {
 "topoObjectType": "link",
 "topologyIndex": 1,
 "name": "L62.103.107.1_62.103.107.2",
 "operationalStatus": "Up",
 "linkIndex": 4,
 "endA": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.1"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
  },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39970000896,39970000896,39970000896,38470000640,
38470000640,38470000640,38470000640,38470000640],
      "node": {"topoObjectType": "node","name": "62.0.0.103","topologyIndex":
 1}
 },
 "endZ": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.2"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
```

```
    },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39469998080,38969999360,38470000640,38470000640,
37970001920,37970001920,37970001920,37970001920],
      "node": {"topoObjectType": "node","name": "62.0.0.107","topologyIndex":
 1}
  },
  "timestamp": 1427129349871
      }
]
```

3.4. TE-LSPs

The corresponding schema is: lsp.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topolo-
  gy/<topology-id>/te-lsps/ [GET : get all te-lsps, POST : create one LSP]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/
  topology/<topology-id>/te-lsps/search search parameters : name={nameFilter},
  from={fromIpV4} operStatus={operationalStatus} queryType=OR [GET : search LSPs ()]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topolo-
  gy/<topology-id>/te-lsps/bulk Bulk LSP operations: allows to create/update/delete a list
  of te-lsps [POST : create LSPs , PUT : update lsps, DELETE]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topolo-
  gy/<topology-id>/te-lsps/<lspIndex> [GET : get te-lsp, PUT : update, DELETE]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/topolo-
  gy/<topology-id>/te-lsps/<lspIndex>/history [GET]

Method	URI	Description
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps	Retrieve the full list of TE-LSPs.
POST	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps	Creates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/createLSP .
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{? name,from,operationalStatus,query-Type}	Searches the LSP list based on the URI parameters. For example, search?name=62.101.105 should return one Link.
GET	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Retrieves the details for a TE-LSP.
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Updates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/updateLSP .
DELETE	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Requests a TE-LSP to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Creates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/createLSPOrRespon-seList .
PUT	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/lspListUpdate .
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Requests a list of TE-LSPs to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}`	Retrieves the history for a TE-LSP.

3.4.1. Get TE-LSPs

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Retrieve the full list of TE-LSPs.

The example contains 10 TE-LSPs:

- A simple delegated LSP (index 1, named LSP_Node101_Node102). A delegated LSP is configured in the PCC and delegated to NorthStar. Northstar will control the path and some attributes of the LSP.

- A delegated LSP with a configured explicit path (index 2, name LSP_101_103). The path name in the router is Path_Node101_Node103_Strict_1.

- Protected tunnel with a primary and secondary path. The two paths (each represented as a TE-LSP) of a tunnel (index 3 and 4). The tunnel is named LSP_Node102_Node104_with_secondary and each path has a pathName. The tunnel name is used for correlation. One path (index3) is the primary path, while the other is the secondary path. The secondary path will be activated upon primary path failure. LSPs carrying traffic are marked as Active rather than Up.

- Protected tunnel with a primary and secondary standby path (index 5 and 6). The model is similar to a tunnel with a secondary path, the difference is the standby path has a pathType set to standby and the path is signaled in the control plane (hence its operational Status Up).

- A set of three TE-LSPs in a TE++ configuration (index 7,8,9). The TE-LSPs are named TEplusplus-Node102-Node103-<index>. Correlation of the entries can be done using the liveProperties, options, TEPlusPlusId. Those LSPs are not delegated to NorthStar, as indicated by the attribute controlType set to PCC. NorthStar will not modify those LSPs.

- A PCE-Initiated LSP (index 10).

Normal response codes: 200

3.4.1.1. Request

This table shows the URI parameters for the get te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.4.1.2. Response

Example 3.22. Get TE-LSPs: JSON response

```
[
    {
        "lspIndex": 1,
```

```
        "name": "LSP_Node101_Node102",
        "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.102", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "500M",
    "setupPriority": 1,
    "holdingPriority": 1,
    "adminStatus": "Up",
    "routingStatus": "Up",
    "lastStatusString": "<Active PCS initialization"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 500000000,
            "ero": [
                {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.102.105.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 1,
            "metric": 25,
            "rro": [
                {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.102",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.105.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 1
        },
        "controlType": "Delegated",
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 56615
   },
   {
        "lspIndex": 2,
        "name": "LP_101_103",
        "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "controlType": "Delegated",
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "calculatedEro": [
 {"topoObjectType": "ipv4","address": "62.101.105.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.102.105.1","loose": false},
 {"topoObjectType": "ipv4","address": "62.102.106.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.104.106.1","loose": false},
 {"topoObjectType": "ipv4","address": "62.104.107.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.103.107.1","loose": false}
    ],
    "pathName": "Path_Node101_Node103_Strict_1",
    "adminStatus": "Up",
    "routingStatus": "Up",
```

```
     "lastStatusString": "<Active PCS initialization"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 10000000,
            "ero": [
                {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.103.107.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 0,
            "metric": 40,
            "pathName": "Path_Node101_Node103_Strict_1",
            "rro": [
                {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.107",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.105.107.2", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.103",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.103.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 7
        },
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 56614
   },
   {
        "lspIndex": 3,
        "name": "LSP_Node102_Node104_with_secondary",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "400M",
    "setupPriority": 5,
    "holdingPriority": 5,
    "calculatedEro": [
                {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Up",
    "lastStatusString": "<Active"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 400000000,
            "ero": [
```

```
                {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 5,
            "metric": 40,
            "pathName": "102_104_primary",
            "rro": [
                {"address": "62.0.0.106", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.104", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 5
        },
        "controlType": "Delegated",
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 10304
    },
    {
        "lspIndex": 4,
        "name": "LSP_Node102_Node104_with_secondary",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "400M",
    "setupPriority": 5,
    "holdingPriority": 5,
    "calculatedEro": [
 {"address": "62.102.105.2", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"},
 {"address": "62.105.107.2", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"},
 {"address": "62.104.107.1", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"}
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Down",
    "lastStatusString": "<Down"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 400000000,
            "ero": [],
            "holdingPriority": 5,
            "metric": 0,
            "pathName": "102_104_secondary",
            "rro": [],
            "setupPriority": 5
        },
        "controlType": "Delegated",
        "operationalStatus": "Down",
        "pathType": "secondary",
```

```
            "tunnelId": 0
    },
    {
        "lspIndex": 5,
        "name": "LSP_Node102_Node104_with_standby",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "500M",
    "setupPriority": 7,
    "holdingPriority": 7,
    "calculatedEro": [
                {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
    ],
    "pathName": "102_104_primary",
    "adminStatus": "Up",
    "routingStatus": "Up",
    "preference": 10,
    "lastStatusString": "<Active"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 500000000,
            "ero": [
                {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 7,
            "metric": 40,
            "pathName": "102_104_primary",
            "rro": [
                {"address": "62.0.0.106", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.104", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 7
        },
        "controlType": "Delegated",
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 10305
    },
    {
        "lspIndex": 6,
        "name": "LSP_Node102_Node104_with_standby",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "500M",
    "setupPriority": 7,
```

```
    "holdingPriority": 7,
    "calculatedEro": [
            {"address": "62.102.105.2", "loose": false, "topoObjectType":
"ipv4" },
            {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
            {"address": "62.104.107.1", "loose": false, "topoObjectType":
"ipv4" }
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Up",
    "lastStatusString": "<Up"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 500000000,
            "ero": [
                {"address": "62.102.105.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.107.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 7,
            "metric": 40,
            "pathName": "102_104_secondary",
            "rro": [
                {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.107",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.105.107.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.104",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 7
        },
        "controlType": "Delegated",
        "operationalStatus": "Up",
        "pathType": "standby",
        "tunnelId": 10306
    },
    {
"lspIndex": 7,
"name": "TEplusplus-Node102-Node103-1",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10310,
"liveProperties": {
    "bandwidth": 100000000,
    "metric": 40,
```

```
    "setupPriority": 7,
    "holdingPriority": 0,
    "adminStatus": "Up",
    "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
    ],
    "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
    ],
    "options": {
 "TEPlusPlusId": 2
    }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
    },
    {
"lspIndex": 8,
"name": "TEplusplus-Node102-Node103-2",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10311,
"liveProperties": {
    "bandwidth": 100000000,
    "metric": 40,
    "setupPriority": 7,
    "holdingPriority": 0,
    "adminStatus": "Up",
    "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
    ],
    "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
    ],
    "options": {
 "TEPlusPlusId": 2
    }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
    },
    {
```

```
"lspIndex": 9,
"name": "TEplusplus-Node102-Node103-3",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10312,
"liveProperties": {
    "bandwidth": 100000000,
    "metric": 40,
    "setupPriority": 7,
    "holdingPriority": 0,
    "adminStatus": "Up",
    "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false },
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
    ],
    "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "protectionInUse":
false, "protectionAvailable": false}
    ],
    "options": {
 "TEPlusPlusId": 2
    }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
    },
    {
"lspIndex": 10,
"name": "PCE_Initiated_LSP",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.101"},
"to":   { "topoObjectType": "ipv4", "address": "62.0.0.103"},
"tunnelId": 56694,
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 7,
    "adminStatus": "Up",
    "routingStatus": "Up",
    "lastStatusString": "<Active"
},
"liveProperties": {
    "bandwidth": 10000000,
    "metric": 40,
    "setupPriority": 7,
    "holdingPriority": 7,
    "adminStatus": "Up",
    "ero": [
 {"topoObjectType": "ipv4", "address": "62.101.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
    ],
    "rro": [
```

```
  {"topoObjectType": "ipv4", "address": "62.101.105.2","protectionInUse":
false, "protectionAvailable": false},
  {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
  {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
     ]
},
"operationalStatus": "Active",
"controlType": "PCEInitiated",
"pathType": "primary"
    }
]
```

3.4.2. Create a TE-LSP

Method	URI	Description
POST	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps	Creates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/createLSP .

Normal response codes: 201

Error response codes: 400

3.4.2.1. Request

This table shows the URI parameters for the create a te-lsp request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{topologyId}	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

Example 3.23. Create a TE-LSP : JSON request

Table 3.3. Create LSP Required Attributes

Attribute	Type	Description	Fixed
name	string	No	Tunnel name
from/address	string	No	Tunnel ingress
to/address	string	No	Tunnel egress

The following example shows the creation of a LSP with a bandwidth of 100M:

```
{
    "name": "Rest_LSP_1",
    "from": {
 "topoObjectType": "ipv4",
 "address": "62.0.0.101"
    },
    "to": {
 "topoObjectType": "ipv4",
 "address": "62.0.0.103"
    },
    "plannedProperties": {
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

The following two requests show the creation of Primary and Standby LSPs. The source (from), destination (to), and name must be the same. The standby (and secondary) LSPs must have a pathName attribute set in order to differentiate them. The Primary LSP may have a pathName set.

```
{
```

```
    "name": "REST_LSP_2",
    "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
    "to": {"address": "62.0.0.104", "topoObjectType": "ipv4"},
    "pathType": "primary",
    "plannedProperties": {
 "bandwidth": "400M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

```
{
    "name": "REST_LSP_2",
    "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
    "to": {"address": "62.0.0.104", "topoObjectType": "ipv4"},
    "pathType": "standby",
    "plannedProperties": {
 "pathName" : "standby_path_for_second_LSP",
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

The third example shows a request to create an LSP with a loose explicit route. The loose hop must follow a hop; if no other hop can be supplied, it is recommended to use the ingress node ID.

```
{

    "name": "REST_LPS_with_explicit_route",
    "from": {"topoObjectType": "ipv4","address": "62.0.0.101"},
    "to":   {"topoObjectType": "ipv4","address": "62.0.0.103"},
    "plannedProperties": {
 "bandwidth": 10000000,
 "setupPriority": 7,
 "holdingPriority": 7,
 "ero" : [
            {"topoObjectType": "ipv4","address": "62.0.0.101","loose": false},
            {"topoObjectType": "ipv4","address": "62.0.0.102","loose": true}
 ]
    }
}
```

3.4.2.2. Response

Example 3.24. Create a TE-LSP : JSON response

The following example shows the creation of a LSP with a bandwidth of 100M:

```
{
    "lspIndex": 20,
    "name": "Rest_LSP_1",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "PCEInitiated",
    "plannedProperties": {
 "adminStatus": "Up",
 "bandwidth": "100M",
```

```
"setupPriority": 7,
"holdingPriority": 7,
"lastStatusString": "Provisioning Order from REST Interface",
"routingStatus": "Unknown"
    },
    "operationalStatus": "Unknown",
    "pathType": "primary"
}
```

3.4.3. Search LSPs

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{? name,from,operationalStatus,query-Type}`	Searches the LSP list based on the URI parameters. For example, search?name=62.101.105 should return one Link.

Normal response codes: 200

3.4.3.1. Request

This table shows the URI parameters for the search lsps request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This table shows the query parameters for the search lsps request:

Name	Type	Description
`name`	String *(Optional)*	Filters on LSP Name. The parameter is treated as a regular expression. Simple string such as LP_ is accepted. Javasript regexp (for example, /104$/) is also accepted
`from`	String *(Optional)*	Filters on LSP from/address property.
`operationalStatus`	String *(Optional)*	Filters based on LSP operationalStatus property.
`queryType`	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If the queryType is set to OR, LSP is included in the result if any of the query parameters matches.

3.4.3.2. Response

Example 3.25. Search LSPs: JSON response

```
[
    {
        "lspIndex": 1,
        "name": "LSP_Node101_Node102",
        "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.102", "topoObjectType": "ipv4"},
 "plannedProperties": {
     "bandwidth": "500M",
     "setupPriority": 1,
     "holdingPriority": 1,
     "adminStatus": "Up",
     "routingStatus": "Up",
     "lastStatusString": "<Active PCS initialization"
},
        "liveProperties": {
            "adminStatus": "Up",
```

```
                "bandwidth": 500000000,
                "ero": [
                    {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
                    {"address": "62.102.105.1", "loose": false, "topoObjectType":
"ipv4" }
                ],
                "holdingPriority": 1,
                "metric": 25,
                "rro": [
                    {"address": "62.0.0.105",    "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                    {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                    {"address": "62.0.0.102",    "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                    {"address": "62.102.105.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
                ],
                "setupPriority": 1
            },
            "controlType": "Delegated",
            "operationalStatus": "Active",
            "pathType": "primary",
            "tunnelId": 56615
        },
        {
            "lspIndex": 2,
            "name": "LP_101_103",
            "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
            "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
            "controlType": "Delegated",
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "calculatedEro": [
 {"topoObjectType": "ipv4","address": "62.101.105.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.102.105.1","loose": false},
 {"topoObjectType": "ipv4","address": "62.102.106.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.104.106.1","loose": false},
 {"topoObjectType": "ipv4","address": "62.104.107.2","loose": false},
 {"topoObjectType": "ipv4","address": "62.103.107.1","loose": false}
        ],
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Up",
        "lastStatusString": "<Active PCS initialization"
},
            "liveProperties": {
                "adminStatus": "Up",
                "bandwidth": 10000000,
                "ero": [
                    {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
                    {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                    {"address": "62.103.107.1", "loose": false, "topoObjectType":
"ipv4" }
                ],
```

```
            "holdingPriority": 0,
            "metric": 40,
            "pathName": "Path_Node101_Node103_Strict_1",
            "rro": [
                {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.107",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.105.107.2", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.103",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.103.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 7
        },
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 56614
   },
   {
        "lspIndex": 3,
        "name": "LSP_Node102_Node104_with_secondary",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "400M",
    "setupPriority": 5,
    "holdingPriority": 5,
    "calculatedEro": [
                {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Up",
    "lastStatusString": "<Active"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 400000000,
            "ero": [
                {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 5,
            "metric": 40,
            "pathName": "102_104_primary",
            "rro": [
                {"address": "62.0.0.106", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
```

```
                {"address": "62.0.0.104", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 5
        },
        "controlType": "Delegated",
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 10304
    },
    {
        "lspIndex": 4,
        "name": "LSP_Node102_Node104_with_secondary",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "400M",
    "setupPriority": 5,
    "holdingPriority": 5,
    "calculatedEro": [
 {"address": "62.102.105.2", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"},
 {"address": "62.105.107.2", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"},
 {"address": "62.104.107.1", "protectionAvailable": false, "protectionInUse":
false, "topoObjectType": "ipv4"}
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Down",
    "lastStatusString": "<Down"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 400000000,
            "ero": [],
            "holdingPriority": 5,
            "metric": 0,
            "pathName": "102_104_secondary",
            "rro": [],
            "setupPriority": 5
        },
        "controlType": "Delegated",
        "operationalStatus": "Down",
        "pathType": "secondary",
        "tunnelId": 0
    },
    {
        "lspIndex": 5,
        "name": "LSP_Node102_Node104_with_standby",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "500M",
    "setupPriority": 7,
    "holdingPriority": 7,
    "calculatedEro": [
```

```
                {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
    ],
    "pathName": "102_104_primary",
    "adminStatus": "Up",
    "routingStatus": "Up",
    "preference": 10,
    "lastStatusString": "<Active"
},
      "liveProperties": {
          "adminStatus": "Up",
          "bandwidth": 500000000,
          "ero": [
              {"address": "62.102.106.2", "loose": false, "topoObjectType":
"ipv4" },
              {"address": "62.104.106.1", "loose": false, "topoObjectType":
"ipv4" }
          ],
          "holdingPriority": 7,
          "metric": 40,
          "pathName": "102_104_primary",
          "rro": [
              {"address": "62.0.0.106", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
              {"address": "62.102.106.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
              {"address": "62.0.0.104", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
              {"address": "62.104.106.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
          ],
          "setupPriority": 7
      },
      "controlType": "Delegated",
      "operationalStatus": "Active",
      "pathType": "primary",
      "tunnelId": 10305
  },
  {
      "lspIndex": 6,
      "name": "LSP_Node102_Node104_with_standby",
      "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
      "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
"plannedProperties": {
    "bandwidth": "500M",
    "setupPriority": 7,
    "holdingPriority": 7,
    "calculatedEro": [
                {"address": "62.102.105.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.107.1", "loose": false, "topoObjectType":
"ipv4" }
    ],
    "pathName": "102_104_secondary",
    "adminStatus": "Up",
    "routingStatus": "Up",
```

```
     "lastStatusString": "<Up"
},
        "liveProperties": {
            "adminStatus": "Up",
            "bandwidth": 500000000,
            "ero": [
                {"address": "62.102.105.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                {"address": "62.104.107.1", "loose": false, "topoObjectType":
"ipv4" }
            ],
            "holdingPriority": 7,
            "metric": 40,
            "pathName": "102_104_secondary",
            "rro": [
                {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.102.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.107",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.105.107.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.0.0.104",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                {"address": "62.104.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
            ],
            "setupPriority": 7
        },
        "controlType": "Delegated",
        "operationalStatus": "Up",
        "pathType": "standby",
        "tunnelId": 10306
    },
    {
"lspIndex": 7,
"name": "TEplusplus-Node102-Node103-1",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10310,
"liveProperties": {
    "bandwidth": 100000000,
    "metric": 40,
    "setupPriority": 7,
    "holdingPriority": 0,
    "adminStatus": "Up",
    "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
    ],
    "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2","protectionInUse":
false, "protectionAvailable": false},
```

```
 {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
     ],
     "options": {
 "TEPlusPlusId": 2
     }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
    },
    {
"lspIndex": 8,
"name": "TEplusplus-Node102-Node103-2",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10311,
"liveProperties": {
     "bandwidth": 100000000,
     "metric": 40,
     "setupPriority": 7,
     "holdingPriority": 0,
     "adminStatus": "Up",
     "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
     ],
     "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
     ],
     "options": {
 "TEPlusPlusId": 2
     }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
    },
    {
"lspIndex": 9,
"name": "TEplusplus-Node102-Node103-3",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.102"
},
"to": { "topoObjectType": "ipv4", "address": "62.0.0.103"
},
"tunnelId": 10312,
"liveProperties": {
     "bandwidth": 100000000,
     "metric": 40,
     "setupPriority": 7,
```

```
        "holdingPriority": 0,
        "adminStatus": "Up",
        "ero": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "loose": false },
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
        ],
        "rro": [
 {"topoObjectType": "ipv4", "address": "62.102.105.2", "protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "protectionInUse":
false, "protectionAvailable": false}
        ],
        "options": {
 "TEPlusPlusId": 2
        }
},
"operationalStatus": "Active",
"controlType": "PCC",
"pathType": "primary"
        },
        {
"lspIndex": 10,
"name": "PCE_Initiated_LSP",
"from": { "topoObjectType": "ipv4", "address": "62.0.0.101"},
"to":    { "topoObjectType": "ipv4", "address": "62.0.0.103"},
"tunnelId": 56694,
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "routingStatus": "Up",
        "lastStatusString": "<Active"
},
"liveProperties": {
        "bandwidth": 10000000,
        "metric": 40,
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
 {"topoObjectType": "ipv4", "address": "62.101.105.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2", "loose": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1", "loose": false}
        ],
        "rro": [
 {"topoObjectType": "ipv4", "address": "62.101.105.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.105.107.2","protectionInUse":
false, "protectionAvailable": false},
 {"topoObjectType": "ipv4", "address": "62.103.107.1","protectionInUse":
false, "protectionAvailable": false}
        ]
},
"operationalStatus": "Active",
"controlType": "PCEInitiated",
"pathType": "primary"
```

```
        }
]
```

3.4.4. Get a single TE-LSP

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Retrieves the details for a TE-LSP.

Normal response codes: 200

3.4.4.1. Request

This table shows the URI parameters for the get a single te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex

This operation does not accept a request body.

3.4.4.2. Response

Example 3.26. Get a single TE-LSP: JSON response

```
{
    "lspIndex": 2,
    "name": "LP_101_103",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "Delegated",
    "plannedProperties": {
"bandwidth": "10M",
"setupPriority": 7,
"holdingPriority": 0,
"calculatedEro": [
    {"topoObjectType": "ipv4","address": "62.101.105.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.102.105.1","loose": false},
    {"topoObjectType": "ipv4","address": "62.102.106.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.104.106.1","loose": false},
    {"topoObjectType": "ipv4","address": "62.104.107.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.103.107.1","loose": false}
],
"pathName": "Path_Node101_Node103_Strict_1",
"adminStatus": "Up",
"routingStatus": "Up",
"lastStatusString": "<Active PCS initialization"
    },
    "liveProperties": {
        "adminStatus": "Up",
        "bandwidth": 10000000,
        "ero": [
            {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
```

```
           {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
           {"address": "62.103.107.1", "loose": false, "topoObjectType":
"ipv4" }
       ],
       "holdingPriority": 0,
       "metric": 40,
       "pathName": "Path_Node101_Node103_Strict_1",
       "rro": [
           {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
           {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
           {"address": "62.0.0.107",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
           {"address": "62.105.107.2", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
           {"address": "62.0.0.103",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
           {"address": "62.103.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
       ],
       "setupPriority": 7
   },
   "operationalStatus": "Active",
   "pathType": "primary",
   "tunnelId": 56614
}
```

3.4.5. Update TE-LSP

Method	URI	Description
PUT	/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Updates a TE-LSP. The accepted data is described by JSON schema lsp.json#/definitions/updateLSP .

Normal response codes: 202

3.4.5.1. Request

This table shows the URI parameters for the update te-lsp request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{topologyId}	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
{lspIndex}	Int	The unique lspIndex

Example 3.27. Update TE-LSP : JSON request

The update does accept the same parameters as the create, except for some parameters which cannot be modified (from, to, name, pathName, pathType).

```
{
    "lspIndex": 31,
    "name": "Rest_LSP_1",
    "from": {"topoObjectType": "ipv4","address": "62.0.0.101" },
    "to": {"topoObjectType": "ipv4","address": "62.0.0.103"  },
    "pathType": "primary",
    "plannedProperties": {
 "bandwidth": "15M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

3.4.5.2. Response

Example 3.28. Update TE-LSP : JSON response

```
{
    "lspIndex": 20,
    "name": "Rest_LSP_1",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "PCEInitiated",
    "plannedProperties": {
 "adminStatus": "Up",
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7,
 "lastStatusString": "Provisioning Order from REST Interface",
```

```
"routingStatus": "Unknown"
    },
    "operationalStatus": "Unknown",
    "pathType": "primary"
}
```

3.4.6. Delete a TE-lsp

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Requests a TE-LSP to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.

Normal response codes: 204

3.4.6.1. Request

This table shows the URI parameters for the delete a te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex

This operation does not accept a request body.

3.4.7. Create a list of TE-LSPs

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Creates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/createLSPOrRespon-seList .

Normal response codes: 201

3.4.7.1. Request

This table shows the URI parameters for the create a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

Example 3.29. Create a list of TE-LSPs: JSON request

The request must contain a list of LSPs to be created. The LSP parameters are the same as individual LSP creation. The following example shows the creation of two diverse LSPs at the same time.

```
[
    {
        "name": "REST_LSP_DIVERSE_1",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
        "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"}
        }
    },
    {
        "name": "REST_LSP_DIVERSE_2",
        "from": {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
        "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"}
        }
    }
]
```

3.4.7.2. Response

Example 3.30. Create a list of TE-LSPs: JSON response

```
[
```

```
    {
        "name": "REST_LSP_DIVERSE_1",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
        "lspIndex": 21,
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
            "adminStatus": "Up",
            "routingStatus": "Unknown",
            "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"},
            "lastStatusString": ">Provisioning Order from REST Interface"
        },
        "controlType": "PCEInitiated",
        "operationalStatus": "Unknown"
    },
    {
        "name": "REST_LSP_DIVERSE_2",
        "from": {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "lspIndex": 22,
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
            "adminStatus": "Up",
            "routingStatus": "Unknown",
            "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"},
            "lastStatusString": ">Provisioning Order from REST Interface"
        },
        "controlType": "PCEInitiated",
        "operationalStatus": "Unknown"
    }
]
```

3.4.8. Update a list of TE-LSPs

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs. The accepted data is described by JSON schema lsp.json#/definitions/lspListUpdate .

Normal response codes: 202

3.4.8.1. Request

This table shows the URI parameters for the update a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

The bulk update accepts a list of LSP updates. The same parameter and logic as for the single LSP update apply to each entry.

This operation does not accept a request body.

3.4.8.2. Response

The response contains a list of individual update response, see TE-LSP update.

This operation does not return a response body.

3.4.9. Delete a list of TE-LSPs

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Requests a list of TE-LSPs to be deleted. This is possible only for PCE-Initiated LSPs. PCC-Controlled and PCC-Delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.

Normal response codes: 204

3.4.9.1. Request

This table shows the URI parameters for the delete a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.4.10. Retrieve the LSP event history

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}`	Retrieves the history for a TE-LSP.

The history contains a list of timestamped (unix timestamp) events for the LSP resource.

Normal response codes: 200

3.4.10.1. Request

This table shows the URI parameters for the retrieve the lsp event history request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{topologyId}`	Int	The unique identifier of the topology. In NorthStar version 1, unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex

This table shows the query parameters for the retrieve the lsp event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include only the events with timestamps beginning at and after the specified starting timestamp.
`end`	Int *(Optional)*	End timestamp: Include only the events with timestamps before (but not including) the ending timestamp.

3.4.10.2. Response

Example 3.31. Retrieve the LSP event history: JSON response

```
[
    {
 "plannedProperties": {
     "bandwidth": "0",
     "setupPriority": 7,
     "holdingPriority": 0,
     "adminStatus": "Up",
     "routingStatus": "Down"
},
 "controlType": "PCC",
 "eventStatusString": "<Down",
 "timestamp": 1427128941053,
 "operation": "State Change"
    },
    {
 "plannedProperties": {
     "bandwidth": "0",
     "setupPriority": 7,
     "holdingPriority": 0,
     "adminStatus": "Up",
     "routingStatus":  "Down"
```

```
    },
"controlType": "PCC",
"eventStatusString": "<Down PCS initialization",
"timestamp": 1427128941057,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "VMX103_VMX101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "reprovision:provisioning new delegated lsp",
"timestamp": 1427132006714,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427132006720,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427132006780,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Up",
"timestamp": 1427132007053,
```

```
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427132007069,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427132009764,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427135406437,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Path_Node101_Node103_Strict_1",
    "adminStatus": "Up",
    "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "reprovision:Provision using planned data",
"timestamp": 1427167092366,
"operation": "State Change"
    },
    {
"plannedProperties": {
```

```
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
    },
    "controlType": "Delegated",
    "eventStatusString": "Down, PCS initialization",
    "timestamp": 1427167092372,
    "operation": "State Change"
        },
        {
    "plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
    },
    "controlType": "Delegated",
    "eventStatusString": "Down",
    "timestamp": 1427167092475,
    "operation": "State Change"
        },
        {
    "plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
    },
    "controlType": "Delegated",
    "eventStatusString": "Down",
    "timestamp": 1427167092516,
    "operation": "State Change"
        },
        {
    "plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Up"
    },
    "controlType": "Delegated",
    "eventStatusString": "Active",
    "timestamp": 1427167092865,
    "operation": "State Change"
        }
]
```

3.5. Device Profiles

The device profile schema is: deviceProfile.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/netconf/pro-files/ [GET : get all device profile, POST : create new device profiles, PUT: update device profiles, DELETE : delete device profiles]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/netconf/net-confCollection/liveNetwork [POST: create a collection job with requested device profile ids]

- https://northstar.example.net:8443/NorthStar/API/v1/tenant/<tenant-id>/netconf/net-confCollection/<id> [GET: get a collection job status with requested job id]

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/net-conf/profiles`	Get all Profiles.
POST	`/v1/tenant/{tenant_id}/net-conf/profiles`	Create new profiles.
PUT	`/v1/tenant/{tenant_id}/net-conf/profiles`	Update profiles.
DELETE	`/v1/tenant/{tenant_id}/net-conf/profiles`	Delete profiles.
POST	`/v1/tenant/{tenant_id}/net-conf/netconfCollection/liveNetwork`	Creates a new collection.
GET	`/v1/tenant/{tenant_id}/net-conf/netconfCollection/{id}`	Gets the Status of a collection job.

3.5.1. Get all Profiles

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/net-conf/profiles`	Get all Profiles.

Normal response codes: 200

3.5.1.1. Request

This table shows the URI parameters for the get all profiles request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.5.1.2. Response

The JSON document returned follows deviceProfile.json#/definitions/profileList.

This operation does not return a response body.

3.5.2. Create new profiles

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/net-conf/profiles`	Create new profiles.

Normal response codes: 201

3.5.2.1. Request

This table shows the URI parameters for the create new profiles request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The JSON document request follows deviceProfile.json#/definitions/profileList.

This operation does not accept a request body.

3.5.2.2. Response

The JSON document returned follows deviceProfile.json#/definitions/profileList.

This operation does not return a response body.

3.5.3. Update profiles

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/net-conf/profiles`	Update profiles.

Normal response codes: 202

3.5.3.1. Request

This table shows the URI parameters for the update profiles request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The JSON document request follows, deviceProfile.json#/definitions/profileList. and must contains id in each profiledeviceProfile.json#/definitions/profile.

This operation does not accept a request body.

3.5.3.2. Response

The JSON document returned follows deviceProfile.json#/definitions/profileList.

This operation does not return a response body.

3.5.4. Delete profiles

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/net-conf/profiles`	Delete profiles.

Normal response codes: 204

3.5.4.1. Request

This table shows the URI parameters for the delete profiles request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The JSON document request follows, deviceProfile.json#/definitions/profileList. and must contains id in each profiledeviceProfile.json#/definitions/profile.

This operation does not accept a request body.

3.5.4.2. Response

The JSON document returned follows deviceProfile.json#/definitions/profileList.

This operation does not return a response body.

3.5.5. Create a New Collect

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/net-conf/netconfCollection/liveNetwork`	Creates a new collection.

Normal response codes: 201

3.5.5.1. Request

This table shows the URI parameters for the create a new collect request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The request must use the following JSON schema: deviceProfile.json#/definitions/startCollection .

This operation does not accept a request body.

3.5.5.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/collectionStatus .

This operation does not return a response body.

3.5.6. Get the Status of a Collection Job

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/net-conf/netconfCollection/{id}`	Gets the Status of a collection job.

Normal response codes: 200

3.5.6.1. Request

This table shows the URI parameters for the get the status of a collection job request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{collectionJobId}`	Int	The unique identifier of the collection job.

This operation does not accept a request body.

3.5.6.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/collectionStatus .

This operation does not return a response body.

3.6. Transport Topology acquisition

Transport Controller configuration API. The API permits configuring NorthStar connection to transport controller to retrieve the abstracted transport topology to automatically add an extra information to the IP layer.

The corresponding schema is: transportController.json .

The following tables show the set of parameters describing a transport controller configuration.

Table 3.4. Create Transport controller Attributes

Attribute	Type	Fixed	Description
name	string	No	Transport controller name
notifyUrl	string	No	The REST/RESTCONF URL publishing (via Server-Sent-event) topology notifications
profileName	string	No	The profile group name the NorthStar controller must use to connect to the transport controller instances.
topologyUrl	string	No	The URL providing the abstract topology, following the IETF model supported by NorthStar .

Attribute	Type	Fixed	Description
topoObjectType	string	Yes	transportController

The other parameters are:

Table 3.5. Create Transport controller optional Attributes

Attribute	Type	Fixed	Description
interfaceType	string	No	Indicates if the transport controller interface follows the RESTCONF draft or a more simple REST interface. This does not affect the NorthStar Operation.
pollUrl	string	No	The URL on the server to poll server liveliness, by default /.well-known/host-meta.
reconnectTimeout	string	No	The time in seconds in-between two reconnect attempt between controller instances.
rootUrl	string	No	Default root URL for REST-CONF datastores.
srlgPrefix	string	No	The SRLG prefix is used to generate the SRLGs for the IP topology. If set the SRLGs will be TSRLG_<srlgPrefix>_<SRLG>, otherwise TSRLG_<SRLG>. This permits to either separate or merge two controller SRLG space. By default, SRLG is not set or it has an empty string which corresponds to merging the SRLGs space.
topologyToUse	string	No	The transport controller might return several topologies. This field permits you to select a specific topology the filter is applied to the model te-topology-id field.

Method	URI	Description
GET	/v1/tenant/{tenant_id}/transport-Controllers	Retrieves the full list of transport controllers. The schema describing the response is transportController.json#/definitions/transportControllerList .
POST	/v1/tenant/{tenant_id}/transport-Controllers	Creates transport controller. The request must follow the schema transportController.json#/definitions/createTransportController .
GET	/v1/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Retrieves the details for a transport controller configuration.
PUT	/v1/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Updates a transport controller. The request must follow the schema transportController.json#/definitions/updateTransportController . The parameters are the same as for transport controller creation. A change of parameter will trigger a reconnection to the transport controller using the new parameters.

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}`	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport controller are not deleted. You must delete them manually, if required.

3.6.1. Get transport controller list

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/transport-Controllers`	Retrieves the full list of transport controllers. The schema describing the response is transportController.json#/definitions/transportControllerList .

Normal response codes: 200

3.6.1.1. Request

This table shows the URI parameters for the get transport controller list request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.6.1.2. Response

Example 3.32. Get transport controller list: JSON response

```
[
  {
    "transportControllerIndex": 1,
    "name": "Nortel",
    "interfaceType": "RESTCONF",
    "notifyUrl": "/streams/NETCONF-JSON",
    "pollUrl": "",
    "profileName": "NortelProfile",
    "reconnectTimeout": 10,
    "rootUrl": "",
    "srlgPrefix": "",
    "topologyToUse": "",
    "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
    "topoObjectType": "transportController"
  }
]
```

3.6.2. Create a transport controller configuration

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/transport-Controllers`	Creates transport controller. The request must follow the schema transportController.json#/definitions/createTransportController .

Normal response codes: 201

3.6.2.1. Request

This table shows the URI parameters for the create a transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

Example 3.33. Create a transport controller configuration: JSON request

```
{
    "name": "Nortel",
    "interfaceType": "RESTCONF",
    "notifyUrl": "/streams/NETCONF-JSON",
    "profileName": "NortelProfile",
    "reconnectTimeout": 10,
    "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
    "topoObjectType": "transportController"
}
```

3.6.2.2. Response

Example 3.34. Create a transport controller configuration: JSON response

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

3.6.3. Get a transport controller configuration

Method	URI	Description
GET	/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}	Retrieves the details for a transport controller configuration.

Normal response codes: 200

3.6.3.1. Request

This table shows the URI parameters for the get a transport controller configuration request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{transportControl-lerIndex}	Int	The unique transportControllerIndex.

This operation does not accept a request body.

3.6.3.2. Response

Example 3.35. Get a transport controller configuration: JSON response

The JSON document returned follows transportController.json#/definitions/transportController .

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

3.6.4. Update transport controller configuration

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}`	Updates a transport controller. The request must follow the schema transportController.json#/definitions/update-TransportController . The parameters are the same as for transport controller creation. A change of parameter will trigger a reconnection to the transport controller using the new parameters.

Normal response codes: 202

3.6.4.1. Request

This table shows the URI parameters for the update transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{transportControllerIndex}`	Int	The unique transportControllerIndex.

Example 3.36. Update transport controller configuration: JSON request

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "srlgPrefix": "space1",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

3.6.4.2. Response

Example 3.37. Update transport controller configuration: JSON response

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "srlgPrefix": "space1",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

3.6.5. Delete transport controller configuration

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}`	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport controller are not deleted. You must delete them manually, if required.

Normal response codes: 204

3.6.5.1. Request

This table shows the URI parameters for the delete transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{transportControl-lerIndex}`	Int	The unique transportControllerIndex.

This operation does not accept a request body.

3.7. Transport Topology devices

This API manages a set of instances of a transport controller.

The corresponding schema is: transportControllerEndpoint.json .

The devices are managed as group of devices. For each device the following parameters can be managed:

Table 3.6. Create Transport controller Attributes

Attribute	Type	Fixed	Description
ipAddr	string	No	IP address to connect
accessMethod	string	No	Either HTTP or HTTPS
authMethod	string	No	Authentication method; can be BASIC or NOAUTH

The other parameters are:

Table 3.7. Create Transport controller optional Attributes

Attribute	Type	Fixed	Description
hostName	string	No	Device name.
httpPort	int	No	HTTP port.
login	string	Yes	Login to be used for the BASIC auth.
passwd	string	Yes	Encrypted password to be used for the BASIC auth.

Attribute	Type	Fixed	Description
retry	int	No	Number of retries for the heartbeat, before the device is considered down.
timeout	int	No	Request timeout for the device.

Method	URI	Description
GET	/v1/tenant/{tenant_id}/transport-ControllerGroups	Retrieves the full list of transport controller groups. The schema describing the response is transportControllerEndpoint.json#/definitions/transportControllerGroupList .
POST	/v1/tenant/{tenant_id}/transport-ControllerGroups	Creates a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .
DELETE	/v1/tenant/{tenant_id}/transport-ControllerGroups	Deletes a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .
GET	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Retrieves a transport controller group, which is a list of devices. The schema describing the response is transportControllerEndpoint.json#/definitions/transportControllerGroup . The password are set by empty strings.
POST	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Creates devices in the group. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroup .
PUT	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Updates devices in the group. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroup .
DELETE	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Deletes devices from the group. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroup .

3.7.1. Get transport controller device groups

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/transport-ControllerGroups`	Retrieves the full list of transport controller groups. The schema describing the response is transportControllerEndpoint.json#/definitions/transport-ControllerGroupList .

Normal response codes: 200

3.7.1.1. Request

This table shows the URI parameters for the get transport controller device groups request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.7.1.2. Response

Example 3.38. Get transport controller device groups: JSON response

```
[
  {
    "name": "NortelProfile"
  },
  {
    "name": "Default"
  }
]
```

3.7.2. Create a transport controller device group

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/transport-ControllerGroups`	Creates a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .

The request must contain the group name to be created, as shown in the example

Normal response codes: 201

3.7.2.1. Request

This table shows the URI parameters for the create a transport controller device group request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

Example 3.39. Create a transport controller device group: JSON request

```
{
    "name": "NortelProfile",
    "profileType": "Network Controllers"
}
```

3.7.2.2. Response

Example 3.40. Create a transport controller device group: JSON response

```
{
  "success": true
}
```

3.7.3. Delete a transport controller device group

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/transport-ControllerGroups`	Deletes a group for transport controller. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .

The request must contain the group name to be deleted, as shown in the example

Normal response codes: 201

3.7.3.1. Request

This table shows the URI parameters for the delete a transport controller device group request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

Example 3.41. Delete a transport controller device group: JSON request

```
{
    "name": "NortelProfile",
    "profileType": "Network Controllers"
}
```

3.7.3.2. Response

Example 3.42. Delete a transport controller device group: JSON response

```
{
  "success": true
}
```

3.7.4. Get transport controller device groups

Method	URI	Description
GET	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Retrieves a transport controller group, which is a list of devices. The schema describing the response is transportControllerEndpoint.json#/definitions/transport-ControllerGroup . The password are set by empty strings.

Normal response codes: 200

3.7.4.1. Request

This table shows the URI parameters for the get transport controller device groups request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{transportController-GroupName}	String	The transport controller devices groups name.

This operation does not accept a request body.

3.7.4.2. Response

Example 3.43. Get transport controller device groups: JSON response

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.3",
    "login": "Login2",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  },
  {
    "id": "7bcf5b8a-30f4-46ad-9a51-29daac671587",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.2",
    "login": "Login",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  }
]
```

3.7.5. Create new devices in the group

Method	URI	Description
POST	/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Creates devices in the group. The request must follow the schema transportControllerEndpoint.json#/defini-tions/transportControllerGroup .

The request contains a list of devices to be created.

Normal response codes: 201

3.7.5.1. Request

This table shows the URI parameters for the create new devices in the group request:

Name	Type	Description
{tenant_id}	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
{transportController-GroupName}	String	The transport controller devices groups name.

Example 3.44. Create new devices in the group: JSON request

```
[
    {
        "accessMethod": "HTTP",
        "authMethod": "BASIC",
        "hostName": "",
        "httpPort": 80,
        "ipAddr": "10.0.1.2",
        "login": "Login",
        "passwd" : "XYXYXYXYXYX",
        "retry": 3,
        "timeout": 2
    },
    {
        "accessMethod": "HTTP",
        "authMethod": "BASIC",
        "hostName": "",
        "httpPort": 80,
        "ipAddr": "10.0.1.3",
        "login": "Login2",
        "passwd" : "XYXYXYXYXYX",
        "retry": 3,
        "timeout": 2
    }
]
```

3.7.5.2. Response

Example 3.45. Create new devices in the group: JSON response

```
{
  "success": true
}
```

3.7.6. Update devices in the group

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Updates devices in the group. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroup .

The request contains a list of devices to be updated. The id parameter is required.

Normal response codes: 201

3.7.6.1. Request

This table shows the URI parameters for the update devices in the group request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{transportController-GroupName}`	String	The transport controller devices groups name.

Example 3.46. Update devices in the group: JSON request

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.3",
    "login": "Login3",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  }
]
```

3.7.6.2. Response

Example 3.47. Update devices in the group: JSON response

```
{
  "success": true
}
```

3.7.7. Delete devices from the group

Method	URI	Description
DELETE	`/v1/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Deletes devices from the group. The request must follow the schema transportControllerEndpoint.json#/definitions/transportControllerGroup .

The request contains a list of devices to be deleted. The id parameter is a mandatory parameter. The other parameters are ignored.

Normal response codes: 201

3.7.7.1. Request

This table shows the URI parameters for the delete devices from the group request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.
`{transportController-GroupName}`	String	The transport controller devices groups name.

Example 3.48. Delete devices from the group: JSON request

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf"
  }
]
```

3.7.7.2. Response

Example 3.49. Delete devices from the group: JSON response

```
{
  "success": true
}
```

3.8. High Availability

This API permits monitoring and configuration of NorthStar high availability cluster.

The corresponding schema is: ha.json .

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/highAvailability/hosts`	Get the status of all the nodes and processes of the cluster. .
GET	`/v1/tenant/{tenant_id}/highAvailability/zkstatus`	Get the status of all the zookeeper clusters. .
GET	`/v1/tenant/{tenant_id}/highAvailability/highAvailability`	Retrieves the list of preferences.

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/highAvail-` `ability/highAvailability`	Sets the node preferences.
POST	`/v1/tenant/{tenant_id}/highAvail-` `ability/stepdown`	Triggers a switchover.

3.8.1. Get the status of the cluster

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/highAvail-ability/hosts`	Get the status of all the nodes and processes of the cluster. .

Normal response codes: 200

3.8.1.1. Request

This table shows the URI parameters for the get the status of the cluster request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.8.1.2. Response

Example 3.50. Get the status of the cluster: JSON response

The JSON document returned follows ha.json#/definitions/hosts . The data indicates the nodes that are part of the cluster and the processes running on each node. The role indicates the current role of the node and has the following two components: 1. First part indicates Active or Standby; the Active node is where the path computation is running. 2. Second part indicates whether or not the node is running as HA coordinator. This does not reflect the status of the zookeeper master available in a different URL.

```
[
  {
    "hostname": "northstar-cluster-3",
    "ipv4": "10.0.0.1",
    "status": "Up",
    "role": "Standby,Coordinator",
    "version": "2.0.0-20160216_081948.x86_64",
    "processes": [
      {
        "processId": 26683,
        "processName": "junosvm",
        "startTime": "2016-02-16T19:24:07.000Z",
        "role": "Standby"
      },
      {
        "processId": 8389,
        "processName": "zookeeper",
        "startTime": "2016-02-16T22:54:15.000Z",
        "role": "Standby"
      },
      {
        "processId": 12347,
        "processName": "ha_agent",
        "startTime": "2016-02-16T23:07:09.000Z",
        "role": "Standby"
      },
      {
```

```
      "processId": 12276,
      "processName": "npat",
      "startTime": "2016-02-16T23:06:56.000Z",
      "role": "Standby"
    },
    {
      "processId": 12243,
      "processName": "pceserver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 12192,
      "processName": "nodejs",
      "startTime": "2016-02-16T23:06:44.000Z",
      "role": "Standby"
    },
    {
      "processId": 7821,
      "processName": "rabbitmq",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processName": "keepalived",
      "startTime": "2016-02-16T19:59:46.000Z",
      "role": "Standby"
    },
    {
      "processId": 12248,
      "processName": "toposerver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 8138,
      "processName": "cassandra",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processId": 3455,
      "processName": "haproxy",
      "startTime": "2016-02-16T19:59:46.000Z",
      "role": "Standby"
    },
    {
      "processId": 8453,
      "processName": "listener1_00",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processId": 12255,
      "processName": "pcserver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 12268,
```

```
          "processName": "mladapter",
          "startTime": "2016-02-16T23:06:56.000Z",
          "role": "Standby"
        },
        {
          "processId": 12242,
          "processName": "npat_ro",
          "startTime": "2016-02-16T23:06:54.000Z",
          "role": "Standby"
        }
      ]
    },
    {
      "hostname": "northstar-cluster-2",
      "ipv4": "10.0.0.2",
      "status": "Up",
      "role": "Standby",
      "version": "2.0.0-20160216_081948.x86_64",
      "processes": [
        {
          "processId": 5427,
          "processName": "junosvm",
          "startTime": "2016-02-16T19:23:29.000Z",
          "role": "Standby"
        },
        {
          "processId": 18452,
          "processName": "zookeeper",
          "startTime": "2016-02-16T22:49:58.000Z",
          "role": "Standby"
        },
        {
          "processId": 22489,
          "processName": "ha_agent",
          "startTime": "2016-02-16T23:08:13.000Z",
          "role": "Standby"
        },
        {
          "processId": 22419,
          "processName": "npat",
          "startTime": "2016-02-16T23:08:01.000Z",
          "role": "Standby"
        },
        {
          "processId": 22387,
          "processName": "pceserver",
          "startTime": "2016-02-16T23:07:59.000Z",
          "role": "Standby"
        },
        {
          "processId": 22344,
          "processName": "nodejs",
          "startTime": "2016-02-16T23:07:49.000Z",
          "role": "Standby"
        },
        {
          "processId": 17884,
          "processName": "rabbitmq",
          "startTime": "2016-02-16T22:49:55.000Z",
          "role": "Standby"
```

```
        },
        {
          "processName": "keepalived",
          "startTime": "2016-02-16T19:44:45.000Z",
          "role": "Standby"
        },
        {
          "processId": 22393,
          "processName": "toposerver",
          "startTime": "2016-02-16T23:07:59.000Z",
          "role": "Standby"
        },
        {
          "processId": 18196,
          "processName": "cassandra",
          "startTime": "2016-02-16T22:49:55.000Z",
          "role": "Standby"
        },
        {
          "processId": 11334,
          "processName": "haproxy",
          "startTime": "2016-02-16T19:44:45.000Z",
          "role": "Standby"
        },
        {
          "processId": 18516,
          "processName": "listener1_00",
          "startTime": "2016-02-16T22:49:55.000Z",
          "role": "Standby"
        },
        {
          "processId": 22404,
          "processName": "pcserver",
          "startTime": "2016-02-16T23:07:59.000Z",
          "role": "Standby"
        },
        {
          "processId": 22411,
          "processName": "mladapter",
          "startTime": "2016-02-16T23:08:00.000Z",
          "role": "Standby"
        },
        {
          "processId": 22386,
          "processName": "npat_ro",
          "startTime": "2016-02-16T23:07:59.000Z",
          "role": "Standby"
        }
      ]
    },
    {
      "hostname": "northstar-cluster-1",
      "ipv4": "10.0.0.3",
      "status": "Up",
      "role": "Active",
      "version": "2.0.0-20160216_081948.x86_64",
      "processes": [
        {
          "processId": 11420,
          "processName": "junosvm",
```

```
      "startTime": "2016-02-16T19:24:28.000Z",
      "role": "Active"
    },
    {
      "processId": 23745,
      "processName": "zookeeper",
      "startTime": "2016-02-16T22:47:26.000Z",
      "role": "Active"
    },
    {
      "processId": 27746,
      "processName": "ha_agent",
      "startTime": "2016-02-16T23:08:19.000Z",
      "role": "Active"
    },
    {
      "processId": 28375,
      "processName": "npat",
      "startTime": "2016-02-16T23:10:57.000Z",
      "role": "Active"
    },
    {
      "processId": 27799,
      "processName": "pceserver",
      "startTime": "2016-02-16T23:08:35.000Z",
      "role": "Active"
    },
    {
      "processId": 27604,
      "processName": "nodejs",
      "startTime": "2016-02-16T23:07:55.000Z",
      "role": "Active"
    },
    {
      "processId": 23190,
      "processName": "rabbitmq",
      "startTime": "2016-02-16T22:47:23.000Z",
      "role": "Active"
    },
    {
      "processId": 28379,
      "processName": "keepalived",
      "startTime": "2016-02-16T23:10:57.000Z",
      "role": "Active"
    },
    {
      "processId": 28358,
      "processName": "toposerver",
      "startTime": "2016-02-16T23:10:56.000Z",
      "role": "Active"
    },
    {
      "processId": 23505,
      "processName": "cassandra",
      "startTime": "2016-02-16T22:47:23.000Z",
      "role": "Active"
    },
    {
      "processId": 13960,
      "processName": "haproxy",
```

```
      "startTime": "2016-02-16T19:29:31.000Z",
      "role": "Active"
    },
    {
      "processId": 23806,
      "processName": "listener1_00",
      "startTime": "2016-02-16T22:47:23.000Z",
      "role": "Active"
    },
    {
      "processId": 27848,
      "processName": "pcserver",
      "startTime": "2016-02-16T23:08:45.000Z",
      "role": "Active"
    },
    {
      "processId": 28360,
      "processName": "mladapter",
      "startTime": "2016-02-16T23:10:56.000Z",
      "role": "Active"
    },
    {
      "processId": 28357,
      "processName": "npat_ro",
      "startTime": "2016-02-16T23:10:56.000Z",
      "role": "Active"
    }
  ]
 }
]
```

3.8.2. Get the status of the zookeeper cluster

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/highAvail-ability/zkstatus`	Get the status of all the zookeeper clusters. .

Normal response codes: 200

3.8.2.1. Request

This table shows the URI parameters for the get the status of the zookeeper cluster request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.8.2.2. Response

Example 3.51. Get the status of the zookeeper cluster: JSON response

The JSON document returned follows ha.json#/definitions/zookeeperStatus . NorthStar uses a zookeeper cluster to coordinate different nodes. The URL provides the status of the zookeeper subsystem. You must check this information during the maintenance, because a failure of the zookeeper master might trigger a switchover, in some cases.

```
{
  "master": "northstar-cluster-2",
  "followers": [
    {
      "ip": "10.0.0.1",
      "synced": true,
      "host": "northstar-cluster-3"
    },
    {
      "ip": "10.0.0.3",
      "synced": true,
      "host": "northstar-cluster-1"
    }
  ]
}
```

3.8.3. Retrieve the list of preferences

Method	URI	Description
GET	`/v1/tenant/{tenant_id}/highAvail-` `ability/highAvailability`	Retrieves the list of preferences.

Normal response codes: 200

3.8.3.1. Request

This table shows the URI parameters for the retrieve the list of preferences request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

This operation does not accept a request body.

3.8.3.2. Response

Example 3.52. Retrieve the list of preferences: JSON response

The JSON document returned follows ha.json#/definitions/highAvailability.

```
[
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-3",
    "priority": 0
  },
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-2",
    "priority": 0
  },
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-1",
    "priority": 0
  }
]
```

3.8.4. Modify the node preferences

Method	URI	Description
PUT	`/v1/tenant/{tenant_id}/highAvail-ability/highAvailability`	Sets the node preferences.

3.8.4.1. Request

This table shows the URI parameters for the modify the node preferences request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The JSON document should follow ha.json#/definitions/highAvailability . You must set the new preferences for a node.

This operation does not accept a request body.

3.8.5. Request the primary node to step down

Method	URI	Description
POST	`/v1/tenant/{tenant_id}/highAvail-` `ability/stepdown`	Triggers a switchover.

3.8.5.1. Request

This table shows the URI parameters for the request the primary node to step down request:

Name	Type	Description
`{tenant_id}`	Int	The unique identifier of the tenant or account. In Northstar version 1, unique identifier is set to 1.

The request body must be empty.

This operation does not accept a request body.

4. NorthStar API v2

The Juniper Networks NorthStar API enables querying of topology, management of topology planning parameters, and management of TE-LSP.

NorthStar API v2 was introduced in NorthStar Controller version 2.1 for id/name separation and is not backwards compatible with v1.

This version allows node and link objects to have separate names and ids. You, as the API user, can control names, while ids are under NorthStar control.

NorthStar 6.0 introduces the following REST API changes:

- Topology can now be augmented with CE and Site nodes, see topology section

- P2MP Tree Design and provisioning now supports CE and Site nodes as destination nodes.

P2MP groups and SRLG/Facilities are available through the API since NorthStar 4.2 , and you can use a notification from NorthStar Controller to dynamically push updates to REST API clients.

Use the P2MP REST API calls to create P2MP groups and manage the following P2MP group common attributes:

- Bandwidth

- Setup/Holding Priority

- Coloring Attributes

NOTE: P2MP groups cannot be created nor managed by TE-LSPs.

You can use the TE-LSP API calls or the new P2MP REST API calls to delete the P2MP leaves. For more information, see the P2MP section

You access the API through the NorthStar server (as in northstar.example.net), through HTTP port 8091 and HTTPS port 8443, on base URLs like the following:

- http://northstar.example.net:8091/NorthStar/API/

- https://northstar.example.net:8443/NorthStar/API/

All of the NorthStar RESTful APIS use JSON-formatted data that conforms to the JSON-Schema specification. The main schema is topology_v2.json , and it contains links to the other data types. All schema can be found in this archive. Common data types are described in common.json . The following kinds of data and functionality are accessible and can be manipulated using the RESTful API:

- Nodes: communication endpoints.

- Links: lines or channels through which data is transmitted.

- Topology: A collection of nodes and links.

- TE-LSPs: Traffic-engineered label-switched paths.

- Demands.

- P2MP groups.

- TE-Containers.

- SRLGs/Facilities.

- BGP Routes.

- Analytics data.

- Maintenances.

- Path Computation.

- Cluster health info.

- Task scheduler.

- NorthStar Controller Management, including High Availability status and prefs, and Transport Controllers

- VRFs.

- IPE Policies.

You will find some example code associated with the API reference information. In addition, several examples that illustrate common usage can be found later in this document . In our example requests, we use HTTP, however the same functionality is available over HTTPS.

Existing REST APIs that reference plannedProperties/operationalStatus needs to be changed to plannedProperties/routingStatus as backwards compatibility will not be maintained from this release going forward. The reason for the change is based on the feedback from users that under plannedProperties, routingStatus would be more clear than operationalStatus. For an example, please see "LSP update example" under TE-LSPs events section below.

Method	URI	Description
Notification API	
Topology	
GET	`/v2/tenant/{tenant_id}/topology`	Returns a list of the topologies that are available.
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}`	Lists topological elements
DELETE	`/v2/tenant/{tenant_id}/topology/{topology_id}`	Deletes all of the topology planned data. The information acquired through BGP-LS reappears immediately.
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/stream`	See EventSource for format. The notifications send on that stream are only topologyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/status`	Returns the status of all NorthStar components.
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/status/pce`	Returns the status of the PCEP protocol adapter component.
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/status/topology-Acquisition`	Returns the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.

Method	URI	Description
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pathCompu-tationServer	Returns the status of the Path Computation Server compo-nent.
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/transport-TopologyAcquisition	Returns the status of the Transport Network Topology Ac-quisition Daemon.
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytic-sCollection	Returns the status of the analytics data collection.
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytics-Database	Returns the status of the analytics data collection database.
Node		
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes	Returns a full list of nodes.
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes	Creates a node using the following schema: node_v2.json#/definitions/createNode .
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/search{? name,hostName,AS,queryType}	Searches the list of nodes for specific URI parameters. For example, search?name=62.0.0.101 must return one node.
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/stream	See EventSource for format. The notifications send on that stream are only nodeEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Returns details for a node.
PUT	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Updates a node using the following schema: node_v2.json#/definitions/updateNode
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Updates a node using a RFC6902 patch: json-patch.json. The result of the patch must conform to node_v2.json#/definitions/updateNode. The REST server remove all oper-ational parameters like operationalStatus, ..etc. .
DELETE	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}	Deletes a node. (You cannot delete a live node; it reap-pears on the next update from Topology server.)
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}	Returns the event history for a node.
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk	Creates several Nodes using the following JSON schema: node_v2.json#/definitions/createNodeList .
PUT	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListUpdate .
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListPatch .
DELETE	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk	Deletes a list of Nodess. The payload must conform to node_v2.json#/definitions/nodeListDelete
Links		
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links	Returns a full list of links.
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links	Creates a link using optional and required parameters defined in the following schema: link_v2.json#/defini-tions/createLink .
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/search{? name,address,queryType}	Searches the link list based on URI parameters. For exam-ple, search?name=62.101.105 must return one Link.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/stream`	See EventSource for format. The notifications send on that stream are only linkEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Returns the details for a link.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Updates a planned link using the optional and required parameters defined in the following schema: link_v2.json#/definitions/updateLink .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Updates a link using a RFC6902 patch: json-patch.json. The result of the patch must conform to link_v2.json#/definitions/updateLink. The REST server remove all operational parameters like operationalStatus, ..etc. .
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Deletes a link. Live links reappear on the next update from the Topology server.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/utilization`	Returns a list of links only containing the endA/endZ utilization
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/links/{linkIndex}/history{?start,end}`	Returns the history for a Link.
TE-LSPs		
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Returns the TE-LSP list.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Creates a TE-LSP using the following JSON schema: lsp.json#/definitions/createLSP . For example, protection and custom service mapping parameters set.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{?name,from,operationalStatus,query-Type}`	Performs a search in the LSP list based on the URI parameters. For example, "search?name=62.101.105" returns one link.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/stream`	See EventSource for format. The notifications send on that stream are only lspEvent or lspTopologyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Returns the details for a TE-LSP.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Updates a TE-LSP using the JSON schema: lsp.json#/definitions/updateLSP .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Updates a TE-LSP using a RFC6902 patch: json-patch.json. The result of the patch must conform to lsp.json#/definitions/updateLsp. The REST server remove all operational parameters like operationalStatus, ..etc. . Using an empty patch (empty list) will result in the LSP to be re-provisioned without parameter changed.
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Deletes a TE-LSP. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Creates several TE-LSPs using the following JSON schema: lsp.json#/definitions/createLSPList .
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListUpdate .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListPatch .

Method	URI	Description
DELETE	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk	Deletes a list of TE-LSPs. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-dele-gated LSPs cannot be deleted from NorthStar. They must be deleted in the node.b The payload must conform to lsp.json#/definitions/lspListDelete
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}	Returns the history for a TE-LSP.
Demands		
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands	Returns a full list of Demands.
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands	Create a demand using the following JSON schema: demands.json#/definitions/createDemand .
GET	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/stream	See EventSource for format. The notifications send on that stream are only demandEvent and demandTopol-ogyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}	Return the details of a specified demand.
PUT	/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}	Modify a specific demand using the following JSON schema: demands.json#/definitions/updateDemand .
PATCH	/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}	Patch a specific demand using a RFC6902 patch: json-patch.json. The result of the patch must conform to demands.json#/definitions/updateDemand. The REST server remove all operational parameters like operationalStatus, ..etc. .
DELETE	/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}	Delete a specific demand.
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Create a set of demands using the following JSON schema: demands.json#/definitions/createDemandList. The result-ing list of demands (after the patch is applied) must also conform to demands.json#/definitions/demandListUpdate . The return code indicates the request acceptance.
PUT	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Update a set of demands using the following JSON schema: demands.json#/definitions/demandListUpdate . The return code indicates the request acceptance.
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Patch a set of demands using the following JSON schema: demands.json#/definitions/demandListPatch . The return code indicates the request acceptance.
DELETE	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Delete a set of demands. The return code indicates the re-quest acceptance.
Task scheduler		
GET	/v2/tenant/{tenant_id}/sched-uler/tasklist	Returns a full list of Tasks as per JSON schema: scheduler.json#/definitions/taskList
GET	/v2/tenant/{tenant_id}/sched-uler/tasks	Returns a list of Tasks by filter task-type(?tasktype={tasktypeFilter}) as per JSON schema: scheduler.json#/definitions/taskList
POST	/v2/tenant/{tenant_id}/sched-uler/updatetask	Update a task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response as per JSON schema: scheduler.json#/definitions/respon-seObject.
POST	/v2/tenant/{tenant_id}/sched-uler/removeaddtask	Removes all the existing tasks with given taskType and adds a new Task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response

Method	URI	Description
		as per JSON schema: scheduler.json#/definitions/responseObject.
POST	/v2/tenant/{tenant_id}/scheduler/deletetask	Delete one or more tasks using the following JSON schema: scheduler.json#/definitions/deleteTask. Returns response as per JSON schema: scheduler.json#/definitions/responseObject.
GET	/v2/tenant/{tenant_id}/scheduler/taskshistory/{taskId}	Returns task execution status history in HTML table format as per JSON schema: scheduler.json#/definitions/tasksHistoryList
GET	/v2/tenant/{tenant_id}/scheduler/taskstatus/{taskId}	Returns task execution status history as per JSON schema: scheduler.json#/definitions/tasksStatusList
Device Profiles	
GET	/v2/tenant/{tenant_id}/netconf/profiles	Gets all profiles.
POST	/v2/tenant/{tenant_id}/netconf/profiles	Creates new profiles.
PUT	/v2/tenant/{tenant_id}/netconf/profiles	Updates profiles.
DELETE	/v2/tenant/{tenant_id}/netconf/profiles	Deletes profiles.
POST	/v2/tenant/{tenant_id}/netconf/netconfCollection/liveNetwork	Creates a new collection.
GET	/v2/tenant/{tenant_id}/netconf/netconfCollection/{id}	Gets the Status of a collection job.
TE-Containers	
GET	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers	List all TE-containers.
POST	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers	Creates a container.
GET	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/stream	See EventSource for format. The notifications send on that stream are only teContainerEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/{containerIndex}	Gets a TE Container.
PUT	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/{containerIndex}	Updates a TE Container
PATCH	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/{containerIndex}	Updates a TE Container using an RFC6902 document
DELETE	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/{containerIndex}	Deletes a container.
POST	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/bulk	Create a list of TE Container
PUT	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/bulk	Modify a list of TE Container
PATCH	/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/bulk	Modify a list of TE Container using a PATCH

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Deletes a list of containers.
	Facilities	
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Gets all Facilities.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Creates a facility.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/stream`	See EventSource for format. The notifications send on that stream are only facilityEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Gets a Facility.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Updates a facility
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Deletes a facility.
	P2MP	
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Returns a full list of P2MP groups.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Create a P2MP group using the following schema: p2mp.json#/definitions/createP2mpGroup. The API request contains the destination list and the common planned properties. The common planned properties may include plannedProperties with flow mapping parameters.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/stream`	See EventSource for format. The notifications send on that stream are only p2mpEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Returns the details of a specified P2MP group.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Modify a specific P2MP group, if the LSPS are not speci-fied, the common properties are changed, not the LSPs. If the LSPs are specified, the set of LSPs will be modified. i.e LSP that is not in the new list will be remove, the other will be added/updated".
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Modify a specific P2MP group using a PATCH document (RFC6906). The operation has the same behavior as the PUT method. An empty PATCH will re-provision the com-plete tree.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	No response is received from the REST API unless an error occurs.
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/bulk`	No response is received from the REST API unless an error occurs.
POST	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	The POST URL accepts a list of new leaves. Use the fol-lowing schema to create a P2MP leaf: p2mp.json#/defini-tions/createP2mpLeavesList .
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	Returns the details of a specified P2MP leaf.

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	No response is received from the REST API unless an error occurs.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/bulk`	No response is received from the REST API unless an error occurs.
VRF		
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs`	Returns the list of VRF summary: which node have vrf information and how many vrf are present.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs/{nodeIndex}`	Returns the list of discovered VRF for that node.
BGP Routes		
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/routes`	List all nodes with BGP routes and the number of routes for that node.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/routes/{nodeIn-dex}`	Gets the routes maintained by NorthStar for a node.
IPE Policies		
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Get all IPE Policies
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Create IPE Policies
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Update IPE Policies
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Delete IPE Policies
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/ipe/poli-cy/{ipePolicyId}`	Get single IPE policy
Analytics API		

POST	`/v2/tenant/{tenant_id}/statis-tics/demands/bulk`	The POST request accepts a JSON object describing the query parameters.
		
		 • interval (string): Time duration for instance 1d, 1y, 24h,.
		
		 • counter : Either a single counter or an array of counters. .
		
		 • aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		
		  • avg
		
		  • max
		
		  • min
		
		  • cardinality
		
		  • sum
		
		 • startTime (Either string or integer): Date time. .
		
		 • demand (array): Array of demand objects.
		
		 • endTime (Either string or integer): Date time. .
		
		 .

Method	URI	Description

POST	`/v2/tenant/{tenant_id}/` `statistics/interfaces/de-` `lay/{device_name}/{interface_name}`	The POST request accepts a JSON object describing the query parameters.
		
		• counter (string): Name of the counter to aggregate by..
		
		• endTime (Either string or integer): Date time. .
		
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		
		  • avg
		
		  • max
		
		  • min
		
		  • cardinality
		
		  • sum
		
		• startTime (Either string or integer): Date time. .
		
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		
		.

POST	`/v2/tenant/{tenant_id}/statis-` `tics/interfaces/bulk`	The POST request accepts a JSON object describing the query parameters.
		
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		
		• counter : Either a single counter or an array of coun-ters. .
		
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		
		  • avg
		
		  • max
		
		  • min
		
		  • cardinality
		
		  • sum
		
		• startTime (Either string or integer): Date time. .
		
		• interface (array): Array of interface objects.
		
		• endTime (Either string or integer): Date time. .
		
		.

POST	`/v2/tenant/{tenant_id}/statis-` `tics/interfaces/fields`	The POST request accepts a JSON object describing the query parameters. • endTime (Either string or integer): Date time. . • startTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statis-` `tics/interfaces/top`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of:

Method	URI	Description
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• device (array): Array of node objects.
		• endTime (Either string or integer): Date time. .
		• size (integer): Max number of interfaces top return.
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/interfaces/childtraf-fic/{device_name}/{interface_name}`	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/interfaces/bulkdelay`	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interface (array): Array of interface objects.

Method	URI	Description
		• endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/interfaces/traffic	The POST request accepts a JSON object describing the query parameters.
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/ statistics/interfaces/traf-fic/{device_name}	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/ statistics/interfaces/traf-fic/{device_name}/{interface_name}	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality

Method	URI	Description
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/statis-tics/interfaces/topdelay	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• device (array): Array of node objects.
		• endTime (Either string or integer): Date time. .
		• size (integer): Max number of interfaces top return. .
POST	/v2/tenant/{tenant_id}/statis-tics/childtraffic/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interface (array): Array of interface objects.
		• endTime (Either string or integer): Date time. .
POST	/v2/tenant/{tenant_id}/statis-tics/jnxcos/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.

Method	URI	Description
		• counter : Either a single counter or an array of counters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interface (array): Array of interface objects.
		• endTime (Either string or integer): Date time. .
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/delay/fields`	The POST request accepts a JSON object describing the query parameters.
		• endTime (Either string or integer): Date time. .
		• startTime (Either string or integer): Date time. .
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/bulk`	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• startTime (Either string or integer): Date time. .
		• counter : Either a single counter or an array of counters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• lsp (array): Array of lsp objects.
		• endTime (Either string or integer): Date time. .
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/fields`	The POST request accepts a JSON object describing the query parameters.
		• endTime (Either string or integer): Date time. .
		• startTime (Either string or integer): Date time. .
		.

Method	URI	Description
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/top	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. . • size (number): ???. .
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/bulkdelay	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • startTime (Either string or integer): Date time. . • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • lsp (array): Array of lsp objects. • endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/delay/{device_name}/{lsp_name}	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max

Method	URI	Description
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/traffic	The POST request accepts a JSON object describing the query parameters.
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/traffic/{device_name}	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/ statistics/te-lsps/traf-fic/{device_name}/{lsp_name}	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:

Method	URI	Description
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/events/bulk`	The POST request accepts a JSON object describing the query parameters.
		• from (number): TODO.
		• startTime (Either string or integer): Date time. .
		• filter (object): Generic filter object, ???.
		• lsp (array): Array of lsp objects.
		• endTime (Either string or integer): Date time. .
		• order : Result order (asc or desc).the value must be one of:
		• asc
		• desc
		• size (number): ???.
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/events/{lsp_name}`	This query does not accept any parameter.
POST	`/v2/tenant/{tenant_id}/statis-tics/device/bulk`	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• device (array): Array of node objects.
		• endTime (Either string or integer): Date time. .
		.

Method	URI	Description
POST	/v2/tenant/{tenant_id}/statis-tics/device/top	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. . • size (number): ???. .
POST	/v2/tenant/{tenant_id}/statis-tics/ldp-lsps/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • startTime (Either string or integer): Date time. . • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • lsp (array): Array of lsp objects. • endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/ statistics/ldp-lsps/traf-fic/{device_name}/{fec}	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max

Method	URI	Description
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-` `tics/netflow/prefix_flow_demand`	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of counters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• demand (array): Array of demand objects.
		• endTime (Either string or integer): Date time. .
POST	`/v2/tenant/{tenant_id}/statis-` `tics/sid/bulk`	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of counters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• sid (array): Array of sid objects.
		• endTime (Either string or integer): Date time. .

Method	URI	Description
POST	/v2/tenant/{tenant_id}/statis-tics/sr-te-policy/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of counters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • policy (array): Array of policy objects. • endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/te-containers/traffic/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of counters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • containerLsp (array): Array of Container LSP objects. • endTime (Either string or integer): Date time. . .
	Transport Topology acquisition	
GET	/v2/tenant/{tenant_id}/transport-Controllers	Returns a full list of the transport controllers using the following schema: transportController.json#/defini-tions/transportControllerList
POST	/v2/tenant/{tenant_id}/transport-Controllers	Creates a transport controller using the following schema: transportController.json#/definitions/createTransportCon-troller
GET	/v2/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}	Returns the configuration of a transport controller.

Method	URI	Description
PUT	/v2/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Updates a transport controller using the following schema: transportController.json#/definitions/updateTransportController The parameters are the same as for transport controller creation. A parameter change triggers reconnection to the transport controller using the new parameters.
DELETE	/v2/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport controller are not deleted. You must delete them manually, if required.
Transport Topology devices		
GET	/v2/tenant/{tenant_id}/transport-ControllerGroups	Returns the full list of transport controller groups using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupList .
POST	/v2/tenant/{tenant_id}/transport-ControllerGroups	Creates a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .
DELETE	/v2/tenant/{tenant_id}/transport-ControllerGroups	Deletes a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription
GET	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Returns a list of transport controller groups using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup The password is set by empty strings.
POST	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Creates devices in a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup
PUT	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Updates devices in a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup
DELETE	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportControllerGroupName}	Deletes devices from a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup
High Availability API		
GET	/v2/tenant/{tenant_id}/highAvailability/hosts	Get the status of all of the nodes and processes in the cluster.
GET	/v2/tenant/{tenant_id}/highAvailability/zkstatus	Gets status of all of the zookeeper clusters. .
GET	/v2/tenant/{tenant_id}/highAvailability/highAvailability	Returns the list of preferences.
PUT	/v2/tenant/{tenant_id}/highAvailability/highAvailability	Sets the node preferences.
POST	/v2/tenant/{tenant_id}/highAvailability/stepdown	Triggers a switchover.
Path Computation API		
POST	/v2/tenant/{tenant_id}/topology/{topology_id}/pathComputation	Use the following schema to request for a path computation: pathComputation.json#/definitions/pathComputationRequests . Response: pathComputation.json#/definitions/pathComputationResponses .
Maintenance API		
GET	/v2/tenant/{tenant_id}/topology/{topology_id}/maintenances	Returns a full list of Maintenance.
POST	/v2/tenant/{tenant_id}/topology/{topology_id}/maintenances	Create a new maintenance using the following schema: maintenance.json#/definitions/createMaintenance .

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/stream`	See EventSource for format. The notifications send on that stream are only maintenanceEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Returns the details of a specified maintenance.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Modify a specific maintenance.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Delete a specific maintenance.
RPCs	
Path Optimization RPC	
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger global path optimization.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Get last global path optimization results.
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger targeted path optimization.
Routing and Failure Simulation RPC	
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Perform failure simulation analysis.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Returns the simulation list.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}`	Returns the details of a specified simulation.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}/{report-Name}`	Returns specific report details of a selected simulation.
P2MP Tree design RPC	
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/diverseTreeDesign`	Create 2 P2MP trees and perform Diverse P2MP Tree Design.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/diverseTreeDesign`	Return the list of simulation optimization RPC list.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/diverseTreeDesign/{uuid}`	Return the details of specified simulation optimization RPC result.
Cluster health info	
GET	`/v2/tenant/{tenant_id}/health`	Returns a summary of the NorthStar API system health.
GET	`/v2/tenant/{tenant_id}/health/nodes`	Returns health information for all of the nodes in the NorthStar system.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}{?nodeId}`	Returns health information for one node in the NorthStar system.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/time{?nodeId}`	Returns the time of a specific node.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/{processName}{?nodeId,processName}`	Processes the status of a specific node.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/{processName}/his-tory{?nodeId,processName}`	Returns the health history of a specific node.
GET	`/v2/tenant/{tenant_id}/health/thresholds`	Returns the health thresholds for the nodes.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `thresholds/diskUtilization`	Returns the disk utility thresholds.
PUT	`/v2/tenant/{tenant_id}/health/` `thresholds/diskUtilization`	Updates the disk utility thresholds using the following schema: health.json#/definitions/diskThreshold
GET	`/v2/tenant/{tenant_id}/health/` `nodes/smtpconfig`	Returns the SMTP configuration.

PUT	`/v2/tenant/{tenant_id}/health/`
	`nodes/smtpconfig{?host,port,se-`
	`cure,username,password,enabled}`
		Updates the SMTP configuration using the following the schema: health.json#/definitions/updateSmtpconfig and sample

PUT	`/v2/tenant/{tenant_id}/health/` `nodes/subscribers`	Updates the list of subscribers for Email Alerts using the following schema: health.json#/definitions/subscriberList
DELETE	`/v2/tenant/{tenant_id}/health/` `nodes/subscribers`	Deletes subscribers for Email Alerts using the following schema: health.json#/definitions/subscriber
Notification examples		

4.1. Notification API

NorthStar provides a socket.io interface on which object updates are sent. The socket.io namespace used is /restNotifications-v2, and the list of events is described in Table 4.1, "NorthStar /restNotifications-v2 events" [243] the next table. Unless noted, the new value of an object (or the index of the object upon object removal) is sent in the event.

Table 4.1. NorthStar /restNotifications-v2 events

Event	Schema	Description
topologyEvent	topology_v2.json#/definitions/topologyNotification	Event affecting the complete topology, for instance when the administrator does a topology reset or resync. The notification sent can be as follows. First an add notification with empty topology indicating that the Topology has been re-synched or reseted. Second an update notification with a topology object containing only node or link set. This indicates that the complete node (resp. link) should be re-synched. This may happen in high-load situation where the notification rate is too big (northstar.cfg *_state_refresh_threshold).
nodeEvent	topology_v2.json#/definitions/nodeNotification	Node event notification.
linkEvent	topology_v2.json#/definitions/linkNotification	Link event notification.
lspEvent	topology_v2.json#/definitions/lspNotification	TE-LSP event notification.
lspTopologyEvent	topology_v2.json#/definitions/lspTopologyEvent	This notification is sent when there is a burst of LSP notification, it indicates that the complete set of TE-LSPs is potentially changed. See northstar.cfg lsp_state_refresh_threshold
demandEvent	topology_v2.json#/definitions/demandNotification	Demand event notification.
demandTopologyEvent	topology_v2.json#/definitions/lspTopologyEvent	This notification is sent when there is a burst of LSP or demand no-

Event	Schema	Description
		tification, it indicates that the complete set of TE-LSPs is potentially changed. See northstar.cfg lsp_state_refresh_threshold (This is intentionally the same as TE-LSPs).
p2mpEvent	topology_v2.json#/definitions/p2mpGroupNotification	P2MP group event notification. The lsp in the update are reduced to their lspIndex to reduce the size of the event
facilityEvent	topology_v2.json#/definitions/facilityNotification	Facility/SRLG event notification.
teContainerEvent	topology_v2.json#/definitions/containerNotification	TE Container event notification.
maintenanceEvent	topology_v2.json#/definitions/maintenanceNotification	Maintenance resource notification.
haEvent	topology_v2.json#/definitions/haHostNotification	Node state event notification. Only update (no add or remove) events are supported. The notification does not include the list of processes and only contains operational information.
healthEvent	topology_v2.json#/definitions/healthNotification	Node health event notification. Only update (no add or remove) events are supported. The notifications include utilization of CPU, disk, memory that exceed certain threshold, and processes status.
componentStatus	topology_v2.json#/definitions/statusComponentNotification	Indicating LSP reconciliation during NS bringup or Switchover.
ipePolicyEvent	topology_v2.json#/definitions/ipePolicyNotification	IPE Policy event notification.

The following example is a simple python client for receiving all NorthStar Notifications:

```
                #!/usr/bin/env python
from socketIO_client import SocketIO, BaseNamespace
import requests,json,sys
serverURL = 'https://northstar.example.net'
username = 'user'
password = 'password'
class NSNotificationNamespace(BaseNamespace):
    def on_connect(self):
        print('Connected to %s:8443/restNotifications-v2'%serverURL)
    def on_event(key,name,data):
        print "NorthStar Event: %r,data:%r"%(name,json.dumps(data))
# First use NorhtStar OAuth2 authentication API to get a token
payload = {'grant_type': 'password','username': username,'password': password}
r = requests.post(serverURL + ':8443/oauth2/token',data=payload,verify=False,
auth=(username, password))
data =r.json()
if "token_type" not in data or "access_token" not in data:
    print "Error: Invalid credentials"
    sys.exit(1)
headers= {'Authorization': "{token_type} {access_token}".format(**data)}
socketIO = SocketIO(serverURL, 8443,verify=False,headers= headers)
ns = socketIO.define(NSNotificationNamespace, '/restNotifications-v2')
socketIO.wait()
```

4.2. Topology

Use the endpoints to retrieve the following information:

- Topology list

- Node list

- Links

- TE-LSPs

- Demands

- Facilities

- P2MP group

- TE-Containers

- Maintenances

- Interfaces

- Component status

- Topology status

Apply query parameter q=JSONPath to filter the objects listed under a specific endpoint. Example: The HTTP request GET https://northstar.example.net:8443/NorthStar/API/v2/tenant/1/topology/1/te-lsps?q=$.[?(@.operationalStatus == "Down")] lists only the te-lsps with attribute operationalStatus value "Down". For more information on JSON, refer JSONPath

The topology schema is: topology_v2.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/topologies [GET: get a list of topologies]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id> [GET: get all Nodes and Links]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/status [GET: get status of all NorthStar components]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/status/multilayerTopology [GET: get multi-layer topology status]

The topology is typically populated using BGP-LS peering with NorthStar, but it is possible to add nodes and links using the REST API for modelling purposes. Since NorthStar 6.0, two node attributes are used to refine how nodes added using the REST API are considered for path computation, typically to model CE and Site nodes. The first attribute is a new attribute (ipRole) that models how the node is used with regard to LSP termination/transit. The attribute accepts the values: Regular, Access and Core and are defined below. Access nodes cannot act as transit, while core nodes can be transit but cannot terminate LSPs from

access nodes directly. Regular nodes can act as transit nodes. The second attribute is an existing attribute (Vendor) with special values (CE or SITE) and control how the LSP is installed in the network:CE and Site nodes are pruned from the signaled path. Please see Nodes section for example on how to create Site and CE nodes.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topology`	Returns a list of the topologies that are available.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}`	Lists topological elements
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}`	Deletes all of the topology planned data. The information acquired through BGP-LS reappears immediately.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/stream`	See EventSource for format. The notifications send on that stream are only topologyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status`	Returns the status of all NorthStar components.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pce`	Returns the status of the PCEP protocol adapter component.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/topology-Acquisition`	Returns the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pathCompu-tationServer`	Returns the status of the Path Computation Server component.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/transport-TopologyAcquisition`	Returns the status of the Transport Network Topology Acquisition Daemon.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytic-sCollection`	Returns the status of the analytics data collection.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytics-Database`	Returns the status of the analytics data collection database.

4.2.1. Get List of Topologies

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topology`	Returns a list of the topologies that are available.

Normal response codes: 200

4.2.1.1. Request

This table shows the URI parameters for the get list of topologies request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.1.2. Response

Example 4.1. Get List of Topologies: JSON response

```
[
    {
        "topologyIndex": 1,
        "topoObjectType": "topology"
    }
]
```

4.2.2. Get Topological Elements

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}`	Lists topological elements

Normal response codes: 200

4.2.2.1. Request

This table shows the URI parameters for the get topological elements request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.2.2. Response

Example 4.2. Get Topological Elements: JSON response

The following examples show different set of results:

- The example shows three nodes, and two point-to-point links between node 11 and node 8. One node is PCEP-enabled (node 8, name 62.0.0.104) and one node is a pseudo-do node (node 2). A pseudo node does not have router-ids in its protocol object. It's pseudoNode attribute set to TRUE.

```
{
    "links": [
        {
            "endA": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.104.107.1",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.104",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": {"bandwidth": 10000000000}
                },
                "srlgs": [{"srlgValue": 407 }],
```

```
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616,
9989999616, 9489999872, 9489999872, 9489999872, 9489999872  ]
            },
            "endZ": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.104.107.2",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.107",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [ { "srlgValue": 407 }]
                    },
                    "RSVP": {"bandwidth": 10000000000 }
                },
                "srlgs": [{"srlgValue": 407}],
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616,9989999616,9489999872]
            },
            "linkIndex": 6,
            "name": "L62.104.107.1_62.104.107.2",
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
        },
        {
            "endA": {
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.114.117.1",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "name": "62.0.0.104",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": { "bandwidth": 10000000000 }
                },
                "srlgs": [{"srlgValue": 407} ],
                "topoObjectType": "interface",
```

```
                    "unreservedBw": [ 10000000000, 10000000000, 10000000000,
10000000000, 10000000000, 10000000000, 10000000000, 10000000000]
                },
                "endZ": {
                    "TEcolor": 0,
                    "TEmetric": 10,
                    "bandwidth": 10000000000,
                    "ipv4Address": {
                        "address": "62.114.117.2",
                        "topoObjectType": "ipv4"
                    },
                    "node": {
                        "name": "62.0.0.107",
                        "topoObjectType": "node",
                        "topologyIndex": 1
                    },
                    "protocols": {
                        "ISIS": {
                            "TEMetric": 10,
                            "level": "L2",
                            "srlgs": [{"srlgValue": 407}]
                        },
                        "RSVP": {"bandwidth": 10000000000}
                    },
                    "srlgs": [{"srlgValue": 407}],
                    "topoObjectType": "interface",
                    "unreservedBw": [9600000000,600000000,9600000000,9600000000,
9600000000,9600000000,9600000000,9600000000]
                },
                "linkIndex": 7,
                "name": "L62.114.117.1_62.114.117.2",
                "operationalStatus": "Up",
                "topoObjectType": "link",
                "topologyIndex": 1
            }
        ],
        "nodes": [
            {
                "AutonomousSystem": {"asNumber": 62},
                "hostName": "vmx104-62",
                "layer": "IP",
                "name": "62.0.0.104",
                "nodeIndex": 8,
                "protocols": {
                    "ISIS": {
                        "TERouterId": "62.0.0.104",
                        "area": "490062",
                        "isoAddress": "0620.0000.0104",
                        "routerId": "62.0.0.104"
                    },
                    "PCEP": {
                        "pccAddress": "62.0.0.104"
                    }
                },
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            {
                "AutonomousSystem": {"asNumber": 62},
                "hostName": "vmx105-62-p107",
```

```
            "layer": "IP",
            "name": "62.0.0.107",
            "nodeIndex": 11,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
                    "isoAddress": "0620.0000.0107",
                    "routerId": "62.0.0.107"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
 {
     "topoObjectType": "node",
     "topologyIndex": 1,
     "name": "0620.0000.0101.02",
     "nodeIndex": 2,
            "AutonomousSystem": {"asNumber": 62},
     "layer": "IP",
     "pseudoNode": true,
     "protocols": {
  "ISIS": { }
     }
 }
    ],
    "topoObjectType": "topology",
    "topologyIndex": 1
}
```

- The example shows two PE nodes (PE3 and PE4 - discovered from BGP-LS), two CE nodes (CE1 and CE2 - manually created using Node API) and three Sites (SiteA, SiteB and SiteC - manually created using Node API) nodes, and links between PE3 and PE4 (id: L10.0.1.10_10.0.1.9 - discovered from BGP-LS), and manually created link using Links API which are PE3 and SiteA (id: L0100.0000.0003_SiteA_PE3-SiteA), PE4 and SiteB (id: L0100.0000.0004_SiteB_PE4-SiteB), PE3 and CE1 (id: L0100.0000.0003_CE1_PE3-CE1), CE1 and SiteO (id: LCE1_SiteO_CE1-SiteO) and CE2 and SiteO (id: LCE2_SiteO_CE2-SiteO).

```
{
    "topologyIndex":1,
    "topoObjectType": "topology",
    "nodes": [
        {
            "topoObjectType": "node",
            "topologyIndex": 1,
            "id": "0100.0000.0003",
            "nodeIndex": 3,
            "layer": "IP",
            "live": true,
            "AutonomousSystem": {
                "asNumber": 100
            },
            "routerId": "10.0.0.3",
            "protocols": {
                "ISIS": {
                    "routerId": "10.0.0.3",
                    "TERouterId": "10.0.0.3",
                    "isoAddress": "0100.0000.0003",
```

```
                        "area": "490001"
                    },
                    "NETCONF": {
                        "operationalStatus": "Up",
                        "operationalState": "Connected",
                        "clientAddress": "10.0.0.3",
                        "sessionParameters": {
                            "keepalive": 300
                        },
                        "clientCapabilities": [
                            "http://xml.juniper.net/dmi/system/1.0",
                            "http://xml.juniper.net/netconf/junos/1.0",
                            "urn:ietf:params:netconf:base:1.0",
                            "urn:ietf:params:netconf:capability:candidate:1.0",
                            "urn:ietf:params:netconf:capability:confirmed-
commit:1.0",
                            "urn:ietf:params:netconf:capability:url:1.0?scheme=
http,ftp,file",
                            "urn:ietf:params:netconf:capability:validate:1.0",
                            "urn:ietf:params:xml:ns:netconf:base:1.0",

 "urn:ietf:params:xml:ns:netconf:capability:candidate:1.0",

 "urn:ietf:params:xml:ns:netconf:capability:confirmed-commit:1.0",
                            "urn:ietf:params:xml:ns:netconf:capability:url:1.0?
scheme=http,ftp,file",

 "urn:ietf:params:xml:ns:netconf:capability:validate:1.0",
                            "urn:ietf:params:xml:ns:yang:ietf-netconf-
monitoring"
                        ]
                    },
                    "PCEP": {
                        "operationalStatus": "Up",
                        "pccAddress": "10.0.0.3",
                        "sessionParameters": {
                            "keepalive": 0,
                            "deadtimer": 0,
                            "maximumStackDepth": 0
                        },
                        "peerStatefullCapabilities": {
                            "lspUpdate": true,
                            "lspInstantiation": true,
                            "p2mp": true,
                            "p2mpUpdate": true,
                            "p2mpInstantiation": true,
                            "SRCapability": false
                        }
                    },
                    "management": {
                        "address": "10.0.0.3",
                        "vendor": "JUNIPER",
                        "operatingSystem": "JUNOS",
                        "operatingSystemVersion": "19.4R1.10"
                    }
                },
                "hostName": "PE3",
                "configurationDataSource": {
                    "latest": {
```

```
                    "href": "/NorthStar/API/v2/tenant/1/topology/1/nodes/3/
device/configurationDataSource/latest"
                }
            }
        },
        {
            "topoObjectType": "node",
            "topologyIndex": 1,
            "id": "0100.0000.0004",
            "nodeIndex": 4,
            "layer": "IP",
            "live": true,
            "AutonomousSystem": {
                "asNumber": 100
            },
            "routerId": "10.0.0.4",
            "protocols": {
                "ISIS": {
                    "routerId": "10.0.0.4",
                    "TERouterId": "10.0.0.4",
                    "isoAddress": "0100.0000.0004",
                    "area": "490001"
                },
                "NETCONF": {
                    "operationalStatus": "Up",
                    "operationalState": "Connected",
                    "clientAddress": "10.0.0.4",
                    "sessionParameters": {
                        "keepalive": 300
                    },
                    "clientCapabilities": [
                        "http://xml.juniper.net/dmi/system/1.0",
                        "http://xml.juniper.net/netconf/junos/1.0",
                        "urn:ietf:params:netconf:base:1.0",
                        "urn:ietf:params:netconf:capability:candidate:1.0",
                        "urn:ietf:params:netconf:capability:confirmed-
commit:1.0",
                        "urn:ietf:params:netconf:capability:url:1.0?scheme=
http,ftp,file",
                        "urn:ietf:params:netconf:capability:validate:1.0",
                        "urn:ietf:params:xml:ns:netconf:base:1.0",

 "urn:ietf:params:xml:ns:netconf:capability:candidate:1.0",

 "urn:ietf:params:xml:ns:netconf:capability:confirmed-commit:1.0",
                        "urn:ietf:params:xml:ns:netconf:capability:url:1.0?
scheme=http,ftp,file",

 "urn:ietf:params:xml:ns:netconf:capability:validate:1.0",
                        "urn:ietf:params:xml:ns:yang:ietf-netconf-
monitoring"
                    ]
                },
                "PCEP": {
                    "operationalStatus": "Up",
                    "pccAddress": "10.0.0.4",
                    "sessionParameters": {
                        "keepalive": 0,
                        "deadtimer": 0,
                        "maximumStackDepth": 0
```

```
                },
                "peerStatefullCapabilities": {
                    "lspUpdate": true,
                    "lspInstantiation": true,
                    "p2mp": true,
                    "p2mpUpdate": true,
                    "p2mpInstantiation": true,
                    "SRCapability": false
                }
            },
            "management": {
                "address": "10.0.0.4",
                "vendor": "JUNIPER",
                "operatingSystem": "JUNOS",
                "operatingSystemVersion": "19.4R1.10"
            }
        },
        "hostName": "PE4",
        "configurationDataSource": {
            "latest": {
                "href": "/NorthStar/API/v2/tenant/1/topology/1/nodes/4/
device/configurationDataSource/latest"
            }
        }
    },
    {
        "topoObjectType": "node",
        "topologyIndex": 1,
        "id": "SiteA",
        "nodeIndex": 11,
        "layer": "Service",
        "live": false,
        "routerId": "11.0.0.1",
        "ipRole": "Access",
        "protocols": {
            "ISIS": {
                "routerId": "11.0.0.1",
                "TERouterId": "11.0.0.1"
            },
            "management": {
                "vendor": "SITE"
            }
        },
        "hostName": "SiteA",
        "name": "SiteA"
    },
    {
        "topoObjectType": "node",
        "topologyIndex": 1,
        "id": "SiteB",
        "nodeIndex": 12,
        "layer": "Service",
        "live": false,
        "routerId": "11.0.0.2",
        "ipRole": "Access",
        "protocols": {
            "ISIS": {
                "routerId": "11.0.0.2",
                "TERouterId": "11.0.0.2"
            },
```

```
                "management": {
                    "vendor": "SITE"
                }
            },
            "hostName": "SiteB",
            "name": "SiteB"
        },
        {
            "topoObjectType": "node",
            "topologyIndex": 1,
            "id": "SiteO",
            "nodeIndex": 25,
            "layer": "Service",
            "live": false,
            "routerId": "11.0.0.15",
            "ipRole": "Access",
            "protocols": {
                "ISIS": {
                    "routerId": "11.0.0.15",
                    "TERouterId": "11.0.0.15"
                },
                "management": {
                    "vendor": "SITE"
                }
            },
            "hostName": "SiteO",
            "name": "SiteO"
        },
        {
            "topoObjectType": "node",
            "topologyIndex": 1,
            "id": "CE1",
            "nodeIndex": 31,
            "layer": "Service",
            "live": false,
            "routerId": "11.0.0.101",
            "ipRole": "Regular",
            "protocols": {
                "ISIS": {
                    "routerId": "11.0.0.101",
                    "TERouterId": "11.0.0.101"
                },
                "management": {
                    "vendor": "CE"
                }
            },
            "hostName": "CE1",
            "name": "CE1"
        },
        {
            "topoObjectType": "node",
            "topologyIndex": 1,
            "id": "CE2",
            "nodeIndex": 32,
            "layer": "Service",
            "live": false,
            "routerId": "11.0.0.102",
            "ipRole": "Regular",
            "protocols": {
                "ISIS": {
```

```
                        "routerId": "11.0.0.102",
                        "TERouterId": "11.0.0.102"
                    },
                    "management": {
                        "vendor": "CE"
                    }
                },
                "hostName": "CE2",
                "name": "CE2"
            }
        ],
        "links": [
            {
                "topoObjectType": "link",
                "linkIndex": 6,
                "id": "L10.0.1.10_10.0.1.9",
                "live": true,
                "topologyIndex": 1,
                "operationalStatus": "Up",
                "endZ": {
                    "ipv4Address": {
                        "topoObjectType": "ipv4",
                        "address": "10.0.1.10"
                    },
                    "protocols": {
                        "RSVP": {
                            "bandwidth": 10000000
                        },
                        "ISIS": {
                            "level": "L2",
                            "TEMetric": 10
                        }
                    },
                    "bandwidth": 10000000,
                    "interfaceName": "ge-0/0/1.0",
                    "TEcolor": 0,
                    "TEmetric": 10,
                    "unreservedBw": [
                        10000000,
                        10000000,
                        10000000,
                        10000000,
                        10000000,
                        10000000,
                        10000000,
                        10000000
                    ],
                    "node": {
                        "topoObjectType": "node",
                        "id": "0100.0000.0004",
                        "topologyIndex": 1
                    },
                    "topoObjectType": "interface",
                    "utilization": {
                        "utilization": 0,
                        "availableBandwidth": 10000000,
                        "usedBandwidth": 0,
                        "measuredDelay": 0.87,
                        "interfaceUtilization": 0.00107,
                        "interfaceTraffic": 10700,
```

```
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "ipv4Address": {
                    "topoObjectType": "ipv4",
                    "address": "10.0.1.9"
                },
                "protocols": {
                    "RSVP": {
                        "bandwidth": 10000000
                    },
                    "ISIS": {
                        "level": "L2",
                        "TEMetric": 10
                    }
                },
                "bandwidth": 10000000,
                "interfaceName": "ge-0/0/0.0",
                "TEmetric": 10,
                "unreservedBw": [
                    10000000,
                    10000000,
                    10000000,
                    10000000,
                    10000000,
                    10000000,
                    10000000,
                    10000000
                ],
                "node": {
                    "topoObjectType": "node",
                    "id": "0100.0000.0003",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 10000000,
                    "usedBandwidth": 0,
                    "measuredDelay": 0.87,
                    "interfaceUtilization": 0.00158,
                    "interfaceTraffic": 15800,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T17:07:08Z"
                }
            }
        },
        {
            "topoObjectType": "link",
            "linkIndex": 13,
            "id": "L0100.0000.0003_SiteA_PE3-SiteA",
            "live": false,
            "topologyIndex": 1,
            "operationalStatus": "Unknown",
            "name": "PE3-SiteA",
            "endZ": {
                "node": {
```

```
                    "topoObjectType": "node",
                    "id": "SiteA",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "node": {
                    "topoObjectType": "node",
                    "id": "0100.0000.0003",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T07:34:55Z"
                }
            }
        },
        {
            "topoObjectType": "link",
            "linkIndex": 46,
            "id": "L0100.0000.0003_CE1_PE3-CE1",
            "live": false,
            "topologyIndex": 1,
            "operationalStatus": "Unknown",
            "name": "PE3-CE1",
            "endZ": {
                "node": {
                    "topoObjectType": "node",
                    "id": "CE1",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "node": {
                    "topoObjectType": "node",
                    "id": "0100.0000.0003",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
```

```
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T07:34:55Z"
                }
            }
        },
        {
            "topoObjectType": "link",
            "linkIndex": 62,
            "id": "LCE1_SiteO_CE1-SiteO",
            "live": false,
            "topologyIndex": 1,
            "operationalStatus": "Unknown",
            "name": "CE1-SiteO",
            "endZ": {
                "node": {
                    "topoObjectType": "node",
                    "id": "SiteO",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "node": {
                    "topoObjectType": "node",
                    "id": "CE1",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T07:34:55Z"
                }
            }
        },
        {
            "topoObjectType": "link",
            "linkIndex": 63,
            "id": "LCE2_SiteO_CE2-SiteO",
            "live": false,
            "topologyIndex": 1,
            "operationalStatus": "Unknown",
            "name": "CE2-SiteO",
            "endZ": {
                "node": {
```

```
                    "topoObjectType": "node",
                    "id": "Site0",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "node": {
                    "topoObjectType": "node",
                    "id": "CE2",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T07:34:55Z"
                }
            }
        },
        {
            "topoObjectType": "link",
            "linkIndex": 15,
            "id": "L0100.0000.0004_SiteB_PE4-SiteB",
            "live": false,
            "topologyIndex": 1,
            "operationalStatus": "Unknown",
            "name": "PE4-SiteB",
            "endZ": {
                "node": {
                    "topoObjectType": "node",
                    "id": "SiteB",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0
                }
            },
            "endA": {
                "node": {
                    "topoObjectType": "node",
                    "id": "0100.0000.0004",
                    "topologyIndex": 1
                },
                "topoObjectType": "interface",
```

```
                "utilization": {
                    "utilization": 0,
                    "availableBandwidth": 1000000000,
                    "usedBandwidth": 0,
                    "tunnelUtilization": 0,
                    "tunnelLiveUtilization": 0,
                    "lastUpdate": "2020-04-30T07:34:55Z"
                }
            }
        }
    ]
}
```

4.2.3. Delete the Topology

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}`	Deletes all of the topology planned data. The information acquired through BGP-LS reappears immediately.

Normal response codes: 204

4.2.3.1. Request

This table shows the URI parameters for the delete the topology request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.4. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/stream`	See EventSource for format. The notifications send on that stream are only topologyEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.2.4.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.5. Get NorthStar Component Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status`	Returns the status of all NorthStar components.

Normal response codes: 200

4.2.5.1. Request

This table shows the URI parameters for the get northstar component status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.5.2. Response

Example 4.3. Get NorthStar Component Status: JSON response

Returns the following JSON document: topology_v2.json#/definitions/componentStatusList
.

```
[
  {
    "component": "PCE",
    "status": "PCE is up.",
    "statusTimestamp": 1468006441666,
    "statusTimestampTime": "2016-07-08T19:34:01.666Z"
  },
  {
    "component": "Topology acquisition",
    "status": "Connected to NTAD: 172.16.16.2 port: 450",
    "statusTimestamp": 1468006441632,
    "statusTimestampTime": "2016-07-08T19:34:01.632Z"
  },
  {
    "component": "Path Computation Server",
    "status": "Active Path Stat: 3 up 0 down 0 detoured 0 being provisioned.
 Link Stat: 19 up 0 down. Node Stat: 7 active nodes, 0 PCC nodes",
    "statusTimestamp": 1468153795771,
    "statusTimestampTime": "2016-07-10T12:29:55.771Z"
  },
  {
    "component": "Transport Topology acquisition",
    "status": "Up",
    "childs": [
      {
        "status": "Up; current peer: hostname='' ip='192.0.2.10'",
        "statusTimestamp": 1468153845392,
        "statusTimestampTime": "2016-07-10T12:30:45.392062Z",
```

```
            "component": "VendorX"
        }
    ],
    "statusTimestamp": 1468153853495,
    "statusTimestampTime": "2016-07-10T12:30:53.495Z"
  }
]
```

4.2.6. Get PCEP Protocol Adapter Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pce`	Returns the status of the PCEP protocol adapter compo-nent.

Normal response codes: 200

4.2.6.1. Request

This table shows the URI parameters for the get pcep protocol adapter status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.6.2. Response

Example 4.4. Get PCEP Protocol Adapter Status: JSON response

```
{
    "component": "PCE",
    "status": "PCE is up.",
    "statusTimestamp": 0
}
```

4.2.7. Get BGP-LS Protocol Adapter Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/topology-Acquisition`	Returns the status of the Network Topology Acquisition Daemon (NTAD, BGP-LSP protocol adapter) component.

Normal response codes: 200

4.2.7.1. Request

This table shows the URI parameters for the get bgp-ls protocol adapter status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.7.2. Response

Example 4.5. Get BGP-LS Protocol Adapter Status: JSON response

```
{
    "component": "Topology acquisition",
    "status": "Connected to NTAD: 62.105.199.2 port: 450",
    "statusTimestamp": 1427167092212
}
```

4.2.8. Get Path Computation Server Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/pathCompu-tationServer`	Returns the status of the Path Computation Server compo-nent.

Normal response codes: 200

4.2.8.1. Request

This table shows the URI parameters for the get path computation server status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.8.2. Response

Example 4.6. Get Path Computation Server Status: JSON response

```
{
  "component": "Path Computation Server",
  "status": "Active Path Stat: 3 up 0 down 0 detoured 0 being provisioned.
Link Stat: 19 up 0 down. Node Stat: 7 active nodes, 0 PCC nodes",
  "statusTimestamp": 1468153795771,
  "statusTimestampTime": "2016-07-10T12:29:55.771Z"
}
```

4.2.9. Get Transport Topology Acquisition Daemon Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/transport-TopologyAcquisition`	Returns the status of the Transport Network Topology Ac-quisition Daemon.

Normal response codes: 200

4.2.9.1. Request

This table shows the URI parameters for the get transport topology acquisition daemon sta-tus request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.9.2. Response

Example 4.7. Get Transport Topology Acquisition Daemon Status: JSON response

```
{
  "component": "Transport Topology acquisition",
  "status": "Up",
  "childs": [
    {
      "status": "Up; current peer: hostname='' ip='192.0.2.10'",
      "statusTimestamp": 1468153845392,
      "statusTimestampTime": "2016-07-10T12:30:45.392062Z",
      "component": "VendorX"
    }
  ],
  "statusTimestamp": 1468153853495,
  "statusTimestampTime": "2016-07-10T12:30:53.495Z"
}
```

4.2.10. Get Analytics Data Collection Component Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytic-sCollection`	Returns the status of the analytics data collection.

Normal response codes: 200

4.2.10.1. Request

This table shows the URI parameters for the get analytics data collection component status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.10.2. Response

Example 4.8. Get Analytics Data Collection Component Status: JSON response

```
{
    "component": "Analytics data collection",
    "status": "host=pcs-server, status=OK",
    "statusTimestampTime": "2017-07-27T04:09:05.239Z",
    "statusTimestamp": 1501128545239
}
```

4.2.11. Get Analytics Data Collection Database Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/status/analytics-Database`	Returns the status of the analytics data collection database.

Normal response codes: 200

4.2.11.1. Request

This table shows the URI parameters for the get analytics data collection database status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.2.11.2. Response

Example 4.9. Get Analytics Data Collection Database Status: JSON response

```
{
    "component": "Analytics database",
    "status": "Analytics Database Status:green Cluster NorthStar nodes count:1
 (1 data nodes)",
    "statusTimestamp": 1501129483764,
    "statusTimestampTime": "2017-07-27T04:24:43.764Z"
}
```

4.3. Node

Use these endpoints for access to the nodes retrieved through BGP-LS and planned nodes.

The node schema is: node_v2.json . The operations are:

• https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/nodes [GET : get all nodes, POST : create a new node]

• https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/nodes/search URL parameters : name, AS, queryType=OR [GET : search nodes (name/as)]

• https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/nodes/<nodeIndex> [GET : get node, POST : modify node , DELETE]

• https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/nodes/<nodeIndex>/history [GET : node history]

As explained in the topology section, nodes can be created in the REST API, including CE and Site nodes. The examples for those are detailed in the "Create a Planned Node" section below.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Returns a full list of nodes.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Creates a node using the following schema: node_v2.json#/definitions/createNode .
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/search{? name,hostName,AS,queryType}`	Searches the list of nodes for specific URI parameters. For example, search?name=62.0.0.101 must return one node.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/stream`	See EventSource for format. The notifications send on that stream are only nodeEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Returns details for a node.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Updates a node using the following schema: node_v2.json#/definitions/updateNode
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Updates a node using a RFC6902 patch: json-patch.json. The result of the patch must conform to node_v2.json#/ definitions/updateNode. The REST server remove all operational parameters like operationalStatus, ..etc. .
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Deletes a node. (You cannot delete a live node; it reappears on the next update from Topology server.)
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}`	Returns the event history for a node.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Creates several Nodes using the following JSON schema: node_v2.json#/definitions/createNodeList .
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListUpdate .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListPatch .
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Deletes a list of Nodess. The payload must conform to node_v2.json#/definitions/nodeListDelete

4.3.1. Get Nodes

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Returns a full list of nodes.

Normal response codes: 200

4.3.1.1. Request

This table shows the URI parameters for the get nodes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.3.1.2. Response

Example 4.10. Get Nodes: JSON response

```
[
    {
        "AutonomousSystem": {"asNumber": 62},
        "layer": "IP",
        "name": "0620.0000.0101.02",
        "nodeIndex": 2,
        "protocols": {
            "ISIS": {}
        },
 "pseudoNode": true,
        "topoObjectType": "node",
        "topologyIndex": 1
    },
    {
        "AutonomousSystem": {"asNumber": 62},
        "hostName": "vmx101-62",
        "layer": "IP",
        "name": "62.0.0.101",
        "nodeIndex": 1,
        "protocols": {
            "ISIS": {
                "TERouterId": "62.0.0.101",
                "area": "490062",
                "isoAddress": "0620.0000.0101",
                "routerId": "62.0.0.101"
            },
            "PCEP": {
                "pccAddress": "62.0.0.101"
            }
        },
        "topoObjectType": "node",
        "topologyIndex": 1
```

```
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p105",
            "layer": "IP",
            "name": "62.0.0.105",
            "nodeIndex": 9,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.105",
                    "area": "490062",
                    "isoAddress": "0620.0000.0105",
                    "routerId": "62.0.0.105"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p106",
            "layer": "IP",
            "name": "62.0.0.106",
            "nodeIndex": 10,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.106",
                    "area": "490062",
                    "isoAddress": "0620.0000.0106",
                    "routerId": "62.0.0.106"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p107",
            "layer": "IP",
            "name": "62.0.0.107",
            "nodeIndex": 11,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
                    "isoAddress": "0620.0000.0107",
                    "routerId": "62.0.0.107"
                }
            },
"topology": {
        "coordinates": {
 "type": "Point",
 "coordinates": [-0.025,-49.459999]
        }
}
            "topoObjectType": "node",
            "topologyIndex": 1
        }
]
```

4.3.2. Create a Node

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes`	Creates a node using the following schema: node_v2.json#/definitions/createNode .

Normal response codes: 201

4.3.2.1. Request

This table shows the URI parameters for the create a node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.11. Create a Node: JSON request

The following JSON sample shows the minimum required information to add a planned node. The Following parameters are required:

Table 4.2. Create Node Required Attributes

Attribute	Type	Description	Fixed
name	string	No	Node Name
topologyIndex	integer	Yes	1
topoObjectType	string	Yes	node

The following parameters can be set:

- Name

- Autonomous System

- management address

- hostName

- nodeType

- design parameter: canFail

- Node coordinates

- ipRole: Regular or Access or Core

- vendor: CE or SITE

Create Node examples:

- In this example, create planned node

```
{
    "name": "PlannedNode",
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

The response is:

```
{
    "layer": "IP",
    "name": "PlannedNode",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

- In this example, create Site node with Access role. The node will not be used as transit node during path computation (due to ipRole=Transit) and won't be included in P2MP tree signaling (due to vendor=SITE)

```
{
    "topoObjectType":"node",
    "topologyIndex":1,
    "name":"SiteZ",
    "ipRole":"Access",
    "protocols":{
        "management":{
            "vendor":"SITE"
        }
    }
}
```

The response is:

```
{
    "nodeIndex":46,
    "layer":"IP",
    "name":"SiteZ",
    "ipRole":"Access",
    "topoObjectType":"node",
    "live":false,
    "topologyIndex":1,
    "location":"/NorthStar/API/v2/tenant/1/topology/1/nodes/46",
    "id":"SiteZ",
    "protocols":{
        "management":{
            "vendor":"SITE"
        }
    }
}
```

- In this example, create CE node with Regular role. Compared to the previous example (Site), this node will be used as transit for path computation (ipRole=Regular).

```
{
    "topoObjectType":"node",
    "topologyIndex":1,
```

```
    "name":"CEZ1",
    "ipRole":"Regular",
    "protocols":{
        "management":{
            "vendor":"CE"
        }
    }
}
```

The response is:

```
{
    "nodeIndex":58,
    "layer":"IP",
    "name":"CEZ1",
    "ipRole":"Regular",
    "topoObjectType":"node",
    "live":false,
    "topologyIndex":1,
    "location":"/NorthStar/API/v2/tenant/1/topology/1/nodes/58",
    "id":"CEZ1",
    "protocols":{
        "management":{
            "vendor":"CE"
        }
    }
}
```

4.3.2.2. Response

The responses are shown per example in the request section. In general the response is a JSON document conforming to node_v2.json#/definitions/createNode.

This operation does not return a response body.

4.3.3. Search Nodes

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/search{?name,hostName,AS,queryType}`	Searches the list of nodes for specific URI parameters. For example, search?name=62.0.0.101 must return one node.

Normal response codes: 200

4.3.3.1. Request

This table shows the URI parameters for the search nodes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the search nodes request:

Name	Type	Description
`name`	String *(Optional)*	Filters on node name. The parameter is treated as a regular expression. Simple strings such as 62.0.0.101 are accepted. JavaScript regexp (for example, /^62/) is also accepted.
`hostName`	Int *(Optional)*	Filters on hostname
`AS`	Int *(Optional)*	Filters on AS number
`queryType`	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If queryType is set to OR, node is included in the result if any of the query parameters matches.

4.3.3.2. Response

Example 4.12. Search Nodes: JSON response

```
[
    {
        "AutonomousSystem": {"asNumber": 62},
        "layer": "IP",
        "name": "0620.0000.0101.02",
        "nodeIndex": 2,
        "protocols": {
            "ISIS": {}
        },
 "pseudoNode": true,
        "topoObjectType": "node",
        "topologyIndex": 1
    },
    {
        "AutonomousSystem": {"asNumber": 62},
        "hostName": "vmx101-62",
        "layer": "IP",
```

```
            "name": "62.0.0.101",
            "nodeIndex": 1,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.101",
                    "area": "490062",
                    "isoAddress": "0620.0000.0101",
                    "routerId": "62.0.0.101"
                },
                "PCEP": {
                    "pccAddress": "62.0.0.101"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p105",
            "layer": "IP",
            "name": "62.0.0.105",
            "nodeIndex": 9,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.105",
                    "area": "490062",
                    "isoAddress": "0620.0000.0105",
                    "routerId": "62.0.0.105"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p106",
            "layer": "IP",
            "name": "62.0.0.106",
            "nodeIndex": 10,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.106",
                    "area": "490062",
                    "isoAddress": "0620.0000.0106",
                    "routerId": "62.0.0.106"
                }
            },
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        {
            "AutonomousSystem": {"asNumber": 62},
            "hostName": "vmx105-62-p107",
            "layer": "IP",
            "name": "62.0.0.107",
            "nodeIndex": 11,
            "protocols": {
                "ISIS": {
                    "TERouterId": "62.0.0.107",
                    "area": "490062",
```

```
                "isoAddress": "0620.0000.0107",
                "routerId": "62.0.0.107"
            }
        },
  "topology": {
      "coordinates": {
 "type": "Point",
 "coordinates": [-0.025,-49.459999]
     }
 }
        "topoObjectType": "node",
        "topologyIndex": 1
    }
]
```

4.3.4. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/stream`	See EventSource for format. The notifications send on that stream are only nodeEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.3.4.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.3.5. Get a Single Node

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-` `gy/{topology_id}/nodes/{nodeIndex}`	Returns details for a node.

Normal response codes: 200

4.3.5.1. Request

This table shows the URI parameters for the get a single node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This operation does not accept a request body.

4.3.5.2. Response

Example 4.13. Get a Single Node: JSON response

```
{
    "AutonomousSystem": {
        "asNumber": 62
    },
    "hostName": "vmx101-62",
    "layer": "IP",
    "name": "62.0.0.101",
    "nodeIndex": 1,
    "protocols": {
        "ISIS": {
            "TERouterId": "62.0.0.101",
            "area": "490062",
            "isoAddress": "0620.0000.0101",
            "routerId": "62.0.0.101"
        },
        "PCEP": {
            "pccAddress": "62.0.0.101"
        }
    },
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

4.3.6. Update Node Properties

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-` `gy/{topology_id}/nodes/{nodeIndex}`	Updates a node using the following schema: node_v2.json#/definitions/updateNode

Normal response codes: 202

4.3.6.1. Request

This table shows the URI parameters for the update node properties request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

Example 4.14. Update Node Properties : JSON request

```
{
    "layer": "IP",
    "id": "PlannedNode",
    "hostName" : "plannedNode.domain.example.com",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

4.3.6.2. Response

Example 4.15. Update Node Properties : JSON response

```
{
    "layer": "IP",
    "id": "PlannedNode",
    "hostName" : "plannedNode.domain.example.com",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1
}
```

4.3.7. Patch Node

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Updates a node using a RFC6902 patch: json-patch.json. The result of the patch must conform to node_v2.json#/definitions/updateNode. The REST server remove all operational parameters like operationalStatus, ..etc. .

Normal response codes: 202

4.3.7.1. Request

This table shows the URI parameters for the patch node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

Example 4.16. Patch Node: JSON request

The Patched update accepts the same parameters as the update

```
[{"op" : "add", "path":"/protocols/PCEP/extensions/lsp-association-
protection" , "value" : false}]
```

4.3.7.2. Response

Example 4.17. Patch Node: JSON response

```
{
    "layer": "IP",
    "id": "PlannedNode",
    "hostName" : "plannedNode.domain.example.com",
    "nodeIndex": 12,
    "protocols": {},
    "topoObjectType": "node",
    "topologyIndex": 1,
    "protocols" : {
        "PCEP" : {
            "extensions" : {
                "lsp-association-protection" : false
            }
        }
    }
}
```

4.3.8. Delete a Node

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIndex}`	Deletes a node. (You cannot delete a live node; it reappears on the next update from Topology server.)

Normal response codes: 204

4.3.8.1. Request

This table shows the URI parameters for the delete a node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This operation does not accept a request body.

4.3.9. Get the Node Event History

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/{nodeIn-dex}/history{?start,end}`	Returns the event history for a node.

The history contains a list of Unix-timestamped events for the node resource.

Normal response codes: 200

4.3.9.1. Request

This table shows the URI parameters for the get the node event history request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This table shows the query parameters for the get the node event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include events with the starting timetime and later.
`end`	Int *(Optional)*	End timestamp: Include events before (but not including) the ending timestamp.

4.3.9.2. Response

Example 4.18. Get the Node Event History: JSON response

```
[
    {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
     "asNumber": 62
},
"layer": "IP",
"protocols": {
     "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
     }
},
"hostName": "vmx101-62",
"timestamp": 1427130726939
    },
```

```
        {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
     "asNumber": 62
},
"layer": "IP",
"protocols": {
     "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
     }
},
"hostName": "vmx101-62",
"timestamp": 1427130727025
     },
     {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
     "asNumber": 62
},
"layer": "IP",
"protocols": {
     "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
     }
},
"hostName": "vmx101-62",
"timestamp": 1427135395317
     },
     {
"topoObjectType": "node",
"topologyIndex": 1,
"name": "62.0.0.101",
"nodeIndex": 1,
"AutonomousSystem": {
     "asNumber": 62
},
"layer": "IP",
"protocols": {
     "ISIS": {
 "routerId": "62.0.0.101",
 "TERouterId": "62.0.0.101",
 "isoAddress": "0620.0000.0101",
 "area": "490062"
     }
},
"hostName": "CHI",
"topology": {
     "coordinates": {
```

```
    "type": "Point",
    "coordinates": [
         4.29167,
         2.9
  ]
       }
 },
 "timestamp": 1427168112286
      }
]
```

4.3.10. Create a List of Nodes

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Creates several Nodes using the following JSON schema: node_v2.json#/definitions/createNodeList .

Normal response codes: 201

4.3.10.1. Request

This table shows the URI parameters for the create a list of nodes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.19. Create a List of Nodes: JSON request

The request must contain a list of Nodes to be created. The individual node parameters are the same as creating an single node.

```
[
    {"name": "PlannedNode2","topoObjectType": "node","topologyIndex": 1},
    {"name": "PlannedNode3","topoObjectType": "node","topologyIndex": 1}
]
```

4.3.10.2. Response

Example 4.20. Create a List of Nodes: JSON response

```
[
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode2","name":
 "PlannedNode2","nodeIndex": 9,"layer": "IP","live": false},
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode3","name":
 "PlannedNode3","nodeIndex": 10,"layer": "IP","live": false}
]
```

4.3.11. Update a List of Nodes

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListUpdate .

Normal response codes: 202

4.3.11.1. Request

This table shows the URI parameters for the update a list of nodes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.21. Update a List of Nodes: JSON request

The bulk update accepts a list of Node updates. Each entry requires the same parameters and logic as updating a single Node.

```
[
    {"nodeIndex": 9,"topoObjectType": "node","topologyIndex": 1, "hostName" :
"testHostName"},
    {"nodeIndex": 10,"topoObjectType": "node","topologyIndex": 1,"comment" :
"This is a comment"}
]
```

4.3.11.2. Response

Example 4.22. Update a List of Nodes: JSON response

The response contains a list of individual update responses (see Node update).

```
[
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode2",
"nodeIndex": 9,"layer": "IP","live": false,"hostName" : "testHostName"},
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode3",
"nodeIndex": 10,"layer": "IP","live": false,"comment" : "This is a comment"}
]
```

4.3.12. Update a List of Nodes using PATCH

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Updates several Nodes using the following JSON schema: node_v2.json#/definitions/nodeListPatch .

Normal response codes: 202

4.3.12.1. Request

This table shows the URI parameters for the update a list of nodes using patch request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.23. Update a List of Nodes using PATCH : JSON request

The bulk PATCH accepts a list consisting of nodeIndex and patch:

```
[
    {"nodeIndex": 9, "patch" : [{"op" : "add", "path" : "/comment", "value":
"Updated"}]},
    {"nodeIndex": 10,"patch" : [{"op" : "add", "path" : "/comment", "value":
"Updated-1"}]}
]
```

4.3.12.2. Response

Example 4.24. Update a List of Nodes using PATCH : JSON response

The response contains a list of individual update responses.

```
[
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode2",
"nodeIndex": 9,"layer": "IP","live": false,"hostName" : "testHostName",
"comment" : "Updated"},
    {"topoObjectType": "node","topologyIndex": 1, "id": "PlannedNode3",
"nodeIndex": 10,"layer": "IP","live": false,"comment" : "Updated1"}
]
```

4.3.13. Delete a List of Nodes

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/nodes/bulk`	Deletes a list of Nodess. The payload must conform to node_v2.json#/definitions/nodeListDelete

```
[
    {"nodeIndex": 9},
    {"nodeIndex": 10}
]
```

Normal response codes: 204

4.3.13.1. Request

This table shows the URI parameters for the delete a list of nodes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.4. Links

Use these endpoints for access to links and information about them.

The link schema is: link_v2.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/links [GET : get all links, POST: create link]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/links/search URL parameters : name, address, queryType=OR [GET : search links)]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/links/<linkId> [GET: get property, PUT: modify link, DELETE]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/links/<linkId>/history [GET : get link history]

Similar to Nodes, planned links can be added to NorthStar. Examples for the PE-CE links are detailed in the "Create a Planned Link" section below.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Returns a full list of links.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Creates a link using optional and required parameters defined in the following schema: link_v2.json#/defini-tions/createLink .

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/search{?name,address,queryType}`	Searches the link list based on URI parameters. For example, search?name=62.101.105 must return one Link.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/stream`	See EventSource for format. The notifications send on that stream are only linkEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Returns the details for a link.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Updates a planned link using the optional and re-quired parameters defined in the following schema: link_v2.json#/definitions/updateLink .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Updates a link using a RFC6902 patch: json-patch.json. The result of the patch must conform to link_v2.json#/defini-tions/updateLink. The REST server remove all operational parameters like operationalStatus, ..etc. .
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Deletes a link. Live links reappear on the next update from the Topology server.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/utilization`	Returns a list of links only containing the endA/endZ uti-lization
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/links/{linkIndex}/history{?start,end}`	Returns the history for a Link.

4.4.1. Get Links

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Returns a full list of links.

Normal response codes: 200

4.4.1.1. Request

This table shows the URI parameters for the get links request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.4.1.2. Response

Example 4.25. Get Links: JSON response

The example shows three links:

- One point-to-point link (link #6, named "L62.104.107.1_62.104.107.2").

- Two broadcast links (link 1 and 8). Broadcast links do not have protocols on one end (pseudo node end).

Broadcast links for MPLS-TE is not supported.

```
[
    {
        "endA": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "id": "62.0.0.104",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
                },
                "RSVP": {"bandwidth": 10000000000 }
            },
```

```
            "srlgs": [{"srlgValue": 407}],
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9489999872, 9489999872, 9489999872, 9489999872]
        },
        "endZ": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "id": "62.0.0.107",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 407}]
                },
                "RSVP": {"bandwidth": 10000000000}
            },
            "srlgs": [{"srlgValue": 407}],
            "topoObjectType": "interface",
            "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616, 9489999872]
        },
        "linkIndex": 6,
        "name": "L62.104.107.1_62.104.107.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
"endA": {
            "topoObjectType": "interface",
    "node": {
 "topoObjectType": "node",
 "id": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "id": "62.0.0.101",
                "topoObjectType": "node",
                "topologyIndex": 1
```

```
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
                    "srlgs": [{"srlgValue": 100}]
                },
                "RSVP": {"bandwidth": 40000000000}
            },
            "srlgs": [{"srlgValue": 100}],
            "topoObjectType": "interface",
            "unreservedBw": [39990001664, 39489998848, 39489998848,
39489998848, 39489998848, 39489998848, 39489998848, 39489998848]
        },
        "linkIndex": 1,
        "name": "L_62.101.105.1",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
"endA": {
            "topoObjectType": "interface",
    "node": {
 "topoObjectType": "node",
 "id": "0620.0000.0101.02",
 "topologyIndex": 1
    }
},
        "endZ": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.2",
                "topoObjectType": "ipv4"
            },
            "node": {
                "id": "62.0.0.105",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2"
                },
                "RSVP": {"bandwidth": 40000000000}
            },
            "topoObjectType": "interface",
            "unreservedBw": [39570001920, 39570001920, 39570001920,
39070003200, 38570004480, 38570004480, 38570004480, 38570004480]
        },
        "linkIndex": 8,
        "name": "L_62.101.105.2",
        "operationalStatus": "Up",
        "topoObjectType": "link",
        "topologyIndex": 1
    }
```

```
]
```

4.4.2. Create a Link

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links`	Creates a link using optional and required parameters defined in the following schema: link_v2.json#/definitions/createLink .

Normal response codes: 201

4.4.2.1. Request

This table shows the URI parameters for the create a link request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.26. Create a Link: JSON request

The example shows the creation of a numbered 40G planned link between node 62.0.0.102 and PlannedNode.

Table 4.3. Attributes required for Create Link

Attribute	Type	Description	Fixed
endA/node	string	No	Link source node
endZ/node	string	No	Link destination node
topologyIndex	integer	Yes	1
topoObjectType	string	Yes	link

Create Link examples:

- In this example, create planned link

```
{
    "topoObjectType": "link",
    "topologyIndex": 1,
    "endA": {
"topoObjectType": "interface",
"node": {
    "topoObjectType": "node","name": "62.0.0.102","topologyIndex": 1
},
"ipv4Address": { "topoObjectType": "ipv4","address": "62.102.166.1"},
"bandwidth": 40000000000,
"TEmetric": 10,
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
}
    },
    "endZ": {
```

```
"topoObjectType": "interface",
"node": {
    "topoObjectType": "node", "name": "PlannedNode","topologyIndex": 1
},
"ipv4Address": { "topoObjectType": "ipv4","address": "62.102.166.2"},
"bandwidth": 40000000000,
"TEmetric": 10,
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
}
    }
}
```

The response is:

```
{
    "topoObjectType": "link",
    "topologyIndex": 1,
    "name": "L62.102.166.1_62.102.166.2",
    "operationalStatus": "Planned",
    "linkIndex": 16,
    "endA": {
"topoObjectType": "interface",
"ipv4Address": {"topoObjectType": "ipv4","address": "62.102.166.1"},
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
},
"bandwidth": 40000000000,
"node": {"topoObjectType": "node","name": "62.0.0.102","topologyIndex": 1}
    },
    "endZ": {
"topoObjectType": "interface",
"ipv4Address": {"topoObjectType": "ipv4","address": "62.102.166.2"},
"protocols": {
    "RSVP": {
 "bandwidth": 40000000000
    }
},
"bandwidth": 40000000000,
"node": {"topoObjectType": "node","name": "PlannedNode","topologyIndex": 1}
    }
}
```

- In this example, create a link between PE (id: 0100.0000.0003) and CE (id: CEZ1) node

```
{
   "topoObjectType":"link",
   "topologyIndex":1,
   "endA":{
      "topoObjectType":"interface",
      "node":{
         "topoObjectType":"node",
         "id":"0100.0000.0003",
         "topologyIndex":1
      }
   },
```

```
    "endZ":{
        "topoObjectType":"interface",
        "node":{
            "topoObjectType":"node",
            "id":"CEZ1",
            "topologyIndex":1
        }
    }
}
```

The response is:

```
{
    "endZ":{
        "node":{
            "topologyIndex":1,
            "id":"CEZ1",
            "topoObjectType":"node"
        },
        "topoObjectType":"interface"
    },
    "linkIndex":74,
    "endA":{
        "node":{
            "topologyIndex":1,
            "id":"0100.0000.0003",
            "topoObjectType":"node"
        },
        "topoObjectType":"interface"
    },
    "live":false,
    "operationalStatus":"Unknown",
    "topologyIndex":1,
    "location":"/NorthStar/API/v2/tenant/1/topology/1/links/74",
    "topoObjectType":"link",
    "id":"L0100.0000.0003_CEZ1"
}
```

- In this example, create a link between PE (id: 0100.0000.0003) and Site (id: SiteA1) node

```
{
    "topoObjectType":"link",
    "topologyIndex":1,
    "endA":{
        "topoObjectType":"interface",
        "node":{
            "topoObjectType":"node",
            "id":"0100.0000.0003",
            "topologyIndex":1
        }
    },
    "endZ":{
        "topoObjectType":"interface",
        "node":{
            "topoObjectType":"node",
            "id":"SiteA1",
            "topologyIndex":1
        }
    }
}
```

The response is:

```
{
    "endZ":{
        "node":{
            "topologyIndex":1,
            "id":"SiteA1",
            "topoObjectType":"node"
        },
        "topoObjectType":"interface"
    },
    "linkIndex":86,
    "endA":{
        "node":{
            "topologyIndex":1,
            "id":"0100.0000.0003",
            "topoObjectType":"node"
        },
        "topoObjectType":"interface"
    },
    "live":false,
    "operationalStatus":"Unknown",
    "topologyIndex":1,
    "location":"/NorthStar/API/v2/tenant/1/topology/1/links/86",
    "topoObjectType":"link",
    "id":"L0100.0000.0003_SiteA1"
}
```

- In this example, create a link between CE (id: CEZ1) and Site (id: SiteZ) node

```
{
    "topoObjectType":"link",
    "topologyIndex":1,
    "endA":{
        "topoObjectType":"interface",
        "node":{
            "topoObjectType":"node",
            "id":"CEZ1",
            "topologyIndex":1
        }
    },
    "endZ":{
        "topoObjectType":"interface",
        "node":{
            "topoObjectType":"node",
            "id":"SiteZ",
            "topologyIndex":1
        }
    }
}
```

The response is:

```
{
    "endZ":{
        "node":{
            "topologyIndex":1,
            "id":"SiteZ",
            "topoObjectType":"node"
```

```
            },
            "topoObjectType":"interface"
        },
        "linkIndex":98,
        "endA":{
            "node":{
                "topologyIndex":1,
                "id":"CEZ1",
                "topoObjectType":"node"
            },
            "topoObjectType":"interface"
        },
        "live":false,
        "operationalStatus":"Unknown",
        "topologyIndex":1,
        "location":"/NorthStar/API/v2/tenant/1/topology/1/links/98",
        "topoObjectType":"link",
        "id":"LCEZ1_SiteZ"
}
```

4.4.2.2. Response

The responses are shown per example in the request section. In general the response is a JSON document conforming to link_v2.json#/definitions/createLink.

This operation does not return a response body.

4.4.3. Search Links

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/search{?name,address,queryType}`	Searches the link list based on URI parameters. For example, search?name=62.101.105 must return one Link.

Normal response codes: 200

4.4.3.1. Request

This table shows the URI parameters for the search links request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the search links request:

Name	Type	Description
name	String *(Optional)*	Filters based on the link name. The parameter is treated as a regular expression. Simple strings such as L62 are accepted. JavaScript regexp (for example, /^L62/) is also accepted
address	String *(Optional)*	Filters based on the link address (endA/ipv4Address/address and endZ/ipv4Address/address).
queryType	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If the queryType is set to OR, a link is included in the results if any of the query parameters matches.

4.4.3.2. Response

Example 4.27. Search Links: JSON response

```
[
    {
        "endA": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 10000000000,
            "ipv4Address": {
                "address": "62.104.107.1",
                "topoObjectType": "ipv4"
            },
            "node": {
                "id": "62.0.0.104",
                "topoObjectType": "node",
                "topologyIndex": 1
            },
            "protocols": {
                "ISIS": {
                    "TEMetric": 10,
                    "level": "L2",
```

```
                                "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": {"bandwidth": 10000000000 }
                },
                "srlgs": [{"srlgValue": 407}],
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9489999872, 9489999872, 9489999872, 9489999872]
            },
            "endZ": {
                "topoObjectType": "interface",
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 10000000000,
                "ipv4Address": {
                    "address": "62.104.107.2",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "id": "62.0.0.107",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 407}]
                    },
                    "RSVP": {"bandwidth": 10000000000}
                },
                "srlgs": [{"srlgValue": 407}],
                "topoObjectType": "interface",
                "unreservedBw": [9989999616, 9989999616, 9989999616, 9989999616,
9989999616, 9989999616, 9989999616, 9489999872]
            },
            "linkIndex": 6,
            "name": "L62.104.107.1_62.104.107.2",
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
        },
        {
"endA": {
            "topoObjectType": "interface",
        "node": {
 "topoObjectType": "node",
 "id": "0620.0000.0101.02",
 "topologyIndex": 1
        }
},
        "endZ": {
            "topoObjectType": "interface",
            "TEcolor": 0,
            "TEmetric": 10,
            "bandwidth": 40000000000,
            "ipv4Address": {
                "address": "62.101.105.1",
                "topoObjectType": "ipv4"
            },
```

```
                "node": {
                    "id": "62.0.0.101",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2",
                        "srlgs": [{"srlgValue": 100}]
                    },
                    "RSVP": {"bandwidth": 40000000000}
                },
                "srlgs": [{"srlgValue": 100}],
                "topoObjectType": "interface",
                "unreservedBw": [39990001664, 39489998848, 39489998848,
39489998848, 39489998848, 39489998848, 39489998848, 39489998848]
            },
            "linkIndex": 1,
            "name": "L_62.101.105.1",
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
        },
        {
"endA": {
                "topoObjectType": "interface",
            "node": {
 "topoObjectType": "node",
 "id": "0620.0000.0101.02",
 "topologyIndex": 1
            }
},
        "endZ": {
                "topoObjectType": "interface",
                "TEcolor": 0,
                "TEmetric": 10,
                "bandwidth": 40000000000,
                "ipv4Address": {
                    "address": "62.101.105.2",
                    "topoObjectType": "ipv4"
                },
                "node": {
                    "id": "62.0.0.105",
                    "topoObjectType": "node",
                    "topologyIndex": 1
                },
                "protocols": {
                    "ISIS": {
                        "TEMetric": 10,
                        "level": "L2"
                    },
                    "RSVP": {"bandwidth": 40000000000}
                },
                "topoObjectType": "interface",
                "unreservedBw": [39570001920, 39570001920, 39570001920,
39070003200, 38570004480, 38570004480, 38570004480, 38570004480]
        },
        "linkIndex": 8,
        "name": "L_62.101.105.2",
```

```
            "operationalStatus": "Up",
            "topoObjectType": "link",
            "topologyIndex": 1
        }
]
```

4.4.4. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/stream`	See EventSource for format. The notifications send on that stream are only linkEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.4.4.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.4.5. Get a Single Link

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Returns the details for a link.

Normal response codes: 200

4.4.5.1. Request

This table shows the URI parameters for the get a single link request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This operation does not accept a request body.

4.4.5.2. Response

Example 4.28. Get a Single Link: JSON response

```
{
    "endA": {
        "TEcolor": 0,
        "TEmetric": 10,
 "delay" : 600,
        "bandwidth": 40000000000,
        "ipv4Address": {
            "address": "192.0.2.13",
            "topoObjectType": "ipv4"
        },
        "node": {
            "id": "192.0.2.3",
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        "protocols": {
            "ISIS": {
                "TEMetric": 10,
                "level": "L2"
            },
            "RSVP": {
                "bandwidth": 40000000000
            }
        },
        "topoObjectType": "interface",
        "unreservedBw": [39970000896, 39970000896, 39970000896, 39469998080,
39469998080, 39469998080, 39469998080, 39469998080]
    },
    "endZ": {
        "TEcolor": 0,
```

```
        "TEmetric": 10,
        "delay": 600,
        "bandwidth": 40000000000,
        "ipv4Address": {
            "address": "192.0.2.14",
            "topoObjectType": "ipv4"
        },
        "node": {
            "id": "192.0.2.7",
            "topoObjectType": "node",
            "topologyIndex": 1
        },
        "protocols": {
            "ISIS": {
                "TEMetric": 10,
                "level": "L2"
            },
            "RSVP": {
                "bandwidth": 40000000000
            }
        },
        "unreservedBw": [39289999360, 38790000640, 38790000640, 38790000640,
38790000640, 38790000640, 38790000640, 38790000640]
    },
    "linkIndex": 1,
    "id": "L192.0.2.13_192.0.2.14",
    "operationalStatus": "Up",
    "topoObjectType": "link",
    "topologyIndex": 1
}
```

4.4.6. Update Link

Method	URI	Description
PUT	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}	Updates a planned link using the optional and re-quired parameters defined in the following schema: link_v2.json#/definitions/updateLink .

Normal response codes: 202

4.4.6.1. Request

This table shows the URI parameters for the update link request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
{linkIndex}	Int	The unique linkIndex.

Example 4.29. Update Link : JSON request

The following example sets the link delay for the link L62.103.107.1_62.103.107.2

```
{
    "topoObjectType":"link", "topologyIndex":1,
    "linkIndex":4,
    "endA":{
"topoObjectType":"interface",
"ipv4Address" : {"topoObjectType":"ipv4","address":"62.103.107.1"},
"protocols":{
    "ISIS" : {
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.103","topologyIndex":1}
    },"endZ" : {
"topoObjectType":"interface",
"ipv4Address":{"topoObjectType":"ipv4","address":"62.103.107.2"},
"protocols":{
    "ISIS":{
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
```

```
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.107","topologyIndex":1}
    }
}
```

4.4.6.2. Response

Example 4.30. Update Link : JSON response

```
{
    "topoObjectType":"link", "topologyIndex":1,
    "name":"L62.103.107.1_62.103.107.2",
    "linkIndex":4,
    "operationalStatus": "Up",
    "endA":{
"topoObjectType":"interface",
"ipv4Address" : {"topoObjectType":"ipv4","address":"62.103.107.1"},
"protocols":{
    "ISIS" : {
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.103","topologyIndex":1}
    },"endZ" : {
"topoObjectType":"interface",
"ipv4Address":{"topoObjectType":"ipv4","address":"62.103.107.2"},
"protocols":{
    "ISIS":{
 "TEMetric":10,
 "level":"L2",
 "metric":10
    },
    "RSVP":{"bandwidth":40000000000}
},
"bandwidth":40000000000,
"TEmetric":10,
"TEcolor":0,
"delay":600,
"node":{"topoObjectType":"node","name":"62.0.0.107","topologyIndex":1}
    }
}
```

4.4.7. Patch Link

Method	URI	Description
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}	Updates a link using a RFC6902 patch: json-patch.json. The result of the patch must conform to link_v2.json#/defini-tions/updateLink. The REST server remove all operational parameters like operationalStatus, ..etc. .

Normal response codes: 202

4.4.7.1. Request

This table shows the URI parameters for the patch link request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
{linkIndex}	Int	The unique linkIndex.

Example 4.31. Patch Link: JSON request

The Patched update accepts the same parameters as the update

```
[{"op" : "add", "path" : "/endZ/designParameters/userCost", "value": 40}]
```

4.4.7.2. Response

Example 4.32. Patch Link: JSON response

```
{
    "topoObjectType": "link",
    "linkIndex": 10,
    "id": "L11.101.202.1_11.101.202.2",
    "name": "L11.101.202.1_11.101.202.2",
    "live": false,
    "topologyIndex": 1,
    "operationalStatus": "Unknown",
    "endA": {
        "topoObjectType": "interface",
        "ipv4Address": {
                "topoObjectType": "ipv4",
            "address": "11.101.202.1"
        },
        "node": {
            "topoObjectType": "node",
            "id": "11.0.0.101",
            "topologyIndex": 1
        }
    },
    "endZ": {
        "topoObjectType": "interface",
        "ipv4Address": {
            "topoObjectType": "ipv4",
```

```
                "address": "11.101.202.2"
        },
        "node": {
            "topoObjectType": "node",
            "id": "11.0.0.103",
                "topologyIndex": 1
        },
        "designParameters" : {"userCost":40}
    }
}
```

4.4.8. Delete a Link

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/{linkIndex}`	Deletes a link. Live links reappear on the next update from the Topology server.

Normal response codes: 204

4.4.8.1. Request

This table shows the URI parameters for the delete a link request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This operation does not accept a request body.

4.4.9. Get Links utilization only

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/links/utilization`	Returns a list of links only containing the endA/endZ utilization

Normal response codes: 200

4.4.9.1. Request

This table shows the URI parameters for the get links utilization only request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.4.9.2. Response

Example 4.33. Get Links utilization only: JSON response

The example shows three links:

- One point-to-point link (link #6, named "L62.104.107.1_62.104.107.2").

- Two broadcast links (link 1 and 8). Broadcast links do not have protocols on one end (pseudo node end).

Broadcast links for MPLS-TE is not supported.

```
[
    {
        "endA": {
            "topoObjectType": "interface",
            "node": {"id": "62.0.0.104","topoObjectType": "node",
"topologyIndex": 1},
            "utilization" : {
                "lastUpdate" : "2016-03-24T01:37:24.192474Z",
                "utilization" : 10,
                "availableBandwidth"    : 9000000000,
                "usedBandwidth"         : 100000000,
                "tunnelUtilization"     : 15,
                "tunnelLiveUtilization" : 10
            }
        },
        "endZ": {
            "topoObjectType": "interface",
            "node": {"id": "62.0.0.107","topoObjectType": "node",
"topologyIndex": 1},
            "utilization" : {
                "lastUpdate" : "2016-03-24T01:37:24.192474Z",
```

```
                "utilization" : 20,
                "availableBandwidth"    : 8000000000,
                "usedBandwidth"         : 200000000,
                "tunnelUtilization"     : 15,
                "tunnelLiveUtilization" : 20
            }
        },
        "linkIndex": 6,
        "name": "L62.104.107.1_62.104.107.2",
        "topoObjectType": "link",
        "topologyIndex": 1
    },
    {
        "endA": {
            "topoObjectType": "interface",
            "node": {"id": "62.0.0.102","topoObjectType": "node",
"topologyIndex": 1},
            "utilization" : {
                "lastUpdate" : "2016-03-24T01:37:24.192474Z",
                "utilization" : 20,
                "availableBandwidth"    : 8000000000,
                "usedBandwidth"         : 200000000,
                "tunnelUtilization"     : 20,
                "tunnelLiveUtilization" : 20
            }
        },
        "endZ": {
            "topoObjectType": "interface",
            "node": {"id": "62.0.0.105","topoObjectType": "node",
"topologyIndex": 1},
            "utilization" : {
                "lastUpdate" : "2016-03-24T01:37:24.192474Z",
                "utilization" : 20,
                "availableBandwidth"    : 8000000000,
                "usedBandwidth"         : 200000000,
                "tunnelUtilization"     : 15,
                "tunnelLiveUtilization" : 20
            }
        },
        "linkIndex": 6,
        "name": "L62.102.105.1_62.102.105.2",
        "topoObjectType": "link",
        "topologyIndex": 1
    }
]
```

4.4.10. Get the Link Event History

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/links/{linkIndex}/history{?start,end}`	Returns the history for a Link.

The history contains a list of Unix-timestamped events for the link resource.

Normal response codes: 200

4.4.10.1. Request

This table shows the URI parameters for the get the link event history request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{linkIndex}`	Int	The unique linkIndex.

This table shows the query parameters for the get the link event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include events with the starting timetime and later.
`end`	Int *(Optional)*	End timestamp: Include events before (but not including) the ending timestamp.

4.4.10.2. Response

Example 4.34. Get the Link Event History: JSON response

```
[
    {
 "topoObjectType": "link",
 "topologyIndex": 1,
 "name": "L62.103.107.1_62.103.107.2",
 "operationalStatus": "Up",
 "linkIndex": 4,
 "endA": {
     "topoObjectType": "interface",
     "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.1" },
     "protocols": {
 "ISIS": {
     "TEMetric": 10,
     "level": "L2",
     "metric": 10
 },
 "RSVP": {"bandwidth": 40000000000}
     },
     "bandwidth": 40000000000,
     "TEmetric": 10,
```

```
      "TEcolor": 0,
      "unreservedBw": [40000000000,40000000000,40000000000,40000000000,
40000000000,40000000000,40000000000,40000000000],
      "node": {"topoObjectType": "node","name": "62.0.0.103","topologyIndex":
 1}
 },
 "endZ": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.2"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
  },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39469998080,38969999360,38470000640,38470000640,
37970001920,37970001920,37970001920,37970001920],
      "node": {"topoObjectType": "node","name": "62.0.0.107","topologyIndex":
 1}
 },
 "timestamp": 1427129349771
     },
     {
 "topoObjectType": "link",
 "topologyIndex": 1,
 "name": "L62.103.107.1_62.103.107.2",
 "operationalStatus": "Up",
 "linkIndex": 4,
 "endA": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.1"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
  },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39970000896,39970000896,39970000896,38470000640,
38470000640,38470000640,38470000640,38470000640],
      "node": {"topoObjectType": "node","name": "62.0.0.103","topologyIndex":
 1}
 },
 "endZ": {
      "topoObjectType": "interface",
      "ipv4Address": {"topoObjectType": "ipv4","address": "62.103.107.2"},
      "protocols": {
  "ISIS": {
      "TEMetric": 10,
      "level": "L2",
      "metric": 10
```

```
    },
  "RSVP": {"bandwidth": 40000000000}
      },
      "bandwidth": 40000000000,
      "TEmetric": 10,
      "TEcolor": 0,
      "unreservedBw": [39469998080,38969999360,38470000640,38470000640,
37970001920,37970001920,37970001920,37970001920],
      "node": {"topoObjectType": "node","name": "62.0.0.107","topologyIndex":
 1}
    },
  "timestamp": 1427129349871
      }
]
```

4.5. TE-LSPs

Use these endpoints to access TE-LSPs and the related information.

The TE-LSP schema is: lsp.json .

You can perform the following operations using the TE-LSP endpoints:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-lsps/ [GET : get all te-lsps, POST : create one LSP]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-lsps/search search parameters : name={nameFilter}, from={fromIpV4} operStatus={operationalStatus} queryType=OR [GET : search LSPs ()]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-lsps/bulk Bulk LSP operations: allows to create/update/delete a list of te-lsps [POST : create LSPs , PUT/PATCH : update lsps, DELETE : delete]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-lsps/<lspIndex> [GET : get te-lsp, PUT/PATCH : update, DELETE : delete]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-lsps/<lspIndex>/history [GET : get historical index of te-lsps]

Note: Use this API to create point-to-point LSPs only. The API supports RSVP and SR LSPs. Starting from Northstar release 4.1 onwards, binding SID SR LSPs are supported. Do not use this API to create the P2MP members. Ensure that you use the P2MP resources to create P2MP resources.

The TE-LSP API does allow diverse LSPs to be computed. This is controlled using the following set of attributes:

- diversityGroup: the LSPs are grouped together using a diversityGroup. If LSP1 and LSP2 should be diverse to each other, they should be in the same diversityGroup.

- diversityLevel (site, srlg or link): the level of requested diversity. NorthStar will try to compute path that reach that diversity level, if this cannot be achieved, it will try to route the path as diverse as possible, unless minimumDiversityLevel is specified.

- minimumDiversityLevel (site, srlg or link): the minimum acceptable diversity level. If NorthStar cannot achieve diversity as good or better than minimumDiversityLevel, the routing is considered as failed.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Returns the TE-LSP list.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Creates a TE-LSP using the following JSON schema: lsp.json#/definitions/createLSP . For example, protection and custom service mapping parameters set.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{?name,from,operationalStatus,query-Type}`	Performs a search in the LSP list based on the URI parameters. For example, "search?name=62.101.105" returns one link.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/stream`	See EventSource for format. The notifications send on that stream are only lspEvent or lspTopologyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Returns the details for a TE-LSP.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Updates a TE-LSP using the JSON schema: lsp.json#/definitions/updateLSP .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Updates a TE-LSP using a RFC6902 patch: json-patch.json. The result of the patch must conform to lsp.json#/definitions/updateLsp. The REST server remove all operational parameters like operationalStatus, ..etc. . Using an empty patch (empty list) will result in the LSP to be re-provisioned without parameter changed.
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Deletes a TE-LSP. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Creates several TE-LSPs using the following JSON schema: lsp.json#/definitions/createLSPList .
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListUpdate .
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListPatch .
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Deletes a list of TE-LSPs. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.b The payload must conform to lsp.json#/definitions/lspListDelete
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}`	Returns the history for a TE-LSP.

4.5.1. Get TE-LSPs

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Returns the TE-LSP list.

The example contains 10 TE-LSPs:

- A simple delegated LSP (index 1, named LSP_Node101_Node102). A delegated LSP is configured in the PCC and delegated to NorthStar. NorthStar controls the path and some attributes of the LSP.

- A delegated LSP with a configured explicit path (index 2, name LSP_101_103). The path name in the router is Path_Node101_Node103_Strict_1.

- A protected tunnel with a primary and secondary path. The two paths (each represented as a TE-LSP) of a tunnel (index 3 and 4). The tunnel is named LSP_Node102_Node104_with_secondary and each path has a pathName. The tunnel name is used for correlation. One path (index3) is the primary path, while the other is the secondary path. The secondary path will be activated upon primary path failure. LSPs carrying traffic are marked as "Active" rather than "Up".

- A protected tunnel with a primary and secondary standby path (index 5 and 6). The model is similar to a tunnel with a secondary path, the difference is that the standby path has a pathType set to standby and the path is signaled in the control plane (making its operational status "Up").

- A set of three TE-LSPs in a TE++ configuration (index 7,8,9). The TE-LSPs are named TEplusplus-Node102-Node103-<index>. Correlation of the entries can be done using live-Properties, options, and TEPlusPlusId. Those LSPs are not delegated to NorthStar, as indicated by the attribute controlType set to PCC. NorthStar will not modify those LSPs.

- A PCE-Initiated LSP (index 10).

Normal response codes: 200

4.5.1.1. Request

This table shows the URI parameters for the get te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.5.1.2. Response

Example 4.35. Get TE-LSPs: JSON response

```
[
    {
        "operationalStatus": "Active",
```

```
        "plannedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.106.107.1",
                    "loose": false
                }
            ],
            "routingStatus": "Down",
            "adminStatus": "Up",
            "design": {
                "routingMethod": "routeByDevice"
            },
            "lastStatusString": "[PCServer]<Down controller_state=Path found
on down lsp",
            "controllerStatus": {
                "status": "Path found on down lsp"
            },
            "correlatedRROHopCount": 2
        },
        "name": "rsvp-105-106",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.105"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.106"
        },
        "lspIndex": 13,
        "controlType": "PCC",
        "provisioningType": "RSVP",
        "collectedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.105",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.106.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.106",
                    "loose": false
```

```
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "correlatedRROHopCount": 1
        },
        "tunnelId": 60274,
        "liveProperties": {
            "bandwidth": 0,
            "metric": 10,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.106.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        },
        "controller": "External"
    },
    {
        "operationalStatus": "Active",
        "name": "11.0.0.101:11.0.0.104:300:vpls:vpn_200",
        "p2mpIndex": 184549480,
        "p2mpName": "11.0.0.104:300:vpls:vpn_200",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.101"
        },
        "liveProperties": {
            "bandwidth": 0,
            "metric": 0,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
```

```
                {
                    "topoObjectType": "ipv4",
                    "address": "11.101.105.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        },
        "controlType": "PCC",
        "controller": "External",
        "pathType": "primary",
        "lspIndex": 14
    },
    {
        "operationalStatus": "Active",
        "name": "11.0.0.103:11.0.0.104:300:vpls:vpn_200",
        "p2mpIndex": 184549480,
        "p2mpName": "11.0.0.104:300:vpls:vpn_200",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "liveProperties": {
            "bandwidth": 0,
            "metric": 0,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        },
        "controlType": "PCC",
        "controller": "External",
        "pathType": "primary",
        "lspIndex": 15
    },
    {
        "operationalStatus": "Active",
        "name": "11.0.0.106:11.0.0.104:300:vpls:vpn_200",
        "p2mpIndex": 184549480,
        "p2mpName": "11.0.0.104:300:vpls:vpn_200",
        "from": {
```

```
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104"
                },
                "to": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.106"
                },
                "liveProperties": {
                    "bandwidth": 0,
                    "metric": 0,
                    "setupPriority": 7,
                    "holdingPriority": 0,
                    "operationalStatus": "Active",
                    "adminStatus": "Up",
                    "ero": [],
                    "rro": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.104.107.2",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.107.1",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.106.2",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        }
                    ]
                },
                "controlType": "PCC",
                "controller": "External",
                "pathType": "primary",
                "lspIndex": 16
            },
            {
                "operationalStatus": "Active",
                "plannedProperties": {
                    "bandwidth": "0",
                    "setupPriority": 7,
                    "holdingPriority": 0,
                    "calculatedEro": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.104.107.2",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.107.1",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
```

```
                "address": "11.101.105.1",
                "loose": false
            }
        ],
        "routingStatus": "Up",
        "adminStatus": "Up",
        "lastStatusString": "[PCServer]<PCC ACK request_id=417990091",
        "correlatedRROHopCount": 3
    },
    "name": "Silver-104-101",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.104"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101"
    },
    "lspIndex": 17,
    "controlType": "Delegated",
    "provisioningType": "RSVP",
    "initiator": "PCC",
    "controller": "NorthStar",
    "collectedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 0,
        "calculatedEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.104",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.104.107.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.105.107.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101",
                "loose": false
            }
        ],
        "routingStatus": "Up",
        "adminStatus": "Up",
        "correlatedRROHopCount": 3
    },
    "tunnelId": 32533,
```

```
            "liveProperties": {
                "bandwidth": 0,
                "metric": 30,
                "setupPriority": 7,
                "holdingPriority": 0,
                "operationalStatus": "Active",
                "adminStatus": "Up",
                "ero": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.1",
                        "loose": false
                    }
                ],
                "rro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    }
                ]
            }
        },
        {
            "operationalStatus": "Active",
            "plannedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
```

```
                    "address": "11.105.107.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.102.105.1",
                    "loose": false
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "lastStatusString": "[PCServer]<PCC ACK request_id=417990082",
            "correlatedRROHopCount": 3
        },
        "name": "Silver-104-102",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.102"
        },
        "lspIndex": 18,
        "controlType": "Delegated",
        "provisioningType": "RSVP",
        "initiator": "PCC",
        "controller": "NorthStar",
        "collectedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.102.105.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.102",
                    "loose": false
                }
            ],
```

```
                "routingStatus": "Up",
                "adminStatus": "Up",
                "correlatedRROHopCount": 3
            },
            "tunnelId": 29910,
            "liveProperties": {
                "bandwidth": 0,
                "metric": 30,
                "setupPriority": 7,
                "holdingPriority": 0,
                "operationalStatus": "Active",
                "adminStatus": "Up",
                "ero": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "loose": false
                    }
                ],
                "rro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    }
                ]
            }
        },
        {
            "operationalStatus": "Active",
            "plannedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
```

```
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "loose": false
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "lastStatusString": "[PCServer]<PCC ACK request_id=417990087",
            "correlatedRROHopCount": 2
        },
        "name": "Silver-104-103",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "lspIndex": 19,
        "controlType": "Delegated",
        "provisioningType": "RSVP",
        "initiator": "PCC",
        "controller": "NorthStar",
        "collectedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.103",
                    "loose": false
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "correlatedRROHopCount": 2
        },
        "tunnelId": 32451,
```

```
        "liveProperties": {
            "bandwidth": 0,
            "metric": 20,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "loose": false
                }
            ],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        }
    },
    {
        "operationalStatus": "Active",
        "plannedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "loose": false
                }
            ],
            "routingStatus": "Down",
            "adminStatus": "Up",
            "design": {
                "routingMethod": "routeByDevice"
            },
            "lastStatusString": "[PCServer]<Down controller_state=Path found
on down lsp",
```

```
            "controllerStatus": {
                "status": "Path found on down lsp"
            },
            "correlatedRROHopCount": 2
        },
        "name": "rsvp-104-105",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.105"
        },
        "lspIndex": 20,
        "controlType": "PCC",
        "provisioningType": "RSVP",
        "collectedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.105",
                    "loose": false
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "correlatedRROHopCount": 2
        },
        "tunnelId": 32072,
        "liveProperties": {
            "bandwidth": 0,
            "metric": 20,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [],
            "rro": [
                {
                    "topoObjectType": "ipv4",
```

```
                    "address": "11.104.107.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        },
        "controller": "External"
    }
]
```

4.5.2. Create a TE-LSP

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps`	Creates a TE-LSP using the following JSON schema: lsp.json#/definitions/createLSP . For example, protection and custom service mapping parameters set.

Normal response codes: 201

Error response codes: 400

4.5.2.1. Request

This table shows the URI parameters for the create a te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.36. Create a TE-LSP : JSON request

Table 4.4. Create LSP Required Attributes.

Attribute	Type	Description	Fixed
name	string	No	Tunnel name
from/address	string	No	Tunnel ingress
to/address	string	No	Tunnel egress

The following examples show different set of parameters and results:

- LSP with a bandwidth of 100M

```
{
    "name": "Rest_LSP_1",
    "from": {
 "topoObjectType": "ipv4",
 "address": "62.0.0.101"
    },
    "to": {
 "topoObjectType": "ipv4",
 "address": "62.0.0.103"
    },
    "plannedProperties": {
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

- Primary and standby LSPs. The source (from), destination (to), and name must be the same. The standby (and secondary) LSPs must have a pathName attribute set in order to differentiate them. The Primary LSP may have a pathName set.

Primary LSP:

```
{
    "name": "REST_LSP_2",
    "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
    "to": {"address": "62.0.0.104", "topoObjectType": "ipv4"},
    "pathType": "primary",
    "plannedProperties": {
 "bandwidth": "400M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

Standby LSP:

```
{
    "name": "REST_LSP_2",
    "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
    "to": {"address": "62.0.0.104", "topoObjectType": "ipv4"},
    "pathType": "standby",
    "plannedProperties": {
 "pathName" : "standby_path_for_second_LSP",
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

• LSP with a loose explicit route. The loose hop must follow a hop; if no other hop can be supplied, usual best practice is use of the ingress node ID.

```
{

    "name": "REST_LPS_with_explicit_route",
    "from": {"topoObjectType": "ipv4","address": "62.0.0.101"},
    "to":   {"topoObjectType": "ipv4","address": "62.0.0.103"},
    "plannedProperties": {
 "bandwidth": 10000000,
 "setupPriority": 7,
 "holdingPriority": 7,
 "ero" : [
            {"topoObjectType": "ipv4","address": "62.0.0.101","loose":
 false},
            {"topoObjectType": "ipv4","address": "62.0.0.102","loose": true}
 ]
    }
}
```

• Creates a TE LSP and associates it with a CCC VPN via userProperties.

```
{
  "name": "lintalphaomega",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "RSVP",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.101"
```

```
    },
    "to": {
      "topoObjectType": "ipv4",
      "address": "11.0.0.103"
    },
    "plannedProperties": {
      "bandwidth": "24k",
      "setupPriority": 7,
      "holdingPriority": 7,
      "userProperties": {
        "ccc-vpn-name": "vpnsisisi",
        "ccc-interface": "ge-0/0/7.987",
        "transmit-lsp": "lintalphaomega",
        "receive-lsp": "lintomegaalpha"
      }
    }
}
```

The response is :

```
{
    "plannedProperties": {
        "bandwidth": "24K",
        "setupPriority": 7,
        "holdingPriority": 7,
        "pathName": "lintalphaomega_p0",
        "adminStatus": "Up",
        "preferredEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.105.107.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.103.107.1",
                "loose": false
            }
        ],
        "userProperties": {
            "ccc-vpn-name": "vpnsisisi",
            "ccc-interface": "ge-0/0/7.987",
            "transmit-lsp": "lintalphaomega",
            "receive-lsp": "lintomegaalpha"
        },
        "lastStatusString": "[ConfigServer]<Netconf provisioning order
received",
        "correlatedRROHopCount": 0
    },
    "name": "lintalphaomega",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101"
    },
    "pathType": "primary",
```

```
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "lspIndex": 95,
        "controlType": "PCC",
        "provisioningType": "RSVP"
}
```

In the following NETCONF SR LSP examples, the following should be noted:

• Only Juniper routers are supported.

• Only NETCONF provisioning is supported.

• The binding SID label, if specified, is checked by the device based on the configured label range.

• Only one primary LSP path is supported.

SR LSP examples:

• In this example, the SR LSP has a node SID specified for the destination.

```
{
  "name": "restSRNodeSID",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.101"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.103"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
    "ero": [
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.103",
        "loose": true
      }
    ],
    "design": {
      "routingMethod": "routeByDevice",
      "adminGroups": {}
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.103",
                "loose": true
            }
        ],
        "design": {
            "routingMethod": "routeByDevice"
        }
    },
    "name": "restSRNodeSID",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.103"
    },
    "lspIndex": 106,
    "controlType": "PCC",
    "provisioningType": "SR"
}
```

- In this example, the SR LSP has a list of link SIDs specified to reach the destination.

```
{
  "name": "restSRLinkSIDs",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.101"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.104"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
    "ero": [
```

```
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.101.105.2",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.105.106.2",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.106.107.2",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.104.107.1",
        "loose": false
      }
    ],
    "design": {
      "adminGroups": {}
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.105.106.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.106.107.2",
                "loose": false
```

```
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.104.107.1",
                "loose": false
            }
        ]
    },
    "name": "restSRLinkSIDs",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.104"
    },
    "lspIndex": 107,
    "controlType": "PCC",
    "provisioningType": "SR"
}
```

In NorthStar, a privateForwardingAdjacency is comprised of a pair of binding SID SR LSPs
from node A to node Z and from node Z to node A.

- In this example, the Binding SID SR LSP named restBindingSIDSRnodeSID from vmx105 to
  vmx 107 has a node SID specified for the destination.

```
{
  "name": "restBindingSIDSRnodeSID",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.105"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.107"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
    "bindingSID": 1048048,
    "ero": [
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107",
        "loose": true
      }
    ],
    "design": {
```

```
            "routingMethod": "routeByDevice",
            "adminGroups": {}
        }
    }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.105",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.107",
                "loose": true
            }
        ],
        "design": {
            "routingMethod": "routeByDevice"
        }
    },
    "name": "restBindingSIDSRnodeSID",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107"
    },
    "lspIndex": 108,
    "controlType": "PCC",
    "provisioningType": "SR"
}
```

• In this example, the Binding SID SR LSP named restBindingSIDSRnodeSID from vmx107 to vmx 105 has a node SID specified for the destination.

```
{
  "name": "restBindingSIDSRnodeSID",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.107"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.105"
```

```
    },
    "plannedProperties": {
      "bandwidth": "0",
      "setupPriority": 7,
      "holdingPriority": 7,
      "bindingSID": 1048048,
      "ero": [
        {
          "topoObjectType": "ipv4",
          "address": "11.0.0.107",
          "loose": false
        },
        {
          "topoObjectType": "ipv4",
          "address": "11.0.0.105",
          "loose": true
        }
      ],
      "design": {
        "routingMethod": "routeByDevice",
        "adminGroups": {}
      }
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.107",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.105",
                "loose": true
            }
        ],
        "design": {
            "routingMethod": "routeByDevice"
        }
    },
    "name": "restBindingSIDSRnodeSID",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105"
    },
    "lspIndex": 109,
```

```
      "controlType": "PCC",
      "provisioningType": "SR"
}
```

- In this example, the Binding SID SR LSP named restBindingSIDSRlinkSIDs from vmx105 to vmx 107 has a list of SIDs specified to reach the destination.

```
{
  "name": "restBindingSIDSRlinkSIDs",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.105"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.107"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
    "bindingSID": 1048049,
    "ero": [
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.102.105.1",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.102.106.2",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.104.106.1",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.104.107.2",
        "loose": false
      }
    ],
    "design": {
      "adminGroups": {

      }
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.105",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.102.105.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.102.106.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.104.106.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.104.107.2",
                "loose": false
            }
        ]
    },
    "name": "restBindingSIDSRlinkSIDs",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107"
    },
    "lspIndex": 110,
    "controlType": "PCC",
    "provisioningType": "SR"
}
```

- In this example, the Binding SID SR LSP named restBindingSIDSRlinkSIDs from vmx107 to vmx 105 has a list of SIDs specified to reach the destination.

```
{
  "name": "restBindingSIDSRlinkSIDs",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
```

```
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.107"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.105"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
    "bindingSID": 1048049,
    "ero": [
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.104.107.1",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.104.106.2",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.102.106.1",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.102.105.2",
        "loose": false
      }
    ],
    "design": {
      "adminGroups": {

      }
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.107",
```

```
                    "loose": false
            },
            {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.1",
                    "loose": false
            },
            {
                    "topoObjectType": "ipv4",
                    "address": "11.104.106.2",
                    "loose": false
            },
            {
                    "topoObjectType": "ipv4",
                    "address": "11.102.106.1",
                    "loose": false
            },
            {
                    "topoObjectType": "ipv4",
                    "address": "11.102.105.2",
                    "loose": false
            }
        ]
    },
    "name": "restBindingSIDSRlinkSIDs",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.107"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.105"
    },
    "lspIndex": 111,
    "controlType": "PCC",
    "provisioningType": "SR"
}
```

- In this example, the SR LSP named restSRoverPFA1 from vmx101 to vmx 103 has a list of SIDs specified to reach the destination; along the path, a privateForwardingAdjacency is used.

```
{
  "name": "restSRoverPFA1",
  "creationConfigurationMethod": "NETCONF",
  "provisioningType": "SR",
  "pathType": "primary",
  "from": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.101"
  },
  "to": {
    "topoObjectType": "ipv4",
    "address": "11.0.0.103"
  },
  "plannedProperties": {
    "bandwidth": "0",
    "setupPriority": 7,
    "holdingPriority": 7,
```

```
    "ero": [
      {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.101.105.2",
        "loose": false
      },
      {
        "topoObjectType": "hopId",
        "id": "binding:0110.0000.0105:restBindingSIDSRlinkSIDs",
        "loose": false
      },
      {
        "topoObjectType": "ipv4",
        "address": "11.103.107.1",
        "loose": false
      }
    ],
    "design": {
      "adminGroups": {

      }
    }
  }
}
```

The response is:

```
{
    "plannedProperties": {
        "bandwidth": "0",
        "setupPriority": 7,
        "holdingPriority": 7,
        "adminStatus": "Up",
        "ero": [
            {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "hopId",
                "id": "binding:0110.0000.0105:restBindingSIDSRlinkSIDs",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.103.107.1",
                "loose": false
            }
        ]
```

```
        },
        "name": "restSRoverPFA1",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.101"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "lspIndex": 112,
        "controlType": "PCC",
        "provisioningType": "SR"
}
```

4.5.2.2. Response

Example 4.37. Create a TE-LSP : JSON response

The following example shows the creation of an LSP with a bandwidth of 100M:

```
{
    "lspIndex": 20,
    "name": "Rest_LSP_1",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "PCEInitiated",
    "plannedProperties": {
"adminStatus": "Up",
"bandwidth": "100M",
"setupPriority": 7,
"holdingPriority": 7,
"lastStatusString": "Provisioning Order from REST Interface",
"routingStatus": "Unknown"
    },
    "operationalStatus": "Unknown",
    "pathType": "primary"
}
```

4.5.3. Search LSPs

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/search{?name,from,operationalStatus,query-Type}`	Performs a search in the LSP list based on the URI parameters. For example, "search?name=62.101.105" returns one link.

Normal response codes: 200

4.5.3.1. Request

This table shows the URI parameters for the search lsps request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the search lsps request:

Name	Type	Description
`name`	String *(Optional)*	Filters on specified LSP Name, which is treated as a regular expression. Simple strings like "LP_" are acceptable, as are JavaScript regular expressions such as "/104$/").
`from`	String *(Optional)*	Filters on the LSP from/address property.
`operationalStatus`	String *(Optional)*	Filters based on the LSP operationalStatus property.
`queryType`	String *(Optional)*	The queryType parameter sets the logical operator to be used between the query parameters. By default, the queryType is AND. If the queryType is set to OR, an LSP is included in the results if any of its parameter values match the query.

4.5.3.2. Response

Example 4.38. Search LSPs: JSON response

```
[
    {
        "operationalStatus": "Active",
        "plannedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.106.107.1",
```

```
                        "loose": false
                    }
                ],
                "routingStatus": "Down",
                "adminStatus": "Up",
                "design": {
                    "routingMethod": "routeByDevice"
                },
                "lastStatusString": "[PCServer]<Down controller_state=Path found
on down lsp",
                "controllerStatus": {
                    "status": "Path found on down lsp"
                },
                "correlatedRROHopCount": 2
            },
            "name": "rsvp-105-106",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.105"
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.106"
            },
            "lspIndex": 13,
            "controlType": "PCC",
            "provisioningType": "RSVP",
            "collectedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.105",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.106.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.106",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "adminStatus": "Up",
                "correlatedRROHopCount": 1
            },
            "tunnelId": 60274,
            "liveProperties": {
                "bandwidth": 0,
                "metric": 10,
                "setupPriority": 7,
                "holdingPriority": 0,
                "operationalStatus": "Active",
```

```
                    "adminStatus": "Up",
                    "ero": [],
                    "rro": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.106.2",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        }
                    ]
                },
                "controller": "External"
            },
            {
                "operationalStatus": "Active",
                "name": "11.0.0.101:11.0.0.104:300:vpls:vpn_200",
                "p2mpIndex": 184549480,
                "p2mpName": "11.0.0.104:300:vpls:vpn_200",
                "from": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104"
                },
                "to": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.101"
                },
                "liveProperties": {
                    "bandwidth": 0,
                    "metric": 0,
                    "setupPriority": 7,
                    "holdingPriority": 0,
                    "operationalStatus": "Active",
                    "adminStatus": "Up",
                    "ero": [],
                    "rro": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.104.107.2",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.107.1",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.101.105.1",
                            "protectionInUse": false,
                            "protectionAvailable": false
                        }
                    ]
                },
                "controlType": "PCC",
                "controller": "External",
                "pathType": "primary",
                "lspIndex": 14
            },
```

```
{
    "operationalStatus": "Active",
    "name": "11.0.0.103:11.0.0.104:300:vpls:vpn_200",
    "p2mpIndex": 184549480,
    "p2mpName": "11.0.0.104:300:vpls:vpn_200",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.104"
    },
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.103"
    },
    "liveProperties": {
        "bandwidth": 0,
        "metric": 0,
        "setupPriority": 7,
        "holdingPriority": 0,
        "operationalStatus": "Active",
        "adminStatus": "Up",
        "ero": [],
        "rro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.104.107.2",
                "protectionInUse": false,
                "protectionAvailable": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.103.107.1",
                "protectionInUse": false,
                "protectionAvailable": false
            }
        ]
    },
    "controlType": "PCC",
    "controller": "External",
    "pathType": "primary",
    "lspIndex": 15
},
{
    "operationalStatus": "Active",
    "name": "11.0.0.106:11.0.0.104:300:vpls:vpn_200",
    "p2mpIndex": 184549480,
    "p2mpName": "11.0.0.104:300:vpls:vpn_200",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.104"
    },
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.106"
    },
    "liveProperties": {
        "bandwidth": 0,
        "metric": 0,
        "setupPriority": 7,
        "holdingPriority": 0,
        "operationalStatus": "Active",
```

```
                        "adminStatus": "Up",
                        "ero": [],
                        "rro": [
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.104.107.2",
                                "protectionInUse": false,
                                "protectionAvailable": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.105.107.1",
                                "protectionInUse": false,
                                "protectionAvailable": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.105.106.2",
                                "protectionInUse": false,
                                "protectionAvailable": false
                            }
                        ]
                    },
                    "controlType": "PCC",
                    "controller": "External",
                    "pathType": "primary",
                    "lspIndex": 16
                },
                {
                    "operationalStatus": "Active",
                    "plannedProperties": {
                        "bandwidth": "0",
                        "setupPriority": 7,
                        "holdingPriority": 0,
                        "calculatedEro": [
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.104.107.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.105.107.1",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.101.105.1",
                                "loose": false
                            }
                        ],
                        "routingStatus": "Up",
                        "adminStatus": "Up",
                        "lastStatusString": "[PCServer]<PCC ACK request_id=417990091",
                        "correlatedRROHopCount": 3
                    },
                    "name": "Silver-104-101",
                    "from": {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.104"
```

```
                },
                "pathType": "primary",
                "to": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.101"
                },
                "lspIndex": 17,
                "controlType": "Delegated",
                "provisioningType": "RSVP",
                "initiator": "PCC",
                "controller": "NorthStar",
                "collectedProperties": {
                    "bandwidth": "0",
                    "setupPriority": 7,
                    "holdingPriority": 0,
                    "calculatedEro": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.104",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.104.107.2",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.105.107.1",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.101.105.1",
                            "loose": false
                        },
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.101",
                            "loose": false
                        }
                    ],
                    "routingStatus": "Up",
                    "adminStatus": "Up",
                    "correlatedRROHopCount": 3
                },
                "tunnelId": 32533,
                "liveProperties": {
                    "bandwidth": 0,
                    "metric": 30,
                    "setupPriority": 7,
                    "holdingPriority": 0,
                    "operationalStatus": "Active",
                    "adminStatus": "Up",
                    "ero": [
                        {
                            "topoObjectType": "ipv4",
                            "address": "11.104.107.2",
                            "loose": false
                        },
```

```
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.1",
                        "loose": false
                    }
                ],
                "rro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    }
                ]
            }
        },
        {
            "operationalStatus": "Active",
            "plannedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "adminStatus": "Up",
                "lastStatusString": "[PCServer]<PCC ACK request_id=417990082",
                "correlatedRROHopCount": 3
```

```
            },
            "name": "Silver-104-102",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.104"
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.102"
            },
            "lspIndex": 18,
            "controlType": "Delegated",
            "provisioningType": "RSVP",
            "initiator": "PCC",
            "controller": "NorthStar",
            "collectedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.104",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.102",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "adminStatus": "Up",
                "correlatedRROHopCount": 3
            },
            "tunnelId": 29910,
            "liveProperties": {
                "bandwidth": 0,
                "metric": 30,
                "setupPriority": 7,
                "holdingPriority": 0,
                "operationalStatus": "Active",
                "adminStatus": "Up",
                "ero": [
```

```
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "loose": false
                    }
                ],
                "rro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.105.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    }
                ]
            }
        },
        {
            "operationalStatus": "Active",
            "plannedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.103.107.1",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "adminStatus": "Up",
                "lastStatusString": "[PCServer]<PCC ACK request_id=417990087",
                "correlatedRROHopCount": 2
```

```
        },
        "name": "Silver-104-103",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "lspIndex": 19,
        "controlType": "Delegated",
        "provisioningType": "RSVP",
        "initiator": "PCC",
        "controller": "NorthStar",
        "collectedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.104",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.103",
                    "loose": false
                }
            ],
            "routingStatus": "Up",
            "adminStatus": "Up",
            "correlatedRROHopCount": 2
        },
        "tunnelId": 32451,
        "liveProperties": {
            "bandwidth": 0,
            "metric": 20,
            "setupPriority": 7,
            "holdingPriority": 0,
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
```

```
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "loose": false
                }
            ],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.103.107.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ]
        }
    },
    {
        "operationalStatus": "Active",
        "plannedProperties": {
            "bandwidth": "0",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.104.107.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.105.107.1",
                    "loose": false
                }
            ],
            "routingStatus": "Down",
            "adminStatus": "Up",
            "design": {
                "routingMethod": "routeByDevice"
            },
            "lastStatusString": "[PCServer]<Down controller_state=Path found
on down lsp",
            "controllerStatus": {
                "status": "Path found on down lsp"
            },
            "correlatedRROHopCount": 2
        },
        "name": "rsvp-104-105",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
```

```
                "address": "11.0.0.105"
            },
            "lspIndex": 20,
            "controlType": "PCC",
            "provisioningType": "RSVP",
            "collectedProperties": {
                "bandwidth": "0",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.104",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.105",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "adminStatus": "Up",
                "correlatedRROHopCount": 2
            },
            "tunnelId": 32072,
            "liveProperties": {
                "bandwidth": 0,
                "metric": 20,
                "setupPriority": 7,
                "holdingPriority": 0,
                "operationalStatus": "Active",
                "adminStatus": "Up",
                "ero": [],
                "rro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.104.107.2",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.1",
                        "protectionInUse": false,
                        "protectionAvailable": false
                    }
                ]
            },
            "controller": "External"
```

```
        }
]
```

4.5.4. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-` `gy/{topology_id}/te-lsps/stream`	See EventSource for format. The notifications send on that stream are only lspEvent or lspTopologyEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.5.4.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.5.5. Get a Single TE-LSP

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Returns the details for a TE-LSP.

Normal response codes: 200

4.5.5.1. Request

This table shows the URI parameters for the get a single te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex.

This operation does not accept a request body.

4.5.5.2. Response

Example 4.39. Get a Single TE-LSP: JSON response

```
{
    "lspIndex": 2,
    "name": "LP_101_103",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "Delegated",
    "plannedProperties": {
"bandwidth": "10M",
"setupPriority": 7,
"holdingPriority": 0,
"calculatedEro": [
    {"topoObjectType": "ipv4","address": "62.101.105.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.102.105.1","loose": false},
    {"topoObjectType": "ipv4","address": "62.102.106.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.104.106.1","loose": false},
    {"topoObjectType": "ipv4","address": "62.104.107.2","loose": false},
    {"topoObjectType": "ipv4","address": "62.103.107.1","loose": false}
],
"pathName": "Path_Node101_Node103_Strict_1",
"adminStatus": "Up",
"routingStatus": "Up",
"lastStatusString": "<Active PCS initialization"
    },
    "liveProperties": {
        "adminStatus": "Up",
        "bandwidth": 10000000,
        "ero": [
            {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
```

```
             {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
             {"address": "62.103.107.1", "loose": false, "topoObjectType":
"ipv4" }
        ],
        "holdingPriority": 0,
        "metric": 40,
        "pathName": "Path_Node101_Node103_Strict_1",
        "rro": [
            {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
            {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
            {"address": "62.0.0.107",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
            {"address": "62.105.107.2", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
            {"address": "62.0.0.103",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
            {"address": "62.103.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
        ],
        "setupPriority": 7
    },
    "operationalStatus": "Active",
    "pathType": "primary",
    "tunnelId": 56614
}
```

4.5.6. Update a TE-LSP

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Updates a TE-LSP using the JSON schema: lsp.json#/defini-tions/updateLSP .

Normal response codes: 202

4.5.6.1. Request

This table shows the URI parameters for the update a te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex.

Example 4.40. Update a TE-LSP : JSON request

The update accepts the same parameters as the create, except for parameters that cannot be modified (from, to, name, pathName, pathType).

```
{
    "lspIndex": 31,
    "name": "Rest_LSP_1",
    "from": {"topoObjectType": "ipv4","address": "62.0.0.101" },
    "to": {"topoObjectType": "ipv4","address": "62.0.0.103"  },
    "pathType": "primary",
    "plannedProperties": {
 "bandwidth": "15M",
 "setupPriority": 7,
 "holdingPriority": 7
    }
}
```

4.5.6.2. Response

Example 4.41. Update a TE-LSP : JSON response

```
{
    "lspIndex": 20,
    "name": "Rest_LSP_1",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "PCEInitiated",
    "plannedProperties": {
 "adminStatus": "Up",
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7,
 "lastStatusString": "Provisioning Order from REST Interface",
```

```
    "routingStatus": "Unknown"
     },
     "operationalStatus": "Unknown",
     "pathType": "primary"
}
```

4.5.7. Patch a TE-LSP

Method	URI	Description
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}	Updates a TE-LSP using a RFC6902 patch: json-patch.json. The result of the patch must conform to lsp.json#/defini-tions/updateLsp. The REST server remove all operational parameters like operationalStatus, ..etc. . Using an empty patch (empty list) will result in the LSP to be re-provisioned without parameter changed.

Normal response codes: 202

4.5.7.1. Request

This table shows the URI parameters for the patch a te-lsp request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
{lspIndex}	Int	The unique lspIndex.

Example 4.42. Patch a TE-LSP: JSON request

The Patched update accepts the same parameters as the create, except for parameters that cannot be modified (from, to, name, pathName, pathType).

```
[{ "op": "replace", "path": "/plannedProperties/bandwidth", "value": "100M" }]
```

4.5.7.2. Response

Example 4.43. Patch a TE-LSP: JSON response

```
{
    "lspIndex": 20,
    "name": "Rest_LSP_1",
    "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
    "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
    "controlType": "PCEInitiated",
    "plannedProperties": {
 "adminStatus": "Up",
 "bandwidth": "100M",
 "setupPriority": 7,
 "holdingPriority": 7,
 "lastStatusString": "Provisioning Order from REST Interface",
 "routingStatus": "Unknown"
    },
    "operationalStatus": "Unknown",
    "pathType": "primary"
}
```

4.5.8. Delete a TE-LSP

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}`	Deletes a TE-LSP. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-delegated LSPs cannot be deleted from NorthStar. They must be deleted in the node.

Normal response codes: 204

4.5.8.1. Request

This table shows the URI parameters for the delete a te-lsp request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex.

This operation does not accept a request body.

4.5.9. Create a List of TE-LSPs

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Creates several TE-LSPs using the following JSON schema: lsp.json#/definitions/createLSPList .

Normal response codes: 201

4.5.9.1. Request

This table shows the URI parameters for the create a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.44. Create a List of TE-LSPs: JSON request

The request must contain a list of LSPs to be created. The LSP parameters are the same as creating an individual LSP. The following example shows the creation of two diverse LSPs at the same time.

```
[
    {
        "name": "REST_LSP_DIVERSE_1",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
        "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"}
        }
    },
    {
        "name": "REST_LSP_DIVERSE_2",
        "from": {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
        "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"}
        }
    }
]
```

4.5.9.2. Response

Example 4.45. Create a List of TE-LSPs: JSON response

```
[
```

```
    {
        "name": "REST_LSP_DIVERSE_1",
        "from": {"address": "62.0.0.102", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.104", "topoObjectType": "ipv4"},
        "lspIndex": 21,
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
            "adminStatus": "Up",
            "routingStatus": "Unknown",
            "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"},
            "lastStatusString": ">Provisioning Order from REST Interface"
        },
        "controlType": "PCEInitiated",
        "operationalStatus": "Unknown"
    },
    {
        "name": "REST_LSP_DIVERSE_2",
        "from": {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "lspIndex": 22,
        "plannedProperties": {
    "bandwidth": "100M",
    "setupPriority": 7,
    "holdingPriority": 7,
            "adminStatus": "Up",
            "routingStatus": "Unknown",
            "design" : {"diversityLevel":"srlg",
"diversityGroup":"DiverseGroup1"},
            "lastStatusString": ">Provisioning Order from REST Interface"
        },
        "controlType": "PCEInitiated",
        "operationalStatus": "Unknown"
    }
]
```

4.5.10. Update a List of TE-LSPs

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListUpdate .

Normal response codes: 202

4.5.10.1. Request

This table shows the URI parameters for the update a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The bulk update accepts a list of LSP updates. Each entry requires the same parameters and logic as updating a single LSP.

This operation does not accept a request body.

4.5.10.2. Response

The response contains a list of individual update responses (see TE-LSP update).

This operation does not return a response body.

4.5.11. Update a List of TE-LSPs using PATCH

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Updates several TE-LSPs using the following JSON schema: lsp.json#/definitions/lspListPatch .

Normal response codes: 202

4.5.11.1. Request

This table shows the URI parameters for the update a list of te-lsps using patch request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.46. Update a List of TE-LSPs using PATCH : JSON request

The bulk PATCH accepts a list consisting of lspIndex and patch:

```
[
 {"lspIndex" : 1,"patch":[{ "op": "replace", "path": "/plannedProperties/
bandwidth", "value": "1M" }]},
 {"lspIndex" : 2,"patch":[{ "op": "replace", "path": "/plannedProperties/
bandwidth", "value": "2M" }]}
]
```

4.5.11.2. Response

The response contains a list of individual update responses (see TE-LSP update).

This operation does not return a response body.

4.5.12. Delete a List of TE-LSPs

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/bulk`	Deletes a list of TE-LSPs. This function is supported only on the PCE-initiated LSPs. PCC-controlled and PCC-dele-gated LSPs cannot be deleted from NorthStar. They must be deleted in the node.b The payload must conform to lsp.json#/definitions/lspListDelete

Normal response codes: 204

4.5.12.1. Request

This table shows the URI parameters for the delete a list of te-lsps request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.5.13. Get the LSP Event History

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-lsps/{lspIn-dex}/history{?start,end}`	Returns the history for a TE-LSP.

The history contains a list of Unix-timestamped events for the LSP resource.

Normal response codes: 200

4.5.13.1. Request

This table shows the URI parameters for the get the lsp event history request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{lspIndex}`	Int	The unique lspIndex.

This table shows the query parameters for the get the lsp event history request:

Name	Type	Description
`start`	Int *(Optional)*	Start timestamp: Include events with the starting timetime and later.
`end`	Int *(Optional)*	End timestamp: Include events before (but not including) the ending timestamp.

4.5.13.2. Response

Example 4.47. Get the LSP Event History: JSON response

```
[
    {
  "plannedProperties": {
      "bandwidth": "0",
      "setupPriority": 7,
      "holdingPriority": 0,
      "adminStatus": "Up",
      "routingStatus": "Down"
},
  "controlType": "PCC",
  "eventStatusString": "<Down",
  "timestamp": 1427128941053,
  "operation": "State Change"
    },
    {
  "plannedProperties": {
      "bandwidth": "0",
      "setupPriority": 7,
      "holdingPriority": 0,
      "adminStatus": "Up",
      "routingStatus": "Down"
```

```
        },
"controlType": "PCC",
"eventStatusString": "<Down PCS initialization",
"timestamp": 1427128941057,
"operation": "State Change"
            },
            {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "VMX103_VMX101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "reprovision:provisioning new delegated lsp",
"timestamp": 1427132006714,
"operation": "State Change"
            },
            {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427132006720,
"operation": "State Change"
            },
            {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427132006780,
"operation": "State Change"
            },
            {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Node103_Node101",
        "adminStatus": "Up",
        "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Up",
"timestamp": 1427132007053,
```

```
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427132007069,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427132009764,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Node103_Node101",
    "adminStatus": "Up",
    "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427135406437,
"operation": "State Change"
    },
    {
"plannedProperties": {
    "bandwidth": "10M",
    "setupPriority": 7,
    "holdingPriority": 0,
    "pathName": "Path_Node101_Node103_Strict_1",
    "adminStatus": "Up",
    "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "reprovision:Provision using planned data",
"timestamp": 1427167092366,
"operation": "State Change"
    },
    {
"plannedProperties": {
```

```
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down, PCS initialization",
"timestamp": 1427167092372,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427167092475,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Down"
},
"controlType": "Delegated",
"eventStatusString": "Down",
"timestamp": 1427167092516,
"operation": "State Change"
        },
        {
"plannedProperties": {
        "bandwidth": "10M",
        "setupPriority": 7,
        "holdingPriority": 0,
        "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Up"
},
"controlType": "Delegated",
"eventStatusString": "Active",
"timestamp": 1427167092865,
"operation": "State Change"
        }
]
```

4.6. Demands

Use the following endpoints to access demands and the related information. Demands can be created based on netflow or LDP collection tasks.

The demand resources are described in demands.json .

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands`	Returns a full list of Demands.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands`	Create a demand using the following JSON schema: demands.json#/definitions/createDemand .
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/stream`	See EventSource for format. The notifications send on that stream are only demandEvent and demandTopol-ogyEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Return the details of a specified demand.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Modify a specific demand using the following JSON schema: demands.json#/definitions/updateDemand .
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Patch a specific demand using a RFC6902 patch: json-patch.json. The result of the patch must conform to demands.json#/definitions/updateDemand. The REST server remove all operational parameters like operationalStatus, ..etc. .
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Delete a specific demand.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Create a set of demands using the following JSON schema: demands.json#/definitions/createDemandList. The result-ing list of demands (after the patch is applied) must also conform to demands.json#/definitions/demandListUpdate . The return code indicates the request acceptance.
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Update a set of demands using the following JSON schema: demands.json#/definitions/demandListUpdate . The return code indicates the request acceptance.
PATCH	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Patch a set of demands using the following JSON schema: demands.json#/definitions/demandListPatch . The return code indicates the request acceptance.
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Delete a set of demands. The return code indicates the re-quest acceptance.

4.6.1. Gets all Demands

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands`	Returns a full list of Demands.

Normal response codes: 200

4.6.1.1. Request

This table shows the URI parameters for the gets all demands request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.6.1.2. Response

Example 4.48. Gets all Demands: JSON response

```
[
    {
        "operationalStatus":"Unknown",
        "plannedProperties":{
            "bandwidth":"1.684666M",
            "setupPriority":7,
            "holdingPriority":7,
            "calculatedEro":[
                {
                    "topoObjectType":"ipv4",
                    "address":"11.103.107.2",
                    "loose":false
                },
                {
                    "topoObjectType":"ipv4",
                    "address":"11.105.107.1",
                    "loose":false
                },
                {
                    "topoObjectType":"ipv4",
                    "address":"11.101.105.1",
                    "loose":false
                }
            ],
            "routingStatus":"Up",
            "pathName":"11.0.0.101",
            "adminStatus":"Up",
            "lastStatusString":"[PCServer]>demand update",
            "controllerStatus":{
                "status":""
            },
            "correlatedRROHopCount":3
        },
```

```
            "name":"vmx103_11.0.0.101/32_NONE_IP",
            "from":{
                "topoObjectType":"ipv4",
                "address":"11.0.0.103"
            },
            "pathType":"primary",
            "to":{
                "topoObjectType":"prefix",
                "address":"11.0.0.101",
                "length":32
            },
            "demandIndex":30,
            "liveProperties":{
                "bandwidth":"1.684666M"
            }
        },
        {
            "operationalStatus":"Unknown",
            "plannedProperties":{
                "bandwidth":"1.613733M",
                "setupPriority":7,
                "holdingPriority":7,
                "calculatedEro":[
                    {
                        "topoObjectType":"ipv4",
                        "address":"11.104.107.2",
                        "loose":false
                    },
                    {
                        "topoObjectType":"ipv4",
                        "address":"11.105.107.1",
                        "loose":false
                    },
                    {
                        "topoObjectType":"ipv4",
                        "address":"11.102.105.1",
                        "loose":false
                    }
                ],
                "routingStatus":"Up",
                "pathName":"11.0.0.102",
                "adminStatus":"Up",
                "lastStatusString":"[PCServer]>demand update",
                "controllerStatus":{
                    "status":""
                },
                "correlatedRROHopCount":3
            },
            "name":"vmx104_11.0.0.102/32_NONE_IP",
            "from":{
                "topoObjectType":"ipv4",
                "address":"11.0.0.104"
            },
            "pathType":"primary",
            "to":{
                "topoObjectType":"prefix",
                "address":"11.0.0.102",
                "length":32
            },
            "demandIndex":31,
```

```
        "liveProperties":{
            "bandwidth":"1.613733M"
        }
    }
]
```

4.6.2. Create a Demand

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topology/{topology_id}/demands`	Create a demand using the following JSON schema: demands.json#/definitions/createDemand .

Normal response codes: 200

4.6.2.1. Request

This table shows the URI parameters for the create a demand request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.49. Create a Demand: JSON request

```
{
    "plannedProperties":{
        "pathName":"11.0.0.11",
        "bandwidth":"0",
        "setupPriority":7,
        "holdingPriority":7,
        "design":{
            "routingMethod":"default",
            "adminGroups":{

            }
        }
    },
    "name":"testprefix",
    "pathType":"primary",
    "from":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.10"
    },
    "to":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.11"
    },
    "prefix":{
        "topoObjectType":"ipv4",
        "address":"10.4.10.0",
        "length":24
    }
}
```

4.6.2.2. Response

Example 4.50. Create a Demand: JSON response

```
{
```

```
    "plannedProperties": {
        "bandwidth": 0,
        "setupPriority": 7,
        "holdingPriority": 7,
        "pathName": "11.0.0.11",
        "adminStatus": "Up"
    },
    "name": "testprefix",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.10"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.11"
    },
    "demandIndex": 17,
    "prefix": {
        "topoObjectType": "prefix",
        "address": "10.4.10.0",
        "length": 24
    }
}
```

4.6.3. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-` `gy/{topology_id}/demands/stream`	See EventSource for format. The notifications send on that stream are only demandEvent and demandTopologyEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.6.3.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.6.4. Get a Specific Demand

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Return the details of a specified demand.

Normal response codes: 200

4.6.4.1. Request

This table shows the URI parameters for the get a specific demand request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{demandIndex}`	Int	The unique demandIndex.

This operation does not accept a request body.

4.6.4.2. Response

Example 4.51. Get a Specific Demand: JSON response

```
{
    "operationalStatus": "Unknown",
    "plannedProperties": {
        "bandwidth": 0,
        "setupPriority": 7,
        "holdingPriority": 7,
        "pathName": "11.0.0.11",
        "adminStatus": "Up",
        "calculatedEro": [
            {
                "topoObjectType": "ipv4",
                "address": "10.1.10.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "10.1.2.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "10.2.11.11",
                "loose": false
            }
        ],
        "routingStatus": "Up",
        "correlatedRROHopCount": 3,
        "lastStatusString": "[PCServer]<demand orders update"
    },
```

```
        "name": "testprefix",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 27,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.10.0",
            "length": 24
        }
}
```

4.6.5. Update a Specific Demand

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Modify a specific demand using the following JSON schema: demands.json#/definitions/updateDemand .

Normal response codes: 200

4.6.5.1. Request

This table shows the URI parameters for the update a specific demand request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{demandIndex}`	Int	The unique demandIndex.

Example 4.52. Update a Specific Demand: JSON request

```
{
    "plannedProperties": {
        "bandwidth": 4727,
        "setupPriority": 7,
        "holdingPriority": 7,
        "calculatedEro": [
            {
                "topoObjectType": "ipv4",
                "address": "10.1.10.1",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "10.1.2.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "10.2.11.11",
                "loose": false
            }
        ],
        "bindingLSP":"sr-color-test",
        "routingStatus": "Up",
        "pathName": "11.0.0.11",
        "adminStatus": "Up",
        "lastStatusString": "[PCServer]>new demand",
        "correlatedRROHopCount": 3
    },
    "name": "PE1_10.4.0.0/24_IP",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.10"
    },
```

```
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 47,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.0.0",
            "length": 24
        }
}
```

4.6.5.2. Response

Example 4.53. Update a Specific Demand: JSON response

```
{
    "plannedProperties": {
        "bandwidth": 4727,
        "setupPriority": 7,
        "holdingPriority": 7,
        "pathName": "11.0.0.11",
        "adminStatus": "Up",
        "bindingLSP": "sr-color-test"
    },
    "name": "PE1_10.4.0.0/24_IP",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.10"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.11"
    },
    "demandIndex": 47,
    "prefix": {
        "topoObjectType": "prefix",
        "address": "10.4.0.0",
        "length": 24
    }
}
```

4.6.6. Update a Specific Demand using PATCH

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Patch a specific demand using a RFC6902 patch: json-patch.json. The result of the patch must conform to demands.json#/definitions/updateDemand. The REST server remove all operational parameters like operationalStatus, ..etc. .

Normal response codes: 200

4.6.6.1. Request

This table shows the URI parameters for the update a specific demand using patch request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{demandIndex}`	Int	The unique demandIndex.

Example 4.54. Update a Specific Demand using PATCH: JSON request

```
[{ "op": "add", "path": "/plannedProperties/bindingLSP", "value": "sr-color-
test" }]
```

4.6.6.2. Response

Example 4.55. Update a Specific Demand using PATCH: JSON response

```
{
    "plannedProperties": {
        "bandwidth": 140019,
        "setupPriority": 7,
        "holdingPriority": 7,
        "pathName": "11.0.0.11",
        "adminStatus": "Up",
        "bindingLSP": "sr-color-test"
    },
    "name": "PE1_10.4.0.0/24_IP",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.10"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.11"
    },
    "demandIndex": 50,
    "prefix": {
        "topoObjectType": "prefix",
        "address": "10.4.0.0",
        "length": 24
```

```
        }
}
```

4.6.7. Delete a Specific Demand

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/demands/{de-mandIndex}`	Delete a specific demand.

Normal response codes: 204

4.6.7.1. Request

This table shows the URI parameters for the delete a specific demand request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{demandIndex}`	Int	The unique demandIndex.

This operation does not accept a request body.

4.6.8. Create a set of Demands

Method	URI	Description
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Create a set of demands using the following JSON schema: demands.json#/definitions/createDemandList. The resulting list of demands (after the patch is applied) must also conform to demands.json#/definitions/demandListUpdate. The return code indicates the request acceptance.

Normal response codes: 200

4.6.8.1. Request

This table shows the URI parameters for the create a set of demands request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.56. Create a set of Demands: JSON request

```
[
 {
    "plannedProperties":{
        "pathName":"11.0.0.11",
        "bandwidth":"0",
        "setupPriority":7,
        "holdingPriority":7,
        "design":{
            "routingMethod":"default",
            "adminGroups":{

            }
        }
    },
    "name":"testprefix",
    "pathType":"primary",
    "from":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.10"
    },
    "to":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.11"
    },
    "prefix":{
        "topoObjectType":"ipv4",
        "address":"10.4.10.0",
        "length":24
    }
 },
 {
    "plannedProperties":{
        "pathName":"11.0.0.11",
```

```
        "bandwidth":"0",
        "setupPriority":7,
        "holdingPriority":7,
        "design":{
            "routingMethod":"default",
            "adminGroups":{

            }
        }
    },
    "name":"testprefix2",
    "pathType":"primary",
    "from":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.10"
    },
    "to":{
        "topoObjectType":"ipv4",
        "address":"11.0.0.11"
    },
    "prefix":{
        "topoObjectType":"ipv4",
        "address":"10.4.11.0",
        "length":24
    }
 }
]
```

4.6.8.2. Response

Example 4.57. Create a set of Demands: JSON response

```
[
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 51,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.10.0",
            "length": 24
        }
    },
    {
        "plannedProperties": {
```

```
                "bandwidth": 0,
                "setupPriority": 7,
                "holdingPriority": 7,
                "pathName": "11.0.0.11",
                "adminStatus": "Up"
            },
            "name": "testprefix2",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.10"
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.11"
            },
            "demandIndex": 52,
            "prefix": {
                "topoObjectType": "prefix",
                "address": "10.4.11.0",
                "length": 24
            }
        }
    }
]
```

4.6.9. Update a set of Demands

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Update a set of demands using the following JSON schema: demands.json#/definitions/demandListUpdate . The return code indicates the request acceptance.

Normal response codes: 200

4.6.9.1. Request

This table shows the URI parameters for the update a set of demands request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.58. Update a set of Demands: JSON request

```
[
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 51,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.20.0",
            "length": 24
        }
    },
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix2",
```

```
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 52,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.21.0",
            "length": 24
        }
    }
]
```

4.6.9.2. Response

Example 4.59. Update a set of Demands: JSON response

```
[
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 51,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.20.0",
            "length": 24
        }
    },
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix2",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
```

```
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.11"
            },
            "demandIndex": 52,
            "prefix": {
                "topoObjectType": "prefix",
                "address": "10.4.21.0",
                "length": 24
            }
        }
    ]
```

4.6.10. Patch a set of Demands

Method	URI	Description
PATCH	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk	Patch a set of demands using the following JSON schema: demands.json#/definitions/demandListPatch . The return code indicates the request acceptance.

Normal response codes: 200

4.6.10.1. Request

This table shows the URI parameters for the patch a set of demands request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.60. Patch a set of Demands: JSON request

```
[
 {"demandIndex" : 51,"patch":[{ "op": "replace", "path": "/prefix/address",
 "value": "10.4.30.0" }]},
 {"demandIndex" : 52,"patch":[{ "op": "replace", "path": "/prefix/address",
 "value": "10.4.31.0" }]}
]
```

4.6.10.2. Response

Example 4.61. Patch a set of Demands: JSON response

```
[
    {
        "plannedProperties": {
            "bandwidth": 0,
            "setupPriority": 7,
            "holdingPriority": 7,
            "pathName": "11.0.0.11",
            "adminStatus": "Up"
        },
        "name": "testprefix",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.10"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.11"
        },
        "demandIndex": 51,
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.30.0",
```

```
                "length": 24
            }
    },
    {
            "plannedProperties": {
                "bandwidth": 0,
                "setupPriority": 7,
                "holdingPriority": 7,
                "pathName": "11.0.0.11",
                "adminStatus": "Up"
            },
            "name": "testprefix2",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.10"
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.11"
            },
            "demandIndex": 52,
            "prefix": {
                "topoObjectType": "prefix",
                "address": "10.4.31.0",
                "length": 24
            }
    }
]
```

4.6.11. Delete a set of Demands

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/demands/bulk`	Delete a set of demands. The return code indicates the request acceptance.

Normal response codes: 204

4.6.11.1. Request

This table shows the URI parameters for the delete a set of demands request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.62. Delete a set of Demands: JSON request

```
[
  {"demandIndex":32},
  {"demandIndex":31}
]
```

4.7. Task scheduler

Use these endpoints to work with task scheduler.

The scheduler resources are described in scheduler.json.

The scheduler also provides a socket.io interface on which taskStatusUpdate event updates like task add/remove/update/status-change are sent. The socket.io namespace used is /taskScheduler and event name taskStatusUpdate.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/sched-uler/tasklist`	Returns a full list of Tasks as per JSON schema: scheduler.json#/definitions/taskList
GET	`/v2/tenant/{tenant_id}/sched-uler/tasks`	Returns a list of Tasks by filter task-type(?tasktype={tasktypeFilter}) as per JSON schema: scheduler.json#/definitions/taskList
POST	`/v2/tenant/{tenant_id}/sched-uler/updatetask`	Update a task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response as per JSON schema: scheduler.json#/definitions/responseObject.
POST	`/v2/tenant/{tenant_id}/sched-uler/removeaddtask`	Removes all the existing tasks with given taskType and adds a new Task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response as per JSON schema: scheduler.json#/definitions/responseObject.
POST	`/v2/tenant/{tenant_id}/sched-uler/deletetask`	Delete one or more tasks using the following JSON schema: scheduler.json#/definitions/deleteTask. Returns response as per JSON schema: scheduler.json#/definitions/responseObject.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/sched-` `uler/taskshistory/{taskId}`	Returns task execution status history in HTML table format as per JSON schema: scheduler.json#/definitions/tasksHistoryList
GET	`/v2/tenant/{tenant_id}/sched-` `uler/taskstatus/{taskId}`	Returns task execution status history as per JSON schema: scheduler.json#/definitions/tasksStatusList

4.7.1. Gets all Tasks

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/sched-uler/tasklist`	Returns a full list of Tasks as per JSON schema: scheduler.json#/definitions/taskList

Normal response codes: 200

4.7.1.1. Request

This table shows the URI parameters for the gets all tasks request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.7.1.2. Response

Example 4.63. Gets all Tasks: JSON response

```
[
    {
    "taskID": "7660df1e-b8fb-4f71-987e-a3d261c4d78f",
    "taskType": "Device Collection",
    "taskName": "dc",
    "createTime": "2019-04-26T09:45:54.745",
    "interval": 1,
    "scheduleType": 0,
    "startTime": "2019-04-26T09:45:54.745",
    "stopTime": null,
    "lastExecutionTime": "2019-04-26T09:45:57.755",
    "lastExecutionEndTime": "2019-04-26T09:46:30.762",
    "lastExecutionStatus": "Completed",
    "chainAfter": null,
    "taskparam": {
        "groupName": "liveNetwork",
        "idList": [],
        "jobId": 1556271955188,
        "opts": {
            "useMgmt": true,
            "concurrentJob": 16,
            "runParsing": true,
            "archiveRawData": true
        },
        "waitingList": [],
        "deviceGroups": [],
        "collection_commands": "config|interface|tunnel_path|transit_tunnel",
        "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
    },
    "lastExecutionLog": [
        "IP Address,Hostname,Status,Job Type,Severity",
        "11.0.0.101,vmx101-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
```

```
            "11.0.0.104,vmx104-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "11.0.0.103,vmx103-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "11.0.0.102,vmx102-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            ",All Devices,COMPLETE,Collection (Dir: /opt/northstar/data/
collection/7660df1e-b8fb-4f71-987e-a3d261c4d78f/1556271957755),INFO",
            ",All Devices,COMPLETE,Processing,INFO"
        ],
        "chainTaskGroup": null,
        "taskSize": 1
    },
    {
        "taskID": "fad3d27f-0e20-45b7-bbf1-c027509d75e0",
        "taskType": "Network Archive",
        "taskName": "NA4",
        "createTime": "2019-06-13T06:03:09.795",
        "interval": 0,
        "scheduleType": 0,
        "startTime": "2019-06-13T06:03:09.795",
        "stopTime": null,
        "lastExecutionTime": "2019-06-13T06:03:12.827",
        "lastExecutionEndTime": "2019-06-13T06:05:56.574",
        "lastExecutionStatus": "Completed",
        "chainAfter": null,
        "taskparam": {
            "opts": [
                "-l"
            ]
        },
        "lastExecutionLog": [
            "Details,Severity",
            "Parsed config files,INFO",
            "Parsed tunnel path and added to the spec file,INFO",
            "Added interface and tunnel traffic to the spec file,INFO",
            "Saved PCS tunnel to optunnel.x and added to the spec file,INFO"
        ],
        "chainTaskGroup": null,
        "taskSize": 1
    }
]
```

4.7.2. Get tasks based on filter tasktype

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/sched-uler/tasks`	Returns a list of Tasks by filter task-type(?tasktype={tasktypeFilter}) as per JSON schema: scheduler.json#/definitions/taskList

Normal response codes: 200

4.7.2.1. Request

This table shows the URI parameters for the get tasks based on filter tasktype request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.7.2.2. Response

Example 4.64. Get tasks based on filter tasktype: JSON response

```
[
    {
        "taskID": "7660df1e-b8fb-4f71-987e-a3d261c4d78f",
        "taskType": "Device Collection",
        "taskName": "dc",
        "createTime": "2019-04-26T09:45:54.745",
        "interval": 1,
        "scheduleType": 0,
        "startTime": "2019-04-26T09:45:54.745",
        "stopTime": null,
        "lastExecutionTime": "2019-04-26T09:45:57.755",
        "lastExecutionEndTime": "2019-04-26T09:46:30.762",
        "lastExecutionStatus": "Completed",
        "chainAfter": null,
        "taskparam": {
            "groupName": "liveNetwork",
            "idList": [],
            "jobId": 1556271955188,
            "opts": {
                "useMgmt": true,
                "concurrentJob": 16,
                "runParsing": true,
                "archiveRawData": true
            },
            "waitingList": [],
            "deviceGroups": [],
            "collection_commands": "config|interface|tunnel_path|
transit_tunnel",
            "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
        },
        "lastExecutionLog": [
            "IP Address,Hostname,Status,Job Type,Severity",
```

```
            "11.0.0.101,vmx101-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "11.0.0.104,vmx104-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "11.0.0.103,vmx103-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "11.0.0.102,vmx102-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            ",All Devices,COMPLETE,Collection (Dir: /opt/northstar/data/
collection/7660df1e-b8fb-4f71-987e-a3d261c4d78f/1556271957755),INFO",
            ",All Devices,COMPLETE,Processing,INFO"
        ],
        "chainTaskGroup": null,
        "taskSize": 1
    },
    {
        "taskID": "c51aea24-1c13-426a-89c9-fbb99ecc87de",
        "taskType": "Device Collection",
        "taskName": "future",
        "createTime": "2019-06-11T12:18:52.112",
        "interval": 0,
        "scheduleType": 1,
        "startTime": "2019-06-28T12:18:00.00",
        "stopTime": null,
        "lastExecutionTime": null,
        "lastExecutionEndTime": null,
        "lastExecutionStatus": "Scheduled",
        "chainAfter": null,
        "taskparam": {
            "groupName": "liveNetwork",
            "idList": [],
            "jobId": 1560255525511,
            "opts": {
                "useMgmt": true,
                "concurrentJob": 16,
                "runParsing": true,
                "archiveRawData": true
            },
            "waitingList": [],
            "deviceGroups": [],
            "collection_commands": "config|interface|tunnel_path|
transit_tunnel",
            "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
        },
        "lastExecutionLog": [],
        "chainTaskGroup": null,
        "taskSize": 1
    },
    {
        "taskID": "70c71c06-73b4-4ea6-b4c8-48b831bb1781",
        "taskType": "Device Collection",
        "taskName": "dc1",
        "createTime": "2019-06-10T08:44:04.929",
        "interval": 0,
        "scheduleType": 0,
        "startTime": "2019-06-10T08:44:04.929",
        "stopTime": null,
        "lastExecutionTime": "2019-06-10T08:44:07.953",
        "lastExecutionEndTime": "2019-06-10T08:44:46.30",
```

```
            "lastExecutionStatus": "Completed",
            "chainAfter": null,
            "taskparam": {
                "groupName": "liveNetwork",
                "idList": [],
                "jobId": 1560156243979,
                "opts": {
                    "useMgmt": true,
                    "concurrentJob": 16,
                    "runParsing": true,
                    "archiveRawData": true
                },
                "waitingList": [],
                "deviceGroups": [],
                "collection_commands": "config|interface|tunnel_path|
transit_tunnel",
                "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
            },
            "lastExecutionLog": [
                "Count,IP Address,Hostname,Status,Job Type,Severity",
                "1,11.0.0.101,vmx101-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
                "2,11.0.0.104,vmx104-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
                "3,11.0.0.103,vmx103-shiva,ACCESS_FAIL,config|interface|
tunnel_path|transit_tunnel,CRITIC",
                "4,11.0.0.102,vmx102-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
                "-,-,All Devices,COMPLETE,Collection (Dir: /opt/northstar/data/
collection/70c71c06-73b4-4ea6-b4c8-48b831bb1781/1560156247953),INFO",
                "-,-,All Devices,COMPLETE,Processing,INFO",
                "Task result:,Devices attempted- 4 | success- 3 | access_fail- 1,,
,"
            ],
            "chainTaskGroup": null,
            "taskSize": 4
        },
        {
            "taskID": "00e61ebd-adb2-4d97-a18f-b072f6f43504",
            "taskType": "Device Collection",
            "taskName": "First collection",
            "createTime": "2019-06-14T05:24:45.745",
            "interval": 1,
            "scheduleType": 4,
            "startTime": "2019-06-14T05:23:00.00",
            "stopTime": null,
            "lastExecutionTime": "2019-06-14T05:24:45.759",
            "lastExecutionEndTime": "2019-06-14T05:25:32.754",
            "lastExecutionStatus": "Scheduled",
            "chainAfter": null,
            "taskparam": {
                "groupName": "liveNetwork",
                "idList": [],
                "jobId": 1560489792572,
                "opts": {
                    "useMgmt": true,
                    "concurrentJob": 16,
                    "runParsing": true,
                    "archiveRawData": true
```

```
            },
            "waitingList": [],
            "deviceGroups": [],
            "collection_commands": "config|interface|tunnel_path|
transit_tunnel|switch_cli|equipment_cli",
            "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
        },
        "lastExecutionLog": [
            "Count,IP Address,Hostname,Status,Job Type,Severity",
            "1,11.0.0.101,vmx101-shiva,OK,config|interface|tunnel_path|
transit_tunnel|switch_cli|equipment_cli,INFO",
            "2,11.0.0.104,vmx104-shiva,OK,config|interface|tunnel_path|
transit_tunnel|switch_cli|equipment_cli,INFO",
            "3,11.0.0.103,vmx103-shiva,ACCESS_FAIL,config|interface|
tunnel_path|transit_tunnel|switch_cli|equipment_cli,CRITIC",
            "4,11.0.0.102,vmx102-shiva,OK,config|interface|tunnel_path|
transit_tunnel|switch_cli|equipment_cli,INFO",
            "-,-,All Devices,COMPLETE,Collection (Dir: /opt/northstar/data/
collection/00e61ebd-adb2-4d97-a18f-b072f6f43504/1560489885759),INFO",
            "-,-,All Devices,COMPLETE,Processing,INFO",
            "Task result:,Devices attempted- 4 | success- 3 | access_fail- 1,,
,"
        ],
        "chainTaskGroup": null,
        "taskSize": 4
    },
    {
        "taskID": "862b6dfb-4494-4230-ab4b-f40849eefc10",
        "taskType": "Device Collection",
        "taskName": "dc-1day",
        "createTime": "2019-02-05T09:09:38.237",
        "interval": 1,
        "scheduleType": 4,
        "startTime": "2019-02-05T09:09:38.237",
        "stopTime": null,
        "lastExecutionTime": "2019-06-13T09:09:38.278",
        "lastExecutionEndTime": "2019-06-13T09:10:13.691",
        "lastExecutionStatus": "Scheduled",
        "chainAfter": null,
        "taskparam": {
            "groupName": "liveNetwork",
            "idList": [],
            "jobId": 1549357765460,
            "opts": {
                "useMgmt": true,
                "concurrentJob": 16,
                "runParsing": true,
                "archiveRawData": true
            },
            "waitingList": [],
            "deviceGroups": [],
            "collection_commands": "config|interface|tunnel_path|
transit_tunnel",
            "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
        },
        "lastExecutionLog": [
            "Count,IP Address,Hostname,Status,Job Type,Severity",
```

```
            "1,11.0.0.101,vmx101-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "2,11.0.0.104,vmx104-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "3,11.0.0.103,vmx103-shiva,ACCESS_FAIL,config|interface|
tunnel_path|transit_tunnel,CRITIC",
            "4,11.0.0.102,vmx102-shiva,OK,config|interface|tunnel_path|
transit_tunnel,INFO",
            "-,-,All Devices,COMPLETE,Collection (Dir: /opt/northstar/data/
collection/862b6dfb-4494-4230-ab4b-f40849eefc10/1560416978278),INFO",
            "-,-,All Devices,COMPLETE,Processing,INFO",
            "Task result:,Devices attempted- 4 | success- 3 | access_fail- 1,,
,"
        ],
        "chainTaskGroup": "Device Collection_dc-1day",
        "taskSize": 4
    }
]
```

4.7.3. Update a task

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/sched-uler/updatetask`	Update a task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response as per JSON schema: scheduler.json#/definitions/respon-seObject.

Normal response codes: 200

4.7.3.1. Request

This table shows the URI parameters for the update a task request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.65. Update a task: JSON request

```
{
  "taskID": "00e61ebd-adb2-4d97-a18f-b072f6f43504",
  "taskType": "Device Collection",
  "taskName": "First collection",
  "interval": 1,
  "scheduleType": 4,
  "chainAfter": null,
  "chainTaskGroup": "",
  "taskparam": {
    "groupName": "liveNetwork",
    "idList": [],
    "opts": {
      "useMgmt": true,
      "concurrentJob": 16,
      "runParsing": true,
      "archiveRawData": true
    },
    "waitingList": [],
    "deviceGroups": [],
    "collection_commands": "config|interface|tunnel_path|transit_tunnel|
switch_cli|equipment_cli",
    "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
  },
  "startTime": "2019-06-14T05:23:00.000Z"
}
```

4.7.3.2. Response

Example 4.66. Update a task: JSON response

```
{
  "taskID":"00e61ebd-adb2-4d97-a18f-b072f6f43504",
  "success":true
}
```

4.7.4. Remove and add a new Task

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/sched-uler/removeaddtask`	Removes all the existing tasks with given taskType and adds a new Task using the following JSON schema: scheduler.json#/definitions/updateTask. Returns response as per JSON schema: scheduler.json#/definitions/respon-seObject.

Normal response codes: 200

4.7.4.1. Request

This table shows the URI parameters for the remove and add a new task request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.67. Remove and add a new Task: JSON request

```
{
  "taskID": "00e61ebd-adb2-4d97-a18f-b072f6f43504",
  "taskType": "Device Collection",
  "taskName": "First collection",
  "interval": 1,
  "scheduleType": 4,
  "chainAfter": null,
  "chainTaskGroup": "",
  "taskparam": {
    "groupName": "liveNetwork",
    "idList": [],
    "opts": {
      "useMgmt": true,
      "concurrentJob": 16,
      "runParsing": true,
      "archiveRawData": true
    },
    "waitingList": [],
    "deviceGroups": [],
    "collection_commands": "config|interface|tunnel_path|transit_tunnel|
switch_cli|equipment_cli",
    "process_commands": "config,interface,tunnel_path,transit_tunnel,
switch_cli,equipment_cli"
  },
  "startTime": "2019-06-14T05:23:00.000Z"
}
```

4.7.4.2. Response

Example 4.68. Remove and add a new Task: JSON response

```
{
  "taskID":"00e61ebd-adb2-4d97-a18f-b072f6f43504",
  "success":true
}
```

4.7.5. Delete tasks

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/sched-uler/deletetask`	Delete one or more tasks using the following JSON schema: scheduler.json#/definitions/deleteTask. Returns response as per JSON schema: scheduler.json#/defini-tions/responseObject.

Normal response codes: 200

4.7.5.1. Request

This table shows the URI parameters for the delete tasks request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.69. Delete tasks: JSON request

```
["00e61ebd-adb2-4d97-a18f-b072f6f43504"]
```

4.7.5.2. Response

Example 4.70. Delete tasks: JSON response

```
{
    "success": true
}
```

4.7.6. Gets task execution status history in HTML table format for a given taskId

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/sched-` `uler/taskshistory/{taskId}`	Returns task execution status history in HTML table format as per JSON schema: scheduler.json#/definitions/tasksHis-toryList

Normal response codes: 200

4.7.6.1. Request

This table shows the URI parameters for the gets task execution status history in html table format for a given taskid request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.7.6.2. Response

Example 4.71. Gets task execution status history in HTML table format for a given taskId: JSON response

```
[
{
 "header": "1) 2019-06-14T07:03:18.040Z to 2019-06-14T07:03:42.616Z",
 "details":"
  <html>
    <body>
        <table cellspacing=0 cellpadding=0 width=\"100%\" border=1>\n
            <tr bgcolor=#cccccc>
                <td nowrap>
                    <b>IP Address</b>
                </td>
                <td nowrap>
                    <b>Hostname</b>
                </td>
                <td nowrap>
                    <b>Description</b>
                </td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p107</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva</td>
                <td nowrap>Collected 9 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
```

```
                <td nowrap>vmx101-shiva-p105</td>
                <td nowrap>Collected 2 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p106</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.70</td>
                <td nowrap>vmx104-shiva</td>
                <td nowrap>Collected 27 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.72</td>
                <td nowrap>vmx102-shiva</td>
                <td nowrap>Collected 55 LSPs</td>
            </tr>\n
            <tr bgcolor=#ff3333>
                <td nowrap>172.25.158.71</td>
                <td nowrap>vmx103-shiva</td>
                <td nowrap>No SNMP response received before timeout</td>
            </tr>\n
        </table>
    </body>
</html>"},

{
 "header": "2) 2019-06-14T06:58:18.040Z to 2019-06-14T06:58:42.722Z",
 "details":"
  <html>
    <body>
        <table cellspacing=0 cellpadding=0 width=\"100%\" border=1>\n
            <tr bgcolor=#cccccc>
                <td nowrap>
                    <b>IP Address</b>
                </td>
                <td nowrap>
                    <b>Hostname</b>
                </td>
                <td nowrap>
                    <b>Description</b>
                </td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p107</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva</td>
                <td nowrap>Collected 9 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p105</td>
                <td nowrap>Collected 2 LSPs</td>
            </tr>\n
            <tr>
```

```
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p106</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.70</td>
                <td nowrap>vmx104-shiva</td>
                <td nowrap>Collected 27 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.72</td>
                <td nowrap>vmx102-shiva</td>
                <td nowrap>Collected 55 LSPs</td>
            </tr>\n
            <tr bgcolor=#ff3333>
                <td nowrap>172.25.158.71</td>
                <td nowrap>vmx103-shiva</td>
                <td nowrap>No SNMP response received before timeout</td>
            </tr>\n
        </table>
    </body>
</html>"},

{
 "header":"3) 2019-06-14T06:53:18.037Z to 2019-06-14T06:53:45.973Z",
 "details":"
 <html>
    <body>
        <table cellspacing=0 cellpadding=0 width=\"100%\" border=1>\n
            <tr bgcolor=#cccccc>
                <td nowrap>
                    <b>IP Address</b>
                </td>
                <td nowrap>
                    <b>Hostname</b>
                </td>
                <td nowrap>
                    <b>Description</b>
                </td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p107</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva</td>
                <td nowrap>Collected 9 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p106</td>
                <td nowrap>Collected 1 LSPs</td>
            </tr>\n
            <tr>
                <td nowrap>172.25.158.69</td>
                <td nowrap>vmx101-shiva-p105</td>
                <td nowrap>Collected 2 LSPs</td>
            </tr>\n
```

```
                    <tr>
                        <td nowrap>172.25.158.70</td>
                        <td nowrap>vmx104-shiva</td>
                        <td nowrap>Collected 27 LSPs</td>
                    </tr>\n
                    <tr>
                        <td nowrap>172.25.158.72</td>
                        <td nowrap>vmx102-shiva</td>
                        <td nowrap>Collected 55 LSPs</td>
                    </tr>\n
                    <tr bgcolor=#ff3333>
                        <td nowrap>172.25.158.71</td>
                        <td nowrap>vmx103-shiva</td>
                        <td nowrap>No SNMP response received before timeout</td>
                    </tr>\n
            </table>
        </body>
</html>"
}
]
```

4.7.7. Gets task execution status history for a given taskId

Method	URI	Description
GET	/v2/tenant/{tenant_id}/sched-uler/taskstatus/{taskId}	Returns task execution status history as per JSON schema: scheduler.json#/definitions/tasksStatusList

Normal response codes: 200

4.7.7.1. Request

This table shows the URI parameters for the gets task execution status history for a given taskid request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.7.7.2. Response

Example 4.72. Gets task execution status history for a given taskId: JSON response

```
[
    {
        "taskid": "1767fcb4-59a0-48f8-8cb7-ad2612ceb606",
        "executionbegintime": "2019-06-14 07:18:18.044Z",
        "executionendtime": "2019-06-14 07:18:41.763Z",
        "executionlog": [
            "IP Address,Hostname,Description,Severity",
            "172.25.158.69,vmx101-shiva-p107,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva,Collected 9 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p105,Collected 2 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p106,Collected 1 LSPs,INFO",
            "172.25.158.70,vmx104-shiva,Collected 27 LSPs,INFO",
            "172.25.158.72,vmx102-shiva,Collected 55 LSPs,INFO",
            "172.25.158.71,vmx103-shiva,No SNMP response received before
timeout,ERROR"
        ]
    },
    {
        "taskid": "1767fcb4-59a0-48f8-8cb7-ad2612ceb606",
        "executionbegintime": "2019-06-14 07:13:18.042Z",
        "executionendtime": "2019-06-14 07:13:42.494Z",
        "executionlog": [
            "IP Address,Hostname,Description,Severity",
            "172.25.158.69,vmx101-shiva-p107,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva,Collected 9 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p106,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p105,Collected 2 LSPs,INFO",
            "172.25.158.70,vmx104-shiva,Collected 27 LSPs,INFO",
            "172.25.158.72,vmx102-shiva,Collected 55 LSPs,INFO",
```

```
            "172.25.158.71,vmx103-shiva,No SNMP response received before
timeout,ERROR"
        ]
    },
    {
        "taskid": "1767fcb4-59a0-48f8-8cb7-ad2612ceb606",
        "executionbegintime": "2019-06-14 07:08:18.040Z",
        "executionendtime": "2019-06-14 07:08:44.478Z",
        "executionlog": [
            "IP Address,Hostname,Description,Severity",
            "172.25.158.69,vmx101-shiva-p107,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva,Collected 9 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p106,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p105,Collected 2 LSPs,INFO",
            "172.25.158.70,vmx104-shiva,Collected 27 LSPs,INFO",
            "172.25.158.72,vmx102-shiva,Collected 55 LSPs,INFO",
            "172.25.158.71,vmx103-shiva,No SNMP response received before
timeout,ERROR"
        ]
    },
    {
        "taskid": "1767fcb4-59a0-48f8-8cb7-ad2612ceb606",
        "executionbegintime": "2019-06-14 07:03:18.040Z",
        "executionendtime": "2019-06-14 07:03:42.616Z",
        "executionlog": [
            "IP Address,Hostname,Description,Severity",
            "172.25.158.69,vmx101-shiva-p107,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva,Collected 9 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p105,Collected 2 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p106,Collected 1 LSPs,INFO",
            "172.25.158.70,vmx104-shiva,Collected 27 LSPs,INFO",
            "172.25.158.72,vmx102-shiva,Collected 55 LSPs,INFO",
            "172.25.158.71,vmx103-shiva,No SNMP response received before
timeout,ERROR"
        ]
    },
    {
        "taskid": "1767fcb4-59a0-48f8-8cb7-ad2612ceb606",
        "executionbegintime": "2019-06-14 06:58:18.040Z",
        "executionendtime": "2019-06-14 06:58:42.722Z",
        "executionlog": [
            "IP Address,Hostname,Description,Severity",
            "172.25.158.69,vmx101-shiva-p107,Collected 1 LSPs,INFO",
            "172.25.158.69,vmx101-shiva,Collected 9 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p105,Collected 2 LSPs,INFO",
            "172.25.158.69,vmx101-shiva-p106,Collected 1 LSPs,INFO",
            "172.25.158.70,vmx104-shiva,Collected 27 LSPs,INFO",
            "172.25.158.72,vmx102-shiva,Collected 55 LSPs,INFO",
            "172.25.158.71,vmx103-shiva,No SNMP response received before
timeout,ERROR"
        ]
    }
]
```

4.8. Device Profiles

Use these endpoints to work with device profiles.

The device profile schema is: deviceProfile.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/netconf/profiles/ [GET : get all device profile, POST : create new device profiles, PUT: update device profiles, DELETE : delete device profiles]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/netconf/netconfCollection/liveNetwork [POST: create a collection job with requested device profile ids]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/netconf/netconfCollection/<id> [GET: get a collection job status with requested job id]

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/net-conf/profiles`	Gets all profiles.
POST	`/v2/tenant/{tenant_id}/net-conf/profiles`	Creates new profiles.
PUT	`/v2/tenant/{tenant_id}/net-conf/profiles`	Updates profiles.
DELETE	`/v2/tenant/{tenant_id}/net-conf/profiles`	Deletes profiles.
POST	`/v2/tenant/{tenant_id}/net-conf/netconfCollection/liveNetwork`	Creates a new collection.
GET	`/v2/tenant/{tenant_id}/net-conf/netconfCollection/{id}`	Gets the Status of a collection job.

4.8.1. Get all Profiles

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/net-conf/profiles`	Gets all profiles.

Normal response codes: 200

4.8.1.1. Request

This table shows the URI parameters for the get all profiles request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.8.1.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/profileList .

This operation does not return a response body.

4.8.2. Create New Profiles

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/net-conf/profiles`	Creates new profiles.

Normal response codes: 201

4.8.2.1. Request

This table shows the URI parameters for the create new profiles request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The request must use the following JSON schema: deviceProfile.json#/definitions/createProfileList .

This operation does not accept a request body.

4.8.2.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/profileList

This operation does not return a response body.

4.8.3. Update Profiles

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/net-conf/profiles`	Updates profiles.

Normal response codes: 202

4.8.3.1. Request

This table shows the URI parameters for the update profiles request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The request must use the following JSON schema: deviceProfile.json#/definitions/updateProfileList and must contain an id in each profile: deviceProfile.json#/definitions/profile

This operation does not accept a request body.

4.8.3.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/profileList

This operation does not return a response body.

4.8.4. Delete Profiles

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/net-conf/profiles`	Deletes profiles.

Normal response codes: 204

4.8.4.1. Request

This table shows the URI parameters for the delete profiles request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The request must use the following JSON schema: deviceProfile.json#/definitions/deleteProfileList and must contain an id in each profile: deviceProfile.json#/definitions/profile

This operation does not accept a request body.

4.8.4.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/profileList

This operation does not return a response body.

4.8.5. Create a New Collect

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/net-conf/netconfCollection/liveNetwork`	Creates a new collection.

Normal response codes: 201

4.8.5.1. Request

This table shows the URI parameters for the create a new collect request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The request must use the following JSON schema: deviceProfile.json#/definitions/startCollection .

This operation does not accept a request body.

4.8.5.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/collectionStatus .

This operation does not return a response body.

4.8.6. Get the Status of a Collection Job

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/net-conf/netconfCollection/{id}`	Gets the Status of a collection job.

Normal response codes: 200

4.8.6.1. Request

This table shows the URI parameters for the get the status of a collection job request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{collectionJobId}`	Int	The unique identifier of the collection job.

This operation does not accept a request body.

4.8.6.2. Response

Returns the following JSON document: deviceProfile.json#/definitions/collectionStatus .

This operation does not return a response body.

4.9. TE-Containers

TE-Containers are related to TE-LSPs, similar to JunOS TE++ containers. The API allows the access to those TE-Containers parameter. A TE-Container has most of the TE-LSP parameters and split/merge parameters. A TE-Container will create a set of child TE-LSPs to adjust for traffic. The container normalization is handled as a separate global task.

The TE-containers schema is: lsp-containers.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-containers/ [GET, POST]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-containers/<containerIndex> [GET , PUT, PATCH , DELETE]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/te-containers/bulk [POST , PUT, PATCH , DELETE] Bulk API

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers`	List all TE-containers.
POST	`/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers`	Creates a container.
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/te-containers/stream`	See EventSource for format. The notifications send on that stream are only teContainerEvent. The data will contain a JSON document (see NorthStar Notification API).

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Gets a TE Container.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Updates a TE Container
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Updates a TE Container using an RFC6902 document
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Deletes a container.
POST	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Create a list of TE Container
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Modify a list of TE Container
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Modify a list of TE Container using a PATCH
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Deletes a list of containers.

4.9.1. getAllTEContainers

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-containers`	List all TE-containers.

Normal response codes: 200

4.9.1.1. Request

This table shows the URI parameters for the getalltecontainers request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.9.1.2. Response

Returns the following JSON document: lsp-containers.json.json#/definitions/containerList .

This operation does not return a response body.

4.9.2. createTEContainer

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/te-containers`	Creates a container.

Normal response codes: 201

4.9.2.1. Request

This table shows the URI parameters for the createtecontainer request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The input must conform to the lsp-containers.json#/definitions/createContainer schema.

This operation does not accept a request body.

4.9.2.2. Response

Follows lsp-containers.json#/definitions/container .

This operation does not return a response body.

4.9.3. Start a SSE Stream

Method	URI	Description

GET	`/v2/tenant/{tenant_id}/topol-`
	`ogy/{topology_id}/te-contain-`
	`ers/stream`
		See [EventSource](#) for format. The notifications send on that stream are only teContainerEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.9.3.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.9.4. getATEContainer

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Gets a TE Container.

Normal response codes: 200

4.9.4.1. Request

This table shows the URI parameters for the getatecontainer request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{containerIndex}`	Int	Program ID of a TE-container.

This operation does not accept a request body.

4.9.4.2. Response

Follows lsp-containers.json#/definitions/container .

This operation does not return a response body.

4.9.5. updateContainer

Method	URI	Description

PUT	`/v2/tenant/{tenant_id}/topol-`
	`ogy/{topology_id}/te-contain-`
	`ers/{containerIndex}`
		Updates a TE Container

Normal response codes: 201

4.9.5.1. Request

This table shows the URI parameters for the updatecontainer request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{containerIndex}`	Int	Program ID of a TE-container.

The input must conform to the lsp-containers.json#/definitions/updateContainer schema.

This operation does not accept a request body.

4.9.5.2. Response

Returns the following JSON document: lsp-containers.json#/definitions/container .

This operation does not return a response body.

4.9.6. patchContainer

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Updates a TE Container using an RFC6902 document

Normal response codes: 201

4.9.6.1. Request

This table shows the URI parameters for the patchcontainer request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{containerIndex}`	Int	Program ID of a TE-container.

The input must conform to the rest-schemas/json-patch.json schema, the produced docu-ment (Original resource +patch) must conform to the lsp-containers.json#/definitions/up-dateContainer schema.

This operation does not accept a request body.

4.9.6.2. Response

Returns the following JSON document: lsp-containers.json#/definitions/container

This operation does not return a response body.

4.9.7. deleteContainer

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/{containerIndex}`	Deletes a container.

The container must exist, no payload is expected or returned.

Normal response codes: 204

4.9.7.1. Request

This table shows the URI parameters for the deletecontainer request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{containerIndex}`	Int	Program ID of a TE-container.

No content is expected.

This operation does not accept a request body.

4.9.7.2. Response

No content

This operation does not return a response body.

4.9.8. createContainerBulk

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Create a list of TE Container

Normal response codes: 200

4.9.8.1. Request

This table shows the URI parameters for the createcontainerbulk request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The input must conform to the lsp-containers.json#/definitions/containerCreateList schema.

This operation does not accept a request body.

4.9.8.2. Response

Returns the following JSON document: lsp-containers.json#/definitions/containerList .

This operation does not return a response body.

4.9.9. updateContainerBulk

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Modify a list of TE Container

Normal response codes: 200

4.9.9.1. Request

This table shows the URI parameters for the updatecontainerbulk request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The input must conform to the lsp-containers.json#/definitions/containerUpdateList schema.

This operation does not accept a request body.

4.9.9.2. Response

Returns the following JSON document: lsp-containers.json#/definitions/containerList .

This operation does not return a response body.

4.9.10. patchContainerBulk

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Modify a list of TE Container using a PATCH

Normal response codes: 200

4.9.10.1. Request

This table shows the URI parameters for the patchcontainerbulk request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The input must conform to the lsp-containers.json#/definitions/containerListPatch schema. the resulting container list (with patch applied) must also comply to the lsp-containers.json#/definitions/containerUpdateList schema.

This operation does not accept a request body.

4.9.10.2. Response

Returns the following JSON document: lsp-containers.json#/definitions/containerList

This operation does not return a response body.

4.9.11. deleteContainerBulk

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/te-contain-ers/bulk`	Deletes a list of containers.

Normal response codes: 200

4.9.11.1. Request

This table shows the URI parameters for the deletecontainerbulk request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

The containers must exist, the payload must conform to lsp-containers.json#/defini-tions/containerListDelete.

This operation does not accept a request body.

4.9.11.2. Response

This operation does not return a response body.

4.10. Facilities

Use these endpoints to work with facilities.

The facilities schema is: facilities.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/facilities/ [GET : get all facilities]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/facilities/<facilityIndex> [GET : get a facitity, PUT : update, DELETE: delete]

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Gets all Facilities.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Creates a facility.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/stream`	See EventSource for format. The notifications send on that stream are only facilityEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Gets a Facility.

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topology/{topology_id}/facilities/{facilityIndex}`	Updates a facility
DELETE	`/v2/tenant/{tenant_id}/topology/{topology_id}/facilities/{facilityIndex}`	Deletes a facility.

4.10.1. getAllFacilities

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Gets all Facilities.

Returns the following JSON document: facilities.json#/definitions/facilityList .

4.10.1.1. Request

This table shows the URI parameters for the getallfacilities request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.10.2. createAFacilitity

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities`	Creates a facility.

Returns the following JSON document: facilities.json#/definitions/facility .

4.10.2.1. Request

This table shows the URI parameters for the createafacilitity request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.10.3. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/stream`	See EventSource for format. The notifications send on that stream are only facilityEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.10.3.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.10.4. getAFacilitity

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Gets a Facility.

Returns the following JSON document: facilities.json#/definitions/facility .

4.10.4.1. Request

This table shows the URI parameters for the getafacilitity request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{facilityIndex}`	Int	Program ID of a facility.

This operation does not accept a request body.

4.10.5. updateFacilitity

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Updates a facility

Returns the following JSON document: facilities.json#/definitions/facility .

4.10.5.1. Request

This table shows the URI parameters for the updatefacilitity request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{facilityIndex}`	Int	Program ID of a facility.

This operation does not accept a request body.

4.10.6. deleteFacilitity

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/facilities/{fa-cilityIndex}`	Deletes a facility.

4.10.6.1. Request

This table shows the URI parameters for the deletefacilitity request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{facilityIndex}`	Int	Program ID of a facility.

This operation does not accept a request body.

4.11. P2MP

Use these endpoints to retrieve the P2MP lists and manage the P2MP groups. The complete set of endpoints and parameters is described in the schema p2mp.json. P2MP group in NorthStar can be provisioned using NETCONF (default) or PCEP. Since NorthStar 5.1 flow mapping to MVPN using source and group is supported.

The API allows for group and leaf discovery, creation, modification, deletion and bulk deletion. Those operations are supported using the following endpoints:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/p2mp/ [GET: get all P2MP groups, POST: create a new P2MP group]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/p2mp/<p2mpGroupIndex> [GET: get a P2MP group specified by index, PUT/PATCH: modify the P2MP group, DELETE: Delete the P2MP group and all its members leaves, POST: Create a list of leaves,]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/p2mp/<p2mpGroupIndex>/<lspIndex> [GET: get a P2MP leaf by index, PUT: get a P2MP leaf specified by index, DELETE: remove a leaf]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/p2mp/<p2mpGroupIndex>/bulk [DELETE: bulk remove a list of leaves]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/p2mp/<p2mpGroupIndex>/bulk [DELETE only: delete a list of TE-LSP members]

A special use case for the PATCH method is to re-provision an entire tree (or a leaf) and do not change anything. To reprovision a tree a PATCH /NorthStar/API/v2/tenant/1/topology/1/p2mp/<p2mpGroupIndex> payload

```
[ ]
```

The same method is used for a leaf: PATCH /NorthStar/API/v2/tenant/1/topology/1/te-lsps/< lspIndex> payload

```
[ ]
```

. Another use case for PATCH is to add or replace flow mapping, the PATH examples show how to achieve those operations.

Since NorthStar 6.0, the P2MP tree leaves can also be CE or Site nodes. NorthStar path computation will compute the P2MP tree using those nodes but will configure them in the network terminating at the PE nodes. Please note that currently combination of PE and non-pE (CE or Site) nodes as destinations nodes in a P2MP tree is not supported. Use can either create P2MP tree where all destination nodes consist of PE nodes only or consist of CE nodes only. It cannot be combination of both (mixture of PE and CE nodes) in a single tree.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Returns a full list of P2MP groups.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Create a P2MP group using the following schema: p2mp.json#/definitions/createP2mpGroup. The API request contains the destination list and the common planned properties. The common planned properties may include plannedProperties with flow mapping parameters.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/stream`	See EventSource for format. The notifications send on that stream are only p2mpEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Returns the details of a specified P2MP group.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Modify a specific P2MP group, if the LSPS are not specified, the common properties are changed, not the LSPs. If the LSPs are specified, the set of LSPs will be modified. i.e LSP that is not in the new list will be remove, the other will be added/updated".
PATCH	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Modify a specific P2MP group using a PATCH document (RFC6906). The operation has the same behavior as the PUT method. An empty PATCH will re-provision the complete tree.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	No response is received from the REST API unless an error occurs.
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/bulk`	No response is received from the REST API unless an error occurs.
POST	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	The POST URL accepts a list of new leaves. Use the following schema to create a P2MP leaf: p2mp.json#/definitions/createP2mpLeavesList .
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	Returns the details of a specified P2MP leaf.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	No response is received from the REST API unless an error occurs.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/bulk`	No response is received from the REST API unless an error occurs.

4.11.1. Get P2MP groups

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Returns a full list of P2MP groups.

Normal response codes: 200

4.11.1.1. Request

This table shows the URI parameters for the get p2mp groups request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.11.1.2. Response

Example 4.73. Get P2MP groups: JSON response

```
[
    {
        "p2mpGroupIndex": 3,
        "p2mpIndex": 40,
        "name": "geeiamtree",
        "topoObjectType": "p2mpGroup",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.101"
        },
        "links": [
            {
                "rel": "self",
                "href": "3/"
            }
        ]
    },
    {
        "p2mpGroupIndex": 4,
        "p2mpIndex": 43,
        "name": "mapletree",
        "topoObjectType": "p2mpGroup",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.101"
        },
        "links": [
            {
                "rel": "self",
                "href": "4/"
            }
```

```
            ]
        }
]
```

4.11.2. Create a P2MP group

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp`	Create a P2MP group using the following schema: p2mp.json#/definitions/createP2mpGroup. The API request contains the destination list and the common planned properties. The common planned properties may include plannedProperties with flow mapping parameters.

Normal response codes: 200

4.11.2.1. Request

This table shows the URI parameters for the create a p2mp group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.74. Create a P2MP group: JSON request

While creating the P2MP group, ensure that either the following plannedProperties parameters of all the members are identical, or the group plannedProperties are applied. Do not set the plannedProperties in the members. If you do not provide the plannedProperties parameter, the default value is applied.

Table 4.5. P2MP group creation required Attributes.

Attribute	Type	Default	Description
name	string	None	P2MP group name name
from/address	string	none	P2MP group ingress ingress
plannedProperties/band-width	string or integer	0	P2MP members bandwidth
plannedProperties/setupPri-ority	integer	7	P2MP member setup priority
plannedProperties/holding-Priority	integer	0	P2MP member setup hold-ingPriority
plannedProperties/de-sign/adminGroups/at-tributeIncludeAny	integer	0 (not set)	P2MP member setup admin-istrative color include any
plannedProperties/de-sign/adminGroups/at-tributeIncludeAll	integer	0 (not set)	P2MP member setup admin-istrative color include all
plannedProperties/de-sign/adminGroups/attribu-teExclude	integer	0 (not set)	P2MP member setup admin-istrative color exclude
lsps	list	None	List of members with name and destination. The name

Attribute	Type	Default	Description
			must be unique on the ingress.

The following examples show different set of parameters and results:

- A P2MP tree with 3 Members using NETCONF.

```
{
  "name":"alphatree",
  "from":{"address": "11.0.0.101", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":7,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      },
      "diversityGroup":"twins"
    }
  },
  "lsps":[
    {
      "name":"alphatree-101102",
      "to":{"address": "11.0.0.102", "topoObjectType": "ipv4"}
    },
    {
      "name":"alphatree-101103",
      "to":{"address": "11.0.0.103", "topoObjectType": "ipv4"}
    },
    {
      "name":"alphatree-101104",
      "to":{"address": "11.0.0.104", "topoObjectType": "ipv4"}
    }
  ]
}
```

The response is:

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.101", "topoObjectType": "ipv4"},
  "lsps":[
    {
      "name":"alphatree-101102",
      "to":{"address": "11.0.0.102", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99K",
        "correlatedRROHopCount":0,
        "design":{
          "diversityGroup":"TWINS"
        },
        "ero":[
          {
            "address":"11.101.105.2",
```

```
            "loose":false,
            "topoObjectType":"ipv4"
          },
          {
            "address":"11.102.105.1",
            "loose":false,
            "topoObjectType":"ipv4"
          }
        ],
        "holdingPriority":0,
        "lastStatusString":"[ConfigServer]<Netconf provisioning order
received",
        "pathName":"alphatree-101102_p0",
        "setupPriority":7
      },
      "controlType":"PCC",
      "from":{
        "address":"11.0.0.101",
        "topoObjectType":"ipv4"
      },
      "lspIndex":91,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    },
    {
      "name":"alphatree-101103",
      "to":{"address": "11.0.0.103", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99K",
        "correlatedRROHopCount":0,
        "design":{
          "diversityGroup":"TWINS"
        },
        "ero":[
          {
            "address":"11.101.105.2",
            "loose":false,
            "topoObjectType":"ipv4"
          },
          {
            "address":"11.105.107.2",
            "loose":false,
            "topoObjectType":"ipv4"
          },
          {
            "address":"11.103.107.1",
            "loose":false,
            "topoObjectType":"ipv4"
          }
        ],
        "holdingPriority":0,
        "lastStatusString":"[ConfigServer]<Netconf provisioning order
received",
        "pathName":"alphatree-101103_p0",
        "setupPriority":7
      },
      "controlType":"PCC",
      "from":{
```

```
          "address":"11.0.0.101",
          "topoObjectType":"ipv4"
        },
        "lspIndex":92,
        "p2mpName":"alphatree",
        "pathType":"primary",
        "provisioningType":"RSVP"
      },
      {
        "name":"alphatree-101104",
        "to":{"address": "11.0.0.104", "topoObjectType": "ipv4"},
        "plannedProperties":{
          "adminStatus":"Up",
          "bandwidth":"99K",
          "correlatedRROHopCount":0,
          "design":{
            "diversityGroup":"TWINS"
          },
          "ero":[
            {
              "address":"dynamic",
              "loose":false,
              "topoObjectType":"ipv4"
            }
          ],
          "holdingPriority":0,
          "lastStatusString":"[ConfigServer]<Netconf provisioning order
received",
          "pathName":"alphatree-101104_p0",
          "setupPriority":7
        },
        "controlType":"PCC",
        "from":{
          "address":"11.0.0.101",
          "topoObjectType":"ipv4"
        },
        "lspIndex":93,
        "p2mpName":"alphatree",
        "pathType":"primary",
        "provisioningType":"RSVP"
      }
    ]
}
```

- Create a P2MP group using PCEP and associate it with a Multicast VPN. This is the North-Star 5.1 version using the flow mapping, prior version were using different encoding.

```
{
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":7,
    "flows":[
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
```

```
            "group":{"address": "239.2.2.2", "length": 32, "topoObjectType":
"prefix"}
      },
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.3.3.3", "length": 32, "topoObjectType":
"prefix"}
      }
    ]
  },
  "lsps":[
    {
      "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"}
    },
    {
      "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"}
    }
  ],
  "creationConfigurationMethod":"PCEP"
}
```

The response is:

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":7,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      }
    },
    "flows":[
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.2.2.2", "length": 32, "topoObjectType":
"prefix"}
      },
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.3.3.3", "length": 32, "topoObjectType":
"prefix"}
      }
    ]
  },
```

```
  "lsps":[
    {
      "name":"alphatree_11.0.0.213",
      "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "pathName":"alphatree_to213_p0",
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
        "topoObjectType":"ipv4"
      },
      "lspIndex":145953,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    },
    {
      "name":"alphatree_11.0.0.214",
      "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
        "topoObjectType":"ipv4"
      },
      "lspIndex":145954,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    }
  ]
}
```

- Create a P2MP group using PCEP and CE and Site nodes as destination nodes. This is NorthStar 6.0 version. CE and Sites nodes are SiteA1, SiteZ and CEY2. Please note that currently combination of PE and Site nodes as destinations nodes in a P2MP tree is not supported. Use can either create P2MP tree with all destination nodes consist of PE nodes only or consist of CE/Site nodes only. It cannot be combination of both (mixture of PE and CE/Sites nodes) in a single tree.

```
{
  "name":"pecenoippcep1",
  "creationConfigurationMethod":"PCEP",
  "from":{
    "topoObjectType":"ipv4",
    "address":"10.0.0.1"
  },
  "plannedProperties":{
    "bandwidth":"10"
```

```
        },
        "lsps":[
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"SiteA1"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"SiteZ"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"CEY2"
                }
            }
        ]
}
```

The response is:

```
{
    "from":{
        "address":"10.0.0.1",
        "topoObjectType":"ipv4"
    },
    "name":"pecenoippcep1",
    "lsps":[
        {
            "p2mpName":"pecenoippcep1",
            "initiator":"PCE",
            "from":{
                "address":"10.0.0.1",
                "topoObjectType":"ipv4"
            },
            "name":"pecenoippcep1_SiteA1",
            "pathType":"primary",
            "plannedProperties":{
                "adminStatus":"Up",
                "bandwidth":10,
                "holdingPriority":0,
                "setupPriority":7
            },
            "to":{
                "address":"SiteA1",
                "topoObjectType":"ipv4"
            },
            "controlType":"PCEInitiated",
            "provisioningType":"RSVP",
            "lspIndex":462
        },
        {
            "p2mpName":"pecenoippcep1",
            "initiator":"PCE",
            "from":{
                "address":"10.0.0.1",
```

```
                "topoObjectType":"ipv4"
            },
            "name":"pecenoippcep1_SiteZ",
            "pathType":"primary",
            "plannedProperties":{
                "adminStatus":"Up",
                "bandwidth":10,
                "holdingPriority":0,
                "setupPriority":7
            },
            "to":{
                "address":"SiteZ",
                "topoObjectType":"ipv4"
            },
            "controlType":"PCEInitiated",
            "provisioningType":"RSVP",
            "lspIndex":464
        },
        {
            "p2mpName":"pecenoippcep1",
            "initiator":"PCE",
            "from":{
                "address":"10.0.0.1",
                "topoObjectType":"ipv4"
            },
            "name":"pecenoippcep1_CEY2",
            "pathType":"primary",
            "plannedProperties":{
                "adminStatus":"Up",
                "bandwidth":10,
                "holdingPriority":0,
                "setupPriority":7
            },
            "to":{
                "address":"CEY2",
                "topoObjectType":"ipv4"
            },
            "controlType":"PCEInitiated",
            "provisioningType":"RSVP",
            "lspIndex":467
        }
    ],
    "creationConfigurationMethod":"PCEP",
    "topoObjectType":"p2mpGroup",
    "plannedProperties":{
        "bandwidth":10,
        "design":{
            "adminGroups":{
                "attributeIncludeAny":0,
                "attributeExclude":0,
                "attributeIncludeAll":0
            }
        },
        "holdingPriority":0,
        "setupPriority":7
    },
    "location":"/NorthStar/API/v2/tenant/1/topology/1/p2mp/2",
    "p2mpGroupIndex":2,
    "provisioningType":"RSVP"
}
```

4.11.2.2. Response

The responses are shown per example in the request section. In general the response is a JSON document conforming to p2mp.json#/definitions/p2mpGroup.

This operation does not return a response body.

4.11.3. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/stream`	See EventSource for format. The notifications send on that stream are only p2mpEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.11.3.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.11.4. Get a Specific P2MP Group

Method	URI	Description

GET	`/v2/tenant/{tenant_id}/topol-`
	`ogy/{topology_id}/p2mp/`
	`{p2mpGroupIndex}`
		Returns the details of a specified P2MP group.

Normal response codes: 200

4.11.4.1. Request

This table shows the URI parameters for the get a specific p2mp group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.

This operation does not accept a request body.

4.11.4.2. Response

Example 4.75. Get a Specific P2MP Group: JSON response

```
{
  "topoObjectType":"p2mpGroup",
  "p2mpGroupIndex":8,
  "name":"geeiamtree",
  "from":{"address": "11.0.0.101", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":0,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      }
    }
  },
  "lsps":[
    {
      "name":"geeiamtree101-102",
      "to":{"address": "11.0.0.102", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99K",
        "calculatedEro":[
          {
            "address":"11.101.105.2",
            "loose":false,
            "topoObjectType":"ipv4"
          },
```

```
                {
                  "address":"11.102.105.1",
                  "loose":false,
                  "topoObjectType":"ipv4"
                }
              ],
              "correlatedRROHopCount":2,
              "holdingPriority":0,
              "lastStatusString":"[PCServer]<Active",
              "pathName":"geeiamtree101-102_p0",
              "preferredEro":[
                {
                  "address":"11.101.105.2",
                  "loose":false,
                  "topoObjectType":"ipv4"
                },
                {
                  "address":"11.102.105.1",
                  "loose":false,
                  "topoObjectType":"ipv4"
                }
              ],
              "routingStatus":"Up",
              "setupPriority":7
            },
            "collectedProperties":{
              "adminStatus":"Up",
              "bandwidth":"99K",
              "calculatedEro":[
                {
                  "address":"11.101.105.2",
                  "loose":false,
                  "topoObjectType":"ipv4"
                },
                {
                  "address":"11.102.105.1",
                  "loose":false,
                  "topoObjectType":"ipv4"
                }
              ],
              "correlatedRROHopCount":2,
              "explicitPathName":"geeiamtree101-102_p0",
              "holdingPriority":0,
              "preferredEro":[
                {
                  "address":"11.101.105.2",
                  "loose":false,
                  "topoObjectType":"ipv4"
                },
                {
                  "address":"11.102.105.1",
                  "loose":false,
                  "topoObjectType":"ipv4"
                }
              ],
              "routingStatus":"Up",
              "setupPriority":7
            },
            "controlType":"PCC",
            "controller":"External",
```

```
        "from":{
          "address":"11.0.0.101",
          "topoObjectType":"ipv4"
        },
        "liveProperties":{
          "adminStatus":"Up",
          "bandwidth":99000,
          "ero":[
            {
              "address":"11.101.105.2",
              "loose":false,
              "topoObjectType":"ipv4"
            },
            {
              "address":"11.102.105.1",
              "loose":false,
              "topoObjectType":"ipv4"
            }
          ],
          "holdingPriority":0,
          "metric":0,
          "operationalStatus":"Active",
          "pathName":"geeiamtree101-102_p0",
          "rro":[
            {
              "address":"11.101.105.2",
              "protectionAvailable":false,
              "protectionInUse":false,
              "topoObjectType":"ipv4"
            },
            {
              "address":"11.102.105.1",
              "protectionAvailable":false,
              "protectionInUse":false,
              "topoObjectType":"ipv4"
            }
          ],
          "setupPriority":7
        },
        "lspIndex":638,
        "operationalStatus":"Active",
        "p2mpIndex":184549477,
        "p2mpName":"geeiamtree",
        "pathType":"primary",
        "provisioningType":"RSVP"
      }
    ],
    "p2mpIndex":638
}
```

4.11.5. Update a Specific P2MP Group

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	Modify a specific P2MP group, if the LSPS are not specified, the common properties are changed, not the LSPs. If the LSPs are specified, the set of LSPs will be modified. i.e LSP that is not in the new list will be remove, the other will be added/updated".

Normal response codes: 200

4.11.5.1. Request

This table shows the URI parameters for the update a specific p2mp group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.

Example 4.76. Update a Specific P2MP Group: JSON request

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"21k",
    "setupPriority":3,
    "holdingPriority":3
  },
  "lsps":[
    {"to":{"address": "11.0.0.102", "topoObjectType": "ipv4"}},
    {"to":{"address": "11.0.0.103", "topoObjectType": "ipv4"}},
    {"to":{"address": "11.0.0.104", "topoObjectType": "ipv4"}}
  ]
}
```

4.11.5.2. Response

Example 4.77. Update a Specific P2MP Group: JSON response

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"21k",
    "setupPriority":3,
    "holdingPriority":3,
    "design":{
      "adminGroups":{
```

```
          "attributeExclude":0,
          "attributeIncludeAll":0,
          "attributeIncludeAny":0
        }
      }
    },
    "lsps":[
      {
        "name":"alphatree_to213",
        "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"},
        "plannedProperties":{
          "adminStatus":"Up",
          "bandwidth":"21k",
          "design":{
            "routingMethod":"routeByDevice"
          },
          "holdingPriority":3,
          "pathName":"alphatree_to213_p0",
          "setupPriority":3
        },
        "controlType":"PCC",
        "from":{
          "address":"11.0.0.191",
          "topoObjectType":"ipv4"
        },
        "lspIndex":145948,
        "p2mpName":"alphatree",
        "pathType":"primary",
        "provisioningType":"RSVP"
      },
      {
        "name":"alphatree_to214",
        "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"},
        "plannedProperties":{
          "adminStatus":"Up",
          "bandwidth":"21k",
          "design":{
            "routingMethod":"routeByDevice"
          },
          "holdingPriority":3,
          "pathName":"alphatree_to214_p0",
          "setupPriority":3
        },
        "controlType":"PCC",
        "from":{
          "address":"11.0.0.191",
          "topoObjectType":"ipv4"
        },
        "lspIndex":145949,
        "p2mpName":"alphatree",
        "pathType":"primary",
        "provisioningType":"RSVP"
      }
    ]
}
```

4.11.6. Update a Specific P2MP Group using a PATCH document

Method	URI	Description
PATCH	`/v2/tenant/{tenant_id}/topol-` `ogy/{topology_id}/p2mp/` `{p2mpGroupIndex}`	Modify a specific P2MP group using a PATCH document (RFC6906). The operation has the same behavior as the PUT method. An empty PATCH will re-provision the complete tree.

Normal response codes: 200

4.11.6.1. Request

This table shows the URI parameters for the update a specific p2mp group using a patch document request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.

Example 4.78. Update a Specific P2MP Group using a PATCH document: JSON request

The following examples show different set of parameters and results:

• Modify the group bandwidth, setup and holding priority.

```
[{ "op": "add", "path": "/plannedProperties/bandwidth", "value": "21k" },
{ "op": "add", "path": "/plannedProperties/setupPriority", "value": 3 },
{ "op": "add", "path": "/plannedProperties/holdingPriority", "value": 3 }]
```

• Modify flow mapping: replace all (initial flows with groups 239.2.2.2 and 239.3.3.3) flows.

```
[
  {
    "op":"add",
    "path":"/plannedProperties/flows",
    "value":[
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.4.4.4", "length": 32, "topoObjectType":
"prefix"}
      },
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
```

```
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.5.5.5", "length": 32, "topoObjectType":
"prefix"}
      }
    ]
  }
]
```

• Modify flow mapping: insert a new flow (initial flows with groups 239.2.2.2 and 239.3.3.3) flows.

```
[
  {
    "op":"add",
    "path":"/plannedProperties/flows/0",
    "value": {
      "topoObjectType":"flow",
      "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
      "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
      "group":{"address": "239.1.1.1", "length": 32, "topoObjectType":
"prefix"}
    }
  }
]
```

4.11.6.2. Response

Example 4.79. Update a Specific P2MP Group using a PATCH document: JSON response

The response to the requests are

• Modify the group bandwidth, setup and holding priority.

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"21k",
    "setupPriority":3,
    "holdingPriority":3,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      }
    }
  },
  "lsps":[
    {
      "name":"alphatree_to213",
      "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"21k",
```

```
                "design":{
                  "routingMethod":"routeByDevice"
                },
                "holdingPriority":3,
                "pathName":"alphatree_to213_p0",
                "setupPriority":3
              },
              "controlType":"PCC",
              "from":{
                "address":"11.0.0.191",
                "topoObjectType":"ipv4"
              },
              "lspIndex":145948,
              "p2mpName":"alphatree",
              "pathType":"primary",
              "provisioningType":"RSVP"
          },
          {
              "name":"alphatree_to214",
              "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"},
              "plannedProperties":{
                "adminStatus":"Up",
                "bandwidth":"21k",
                "design":{
                  "routingMethod":"routeByDevice"
                },
                "holdingPriority":3,
                "pathName":"alphatree_to214_p0",
                "setupPriority":3
              },
              "controlType":"PCC",
              "from":{
                "address":"11.0.0.191",
                "topoObjectType":"ipv4"
              },
              "lspIndex":145949,
              "p2mpName":"alphatree",
              "pathType":"primary",
              "provisioningType":"RSVP"
          }
      ]
}
```

- Modify flow mapping: replace all flows.

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":7,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      }
    },
```

```
    "flows":[
      {
       "topoObjectType":"flow",
       "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
       "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
       "group":{"address": "239.4.4.4", "length": 32, "topoObjectType":
"prefix"}
      },
      {
       "topoObjectType":"flow",
       "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
       "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
       "group":{"address": "239.5.5.5", "length": 32, "topoObjectType":
"prefix"}
      }
    ]
  },
  "lsps":[
    {
      "name":"alphatree_11.0.0.213",
      "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "pathName":"alphatree_to213_p0",
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
        "topoObjectType":"ipv4"
      },
      "lspIndex":145953,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    },
    {
      "name":"alphatree_11.0.0.214",
      "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
        "topoObjectType":"ipv4"
      },
      "lspIndex":145954,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    }
  ]
```

```
}
```

• Modify flow mapping: insert a new flow flows.

```
{
  "topoObjectType":"p2mpGroup",
  "name":"alphatree",
  "from":{"address": "11.0.0.191", "topoObjectType": "ipv4"},
  "plannedProperties":{
    "bandwidth":"99k",
    "setupPriority":7,
    "holdingPriority":7,
    "design":{
      "adminGroups":{
        "attributeExclude":0,
        "attributeIncludeAll":0,
        "attributeIncludeAny":0
      }
    },
    "flows":[
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.1.1.1", "length": 32, "topoObjectType":
"prefix"}
      },
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.2.2.2", "length": 32, "topoObjectType":
"prefix"}
      },
      {
        "topoObjectType":"flow",
        "vpn":{"rd": "11.0.0.105:65000", "topoObjectType": "vpnId"},
        "source":{"address": "11.0.0.101", "length": 32, "topoObjectType":
"prefix"},
        "group":{"address": "239.3.3.3", "length": 32, "topoObjectType":
"prefix"}
      }
    ]
  },
  "lsps":[
    {
      "name":"alphatree_11.0.0.213",
      "to":{"address": "11.0.0.213", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "pathName":"alphatree_to213_p0",
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
```

```
          "topoObjectType":"ipv4"
      },
      "lspIndex":145953,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    },
    {
      "name":"alphatree_11.0.0.214",
      "to":{"address": "11.0.0.214", "topoObjectType": "ipv4"},
      "plannedProperties":{
        "adminStatus":"Up",
        "bandwidth":"99k",
        "holdingPriority":7,
        "setupPriority":7
      },
      "controlType":"PCEInitiated",
      "from":{
        "address":"11.0.0.191",
        "topoObjectType":"ipv4"
      },
      "lspIndex":145954,
      "p2mpName":"alphatree",
      "pathType":"primary",
      "provisioningType":"RSVP"
    }
  ]
}
```

4.11.7. Delete a P2MP Group

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}`	No response is received from the REST API unless an error occurs.

Normal response codes: 204

4.11.7.1. Request

This table shows the URI parameters for the delete a p2mp group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.

This operation does not accept a request body.

4.11.8. Delete list of P2MP Groups

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/p2mp/bulk`	No response is received from the REST API unless an error occurs.

Normal response codes: 204

4.11.8.1. Request

This table shows the URI parameters for the delete list of p2mp groups request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Bulk process P2MP Groups.

Example 4.80. Delete list of P2MP Groups: JSON request

```
[
    {"p2mpGroupIndex": 3},
    {"p2mpGroupIndex": 4}
]
```

4.11.9. Create a P2MP Leaf

Method	URI	Description
POST	/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}	The POST URL accepts a list of new leaves. Use the following schema to create a P2MP leaf: p2mp.json#/definitions/createP2mpLeavesList .

Normal response codes: 200

4.11.9.1. Request

This table shows the URI parameters for the create a p2mp leaf request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
{p2mpGroupIndex}	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.

Example 4.81. Create a P2MP Leaf: JSON request

```
[
  {
    "name":"alphatree_to225",
    "to":{"address": "11.0.0.225", "topoObjectType": "ipv4"}
  }
]
```

4.11.9.2. Response

Example 4.82. Create a P2MP Leaf: JSON response

```
[
  {
    "name":"alphatree_to225",
    "to":{"address": "11.0.0.225", "topoObjectType": "ipv4"},
    "plannedProperties":{
      "adminStatus":"Up",
      "bandwidth":"21k",
      "holdingPriority":3,
      "pathName":"alphatree_to225_p0",
      "setupPriority":3
    },
    "controlType":"PCC",
    "from":{
      "address":"11.0.0.191",
      "topoObjectType":"ipv4"
    },
    "lspIndex":145950,
    "p2mpName":"alphatree",
    "pathType":"primary",
    "provisioningType":"RSVP"
  }
```

```
]
```

4.11.10. Get a Specific P2MP Leaf

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	Returns the details of a specified P2MP leaf.

Normal response codes: 200

4.11.10.1. Request

This table shows the URI parameters for the get a specific p2mp leaf request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.
`{lspIndex}`	Int	The unique lspIndex.

This operation does not accept a request body.

4.11.10.2. Response

Example 4.83. Get a Specific P2MP Leaf: JSON response

```
{
    "operationalStatus": "Active",
    "plannedProperties": {
        "bandwidth": "99K",
        "setupPriority": 7,
        "holdingPriority": 0,
        "calculatedEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.102.105.1",
                "loose": false
            }
        ],
        "routingStatus": "Up",
        "pathName": "geeiamtree101-102_p0",
        "adminStatus": "Up",
        "preferredEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
```

```
                "address": "11.102.105.1",
                "loose": false
            }
        ],
        "lastStatusString": "[PCServer]<Active",
        "correlatedRROHopCount": 2
    },
    "name": "geeiamtree101-102",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.101"
    },
    "pathType": "primary",
    "to": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.102"
    },
    "lspIndex": 638,
    "controlType": "PCC",
    "provisioningType": "RSVP",
    "p2mpName": "geeiamtree",
    "collectedProperties": {
        "bandwidth": "99K",
        "setupPriority": 7,
        "holdingPriority": 0,
        "calculatedEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.102.105.1",
                "loose": false
            }
        ],
        "routingStatus": "Up",
        "explicitPathName": "geeiamtree101-102_p0",
        "adminStatus": "Up",
        "preferredEro": [
            {
                "topoObjectType": "ipv4",
                "address": "11.101.105.2",
                "loose": false
            },
            {
                "topoObjectType": "ipv4",
                "address": "11.102.105.1",
                "loose": false
            }
        ],
        "correlatedRROHopCount": 2
    },
    "p2mpIndex": 184549477,
    "liveProperties": {
        "bandwidth": 99000,
        "metric": 0,
        "setupPriority": 7,
        "holdingPriority": 0,
```

```
            "operationalStatus": "Active",
            "adminStatus": "Up",
            "ero": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.101.105.2",
                    "loose": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.102.105.1",
                    "loose": false
                }
            ],
            "rro": [
                {
                    "topoObjectType": "ipv4",
                    "address": "11.101.105.2",
                    "protectionInUse": false,
                    "protectionAvailable": false
                },
                {
                    "topoObjectType": "ipv4",
                    "address": "11.102.105.1",
                    "protectionInUse": false,
                    "protectionAvailable": false
                }
            ],
            "pathName": "geeiamtree101-102_p0"
        },
        "controller": "External"
}
```

4.11.11. Delete a P2MP Leaf

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/{lspIndex}`	No response is received from the REST API unless an error occurs.

Normal response codes: 204

4.11.11.1. Request

This table shows the URI parameters for the delete a p2mp leaf request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.
`{lspIndex}`	Int	The unique lspIndex.

This operation does not accept a request body.

4.11.12. Delete list of P2MP leaves

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/p2mp/{p2mpGroupIndex}/bulk`	No response is received from the REST API unless an error occurs.

Normal response codes: 204

4.11.12.1. Request

This table shows the URI parameters for the delete list of p2mp leaves request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{p2mpGroupIndex}`	Int	Signaling protocol P2MP id, which may be empty, and is the same for all TE-LSPs of a tunnel.
`{lspIndex}`	Int	Bulk process P2MP leaves.

Example 4.84. Delete list of P2MP leaves: JSON request

```
[
    {"lspIndex": 145948},
    {"lspIndex": 145950}
]
```

4.12. VRF

The endpoints defined here allows to discover which VRFs are configured in the router. This endpoint has been introduced in NorthStar 5.1 and is read-only. The information from this endpoint is opulated using the device collection.

Those operations are supported using the following endpoints:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/vrfs/ [GET: list the nodes with VRF information]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topolo-gy/<topology-id>/vrfs/<nodeIndex> [GET: list the VRF on a given node]

The detail of the information provided is defined in the associated json-schema vrfs.json.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs`	Returns the list of VRF summary: which node have vrf information and how many vrf are present.
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs/{nodeIndex}`	Returns the list of discovered VRF for that node.

4.12.1. Get the nodes with VRF

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs`	Returns the list of VRF summary: which node have vrf information and how many vrf are present.

Normal response codes: 200

4.12.1.1. Request

This table shows the URI parameters for the get the nodes with vrf request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.12.1.2. Response

Example 4.85. Get the nodes with VRF : JSON response

```
[
  {
    "topologyIndex":1,
    "topoObjectType":"vrfSummary",
    "links":[{"href": "1/", "rel": "vrfs"}],
    "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
"topologyIndex": 1},
    "entries":6
  },
  {
    "topologyIndex":1,
    "topoObjectType":"vrfSummary",
    "links":[{"href": "2/", "rel": "vrfs"}],
    "node":{"id": "0110.0000.0105", "nodeIndex": 2, "topoObjectType": "node",
"topologyIndex": 1},
    "entries":1
  },
  {
    "topologyIndex":1,
    "topoObjectType":"vrfSummary",
    "links":[{"href": "3/", "rel": "vrfs"}],
    "node":{"id": "0110.0000.0106", "nodeIndex": 3, "topoObjectType": "node",
"topologyIndex": 1},
    "entries":6
  },
  {
    "topologyIndex":1,
    "topoObjectType":"vrfSummary",
    "links":[{"href": "4/", "rel": "vrfs"}],
    "node":{"id": "0110.0000.0107", "nodeIndex": 4, "topoObjectType": "node",
"topologyIndex": 1},
```

```
    "entries":3
  }
]
```

4.12.2. List the VRF on a given node

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/vrfs/{nodeIndex}`	Returns the list of discovered VRF for that node.

Normal response codes: 200

4.12.2.1. Request

This table shows the URI parameters for the list the vrf on a given node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	The unique nodeIndex.

This operation does not accept a request body.

4.12.2.2. Response

Example 4.86. List the VRF on a given node: JSON response

```
[
  {
    "topologyIndex":1,
    "topoObjectType":"vrf",
    "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
"topologyIndex": 1},
    "instanceName":"cherryblossom",
    "routeDistinguisher":"11.0.0.102:65000",
    "interfaces":[{"interfaceName": "ge-0/0/7.0"}],
    "importPolicies":[{"policyName": "65000:100"}],
    "exportPolicies":[{"policyName": "65000:100"}]
  },
  {
    "topologyIndex":1,
    "topoObjectType":"vrf",
    "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
"topologyIndex": 1},
    "instanceName":"etree1",
    "routeDistinguisher":"11.0.0.102:301",
    "interfaces":[{"interfaceName": "ge-0/0/5.301"}],
    "importPolicies":[{"policyName": "6500:301"}],
    "exportPolicies":[{"policyName": "6500:301"}],
    "VLANID":100
  },
  {
    "topologyIndex":1,
    "topoObjectType":"vrf",
    "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
"topologyIndex": 1},
```

```
      "instanceName":"l2vpn_3_ce_101",
      "routeDistinguisher":"",
      "interfaces":[{"interfaceName": "ge-0/0/5.3"}]
   },
   {
      "topologyIndex":1,
      "topoObjectType":"vrf",
      "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
 "topologyIndex": 1},
      "instanceName":"vpn_0",
      "routeDistinguisher":"11.0.0.102:100",
      "interfaces":[{"interfaceName": "ge-0/0/1.0"}, {"interfaceName": "lo0.
1"}],
      "importPolicies":[{"policyName": "11:100"}],
      "exportPolicies":[{"policyName": "11:100"}],
      "lspMatchRegex":"^Silver.*"
   },
   {
      "topologyIndex":1,
      "topoObjectType":"vrf",
      "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
 "topologyIndex": 1},
      "instanceName":"vpws_sh6_sh2_vlan1002",
      "routeDistinguisher":"11.0.0.102:2002",
      "interfaces":[{"interfaceName": "ge-0/0/5.1002"}],
      "importPolicies":[{"policyName": "6500:1002"}],
      "exportPolicies":[{"policyName": "6500:1002"}]
   },
   {
      "topologyIndex":1,
      "topoObjectType":"vrf",
      "node":{"id": "0110.0000.0102", "nodeIndex": 1, "topoObjectType": "node",
 "topologyIndex": 1},
      "instanceName":"vpn_200_ce_101",
      "routeDistinguisher":"",
      "interfaces":[{"interfaceName": "ge-0/0/5.200"}]
   }
]
```

4.13. BGP Routes

If PRDP is configured for a set of nodes, this API allows to see the BGP routes retrived by NorthStar.

The schema is: route.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/routes/ [GET : get the list of nodes with bgp routes (summary only)

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/routes/<nodeIndex> [GET : get the list of routes on a node]

NorthStar is limiting the number of routes fetched, the list may be incomplete.

Method	URI	Description
GET	/v2/tenant/{tenant_id}/topology/{topology_id}/routes	List all nodes with BGP routes and the number of routes for that node.

Method	URI	Description

GET	`/v2/tenant/{tenant_id}/topolo-`
	`gy/{topology_id}/routes/{nodeIn-`
	`dex}`
		Gets the routes maintained by NorthStar for a node.

4.13.1. getRoutesSummary

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-` `gy/{topology_id}/routes`	List all nodes with BGP routes and the number of routes for that node.

Normal response codes: 200

4.13.1.1. Request

This table shows the URI parameters for the getroutessummary request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.13.1.2. Response

Example 4.87. : JSON response

Returns the following JSON document: route.json.json#/definitions/summaryList .

```
[
    {
        "topologyIndex": 1,
        "topologyObjectType": "routeSummary",
        "node": {
            "topoObjectType": "node",
            "nodeIndex": 7,
            "id": "0110.0000.0012",
            "topologyIndex": 1
        },
        "entries": 50
    },
    {
        "topologyIndex": 1,
        "topologyObjectType": "routeSummary",
        "node": {
            "topoObjectType": "node",
            "nodeIndex": 5,
            "id": "0110.0000.0010",
            "topologyIndex": 1
        },
        "entries": 98
    },
    {
        "topologyIndex": 1,
        "topologyObjectType": "routeSummary",
        "node": {
            "topoObjectType": "node",
            "nodeIndex": 6,
```

```
            "id": "0110.0000.0011",
            "topologyIndex": 1
        },
        "entries": 50
    }
]
```

4.13.2. getNodeRoutes

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/routes/{nodeIn-dex}`	Gets the routes maintained by NorthStar for a node.

Normal response codes: 200

4.13.2.1. Request

This table shows the URI parameters for the getnoderoutes request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{nodeIndex}`	Int	Program ID of a node.

This operation does not accept a request body.

4.13.2.2. Response

Example 4.88. : JSON response

Follows route.json#/definitions/routeList .

```
[
    {
        "topologyIndex": 1,
        "topologyObjectType": "route",
        "node": {
            "topoObjectType": "node",
            "nodeIndex": 7,
            "id": "0110.0000.0012",
            "topologyIndex": 1
        },
        "table": "inet.0",
        "prefix": {
            "topoObjectType": "prefix",
            "address": "10.4.4.0",
            "length": 24
        },
        "pathCookie": 190819980,
        "asPath": [
            "3",
            "4"
        ],
        "protocolNextHops": [
            "11.0.0.22",
            "11.0.0.31"
        ],
        "protocol": "BGP",
        "routePreference": 170,
```

```
            "localPreference": 100,
            "vpnLabel": 0
    },
    {
            "topologyIndex": 1,
            "topologyObjectType": "route",
            "node": {
                "topoObjectType": "node",
                "nodeIndex": 7,
                "id": "0110.0000.0012",
                "topologyIndex": 1
            },
            "table": "inet.0",
            "prefix": {
                "topoObjectType": "prefix",
                "address": "10.4.22.0",
                "length": 24
            },
            "pathCookie": 190821156,
            "asPath": [
                "2",
                "4"
            ],
            "protocolNextHops": [
                "11.0.0.22"
            ],
            "protocol": "BGP",
            "routePreference": 170,
            "localPreference": 100,
            "vpnLabel": 0
    }
]
```

4.14. IPE Policies

When generation of external nodes and links through BGP policy configuration is enabled, this API allows creating, retrieving, updating and deleting IPE Policies. Note: This API is currently experimental and subject to change in future releases.

The schema is: ipe.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/ipe/policy/ [GET : Gets all IPE policies, POST: Creates IPE Policies (bulk), PUT: Updates IPE Policies (bulk), DELETE: Deletes IPE Policies (bulk)]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/topology/<topology-id>/ipe/policy/<ipePolicyId> [GET : Gets single IPE]

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topology/{topology_id}/ipe/policy`	Get all IPE Policies
POST	`/v2/tenant/{tenant_id}/topology/{topology_id}/ipe/policy`	Create IPE Policies
PUT	`/v2/tenant/{tenant_id}/topology/{topology_id}/ipe/policy`	Update IPE Policies
DELETE	`/v2/tenant/{tenant_id}/topology/{topology_id}/ipe/policy`	Delete IPE Policies

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/ipe/poli-cy/{ipePolicyId}`	Get single IPE policy

4.14.1. getIPEPolicies

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Get all IPE Policies

Normal response codes: 200

4.14.1.1. Request

This table shows the URI parameters for the getipepolicies request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.14.1.2. Response

Example 4.89. : JSON response

```
{
    "ipe_policies": [
        {
            "id": 1,
            "node": {
                "id": "0110.0000.0011",
                "nodeIndex": 6,
                "topologyIndex": 1,
                "topoObjectType": "node"
            },
            "neighbor": "11.0.0.21",
            "prefix": "199.1.1.0/24",
            "priority": 1,
            "operationalStatus": "Up",
            "errorReason": "None"
        },
        {
            "id": 3,
            "node": {
                "id": "0110.0000.0011",
                "nodeIndex": 6,
                "topologyIndex": 1,
                "topoObjectType": "node"
            },
            "neighbor": "11.0.0.21",
            "prefix": "198.1.1.0/24",
            "priority": 3,
            "operationalStatus": "Up",
            "errorReason": "None"
        },
        {
```

```
            "id": 4,
            "node": {
                "id": "0110.0000.0012",
                "nodeIndex": 7,
                "topologyIndex": 1,
                "topoObjectType": "node"
            },
            "neighbor": "11.0.0.31",
            "prefix": "177.1.2.0/24",
            "priority": 5,
            "operationalStatus": "Up",
            "errorReason": "None"
        }
    ]
}
```

4.14.2. createIPEPolicies

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Create IPE Policies

Normal response codes: 202

4.14.2.1. Request

This table shows the URI parameters for the createipepolicies request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Required schema: ipe.json#/definitions/bulkIPECreate

This operation does not accept a request body.

4.14.2.2. Response

This operation does not return a response body.

This operation does not return a response body.

4.14.3. updateIPEPolicies

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Update IPE Policies

Normal response codes: 202

4.14.3.1. Request

This table shows the URI parameters for the updateipepolicies request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Required schema: ipe.json#/definitions/bulkIPEUpdate

This operation does not accept a request body.

4.14.3.2. Response

This operation does not return a response body.

This operation does not return a response body.

4.14.4. deleteIPEPolicies

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/ipe/policy`	Delete IPE Policies

Normal response codes: 202

4.14.4.1. Request

This table shows the URI parameters for the deleteipepolicies request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Required schema: ipe.json#/definitions/bulkIPEDelete

This operation does not accept a request body.

4.14.4.2. Response

This operation does not return a response body.

This operation does not return a response body.

4.14.5. getIPEPolicy

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/ipe/poli-cy/{ipePolicyId}`	Get single IPE policy

Normal response codes: 200

4.14.5.1. Request

This table shows the URI parameters for the getipepolicy request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{ipePolicyId}`	Int	Program ID of an IPE policy

This operation does not accept a request body.

4.14.5.2. Response

Example 4.90. : JSON response

```
{
    "id": 4,
    "node": {
      "id": "0110.0000.0012",
      "nodeIndex": 7,
      "topologyIndex": 1,
      "topoObjectType": "node"
    },
    "neighbor": "11.0.0.31",
    "prefix": "177.1.2.0/24",
    "priority": 5,
    "operationalStatus": "Up",
    "errorReason": "None"
  }
```

4.15. Analytics API

The analytics REST API allows to query the analytics data collected by NorthStar controller. Each URL accepts a POST request with as set of parameters refining the query.

Each queried object has specific counters. Those counters are dynamically generated based on the data collected. The queries are

- Interfaces: /NorthStar/API/v2/tenant/1/statistics/interfaces/fields

- LSP/demands: /NorthStar/API/v2/tenant/1/statistics/te-lsps/fields

- Interface delay/loss: /NorthStar/API/v2/tenant/1/statistics/delay/fields

The information returned is a JSON object with a fields property containing a list of strings. For instance:

```
{ "fields": [ "average_rtt", "jitter", "loss_percent", "max_rtt", "min_rtt",
"one_way" ]}
```

Other common parameters are startTime and endTime, Those parameter represent an absolute or relative time.

Absolute values can be either a string (ISO8601 format, date is required, time is optional) or an integer (milliseconds since epoch). The special value now is accepted.

The Date mathematic consist of a plus or minus followed by a time unit: y (year), M(month), w (week), d (day), h or H (hours), m (minutes) or s (seconds). For instance a query with startTime set to "now-1d", endTime "now" will retrieve the statistics for the last day. This field is based on ElasticSearch Date Math

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/statistics/demands/bulk`	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of counters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • demand (array): Array of demand objects. • endTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statistics/interfaces/delay/{device_name}/{interface_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. .

Method	URI	Description
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	/v2/tenant/{tenant_id}/statis-tics/interfaces/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interface (array): Array of interface objects. • endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/interfaces/fields	The POST request accepts a JSON object describing the query parameters. • endTime (Either string or integer): Date time. . • startTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/interfaces/top	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. . • size (integer): Max number of interfaces top return. .

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/statis-tics/interfaces/childtraf-fic/{device_name}/{interface_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-tics/interfaces/bulkdelay`	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interface (array): Array of interface objects. • endTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statis-tics/interfaces/traffic`	The POST request accepts a JSON object describing the query parameters. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality

Method	URI	Description
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/` `statistics/interfaces/traf-` `fic/{device_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/` `statistics/interfaces/traf-` `fic/{device_name}/{interface_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-` `tics/interfaces/topdelay`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max

Method	URI	Description
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• device (array): Array of node objects.
		• endTime (Either string or integer): Date time. .
		• size (integer): Max number of interfaces top return.
		.
POST	/v2/tenant/{tenant_id}/statis- tics/childtraffic/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interface (array): Array of interface objects.
		• endTime (Either string or integer): Date time. .
		.
POST	/v2/tenant/{tenant_id}/statis- tics/jnxcos/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interface (array): Array of interface objects.
		• endTime (Either string or integer): Date time. .

Method	URI	Description
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/delay/fields`	The POST request accepts a JSON object describing the query parameters. • endTime (Either string or integer): Date time. . • startTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/bulk`	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • startTime (Either string or integer): Date time. . • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • lsp (array): Array of lsp objects. • endTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/fields`	The POST request accepts a JSON object describing the query parameters. • endTime (Either string or integer): Date time. . • startTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/top`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. .

Method	URI	Description
		• size (number): ???.
		.
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/bulkdelay	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• startTime (Either string or integer): Date time. .
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• lsp (array): Array of lsp objects.
		• endTime (Either string or integer): Date time. .
		.
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/delay/{device_name}/ {lsp_name}	The POST request accepts a JSON object describing the query parameters.
		• counter (string): Name of the counter to aggregate by..
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		.
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/traffic	The POST request accepts a JSON object describing the query parameters.
		• endTime (Either string or integer): Date time. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min

Method	URI	Description
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/traffic/{device_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/ statistics/te-lsps/traf-fic/{device_name}/{lsp_name}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-tics/te-lsps/events/bulk`	The POST request accepts a JSON object describing the query parameters. • from (number): TODO. • startTime (Either string or integer): Date time. . • filter (object): Generic filter object, ???.

Method	URI	Description
		• lsp (array): Array of lsp objects. • endTime (Either string or integer): Date time. . • order : Result order (asc or desc).the value must be one of: • asc • desc • size (number): ???. .
POST	/v2/tenant/{tenant_id}/statis-tics/te-lsps/events/{lsp_name}	This query does not accept any parameter.
POST	/v2/tenant/{tenant_id}/statis-tics/device/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. . .
POST	/v2/tenant/{tenant_id}/statis-tics/device/top	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • device (array): Array of node objects. • endTime (Either string or integer): Date time. . • size (number): ???.

Method	URI	Description
		.
POST	`/v2/tenant/{tenant_id}/statis-tics/ldp-lsps/bulk`	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • startTime (Either string or integer): Date time. . • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • lsp (array): Array of lsp objects. • endTime (Either string or integer): Date time. . .
POST	`/v2/tenant/{tenant_id}/ statistics/ldp-lsps/traf-fic/{device_name}/{fec}`	The POST request accepts a JSON object describing the query parameters. • counter (string): Name of the counter to aggregate by.. • endTime (Either string or integer): Date time. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • interval (string): Time duration for instance 1d, 1y, 24h,. .
POST	`/v2/tenant/{tenant_id}/statis-tics/netflow/prefix_flow_demand`	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of coun-ters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max

Method	URI	Description
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• demand (array): Array of demand objects.
		• endTime (Either string or integer): Date time. .
		.
POST	/v2/tenant/{tenant_id}/statis-tics/sid/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• sid (array): Array of sid objects.
		• endTime (Either string or integer): Date time. .
		.
POST	/v2/tenant/{tenant_id}/statis-tics/sr-te-policy/bulk	The POST request accepts a JSON object describing the query parameters.
		• interval (string): Time duration for instance 1d, 1y, 24h,.
		• counter : Either a single counter or an array of coun-ters. .
		• aggregation (string): Aggregation function to use to aggregate values.the value must be one of:
		• avg
		• max
		• min
		• cardinality
		• sum
		• startTime (Either string or integer): Date time. .
		• policy (array): Array of policy objects.
		• endTime (Either string or integer): Date time. .
		.

Method	URI	Description
POST	/v2/tenant/{tenant_id}/statistics/te-containers/traffic/bulk	The POST request accepts a JSON object describing the query parameters. • interval (string): Time duration for instance 1d, 1y, 24h,. • counter : Either a single counter or an array of counters. . • aggregation (string): Aggregation function to use to aggregate values.the value must be one of: • avg • max • min • cardinality • sum • startTime (Either string or integer): Date time. . • containerLsp (array): Array of Container LSP objects. • endTime (Either string or integer): Date time. . .

4.16. Transport Topology acquisition

Enables configuration of the NorthStar connection to the transport controller for retrieval of abstracted transport topology and automation of addition of information to the IP layer.

The corresponding schema is: transportController.json .

The following tables show the set of parameters describing a transport controller configuration.

Table 4.6. Create Transport controller Attributes

Attribute	Type	Fixed	Description
name	string	No	Transport controller name
notifyUrl	string	No	The REST/RESTCONF URL publishing (via Server-Sent-event) topology notifications
profileName	string	No	The profile group name the NorthStar controller must use to connect to the transport controller instances.
topologyUrl	string	No	The URL providing the abstract topology, following the IETF model supported by NorthStar .
topoObjectType	string	Yes	transportController

The other parameters are:

Table 4.7. Create Transport controller optional Attributes

Attribute	Type	Fixed	Description
interfaceType	string	No	Indicates whether the transport controller interface follows the RESTCONF draft or a more simple REST interface. This does not affect the NorthStar Operation.
pollUrl	string	No	The URL on the server to poll server liveliness, by default /.well-known/host-meta.
reconnectTimeout	string	No	The time, in seconds, between two reconnect attempts between controller instances.
rootUrl	string	No	Default root URL for RESTCONF datastores.
srlgPrefix	string	No	Use the SRLG prefix to generate the SRLGs for the IP topology. If set, the SRLGs will be TSRLG_<srlgPrefix>_<SRLG>, otherwise TSRLG_<SRLG>. This permits you to either separate or merge two controller SRLG spaces. By default, SRLG is not set, or it has an empty string which corresponds to merging the SRLGs space.
topologyToUse	string	No	The transport controller might return several topologies. This field permits you to select a specific topology to apply as a filter to the model te-topology-id field.

Method	URI	Description
GET	/v2/tenant/{tenant_id}/transport-Controllers	Returns a full list of the transport controllers using the following schema: transportController.json#/definitions/transportControllerList
POST	/v2/tenant/{tenant_id}/transport-Controllers	Creates a transport controller using the following schema: transportController.json#/definitions/createTransportController
GET	/v2/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Returns the configuration of a transport controller.
PUT	/v2/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Updates a transport controller using the following schema: transportController.json#/definitions/updateTransportController The parameters are the same as for transport controller creation. A parameter change triggers reconnection to the transport controller using the new parameters.
DELETE	/v2/tenant/{tenant_id}/transport-Controllers/{transportControllerIndex}	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport controller are not deleted. You must delete them manually, if required.

4.16.1. Get Transport Controller List

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/transport-Controllers`	Returns a full list of the transport controllers using the following schema: transportController.json#/definitions/transportControllerList

Normal response codes: 200

4.16.1.1. Request

This table shows the URI parameters for the get transport controller list request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.16.1.2. Response

Example 4.91. Get Transport Controller List: JSON response

```
[
  {
    "transportControllerIndex": 1,
    "name": "Nortel",
    "interfaceType": "RESTCONF",
    "notifyUrl": "/streams/NETCONF-JSON",
    "pollUrl": "",
    "profileName": "NortelProfile",
    "reconnectTimeout": 10,
    "rootUrl": "",
    "srlgPrefix": "",
    "topologyToUse": "",
    "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
    "topoObjectType": "transportController"
  }
]
```

4.16.2. Create Transport Controller Configuration

Method	URI	Description
POST	/v2/tenant/{tenant_id}/transport-Controllers	Creates a transport controller using the following schema: transportController.json#/definitions/createTransportController

Normal response codes: 201

4.16.2.1. Request

This table shows the URI parameters for the create transport controller configuration request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.92. Create Transport Controller Configuration: JSON request

```
{
    "name": "Nortel",
    "topologyModel":"ietf-te-topology-01",
    "interfaceType": "RESTCONF",
    "notifyUrl": "/streams/NETCONF-JSON",
    "profileName": "NortelProfile",
    "reconnectTimeout": 10,
    "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
    "topoObjectType": "transportController"
}
```

4.16.2.2. Response

Example 4.93. Create Transport Controller Configuration: JSON response

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "topologyModel":"ietf-te-topology-01",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

4.16.3. Get Transport Controller Configuration

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}`	Returns the configuration of a transport controller.

Normal response codes: 200

4.16.3.1. Request

This table shows the URI parameters for the get transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{transportControl-lerIndex}`	Int	The unique transportControllerIndex.

This operation does not accept a request body.

4.16.3.2. Response

Example 4.94. Get Transport Controller Configuration: JSON response

Returns the following JSON document: transportController.json#/definitions/transportCon-troller .

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "topologyModel":"ietf-te-topology-01",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

4.16.4. Update Transport Controller Configuration

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}`	Updates a transport controller using the following schema: transportController.json#/definitions/updateTransport-Controller The parameters are the same as for transport controller creation. A parameter change triggers reconnection to the transport controller using the new parameters.

Normal response codes: 202

4.16.4.1. Request

This table shows the URI parameters for the update transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{transportControl-lerIndex}`	Int	The unique transportControllerIndex.

Example 4.95. Update Transport Controller Configuration: JSON request

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "srlgPrefix": "space1",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

4.16.4.2. Response

Example 4.96. Update Transport Controller Configuration: JSON response

```
{
  "name": "Nortel",
  "interfaceType": "RESTCONF",
  "notifyUrl": "/streams/NETCONF-JSON",
  "profileName": "NortelProfile",
  "reconnectTimeout": 10,
  "topologyUrl": "/restconf/data/ietf-te-topology:te-topologies-state",
  "srlgPrefix": "space1",
  "topoObjectType": "transportController",
  "transportControllerIndex": 1
}
```

4.16.5. Delete Transport Controller Configuration

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/transport-Controllers/{transportControl-lerIndex}`	Deletes a transport controller configuration. The transport node, link, and circuits created from that transport controller are not deleted. You must delete them manually, if required.

Normal response codes: 204

4.16.5.1. Request

This table shows the URI parameters for the delete transport controller configuration request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{transportControl-lerIndex}`	Int	The unique transportControllerIndex.

This operation does not accept a request body.

4.17. Transport Topology devices

Manages a set of instances of a transport controller.

The corresponding schema is: transportControllerEndpoint.json .

The devices are managed as group of devices. For each device the following parameters can be managed:

Table 4.8. Create Transport controller Attributes

Attribute	Type	Fixed	Description
ipAddr	string	No	IP address to connect
accessMethod	string	No	Either HTTP or HTTPS
authMethod	string	No	Authentication method; can be BASIC or NOAUTH

The other parameters are:

Table 4.9. Create transport controller optional attributes

Attribute	Type	Fixed	Description
hostName	string	No	Device name.
httpPort	int	No	HTTP port.
login	string	Yes	Login to be used for the BASIC auth.
passwd	string	Yes	Encrypted password to be used for the BASIC auth.

Attribute	Type	Fixed	Description
retry	int	No	Number of retries for the heartbeat, before the device is considered down.
timeout	int	No	Request timeout for the device.

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Returns the full list of transport controller groups using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupList .
POST	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Creates a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .
DELETE	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Deletes a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription
GET	`/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Returns a list of transport controller groups using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup The password is set by empty strings.
POST	`/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Creates devices in a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup
PUT	`/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Updates devices in a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup
DELETE	`/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Deletes devices from a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup

4.17.1. Get Transport Controller Device Groups

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Returns the full list of transport controller groups using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupList .

Normal response codes: 200

4.17.1.1. Request

This table shows the URI parameters for the get transport controller device groups request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.17.1.2. Response

Example 4.97. Get Transport Controller Device Groups: JSON response

```
[
  {
    "name": "NortelProfile"
  },
  {
    "name": "Default"
  }
]
```

4.17.2. Create A Transport Controller Device Group

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Creates a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription .

The request must contain the group name to be created, as shown in the example.

Normal response codes: 201

4.17.2.1. Request

This table shows the URI parameters for the create a transport controller device group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.98. Create A Transport Controller Device Group: JSON request

```
{
    "name": "NortelProfile",
    "profileType": "Network Controllers"
}
```

4.17.2.2. Response

Example 4.99. Create A Transport Controller Device Group: JSON response

```
{
  "success": true
}
```

4.17.3. Delete a Transport Controller Device Group

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/transport-ControllerGroups`	Deletes a group of transport controller devices using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroupDescription

The request must contain the group name to be deleted, as shown in the example.

Normal response codes: 201

4.17.3.1. Request

This table shows the URI parameters for the delete a transport controller device group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.100. Delete a Transport Controller Device Group: JSON request

```
{
    "name": "NortelProfile",
    "profileType": "Network Controllers"
}
```

4.17.3.2. Response

Example 4.101. Delete a Transport Controller Device Group: JSON response

```
{
  "success": true
}
```

4.17.4. Get Transport Controller Device Groups

Method	URI	Description
GET	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Returns a list of transport controller groups using the fol-lowing schema: transportControllerEndpoint.json#/defi-nitions/transportControllerGroup The password is set by empty strings.

Normal response codes: 200

4.17.4.1. Request

This table shows the URI parameters for the get transport controller device groups request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{transportController-GroupName}	String	The name of the transport controller devices group.

This operation does not accept a request body.

4.17.4.2. Response

Example 4.102. Get Transport Controller Device Groups: JSON response

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.3",
    "login": "Login2",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  },
  {
    "id": "7bcf5b8a-30f4-46ad-9a51-29daac671587",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.2",
    "login": "Login",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  }
]
```

4.17.5. Create New Devices in a Group

Method	URI	Description
POST	/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}	Creates devices in a group using the following schema: transportControllerEndpoint.json#/definitions/transport-ControllerGroup

The request contains a list of devices to be created.

Normal response codes: 201

4.17.5.1. Request

This table shows the URI parameters for the create new devices in a group request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{transportController-GroupName}	String	The name of the transport controller devices group.

Example 4.103. Create New Devices in a Group: JSON request

```
[
    {
        "accessMethod": "HTTP",
        "authMethod": "BASIC",
        "hostName": "",
        "httpPort": 80,
        "ipAddr": "10.0.1.2",
        "login": "Login",
        "passwd" : "XYXYXYXYXYX",
        "retry": 3,
        "timeout": 2
    },
    {
        "accessMethod": "HTTP",
        "authMethod": "BASIC",
        "hostName": "",
        "httpPort": 80,
        "ipAddr": "10.0.1.3",
        "login": "Login2",
        "passwd" : "XYXYXYXYXYX",
        "retry": 3,
        "timeout": 2
    }
]
```

4.17.5.2. Response

Example 4.104. Create New Devices in a Group: JSON response

```
{
    "success": true
}
```

4.17.6. Update Devices in the Group

Method	URI	Description

PUT	`/v2/tenant/{tenant_id}/transport-`
	`ControllerGroups/{transportCon-`
	`trollerGroupName}`
		Updates devices in a group using the following schema: [transportControllerEndpoint.json#/definitions/transport-](#)[ControllerGroup](#)

The request contains a list of devices to be updated. The id parameter is required.

Normal response codes: 201

4.17.6.1. Request

This table shows the URI parameters for the update devices in the group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{transportController-` `GroupName}`	String	The name of the transport controller devices group.

Example 4.105. Update Devices in the Group: JSON request

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf",
    "accessMethod": "HTTP",
    "authMethod": "BASIC",
    "hostName": "",
    "httpPort": 80,
    "ipAddr": "10.0.1.3",
    "login": "Login3",
    "passwd": "",
    "retry": 3,
    "timeout": 2
  }
]
```

4.17.6.2. Response

Example 4.106. Update Devices in the Group: JSON response

```
{
  "success": true
}
```

4.17.7. Delete Devices in the Group

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/transport-ControllerGroups/{transportCon-trollerGroupName}`	Deletes devices from a group using the following schema: transportControllerEndpoint.json#/definitions/transportControllerGroup

The request contains a list of devices to be deleted. The id parameter is required, while other parameters are ignored.

Normal response codes: 201

4.17.7.1. Request

This table shows the URI parameters for the delete devices in the group request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{transportController-GroupName}`	String	The name of the transport controller devices group.

Example 4.107. Delete Devices in the Group: JSON request

```
[
  {
    "id": "91172e83-7b45-422c-ac1e-1940fb9a7ddf"
  }
]
```

4.17.7.2. Response

Example 4.108. Delete Devices in the Group: JSON response

```
{
  "success": true
}
```

4.18. High Availability API

Permits monitoring and configuration of NorthStar high availability cluster.

The corresponding schema is: ha.json .

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/highAvailability/hosts`	Get the status of all of the nodes and processes in the cluster.
GET	`/v2/tenant/{tenant_id}/highAvailability/zkstatus`	Gets status of all of the zookeeper clusters. .
GET	`/v2/tenant/{tenant_id}/highAvailability/highAvailability`	Returns the list of preferences.

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/highAvail-` `ability/highAvailability`	Sets the node preferences.
POST	`/v2/tenant/{tenant_id}/highAvail-` `ability/stepdown`	Triggers a switchover.

4.18.1. Get the Status of the Cluster

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/highAvail-ability/hosts`	Get the status of all of the nodes and processes in the cluster.

Normal response codes: 200

4.18.1.1. Request

This table shows the URI parameters for the get the status of the cluster request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.18.1.2. Response

Example 4.109. Get the Status of the Cluster: JSON response

The response returned by the server conforms to: ha.json#/definitions/hostList . The data indicates which nodes are in the cluster and the processes running on each node. The role indicates the current role of the node and has the following two components: - Indicator for Active or Standby; the Active node is where the path computation is running. - Indicator for whether node is running as HA coordinator. This does not reflect the status of the zookeeper master available in a different URL.

```
[
  {
    "hostname": "northstar-cluster-3",
    "ipv4": "10.0.0.1",
    "status": "Up",
    "role": "Standby,Coordinator",
    "version": "2.0.0-20160216_081948.x86_64",
    "processes": [
      {
        "processId": 26683,
        "processName": "junosvm",
        "startTime": "2016-02-16T19:24:07.000Z",
        "role": "Standby"
      },
      {
        "processId": 8389,
        "processName": "zookeeper",
        "startTime": "2016-02-16T22:54:15.000Z",
        "role": "Standby"
      },
      {
        "processId": 12347,
        "processName": "ha_agent",
        "startTime": "2016-02-16T23:07:09.000Z",
        "role": "Standby"
      },
      {
```

```
      "processId": 12276,
      "processName": "npat",
      "startTime": "2016-02-16T23:06:56.000Z",
      "role": "Standby"
    },
    {
      "processId": 12243,
      "processName": "pceserver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 12192,
      "processName": "nodejs",
      "startTime": "2016-02-16T23:06:44.000Z",
      "role": "Standby"
    },
    {
      "processId": 7821,
      "processName": "rabbitmq",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processName": "keepalived",
      "startTime": "2016-02-16T19:59:46.000Z",
      "role": "Standby"
    },
    {
      "processId": 12248,
      "processName": "toposerver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 8138,
      "processName": "cassandra",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processId": 3455,
      "processName": "haproxy",
      "startTime": "2016-02-16T19:59:46.000Z",
      "role": "Standby"
    },
    {
      "processId": 8453,
      "processName": "listener1_00",
      "startTime": "2016-02-16T22:54:12.000Z",
      "role": "Standby"
    },
    {
      "processId": 12255,
      "processName": "pceserver",
      "startTime": "2016-02-16T23:06:54.000Z",
      "role": "Standby"
    },
    {
      "processId": 12268,
```

```
          "processName": "mladapter",
          "startTime": "2016-02-16T23:06:56.000Z",
          "role": "Standby"
        },
        {
          "processId": 12242,
          "processName": "npat_ro",
          "startTime": "2016-02-16T23:06:54.000Z",
          "role": "Standby"
        }
      ]
    },
    {
      "hostname": "northstar-cluster-2",
      "ipv4": "10.0.0.2",
      "status": "Up",
      "role": "Standby",
      "version": "2.0.0-20160216_081948.x86_64",
      "processes": [
        {
          "processId": 5427,
          "processName": "junosvm",
          "startTime": "2016-02-16T19:23:29.000Z",
          "role": "Standby"
        },
        {
          "processId": 18452,
          "processName": "zookeeper",
          "startTime": "2016-02-16T22:49:58.000Z",
          "role": "Standby"
        },
        {
          "processId": 22489,
          "processName": "ha_agent",
          "startTime": "2016-02-16T23:08:13.000Z",
          "role": "Standby"
        },
        {
          "processId": 22419,
          "processName": "npat",
          "startTime": "2016-02-16T23:08:01.000Z",
          "role": "Standby"
        },
        {
          "processId": 22387,
          "processName": "pceserver",
          "startTime": "2016-02-16T23:07:59.000Z",
          "role": "Standby"
        },
        {
          "processId": 22344,
          "processName": "nodejs",
          "startTime": "2016-02-16T23:07:49.000Z",
          "role": "Standby"
        },
        {
          "processId": 17884,
          "processName": "rabbitmq",
          "startTime": "2016-02-16T22:49:55.000Z",
          "role": "Standby"
```

```
      },
      {
        "processName": "keepalived",
        "startTime": "2016-02-16T19:44:45.000Z",
        "role": "Standby"
      },
      {
        "processId": 22393,
        "processName": "toposerver",
        "startTime": "2016-02-16T23:07:59.000Z",
        "role": "Standby"
      },
      {
        "processId": 18196,
        "processName": "cassandra",
        "startTime": "2016-02-16T22:49:55.000Z",
        "role": "Standby"
      },
      {
        "processId": 11334,
        "processName": "haproxy",
        "startTime": "2016-02-16T19:44:45.000Z",
        "role": "Standby"
      },
      {
        "processId": 18516,
        "processName": "listener1_00",
        "startTime": "2016-02-16T22:49:55.000Z",
        "role": "Standby"
      },
      {
        "processId": 22404,
        "processName": "pcserver",
        "startTime": "2016-02-16T23:07:59.000Z",
        "role": "Standby"
      },
      {
        "processId": 22411,
        "processName": "mladapter",
        "startTime": "2016-02-16T23:08:00.000Z",
        "role": "Standby"
      },
      {
        "processId": 22386,
        "processName": "npat_ro",
        "startTime": "2016-02-16T23:07:59.000Z",
        "role": "Standby"
      }
    ]
  },
  {
    "hostname": "northstar-cluster-1",
    "ipv4": "10.0.0.3",
    "status": "Up",
    "role": "Active",
    "version": "2.0.0-20160216_081948.x86_64",
    "processes": [
      {
        "processId": 11420,
        "processName": "junosvm",
```

```
        "startTime": "2016-02-16T19:24:28.000Z",
        "role": "Active"
      },
      {
        "processId": 23745,
        "processName": "zookeeper",
        "startTime": "2016-02-16T22:47:26.000Z",
        "role": "Active"
      },
      {
        "processId": 27746,
        "processName": "ha_agent",
        "startTime": "2016-02-16T23:08:19.000Z",
        "role": "Active"
      },
      {
        "processId": 28375,
        "processName": "npat",
        "startTime": "2016-02-16T23:10:57.000Z",
        "role": "Active"
      },
      {
        "processId": 27799,
        "processName": "pceserver",
        "startTime": "2016-02-16T23:08:35.000Z",
        "role": "Active"
      },
      {
        "processId": 27604,
        "processName": "nodejs",
        "startTime": "2016-02-16T23:07:55.000Z",
        "role": "Active"
      },
      {
        "processId": 23190,
        "processName": "rabbitmq",
        "startTime": "2016-02-16T22:47:23.000Z",
        "role": "Active"
      },
      {
        "processId": 28379,
        "processName": "keepalived",
        "startTime": "2016-02-16T23:10:57.000Z",
        "role": "Active"
      },
      {
        "processId": 28358,
        "processName": "toposerver",
        "startTime": "2016-02-16T23:10:56.000Z",
        "role": "Active"
      },
      {
        "processId": 23505,
        "processName": "cassandra",
        "startTime": "2016-02-16T22:47:23.000Z",
        "role": "Active"
      },
      {
        "processId": 13960,
        "processName": "haproxy",
```

```
      "startTime": "2016-02-16T19:29:31.000Z",
      "role": "Active"
    },
    {
      "processId": 23806,
      "processName": "listener1_00",
      "startTime": "2016-02-16T22:47:23.000Z",
      "role": "Active"
    },
    {
      "processId": 27848,
      "processName": "pcserver",
      "startTime": "2016-02-16T23:08:45.000Z",
      "role": "Active"
    },
    {
      "processId": 28360,
      "processName": "mladapter",
      "startTime": "2016-02-16T23:10:56.000Z",
      "role": "Active"
    },
    {
      "processId": 28357,
      "processName": "npat_ro",
      "startTime": "2016-02-16T23:10:56.000Z",
      "role": "Active"
    }
  ]
 }
]
```

4.18.2. Get Zookeeper Cluster Status

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/highAvail-ability/zkstatus`	Gets status of all of the zookeeper clusters. .

Normal response codes: 200

4.18.2.1. Request

This table shows the URI parameters for the get zookeeper cluster status request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.18.2.2. Response

Example 4.110. Get Zookeeper Cluster Status: JSON response

The response returned by the server conforms to: ha.json#/definitions/zookeeperSta-tus . NorthStar uses a zookeeper cluster to coordinate nodes. The endpoint provides the zookeeper subsystem's status. During normal maintenance, you must check this informa-tion, because a failure of the zookeeper master could, in some cases, trigger a switchover.

```
{
  "master": "northstar-cluster-2",
  "followers": [
    {
      "ip": "10.0.0.1",
      "synced": true,
      "host": "northstar-cluster-3"
    },
    {
      "ip": "10.0.0.3",
      "synced": true,
      "host": "northstar-cluster-1"
    }
  ]
}
```

4.18.3. Get the List of Preferences

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/highAvail-ability/highAvailability`	Returns the list of preferences.

Normal response codes: 200

4.18.3.1. Request

This table shows the URI parameters for the get the list of preferences request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.18.3.2. Response

Example 4.111. Get the List of Preferences: JSON response

Returns the following JSON document: ha.json#/definitions/highAvailability .

```
[
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-3",
    "priority": 0
  },
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-2",
    "priority": 0
  },
  {
    "preferenceType": "primaryNode",
    "host": "northstar-cluster-1",
    "priority": 0
  }
]
```

4.18.4. Modify the Node Preferences

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/highAvail-` `ability/highAvailability`	Sets the node preferences.

4.18.4.1. Request

This table shows the URI parameters for the modify the node preferences request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The JSON document should use the following schema: ha.json#/definitions/highAvailability You must set the new preferences for the node.

This operation does not accept a request body.

4.18.5. Request the Primary Node to Step Down

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/highAvail-ability/stepdown`	Triggers a switchover.

4.18.5.1. Request

This table shows the URI parameters for the request the primary node to step down request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

The request body must be empty.

This operation does not accept a request body.

4.19. Path Computation API

The path computation APIs enable you to compute a path on the TE topology without creating an LSP. It supports the TE-LSP API constraints. The LSP is assumed to be an RSVP LSP by default. The SR-TE path is supported by using the provisioningType parameter, as described in pathComputation.json, and illustrated in the following example:

NOTE: The path computation API for SR-TE provides only the path and does not provide the SIDs.

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/pathComputation`	Use the following schema to request for a path computation: pathComputation.json#/definitions/pathComputationRequests . Response: pathComputation.json#/definitions/pathComputationResponses .

4.19.1. computePath

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/pathComputation`	Use the following schema to request for a path computation: pathComputation.json#/definitions/pathComputationRequests . Response: pathComputation.json#/definitions/pathComputationResponses .

The request/response example illustrates a set of three path computation requests. The first request is successful. The two subsequent requests cannot be computed due to routing constraints because there is no path with fewer than two hops and no path that can carry 100G in the topology. All of the paths in the request list are computed in the order they are specified. This API does NOT re-shuffle the request order to optimize the solution or the constraints. No bandwidth is reserved by the path computation request. For example, if only 5G is available between two nodes, one path computation requesting two paths with 3G each will return a partial result, where only the first path is calculated.

Normal response codes: 201

4.19.1.1. Request

This table shows the URI parameters for the computepath request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.112. : JSON request

```
{"requests" :
 [
    {"from": {"topoObjectType": "ipv4","address": "11.0.0.101"},
     "to"  : {"topoObjectType": "ipv4","address": "11.0.0.104"},
     "bandwidth" : 1000000,"design" :{"maxDelay":5},"extra" :"allowed"
    },
    {"from": {"topoObjectType": "ipv4","address": "11.0.0.104"},
     "to"  : {"topoObjectType": "ipv4","address": "11.0.0.101"},
    "bandwidth" : 1000000,"design" :{"maxHop":2}
    },
    {"from": {"topoObjectType": "ipv4","address": "11.0.0.102"},
     "to"  : {"topoObjectType": "ipv4","address": "11.0.0.103"},
     "bandwidth" : "100G"}
 ]
}
```

4.19.1.2. Response

Example 4.113. : JSON response

```
{
  "result": "partial",
  "responses": [
```

```
        {"from": {"topoObjectType": "ipv4","address": "11.0.0.101"},
         "to"   : {"topoObjectType": "ipv4","address": "11.0.0.104"},
         "bandwidth" : 1000000,"design" :{"maxDelay":5},"extra" :"allowed",
         "status": "success",
         "path": [
             {"topoObjectType": "ipv4","address": "11.101.105.2"},
             {"topoObjectType": "ipv4","address": "11.105.107.2"},
             {"topoObjectType": "ipv4","address": "11.114.117.1"}
         ]
        },
        {"from": {"topoObjectType": "ipv4","address": "11.0.0.104"},
         "to"   : {"topoObjectType": "ipv4","address": "11.0.0.101"},
         "bandwidth" : 1000000,"design" :{"maxHop":2},
         "status": "noPathAvailable"
        },
        {"from": {"topoObjectType": "ipv4","address": "11.0.0.102"},
         "to"   : {"topoObjectType": "ipv4","address": "11.0.0.103"},
         "bandwidth" : "100G",
         "status": "noPathAvailable"
        }
    ]
}
```

4.20. Maintenance API

Use these endpoints to work with maintenance.

The corresponding schema is: maintenance.json .

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/maintenances`	Returns a full list of Maintenance.
POST	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/maintenances`	Create a new maintenance using the following schema: maintenance.json#/definitions/createMaintenance .
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/stream`	See EventSource for format. The notifications send on that stream are only maintenanceEvent. The data will contain a JSON document (see NorthStar Notification API).
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Returns the details of a specified maintenance.
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Modify a specific maintenance.
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Delete a specific maintenance.

4.20.1. Get Maintenance

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/maintenances`	Returns a full list of Maintenance.

Normal response codes: 200

4.20.1.1. Request

This table shows the URI parameters for the get maintenance request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.20.1.2. Response

Example 4.114. Get Maintenance: JSON response

```
[
    {
        "topoObjectType": "maintenance",
        "topologyIndex": 1,
        "maintenanceIndex": 1,
        "user": "admin",
        "name": "1LinkMaint1",
        "status": "planned",
        "startTime": "2018-04-20T17:00:00Z",
        "endTime": "2018-04-20T17:30:00Z",
        "elements": [
            {
                "topoObjectType": "link",
                "index": 8,
                "id": "L11.105.107.1_11.105.107.2"
            }
        ]
    },
    {
        "topoObjectType": "maintenance",
        "topologyIndex": 1,
        "maintenanceIndex": 2,
        "user": "admin",
        "name": "1LinkMaint",
        "status": "planned",
        "startTime": "2018-04-20T17:00:00Z",
        "endTime": "2018-04-20T17:30:00Z",
        "elements": [
            {
                "topoObjectType": "link",
                "index": 8,
```

```
                "id": "L11.105.107.1_11.105.107.2"
            }
        ]
    }
]
```

4.20.2. Create a new maintenance

Method	URI	Description
POST	/v2/tenant/{tenant_id}/topolo-gy/{topology_id}/maintenances	Create a new maintenance using the following schema: maintenance.json#/definitions/createMaintenance .

Normal response codes: 200

4.20.2.1. Request

This table shows the URI parameters for the create a new maintenance request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{topologyId}	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

Example 4.115. Create a new maintenance: JSON request

```
{
"topoObjectType": "maintenance",
"topologyIndex": 1,
"startTime": "20180220T120700",
"endTime": "20180220T120700",
    "name": "2LinksMaint",
    "elements": [
        {
            "topoObjectType": "link",
            "index": 1
        },
        {
            "topoObjectType": "link",
            "index": 3
        }
    ]
}
```

4.20.2.2. Response

Example 4.116. Create a new maintenance: JSON response

```
{
    "topoObjectType": "maintenance",
    "topologyIndex": 1,
    "maintenanceIndex": 3,
    "user": "admin",
    "name": "2LinksMaint",
    "status": "planned",
    "startTime": "2018-04-20T16:07:00Z",
    "endTime": "2018-04-20T16:15:00Z",
    "elements": [
        {
            "topoObjectType": "link",
            "index": 1,
```

```
                "id": "L11.101.105.1_11.101.105.2"
        },
        {
                "topoObjectType": "link",
                "index": 3,
                "id": "L11.102.105.1_11.102.105.2"
        }
    ]
}
```

4.20.3. Start a SSE Stream

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/stream`	See EventSource for format. The notifications send on that stream are only maintenanceEvent. The data will contain a JSON document (see NorthStar Notification API).

Normal response codes: 200

4.20.3.1. Request

This table shows the URI parameters for the start a sse stream request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.20.4. Get a Specific Maintenance

Method	URI	Description

GET	`/v2/tenant/{tenant_id}/topol-`
	`ogy/{topology_id}/mainte-`
	`nances/{maintenanceIndex}`
		Returns the details of a specified maintenance.

Normal response codes: 200

4.20.4.1. Request

This table shows the URI parameters for the get a specific maintenance request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{maintenanceIndex}`	Int	The unique maintenanceIndex.

This operation does not accept a request body.

4.20.4.2. Response

Example 4.117. Get a Specific Maintenance: JSON response

```
{
    "topoObjectType": "maintenance",
    "topologyIndex": 1,
    "maintenanceIndex": 2,
    "user": "admin",
    "name": "1LinkMaint",
    "status": "planned",
    "startTime": "2018-04-20T17:00:00Z",
    "endTime": "2018-04-20T17:30:00Z",
    "elements": [
        {
            "topoObjectType": "link",
            "index": 8,
            "id": "L11.105.107.1_11.105.107.2"
        }
    ]
}
```

4.20.5. Update a Specific Maintenance

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Modify a specific maintenance.

Normal response codes: 200

4.20.5.1. Request

This table shows the URI parameters for the update a specific maintenance request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{maintenanceIndex}`	Int	The unique maintenanceIndex.

Example 4.118. Update a Specific Maintenance: JSON request

```
{
  "topoObjectType": "maintenance",
  "topologyIndex": 1,
  "startTime": "20180408T154500",
  "endTime": "20180408T155000",
  "maintenanceIndex": 2,
    "name": "1LinkMaint",
    "elements": [
        {
            "topoObjectType": "link",
            "index": 1
        },
        {
            "topoObjectType": "link",
            "index": 2
        }
    ]
}
```

4.20.5.2. Response

Example 4.119. Update a Specific Maintenance: JSON response

```
{
    "topoObjectType": "maintenance",
    "topologyIndex": 1,
    "maintenanceIndex": 2,
    "user": "admin",
    "name": "1LinkMaint",
    "status": "planned",
    "startTime": "2018-04-08T20:45:00Z",
    "endTime": "2018-04-08T20:50:00Z",
    "elements": [
```

```
        {
            "topoObjectType": "link",
            "index": 1,
            "id": "L11.101.105.1_11.101.105.2"
        },
        {
            "topoObjectType": "link",
            "index": 2,
            "id": "L11.102.105.1_11.102.105.2"
        }
    ]
}
```

4.20.6. Delete a Specific Maintenance

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/topol-ogy/{topology_id}/mainte-nances/{maintenanceIndex}`	Delete a specific maintenance.

4.20.6.1. Request

This table shows the URI parameters for the delete a specific maintenance request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{topologyId}`	Int	A unique identifier for the topology. In NorthStar version 2, the unique identifier is set to 1.
`{maintenanceIndex}`	Int	The unique maintenanceIndex.

This operation does not accept a request body.

4.21. RPCs

Remote Procedure Call (RPC) REST APIs allow subroutines that are written for NorthStar Planner to be utilized via the REST API. For instance Diverse P2MP Tree Design and Bandwidth Calendaring Simulation functionality can be called via these RPC type of REST APIs.

The corresponding schema is: rpcs.json .

4.22. Path Optimization RPC

These REST APIs are used to perform global or targeted path optimizations runs. The REST POST without a request body is used to call the global path optimization and with a request body to call the targeted path optimization functionalities. The REST GET is used to return the last global path optimization result that shows the difference between the previous vs. the optimized results. The REST GET doesn't support for targeted path optimization.

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger global path optimization.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Get last global path optimization results.
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger targeted path optimization.

4.22.1. global_Optimize.post

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger global path optimization.

The request body must be empty. The response returned by the server conforms to: rpcs.json#/definitions/optimizationResponse .

Normal response codes: 201

4.22.1.1. Request

This table shows the URI parameters for the global_optimize.post request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.22.1.2. Response

Example 4.120. : JSON response

```
{
    "result ": "Path optimization started."
}
```

4.22.2. global_Optimize.get

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Get last global path optimization results.

The response returned by the server conforms to: rpcs.json#/definitions/optimizationStatus
.

Normal response codes: 201

4.22.2.1. Request

This table shows the URI parameters for the global_optimize.get request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.22.2.2. Response

Example 4.121. : JSON response

```
{
    "previous": {
        "bandwidth": 20000000,
        "hopCount": 98,
        "latency": 5
    },
    "optimized": {
        "bandwidth": 17000000,
        "hopCount": 85,
        "latency": 4
    },
    "numberOfOptimizedPaths": 6,
    "maxHopCount": 5,
    "maxLatency": 0.6,
    "tunnelCount": 21,
    "lastOptimizationTimeStamp": "2017-12-01T12:02:36.367Z"
}
```

4.22.3. targeted_Optimize.post

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/optimize`	Trigger targeted path optimization.

The request body must not be empty. The body consists of a list of elements. The elements can be either LSP, link or mixed. The elements are identified by the element index number. The response consists of a list of candidate elements to be optimized.

The response returned by the server conforms to: rpcs.json#/definitions/optimizationRe-sponse .

Normal response codes: 201

4.22.3.1. Request

This table shows the URI parameters for the targeted_optimize.post request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.122. : JSON request

```
{
    "elements":[
        {
            "index":1,
            "topoObjectType":"lsp"
        },
        {
            "index":3,
            "topoObjectType":"lsp"
        },
        {
            "index":47,
            "topoObjectType":"lsp"
        }
    ]
}
```

4.22.3.2. Response

Example 4.123. : JSON response

```
{
    "elements":[
        {
            "topoObjectType":"lsp",
            "index":1
        },
        {
            "topoObjectType":"lsp",
            "index":3
        }
```

```
        ]
}
```

4.23. Routing and Failure Simulation RPC

The routing and failure simulation APIs are used to simulate bandwidth calendaring (time based) and failure. Use the first REST POST function to perform routing simulation or failure simulation. Use the subsequent three REST GET operations to return the reports to the calling program for further analysis.

NOTE: Starting from Northstar release 4.1, all the requests are timestamped.

Use the following API to simulate routes and failures:

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Perform failure simulation analysis.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Returns the simulation list.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}`	Returns the details of a specified simulation.
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}/{report-Name}`	Returns specific report details of a selected simulation.

4.23.1. Failure Simulation optimization RPC

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Perform failure simulation analysis.

The request body must follow the schema rpcs.json#/definitions/simulationRequest The response returned by the server conforms to: rpcs.json#/definitions/simulationResponse .

Normal response codes: 200

4.23.1.1. Request

This table shows the URI parameters for the failure simulation optimization rpc request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.124. Failure Simulation optimization RPC: JSON request

The following example show different set of request:

- The following example shows maintenance simulation creation with exhaustive node, link and facility failure:

```
{
  "topologyIndex": 1,
  "elements":
  [
    "node",
    "link",
    "srlg",
    {
    "type": "maintenance",
    "maintenanceName": "1LinkMaint"
    }
  ]
}
```

- The following example shows maintenance simulation creation without exhaustive failure:

```
{
  "topologyIndex": 1,
  "elements":
  [
    {
    "type": "maintenance",
    "maintenanceName": "1LinkMaint"
    }
  ]
}
```

4.23.1.2. Response

Example 4.125. Failure Simulation optimization RPC: JSON response

The following example show different set of response based on the request above:

- The following example shows the response of maintenance simulation creation with exhaustive node, link and facility failure:

```
{
    "status": "success",
    "simulationId": "c203d890-24ee-4592-84b4-0975c7c0b79a",
    "results": {
        "links": [
            {
                "rel": "results",
                "href": "c203d890-24ee-4592-84b4-0975c7c0b79a"
            }
        ]
    },
    "topologyIndex": 1,
    "elements": [
        "node",
        "link",
        "srlg",
        {
            "type": "maintenance",
            "maintenanceName": "1LinkMaint"
        }
    ]
}
```

- The following example shows the response of maintenance simulation creation without exhaustive failure:

```
{
    "status": "success",
    "simulationId": "852c34b8-368d-4ae8-82d2-e9ed2dd8d223",
    "results": {
        "links": [
            {
                "rel": "results",
                "href": "852c34b8-368d-4ae8-82d2-e9ed2dd8d223"
            }
        ]
    },
    "topologyIndex": 1,
    "elements": [
        {
            "type": "maintenance",
            "maintenanceName": "1LinkMaint"
        }
    ]
}
```

4.23.2. Get Simulation optimization RPC list

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation`	Returns the simulation list.

The response returned by the server conforms to: rpcs.json#/definitions/simulationsList .

Normal response codes: 200

4.23.2.1. Request

This table shows the URI parameters for the get simulation optimization rpc list request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.23.2.2. Response

Example 4.126. Get Simulation optimization RPC list: JSON response

```
{
    "topologyIndex": 1,
    "simulationReports": [
        {
            "status": "success",
            "simulationId": "c203d890-24ee-4592-84b4-0975c7c0b79a",
            "results": {
                "links": [
                    {
                        "rel": "results",
                        "href": "c203d890-24ee-4592-84b4-0975c7c0b79a"
                    }
                ]
            },
            "topologyIndex": 1,
            "elements": [
                "node",
                "link",
                "srlg",
                {
                    "type": "maintenance",
                    "maintenanceName": "1LinkMaint"
                }
            ]
        },
        {
            "simulationId": "20facea2-4ca6-4883-93da-0af22a0a4b75",
            "results": {
                "links": [
                    {
                        "rel": "results",
                        "href": "20facea2-4ca6-4883-93da-0af22a0a4b75"
```

```
                            }
                        ]
                },
                "topologyIndex": 1,
                "elements": [
                        {
                                "type": "maintenance",
                                "maintenanceName": "2LinkMaint"
                        }
                ]
        }
    ]
}
```

4.23.3. Get a specific simulation

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}`	Returns the details of a specified simulation.

The response returned by the server conforms to: rpcs.json#/definitions/simulationReports .

Normal response codes: 200

4.23.3.1. Request

This table shows the URI parameters for the get a specific simulation request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{uuid}`	String	rpc id.

This operation does not accept a request body.

4.23.3.2. Response

Example 4.127. Get a specific simulation: JSON response

```
{
    "status": "success",
    "simulationId": "c203d890-24ee-4592-84b4-0975c7c0b79a",
    "topologyIndex": 1,
    "elements": [
        "node",
        "link",
        "srlg",
        {
            "type": "maintenance",
            "maintenanceName": "1LinkMaint"
        }
    ],
    "reports": [
        {
            "reportName": "Report/L2_PathChange.r0",
            "links": [
                {
                    "href": "Report/L2_PathChange.r0"
                }
            ]
        },
        {
            "reportName": "Report/L2_PATHDELAY.r0",
            "links": [
                {
                    "href": "Report/L2_PATHDELAY.r0"
                }
            ]
        },
        {
```

```
                "reportName": "Report/L2_DVSIM.r0",
                "links": [
                    {
                        "href": "Report/L2_DVSIM.r0"
                    }
                ]
            },
            {
                "reportName": "Report/L2_LinkUtilChange.r0",
                "links": [
                    {
                        "href": "Report/L2_LinkUtilChange.r0"
                    }
                ]
            },
            {
                "reportName": "Report/L2_PeakSimLink.r0",
                "links": [
                    {
                        "href": "Report/L2_PeakSimLink.r0"
                    }
                ]
            },
            {
                "reportName": "Report/L2_PeakSimRoute.r0",
                "links": [
                    {
                        "href": "Report/L2_PeakSimRoute.r0"
                    }
                ]
            },
            {
                "reportName": "Report/L2_PHYDVSIM.r0",
                "links": [
                    {
                        "href": "Report/L2_PHYDVSIM.r0"
                    }
                ]
            },
            {
                "reportName": "Report/Maintenance/maintsiminfo.1LinkMaint",
                "links": [
                    {
                        "href": "Report/Maintenance/maintsiminfo.1LinkMaint"
                    }
                ]
            },
            {
                "reportName": "Report/L2_PeakSimSummary.r0",
                "links": [
                    {
                        "href": "Report/L2_PeakSimSummary.r0"
                    }
                ]
            }
        ]
}
```

4.23.4. Get a specific report of one simulation

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/simulation/{uuid}/{report-Name}`	Returns specific report details of a selected simulation.

The response returned by the server is a WANDL Report (Text file), see IPMPLSVIew report format documentation.

Normal response codes: 200

4.23.4.1. Request

This table shows the URI parameters for the get a specific report of one simulation request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
`{uuid}`	String	rpc id.
`{reportName}`	String	report name.

This operation does not accept a request body.

4.23.4.2. Response

Example 4.128. Get a specific report of one simulation: application/textresponse

```
#*********************************************
#   LSP Path Changes
#*********************************************
##   Software Release= 4.0.0 20180327_72790_157, 64 bits,  Compilation Date=
 20180327
##   Customer= JNPR_Hanita-test
##   Platform=x86_64, OS=Linux 2.6.32-696.1.1.el6.x86_64
##   Report Date= 2018-3-28 14:44   Runcode=r0   User=pcs
Name,Node A,Node Z,Orig Hop Count,New Hop Count,Orig Path Cost,New Path Cost,
Orig Path,New Path,Protection,Orig Delay,New Delay,Delay Change %,Orig BW,New
 BW,Type
Silver-101-103,vmx101,vmx103,3,4,30,60,11.101.105.2-11.105.107.2-11.103.107.1,
11.101.105.2-11.105.106.2-11.106.107.2-11.103.107.1,,  0.00,  0.00,  0.00%,0,
0,,
Silver-104-102,vmx104,vmx102,3,4,30,60,11.104.107.2-11.105.107.1-11.102.105.1,
11.104.107.2-11.106.107.1-11.105.106.1-11.102.105.1,,  0.00,  0.00,  0.00%,0,
0,,
rsvp-103-105,vmx103,vmx105,2,3,20,50,11.103.107.2-11.105.107.1,11.103.107.
2-11.106.107.1-11.105.106.1,,  0.00,  0.00,  0.00%,0,0,,
Silver-103-102,vmx103,vmx102,3,4,30,60,11.103.107.2-11.105.107.1-11.102.105.1,
11.103.107.2-11.106.107.1-11.105.106.1-11.102.105.1,,  0.00,  0.00,  0.00%,0,
0,,
11.0.0.103:11.0.0.106:200:vpls:vpn_200,vmx106,vmx103,3,2,30,40,11.105.106.
1-11.105.107.2-11.103.107.1,11.106.107.2-11.103.107.1,,  0.00,  0.00,  0.00%,
0,0,,
11.0.0.101:11.0.0.103:200:vpls:vpn_200,vmx103,vmx101,3,4,30,60,11.103.107.
2-11.105.107.1-11.101.105.1,11.103.107.2-11.106.107.1-11.105.106.1-11.101.105.
1,,  0.00,  0.00,  0.00%,0,0,,
```

```
rsvp-105-106,vmx105,vmx106,3,1,70,10,11.105.107.2-11.104.107.1-11.104.106.2,
11.105.106.2,,  0.00,  0.00,  0.00%,0,0,,
rsvp-107-105,vmx107,vmx105,1,2,10,40,11.105.107.1,11.106.107.1-11.105.106.1,,
 0.00,  0.00,  0.00%,0,0,,
11.0.0.104:11.0.0.101:300:vpls:vpn_200,vmx101,vmx104,3,4,30,60,11.101.105.
2-11.105.107.2-11.104.107.1,11.101.105.2-11.105.106.2-11.106.107.2-11.104.107.
1,,  0.00,  0.00,  0.00%,0,0,,
tcg1tree-102107,vmx102,vmx107,2,-,20,-,11.102.105.2-11.105.107.2, #
 vmx102--11.0.0.105--11.0.0.107,(path down),  0.00,-,,10.000K,10.000K,,
11.0.0.106:11.0.0.103:200:vpls:vpn_200,vmx103,vmx106,3,2,30,40,11.103.107.
2-11.105.107.1-11.105.106.2,11.103.107.2-11.106.107.1,,  0.00,  0.00,  0.00%,
0,0,,
11.0.0.101:11.0.0.104:300:vpls:vpn_200,vmx104,vmx101,3,3,30,70,11.104.107.
2-11.105.107.1-11.101.105.1,11.104.106.2-11.105.106.1-11.101.105.1,,  0.00,
 0.00,  0.00%,0,0,,
rsvp-106-105,vmx106,vmx105,3,1,70,10,11.104.106.1-11.104.107.2-11.105.107.1,
11.105.106.1,,  0.00,  0.00,  0.00%,0,0,,
tcg1tree-102106,vmx102,vmx106,3,-,50,-,11.102.105.2-11.105.107.2-11.106.107.1,
 # vmx102--11.0.0.105--11.0.0.107--11.0.0.106,(path down),  0.00,-,,10.000K,
10.000K,,
rsvp-104-105,vmx104,vmx105,2,3,20,50,11.104.107.2-11.105.107.1,11.104.107.
2-11.106.107.1-11.105.106.1,,  0.00,  0.00,  0.00%,0,0,,
Silver-102-103,vmx102,vmx103,3,4,30,60,11.102.105.2-11.105.107.2-11.103.107.1,
11.102.105.2-11.105.106.2-11.106.107.2-11.103.107.1,,  0.00,  0.00,  0.00%,0,
0,,
Silver-101-104,vmx101,vmx104,3,4,30,60,11.101.105.2-11.105.107.2-11.104.107.1,
11.101.105.2-11.105.106.2-11.106.107.2-11.104.107.1,,  0.00,  0.00,  0.00%,0,
0,,
11.0.0.103:11.0.0.101:300:vpls:vpn_200,vmx101,vmx103,3,4,30,60,11.101.105.
2-11.105.107.2-11.103.107.1,11.101.105.2-11.105.106.2-11.106.107.2-11.103.107.
1,,  0.00,  0.00,  0.00%,0,0,,
Silver-103-101,vmx103,vmx101,3,4,30,60,11.103.107.2-11.105.107.1-11.101.105.1,
11.103.107.2-11.106.107.1-11.105.106.1-11.101.105.1,,  0.00,  0.00,  0.00%,0,
0,,
Silver-104-101,vmx104,vmx101,3,4,30,60,11.104.107.2-11.105.107.1-11.101.105.1,
11.104.107.2-11.106.107.1-11.105.106.1-11.101.105.1,,  0.00,  0.00,  0.00%,0,
0,,
tcg0tree-102104,vmx102,vmx104,3,-,30,-,11.102.105.2-11.105.107.2-11.104.107.1,
 # vmx102--11.0.0.105--11.0.0.107--11.0.0.104,(path down),  0.00,-,,10.000K,
10.000K,,
11.0.0.106:11.0.0.104:300:vpls:vpn_200,vmx104,vmx106,3,1,30,50,11.104.107.
2-11.105.107.1-11.105.106.2,11.104.106.2,,  0.00,  0.00,  0.00%,0,0,,
11.0.0.104:11.0.0.106:200:vpls:vpn_200,vmx106,vmx104,3,1,30,50,11.105.106.
1-11.105.107.2-11.104.107.1,11.104.106.1,,  0.00,  0.00,  0.00%,0,0,,
```

4.24. P2MP Tree design RPC

These REST APIs are used for P2MP Tree Design Simulation. The first REST POST is utilized by the user to perform diverse p2mp tree design, given two trees in the same diversity group. The subsequent two REST GET operations are used to return the resulting list of P2MP trees. Since NS 5.0 the provisioningMethod (default NETCONF) can be specified and is used when useResultAsEro is set to true (The groups will be provisioned as a result of the design). The provisioningMethod must be set on the diverseTree request and will overwrite any set on the groups themselves.

The tree design API does allow diverse P2MP trees to be computed. This is controlled using the following set of attributes:

- diversityGroup: the tree or leaves are grouped together using a diversityGroup. If TreeA and TreeB (LSP1 and LSP2) should be diverse to each other, they should be in the same diversityGroup (i.e the client should set the same value). Setting the diversityGroup on the Group will set it on all its leaves and NorthStar will pair the leaves based on their destination node/site.

- diversityLevel (site, srlg or link): the level of requested diversity. NorthStar will try to compute path that reach that diversity level, if this cannot be achieved, it will try to route the path as diverse as possible, unless minimumDiversityLevel is specified.

- minimumDiversityLevel (site, srlg or link): the minimum acceptable diversity level. If NorthStar cannot achieve diversity as good or better than minimumDiversityLevel, the routing is considered as failed. For DiverseTree design, this imply that the tree will not be provisioned if the minimumDiversityLevel cannot be achieved.

For instance a diverseTree request with diversityLevel=srlg and no minimumDiversityLevel may provision a tree with link diverse paths, while the same request with diversityLevel=minimumDiversityLevel=srlg will not provision the tree.

The Tree can also be terminated in CE or Site nodes, taking into account the PE to CE links for diversity constraints. The same restriction for P2MP groups detailed in P2MP groups applies.

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topology/rpc/diverseTreeDesign`	Create 2 P2MP trees and perform Diverse P2MP Tree Design.
GET	`/v2/tenant/{tenant_id}/topology/rpc/diverseTreeDesign`	Return the list of simulation optimization RPC list.
GET	`/v2/tenant/{tenant_id}/topology/rpc/diverseTreeDesign/{uuid}`	Return the details of specified simulation optimization RPC result.

4.24.1. P2MP Diverse Tree Design optimization RPC

Method	URI	Description
POST	`/v2/tenant/{tenant_id}/topolo-` `gy/rpc/diverseTreeDesign`	Create 2 P2MP trees and perform Diverse P2MP Tree De-sign.

The request body must follow the schema rpcs.json#/definitions/diverseTreeRequest The response returned by the server conforms to: rpcs.json#/definitions/diverseTreeResult .

Normal response codes: 200

4.24.1.1. Request

This table shows the URI parameters for the p2mp diverse tree design optimization rpc request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

Example 4.129. P2MP Diverse Tree Design optimization RPC: JSON request

The following example show different set of request:

- The following example shows P2MP Diverse Tree Design optimization. Note that the values in the "name" field under "P2MPGroup" and under "diverseP2MPGroup" are required to be different from each other.

```
{

  "P2MPGroup": {
    "name": "hhtree",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.102"
    },
    "plannedProperties": {
      "bandwidth": "99k",
      "design": {
        "diversityGroup": "hhzz"
      }
    },
    "lsps": [
        {
          "name": "hhtree-102104",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
          }
        },
        {
          "name": "hhtree-102107",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.107"
          }
        }
    ]
```

```
  },
  "diverseP2MPGroup": {
    "name": "zztree",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.102"
    },
    "plannedProperties": {
      "bandwidth": "99k",
      "design": {
        "diversityGroup": "hhzz"
      }
    },
    "lsps": [
        {
          "name": "zztree-102104",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
          }
        },
        {
          "name": "zztree-102107",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.107"
          }
        }
    ]
  },
  "ignoreExistingPath" : true,
  "useResultAsEro"     : true,
  "maxIterations" : 1000
}
```

The response is:

```
{
    "result": {
        "requestId": "fa87b57e-6edc-45a8-8b73-b06c79289f87",
        "status": "running",
        "maxIterations": 1000,
        "iterationsRun": 0
    }
}
```

• The following example shows P2MP Diverse Tree Design optimization using sites. Note that the values in the "name" field under "P2MPGroup" and under "diverseP2MPGroup" are required to be different from each other.

```
{
  "P2MPGroup":{
      "name":"tch0tree",
      "from":{
          "topoObjectType":"ipv4",
          "address":"11.0.0.101"
      },
      "plannedProperties":{
          "bandwidth":"10k",
          "design":{
```

```
              "diversityGroup":"h0h1"
          }
      },
      "lsps":[
          {
              "name":"tch0tree-101104",
              "to":{
                  "topoObjectType":"ipv4",
                  "address":"11.0.0.104"
              }
          },
          {
              "name":"tch0tree-101107",
              "to":{
                  "topoObjectType":"ipv4",
                  "address":"11.0.0.107"
              }
          }
      ]
  },
  "diverseP2MPGroup":{
      "name":"tch1tree",
      "from":{
          "topoObjectType":"ipv4",
          "address":"11.0.0.102"
      },
      "plannedProperties":{
          "bandwidth":"10k",
          "design":{
              "diversityGroup":"h0h1"
          }
      },
      "lsps":[
          {
              "name":"tch1tree-102106",
              "to":{
                  "topoObjectType":"ipv4",
                  "address":"11.0.0.106"
              }
          },
          {
              "name":"tch1tree-102107",
              "to":{
                  "topoObjectType":"ipv4",
                  "address":"11.0.0.107"
              }
          }
      ]
  },
  "ignoreExistingPath":true,
  "useResultAsEro":true,
  "maxIterations":1000,
  "sites":[
      {
          "site":"site A",
          "nodes":[
              {"nodeIndex": 4},{"nodeIndex": 6}
          ]
      }
  ]
```

```
}
```

The response is:

```json
{
    "result": {
        "requestId": "f8c290ef-e850-45bb-9fd9-30089b095daa",
        "status": "running",
        "maxIterations": 1000,
        "iterationsRun": 0
    }
}
```

- The following example shows P2MP Diverse Tree Design optimization with bandwidth calendaring. Note that the values in the "name" field under "P2MPGroup" and under "diverseP2MPGroup" are required to be different from each other.

```json
{

  "P2MPGroup": {
    "name": "hhbwcaltree",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.102"
    },
    "plannedProperties": {
      "bandwidth": "99k",
      "bandwidthCalendar":{
       "startTime": "20180430T0900",
       "endTime": "20180430T0905"
      },
      "design": {
        "diversityGroup": "hzbw"
      }
    },
    "lsps": [
        {
          "name": "hhbwcaltree-102104",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.104"
          }
        },
        {
          "name": "hhbwcaltree-102107",
          "to" : {
            "topoObjectType": "ipv4",
            "address": "11.0.0.107"
          }
        }
    ]
  },
  "diverseP2MPGroup": {
    "name": "zzbwcaltree",
    "from": {
        "topoObjectType": "ipv4",
        "address": "11.0.0.102"
    },
    "plannedProperties": {
      "bandwidth": "99k",
```

```
        "bandwidthCalendar":{
         "startTime": "20180430T0900",
         "endTime": "20180430T0905"
        },
        "design": {
          "diversityGroup": "hzbw"
        }
      },
      "lsps": [
          {
            "name": "zzbwcaltree-102104",
            "to" : {
              "topoObjectType": "ipv4",
              "address": "11.0.0.104"
            }
          },
          {
            "name": "zzbwcaltree-102107",
            "to" : {
              "topoObjectType": "ipv4",
              "address": "11.0.0.107"
            }
          }
      ]
    },
    "ignoreExistingPath" : true,
    "useResultAsEro"     : true,
    "maxIterations" : 1000
}
```

The response is:

```
{
    "result": {
        "requestId": "f669b929-d82a-4bda-86bf-3ff623a794c9",
        "status": "running",
        "maxIterations": 1000,
        "iterationsRun": 0
    }
}
```

- The following example shows P2MP Diverse Tree Design optimization with minimum diversity level = site. Minimum diversity level options are site, srlg and link. Note that the values in the "name" field under "P2MPGroup" and under "diverseP2MPGroup" are required to be different from each other.

```
{
    "P2MPGroup":{
        "name":"tcb0pcepmindiv",
        "from":{
            "topoObjectType":"ipv4",
            "address":"11.0.0.101"
        },
        "plannedProperties":{
            "bandwidth":"10",
            "design":{
                "minimumDiversityLevel":"site",
                "diversityGroup":"tcb0tcb1pcepmindiv"
            }
        },
```

```
            "lsps":[
                {
                    "to":{
                        "topoObjectType":"ipv4",
                        "address":"11.0.0.104"
                    }
                },
                {
                    "to":{
                        "topoObjectType":"ipv4",
                        "address":"11.0.0.107"
                    }
                }
            ]
        },
        "diverseP2MPGroup":{
            "name":"tcb1pcepmindiv",
            "from":{
                "topoObjectType":"ipv4",
                "address":"11.0.0.101"
            },
            "plannedProperties":{
                "bandwidth":"10",
                "design":{
                    "minimumDiversityLevel":"site",
                    "diversityGroup":"tcb0tcb1pcepmindiv"
                }
            },
            "lsps":[
                {
                    "to":{
                        "topoObjectType":"ipv4",
                        "address":"11.0.0.104"
                    }
                },
                {
                    "to":{
                        "topoObjectType":"ipv4",
                        "address":"11.0.0.107"
                    }
                }
            ]
        },
        "creationConfigurationMethod":"PCEP",
        "ignoreExistingPath":true,
        "useResultAsEro":true,
        "maxIterations":1000
}
```

The response is:

```
{
    u'result':{
        u'status':u'running',
        u'maxIterations':1000,
        u'requestId':u'2862ddb5-2845-4971-8cd1-d8c9d56c281a',
        u'iterationsRun':0
    }
}
```

- The following example shows P2MP Diverse Tree Design optimization with CE and Site nodes as destination nodes. CE and Sites nodes are SiteA1, SiteZ and CEY2. Please note that currently combination of PE and CE/Site nodes as destinations nodes in a P2MP tree is not supported. Use can either create P2MP tree with all destination nodes consist of PE nodes only or consist of CE/Site nodes only. It cannot be combination of both (mixture of PE and CE/Sites nodes) in a single tree. Note that the values in the "name" field under "P2MPGroup" and under "diverseP2MPGroup" are required to be different from each other.

```
{
    "P2MPGroup":{
        "name":"Atree",
        "from":{
            "topoObjectType":"ipv4",
            "address":"10.0.0.1"
        },
        "plannedProperties":{
            "bandwidth":"10k",
            "design":{
                "diversityGroup":"AB"
            }
        },
        "lsps":[
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"SiteA1"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"SiteZ"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"CEY2"
                }
            }
        ]
    },
    "diverseP2MPGroup":{
        "name":"Btree",
        "from":{
            "topoObjectType":"ipv4",
            "address":"10.0.0.1"
        },
        "plannedProperties":{
            "bandwidth":"10k",
            "design":{
                "diversityGroup":"AB"
            }
        },
        "lsps":[
            {
                "to":{
                    "topoObjectType":"ipv4",
```

```
                    "address":"SiteA1"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"SiteZ"
                }
            },
            {
                "to":{
                    "topoObjectType":"ipv4",
                    "address":"CEY2"
                }
            }
        ]
    },
    "creationConfigurationMethod":"PCEP",
    "ignoreExistingPath":true,
    "useResultAsEro":true,
    "maxIterations":1000
}
```

The response is:

```
{
    "result": {
        "requestId": "4dde363c-abc0-471f-b76c-1b6df88bd9c9",
        "status": "running",
        "maxIterations": 1000,
        "iterationsRun": 0
    }
}
```

4.24.1.2. Response

The responses are shown per example in the request section. In general the response is a JSON document conforming to rpcs.json#/definitions/diverseTreeResult.

This operation does not return a response body.

4.24.2. Get Simulation optimization RPC list

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/topolo-gy/rpc/diverseTreeDesign`	Return the list of simulation optimization RPC list.

The response returned by the server conforms to: rpcs.json#/definitions/diverseTreeRe-sultList .

Normal response codes: 200

4.24.2.1. Request

This table shows the URI parameters for the get simulation optimization rpc list request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.24.2.2. Response

Example 4.130. Get Simulation optimization RPC list: JSON response

```
{
    "topologyIndex": "1",
    "rpcRequestIdList": [
        "f520e4e0-dcd7-4698-9575-6a2bcc8fd54b",
        "45eefe15-a668-4521-9d26-6159753fa948",
        "a9995c11-a5a7-4bf1-a0b1-dc9f65d38d19",
        "b0fa56f2-e178-4257-be47-ab12aab6043c",
        "cf168ccc-8bad-4c5d-8037-3dd5c6af7f53",
        "c4de3065-1b01-4a23-8aae-7a7860e5c4dc",
        "a39291c7-39de-4013-baab-8fa498c072fd",
        "69747e68-8a56-4b55-b36b-5167dd45d883",
        "248a2c33-f0c4-4e11-9275-8aa0aedad7df",
        "6dbe12b1-0cdc-4f85-8862-cf50aaa5b15b",
        "a27b2484-2181-457d-9424-1aa19cf6bcd0",
        "0f66bdf1-0346-49b8-956a-d6995446d861",
        "8fa7d9aa-8e42-4a44-bf93-f936df0ad084",
        "58f4da42-c20d-46b5-951d-bbdc80491da7"
    ]
}
```

4.24.3. Get a Specific Simulation optimization RPC Result

Method	URI	Description
GET	/v2/tenant/{tenant_id}/topolo-gy/rpc/diverseTreeDesign/{uuid}	Return the details of specified simulation optimization RPC result.

The response returned by the server conforms to: rpcs.json#/definitions/diverseTreeResult .

Normal response codes: 200

4.24.3.1. Request

This table shows the URI parameters for the get a specific simulation optimization rpc result request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.
{uuid}	String	rpc id.

This operation does not accept a request body.

4.24.3.2. Response

Example 4.131. Get a Specific Simulation optimization RPC Result: JSON response

```
{
    "result": {
        "requestId": "f520e4e0-dcd7-4698-9575-6a2bcc8fd54b",
        "status": "partial",
        "P2MPGroup": {
            "name": "alphatree",
            "topoObjectType": "p2mpGroup",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101"
            },
            "lsps": [
                {
                    "operationalStatus": "Unknown",
                    "plannedProperties": {
                        "bandwidth": "99K",
                        "setupPriority": 7,
                        "holdingPriority": 0,
                        "calculatedEro": [
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.101.105.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.105.106.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
```

```
                        "address": "11.102.106.1",
                        "loose": false
                    }
                ],
                "routingStatus": "Up",
                "pathName": "alphatree-101102_p0",
                "adminStatus": "Up",
                "design": {
                    "diversityGroup": "TWINS"
                },
                "ero": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.106.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.102.106.1",
                        "loose": false
                    }
                ],
                "correlatedRROHopCount": 3
            },
            "name": "alphatree-101102",
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.101"
            },
            "pathType": "primary",
            "to": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.102"
            },
            "lspIndex": 68,
            "controlType": "PCC",
            "provisioningType": "RSVP",
            "p2mpName": "alphatree"
        },
        {
            "operationalStatus": "Unknown",
            "plannedProperties": {
                "bandwidth": "99K",
                "setupPriority": 7,
                "holdingPriority": 0,
                "calculatedEro": [
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.2",
                        "loose": false
                    },
                    {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.2",
                        "loose": false
```

```
                },
                {
                        "topoObjectType": "ipv4",
                        "address": "11.103.107.1",
                        "loose": false
                }
            ],
            "routingStatus": "Up",
            "pathName": "alphatree-101103_p0",
            "adminStatus": "Up",
            "design": {
                "diversityGroup": "TWINS"
            },
            "ero": [
                {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.2",
                        "loose": false
                },
                {
                        "topoObjectType": "ipv4",
                        "address": "11.105.107.2",
                        "loose": false
                },
                {
                        "topoObjectType": "ipv4",
                        "address": "11.103.107.1",
                        "loose": false
                }
            ],
            "correlatedRROHopCount": 3
        },
        "name": "alphatree-101103",
        "from": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.101"
        },
        "pathType": "primary",
        "to": {
            "topoObjectType": "ipv4",
            "address": "11.0.0.103"
        },
        "lspIndex": 69,
        "controlType": "PCC",
        "provisioningType": "RSVP",
        "p2mpName": "alphatree"
    },
    {
        "operationalStatus": "Unknown",
        "plannedProperties": {
            "bandwidth": "99K",
            "setupPriority": 7,
            "holdingPriority": 0,
            "calculatedEro": [
                {
                        "topoObjectType": "ipv4",
                        "address": "11.101.105.2",
                        "loose": false
                },
                {
```

```
                                    "topoObjectType": "ipv4",
                                    "address": "11.105.107.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.104.107.1",
                                    "loose": false
                                }
                            ],
                            "routingStatus": "Up",
                            "pathName": "alphatree-101104_p0",
                            "adminStatus": "Up",
                            "design": {
                                "diversityGroup": "TWINS"
                            },
                            "ero": [
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.101.105.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.105.107.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.104.107.1",
                                    "loose": false
                                }
                            ],
                            "correlatedRROHopCount": 3
                        },
                        "name": "alphatree-101104",
                        "from": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.101"
                        },
                        "pathType": "primary",
                        "to": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.104"
                        },
                        "lspIndex": 70,
                        "controlType": "PCC",
                        "provisioningType": "RSVP",
                        "p2mpName": "alphatree"
                    }
                ]
            },
            "diverseP2MPGroup": {
                "name": "betatree",
                "topoObjectType": "p2mpGroup",
                "from": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.102"
                },
                "lsps": [
```

```
                    {
                        "operationalStatus": "Unknown",
                        "plannedProperties": {
                            "bandwidth": "99K",
                            "setupPriority": 7,
                            "holdingPriority": 0,
                            "calculatedEro": [
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.102.105.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.101.105.1",
                                    "loose": false
                                }
                            ],
                            "routingStatus": "Up",
                            "pathName": "betatree-102101_p0",
                            "adminStatus": "Up",
                            "design": {
                                "diversityGroup": "TWINS"
                            },
                            "ero": [
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.102.105.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.101.105.1",
                                    "loose": false
                                }
                            ],
                            "correlatedRROHopCount": 2
                        },
                        "name": "betatree-102101",
                        "from": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.102"
                        },
                        "pathType": "primary",
                        "to": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.101"
                        },
                        "lspIndex": 65,
                        "controlType": "PCC",
                        "provisioningType": "RSVP",
                        "p2mpName": "betatree"
                    },
                    {
                        "operationalStatus": "Unknown",
                        "plannedProperties": {
                            "bandwidth": "99K",
                            "setupPriority": 7,
                            "holdingPriority": 0,
                            "calculatedEro": [
```

```
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.102.106.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.106.107.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.103.107.1",
                                "loose": false
                            }
                        ],
                        "routingStatus": "Up",
                        "pathName": "betatree-102103_p0",
                        "adminStatus": "Up",
                        "design": {
                            "diversityGroup": "TWINS"
                        },
                        "ero": [
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.102.106.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.106.107.2",
                                "loose": false
                            },
                            {
                                "topoObjectType": "ipv4",
                                "address": "11.103.107.1",
                                "loose": false
                            }
                        ],
                        "correlatedRROHopCount": 3
                    },
                    "name": "betatree-102103",
                    "from": {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.102"
                    },
                    "pathType": "primary",
                    "to": {
                        "topoObjectType": "ipv4",
                        "address": "11.0.0.103"
                    },
                    "lspIndex": 66,
                    "controlType": "PCC",
                    "provisioningType": "RSVP",
                    "p2mpName": "betatree"
                },
                {
                    "operationalStatus": "Unknown",
                    "plannedProperties": {
                        "bandwidth": "99K",
```

```
                            "setupPriority": 7,
                            "holdingPriority": 0,
                            "calculatedEro": [
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.102.106.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.104.106.1",
                                    "loose": false
                                }
                            ],
                            "routingStatus": "Up",
                            "pathName": "betatree-102104_p0",
                            "adminStatus": "Up",
                            "design": {
                                "diversityGroup": "TWINS"
                            },
                            "ero": [
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.102.106.2",
                                    "loose": false
                                },
                                {
                                    "topoObjectType": "ipv4",
                                    "address": "11.104.106.1",
                                    "loose": false
                                }
                            ],
                            "correlatedRROHopCount": 2
                        },
                        "name": "betatree-102104",
                        "from": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.102"
                        },
                        "pathType": "primary",
                        "to": {
                            "topoObjectType": "ipv4",
                            "address": "11.0.0.104"
                        },
                        "lspIndex": 67,
                        "controlType": "PCC",
                        "provisioningType": "RSVP",
                        "p2mpName": "betatree"
                    }
                ]
            }
        },
        "request": {
            "P2MPGroup": {
                "from": {
                    "topoObjectType": "ipv4",
                    "address": "11.0.0.101"
                },
                "name": "alphatree"
            },
```

```
        "diverseP2MPGroup": {
            "from": {
                "topoObjectType": "ipv4",
                "address": "11.0.0.102"
            },
            "name": "betatree"
        },
        "ignoreExistingPath": true,
        "useResultAsEro": true
    }
}
```

4.25. Cluster health info

Use these endpoints to get cluster health status.

The health schema is: health.json . The operations are:

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health [GET: get all Cluster Nodes Health info summary]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/nodes [GET: get all Nodes Health info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/nodes/<nodeId> [GET: get specific Node Health info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/nodes/<nodeId>/time [GET: get specific Node time info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/nodes/<nodeId>/<processName> [GET: get specific Node specific process status info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/nodes/<nodeId>/<processName>/history [GET: get specific Node specific process status history info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/thresholds [GET: get thresholds info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/thresholds [PUT: update thresholds info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/thresholds/diskUtilization [GET: get disk util thresholds info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/thresholds/diskUtilization [PUT: update disk util thresholds info]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/smtp-config [GET: get SMTP config]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/smtp-config [PUT: update SMTP config]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/sub-scribers [PUT: update Email Alert subscribers list]

- https://northstar.example.net:8443/NorthStar/API/v2/tenant/<tenant-id>/health/sub-scribers [DELETE: delete Email Alert subscriber]

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health`	Returns a summary of the NorthStar API system health.
GET	`/v2/tenant/{tenant_id}/health/nodes`	Returns health information for all of the nodes in the NorthStar system.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}{?nodeId}`	Returns health information for one node in the NorthStar system.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/time{?nodeId}`	Returns the time of a specific node.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/{processName}{?nodeId,processName}`	Processes the status of a specific node.
GET	`/v2/tenant/{tenant_id}/health/nodes/{nodeId}/{processName}/history{?nodeId,processName}`	Returns the health history of a specific node.
GET	`/v2/tenant/{tenant_id}/health/thresholds`	Returns the health thresholds for the nodes.
GET	`/v2/tenant/{tenant_id}/health/thresholds/diskUtilization`	Returns the disk utility thresholds.
PUT	`/v2/tenant/{tenant_id}/health/thresholds/diskUtilization`	Updates the disk utility thresholds using the following schema: health.json#/definitions/diskThreshold
GET	`/v2/tenant/{tenant_id}/health/nodes/smtpconfig`	Returns the SMTP configuration.
PUT	`/v2/tenant/{tenant_id}/health/nodes/smtpconfig{?host,port,secure,username,password,enabled}`	Updates the SMTP configuration using the following the schema: health.json#/definitions/updateSmtpconfig and sample
PUT	`/v2/tenant/{tenant_id}/health/nodes/subscribers`	Updates the list of subscribers for Email Alerts using the following schema: health.json#/definitions/subscriberList
DELETE	`/v2/tenant/{tenant_id}/health/nodes/subscribers`	Deletes subscribers for Email Alerts using the following schema: health.json#/definitions/subscriber

4.25.1. Get System Health API Summary

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health`	Returns a summary of the NorthStar API system health.

Normal response codes: 200

4.25.1.1. Request

This table shows the URI parameters for the get system health api summary request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.1.2. Response

Example 4.132. Get System Health API Summary: JSON response

```
{
    "links": [
        {
            "href": "nodes",
            "rel": "nodes",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}",
            "rel": "node",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/time",
            "rel": "node",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/{processName}",
            "rel": "processDetail",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/{processName}/history",
            "rel": "processDetailHistory",
            "type": "application/json"
        },
        {
            "href": "thresholds",
            "rel": "thresholds",
            "type": "application/json"
        },
        {
            "href": "thresholds/<threshholdId>",
```

```
                    "rel": "threshold",
                    "type": "application/json"
            },
            {
                    "href": "smtpconfig",
                    "rel": "smtpconfig",
                    "type": "application/json"
            },
            {
                    "href": "subscribers",
                    "rel": "subscribers",
                    "type": "application/json"
            }
    ]
}
```

4.25.2. Get the Health of All Nodes in the NorthStar System

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `nodes`	Returns health information for all of the nodes in the NorthStar system.

Normal response codes: 200

4.25.2.1. Request

This table shows the URI parameters for the get the health of all nodes in the northstar system request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.2.2. Response

Example 4.133. Get the Health of All Nodes in the NorthStar System: JSON response

```
[
    {
        "nodeType": [
            "northstar",
            "dataCollector"
        ],
        "node": "pcs-q-pod08",
        "clusterIPs": [
            "10.49.161.46"
        ],
        "memory": {
            "free": 165941248,
            "usage": 6105755648,
            "total": 6271696896
        },
        "disk": {
            "partitions": [
                {
                    "total": 59362,
                    "used": 5368,
                    "free": 50972,
                    "usage": 10,
                    "partition": "/"
                },
                {
                    "total": 2927,
                    "used": 0,
                    "free": 2927,
                    "usage": 0,
                    "partition": "/dev/shm"
                }
            ]
        },
```

```
        "processes": [
            {
                "timestamp": "2017-08-02T10:03:46.922Z",
                "name": "elasticsearch",
                "status": "RUNNING",
                "pid": 6077,
                "pcpu": "16.8",
                "rss": 530132,
                "vsz": 5285472,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H01M51S",
                "cmd": "/usr/bin/java -Xms256m -Xmx1g -Djava.awt.headless=true
 -XX:+UseParNewGC -XX:+UseConcMarkSweepGC -XX:CMSInitiatingOccupancyFraction=
75 -XX:+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -
XX:+DisableExplicitGC -Dfile.encoding=UTF-8 -Djna.nosys=true -Des.path.
home=/opt/northstar/thirdparty/elasticsearch -cp /opt/northstar/thirdparty/
elasticsearch/lib/elasticsearch-2.4.0.jar:/opt/northstar/thirdparty/
elasticsearch/lib/* org.elasticsearch.bootstrap.Elasticsearch start -p /opt/
northstar/data/elasticsearch/elasticsearch.pid -Des.default.path.home=/opt/
northstar/thirdparty/elasticsearch -Des.default.path.logs=/opt/northstar/logs
 -Des.default.path.data=/opt/northstar/data/elasticsearch -Des.default.path.
conf=/opt/northstar/data/elasticsearch/config"
            },
            {
                "timestamp": "2017-08-02T10:03:46.951Z",
                "name": "esauthproxy",
                "status": "RUNNING",
                "pid": 6046,
                "pcpu": "0.0",
                "rss": 66820,
                "vsz": 4925568,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H01M52S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/northstar/esauthproxy/esauthproxy.js"
            },
            {
                "timestamp": "2017-08-02T10:03:46.972Z",
                "name": "logstash",
                "status": "RUNNING",
                "pid": 6541,
                "pcpu": "6.0",
                "rss": 471176,
                "vsz": 5783868,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H01M22S",
                "cmd": "/usr/bin/java -XX:+UseParNewGC -XX:+UseConcMarkSweepGC
 -Djava.awt.headless=true -XX:CMSInitiatingOccupancyFraction=75 -XX:
+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -Djava.
io.tmpdir=/opt/northstar/thirdparty/logstash -Xmx2g -Xss2048k -Djffi.
boot.library.path=/opt/northstar/thirdparty/logstash/vendor/jruby/lib/
jni -XX:+UseParNewGC -XX:+UseConcMarkSweepGC -Djava.awt.headless=true -
XX:CMSInitiatingOccupancyFraction=75 -XX:+UseCMSInitiatingOccupancyOnly -
XX:+HeapDumpOnOutOfMemoryError -Djava.io.tmpdir=/opt/northstar/thirdparty/
logstash -XX:HeapDumpPath=/opt/northstar/thirdparty/logstash/heapdump.hprof -
Xbootclasspath/a:/opt/northstar/thirdparty/logstash/vendor/jruby/lib/jruby.jar
 -classpath : -Djruby.home=/opt/northstar/thirdparty/logstash/vendor/jruby -
```

```
Djruby.lib=/opt/northstar/thirdparty/logstash/vendor/jruby/lib -Djruby.script=
jruby -Djruby.shell=/bin/sh org.jruby.Main --1.9 /opt/northstar/thirdparty/
logstash/lib/bootstrap/environment.rb logstash/runner.rb agent -f /opt/
northstar/data/logstash/config -l /opt/northstar/logs/logstash.log --allow-
env"
            },
            {
                "timestamp": "2017-08-02T10:03:47.000Z",
                "name": "cassandra",
                "status": "RUNNING",
                "pid": 4959,
                "pcpu": "0.3",
                "rss": 1396380,
                "vsz": 3471516,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H03M44S",
                "cmd": "/opt/northstar/thirdparty/jdk//bin/
java -ea -javaagent:/opt/northstar/thirdparty/apache-cassandra/
bin/../lib/jamm-0.3.0.jar -XX:+CMSClassUnloadingEnabled -XX:
+UseThreadPriorities -XX:ThreadPriorityPolicy=42 -Xms1495M -
Xmx1495M -Xmn373M -XX:+HeapDumpOnOutOfMemoryError -Xss256k -
XX:StringTableSize=1000003 -XX:+UseParNewGC -XX:+UseConcMarkSweepGC -XX:
+CMSParallelRemarkEnabled -XX:SurvivorRatio=8 -XX:MaxTenuringThreshold=1
 -XX:CMSInitiatingOccupancyFraction=75 -XX:+UseCMSInitiatingOccupancyOnly
 -XX:+UseTLAB -XX:+PerfDisableSharedMem -XX:CompileCommandFile=/opt/
northstar/data/apache-cassandra/conf/hotspot_compiler -XX:CMSWaitDuration=
10000 -XX:+CMSParallelInitialMarkEnabled -XX:+CMSEdenChunksRecordAlways -
XX:CMSWaitDuration=10000 -Djava.net.preferIPv4Stack=true -Dcassandra.jmx.
local.port=7199 -XX:+DisableExplicitGC -Djava.library.path=/opt/northstar/
thirdparty/apache-cassandra/bin/../lib/sigar-bin -Dlogback.configurationFile=
logback.xml -Dcassandra.logdir=/opt/northstar/thirdparty/apache-cassandra/bin/
../logs -Dcassandra.storagedir=/opt/northstar/thirdparty/apache-cassandra/bin/
../data -Dcassandra-foreground=yes -cp /opt/northstar/data/apache-cassandra/
conf:/opt/northstar/thirdparty/apache-cassandra/bin/../build/classes/main:/
opt/northstar/thirdparty/apache-cassandra/bin/../build/classes/thrift:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/airline-0.6.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/antlr-runtime-3.5.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/apache-cassandra-2.2.4.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/apache-cassandra-
clientutil-2.2.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/
apache-cassandra-thrift-2.2.4.jar:/opt/northstar/thirdparty/apache-cassandra/
bin/../lib/cassandra-driver-core-2.2.0-rc2-SNAPSHOT-20150617-shaded.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-cli-1.1.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-codec-1.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-lang3-3.1.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-math3-3.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/compress-lzf-0.8.4.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/concurrentlinkedhashmap-
lru-1.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/crc32ex-0.
1.1.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/disruptor-3.0.
1.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ecj-4.4.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/guava-16.0.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/high-scale-lib-1.0.6.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/jackson-core-asl-1.9.
2.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jackson-mapper-
asl-1.9.2.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jamm-0.
3.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/javax.inject.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jbcrypt-0.3m.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/jcl-over-slf4j-1.7.7.
```

```
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jna-4.0.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/joda-time-2.4.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/json-simple-1.1.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/libthrift-0.9.2.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/log4j-over-slf4j-1.7.7.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/logback-classic-1.1.3.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/logback-core-1.1.
3.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/lz4-1.3.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/metrics-core-3.1.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/metrics-logback-3.1.0.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/netty-all-4.0.23.
Final.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ohc-core-0.3.
4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ohc-core-j8-0.3.4.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/reporter-config3-3.
0.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/reporter-config-
base-3.0.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/sigar-1.
6.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/slf4j-api-1.7.
7.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/snakeyaml-1.11.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/snappy-java-1.1.1.
7.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ST4-4.0.8.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/stream-2.5.2.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/super-csv-2.1.0.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/thrift-server-0.3.7.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/jsr223/*/*.jar org.apache.
cassandra.service.CassandraDaemon"
            },
            {
                "timestamp": "2017-08-02T10:03:47.029Z",
                "name": "ha_agent",
                "status": "RUNNING",
                "pid": 4588,
                "pcpu": "2.8",
                "rss": 10248,
                "vsz": 369696,
                "user": "root",
                "group": "root",
                "time": "P6DT06H03M50S",
                "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/ha_agent.py"
            },
            {
                "timestamp": "2017-08-02T10:03:47.050Z",
                "name": "healthmonitor",
                "status": "RUNNING",
                "pid": 4590,
                "pcpu": "0.1",
                "rss": 52324,
                "vsz": 5130260,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H03M50S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/northstar/healthMonitor/index.js"
            },
            {
                "timestamp": "2017-08-02T10:03:47.071Z",
                "name": "license_monitor",
                "status": "RUNNING",
                "pid": 4589,
                "pcpu": "0.0",
```

```
                "rss": 4688,
                "vsz": 435532,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H03M50S",
                "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/license_watcher.py"
            },
            {
                "timestamp": "2017-08-02T10:03:47.091Z",
                "name": "nodejs",
                "status": "RUNNING",
                "pid": 6391,
                "pcpu": "0.0",
                "rss": 129960,
                "vsz": 5866768,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H01M39S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/pcs/NodeJS/app.js"
            },
            {
                "timestamp": "2017-08-02T10:03:47.114Z",
                "name": "prunedb",
                "status": "RUNNING",
                "pid": 4585,
                "pcpu": "0.0",
                "rss": 43300,
                "vsz": 4917432,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H03M50S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/pcs/NodeJS/util/prune_db.js"
            },
            {
                "timestamp": "2017-08-02T10:03:47.136Z",
                "name": "rabbitmq",
                "status": "RUNNING",
                "pid": 4769,
                "pcpu": "0.9",
                "rss": 39068,
                "vsz": 2334576,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT06H03M48S",
                "cmd": "/opt/northstar/thirdparty/erlang/lib/erlang/erts-7.0/
bin/beam.smp -W w -A 64 -P 1048576 -K true -- -root /opt/northstar/thirdparty/
erlang/lib/erlang -progname erl -- -home /opt/northstar/ -- -pa /opt/
northstar/thirdparty/rabbitmq/sbin/../ebin -noshell -noinput -s rabbit boot -
sname rabbit@pcs-q-pod08 -boot start_sasl -config /opt/northstar/thirdparty/
rabbitmq/sbin/../etc/rabbitmq/rabbitmq -kernel inet_default_connect_options
 [{nodelay,true}] -sasl errlog_type error -sasl sasl_error_logger false -
rabbit error_logger {file,\"/opt/northstar/thirdparty/rabbitmq/sbin/../var/
log/rabbitmq/rabbit@pcs-q-pod08.log\"} -rabbit sasl_error_logger {file,\
"/opt/northstar/thirdparty/rabbitmq/sbin/../var/log/rabbitmq/rabbit@pcs-q-
pod08-sasl.log\"} -rabbit enabled_plugins_file \"/opt/northstar/thirdparty/
rabbitmq/sbin/../etc/rabbitmq/enabled_plugins\" -rabbit plugins_dir \"/opt/
northstar/thirdparty/rabbitmq/sbin/../plugins\" -rabbit plugins_expand_dir
```

```
        \"/opt/northstar/thirdparty/rabbitmq/sbin/../var/lib/rabbitmq/mnesia/
rabbit@pcs-q-pod08-plugins-expand\" -os_mon start_cpu_sup false -os_mon
 start_disksup false -os_mon start_memsup false -mnesia dir \"/opt/northstar/
thirdparty/rabbitmq/sbin/../var/lib/rabbitmq/mnesia/rabbit@pcs-q-pod08\" -
kernel inet_dist_listen_min 25672 -kernel inet_dist_listen_max 25672"
                },
                {
                    "timestamp": "2017-08-02T10:03:47.162Z",
                    "name": "zookeeper",
                    "status": "RUNNING",
                    "pid": 4943,
                    "pcpu": "0.0",
                    "rss": 87992,
                    "vsz": 4608868,
                    "user": "pcs",
                    "group": "pcs",
                    "time": "P6DT06H03M44S",
                    "cmd": "/opt/northstar/thirdparty/jdk//bin/java -Dzookeeper.
log.dir=/opt/northstar/thirdparty/zookeeper/bin/../logs -Dzookeeper.log.
file=zookeeper--server-pcs-q-pod08.log -Dzookeeper.root.logger=INFO,CONSOLE
 -XX:+HeapDumpOnOutOfMemoryError -XX:OnOutOfMemoryError=kill -9 %p -cp /
opt/northstar/thirdparty/zookeeper/bin/../build/classes:/opt/northstar/
thirdparty/zookeeper/bin/../build/lib/*.jar:/opt/northstar/thirdparty/
zookeeper/bin/../lib/slf4j-log4j12-1.7.5.jar:/opt/northstar/thirdparty/
zookeeper/bin/../lib/slf4j-api-1.7.5.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/servlet-api-2.5-20081211.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/netty-3.10.5.Final.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/log4j-1.2.17.jar:/opt/northstar/thirdparty/zookeeper/bin/../
lib/jline-2.11.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/jetty-
util-6.1.26.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/jetty-6.
1.26.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/javacc.jar:/opt/
northstar/thirdparty/zookeeper/bin/../lib/jackson-mapper-asl-1.9.11.jar:/
opt/northstar/thirdparty/zookeeper/bin/../lib/jackson-core-asl-1.9.11.
jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/commons-cli-1.2.jar:/
opt/northstar/thirdparty/zookeeper/bin/../zookeeper-3.5.2-alpha.jar:/opt/
northstar/thirdparty/zookeeper/bin/../src/java/lib/*.jar:/opt/northstar/
thirdparty/zookeeper/bin/../conf: -Xmx1000m -Dzookeeper.admin.enableServer=
false -Dcom.sun.management.jmxremote -Dcom.sun.management.jmxremote.port=
9999 -Dcom.sun.management.jmxremote.authenticate=false -Dcom.sun.management.
jmxremote.ssl=false -Dzookeeper.jmx.log4j.disable=true org.apache.zookeeper.
server.quorum.QuorumPeerMain /opt/northstar/thirdparty/zookeeper/bin/../conf/
zoo.cfg"
                },
                {
                    "timestamp": "2017-08-02T10:03:47.189Z",
                    "name": "listener1_00",
                    "status": "RUNNING",
                    "pid": 4584,
                    "pcpu": "2.9",
                    "rss": 9904,
                    "vsz": 390752,
                    "user": "root",
                    "group": "root",
                    "time": "P6DT06H03M50S",
                    "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/event_listener.py"
                },
                {
                    "timestamp": "2017-08-02T10:03:47.212Z",
                    "name": "mladapter",
```

```
                        "status": "RUNNING",
                        "pid": 6389,
                        "pcpu": "0.0",
                        "rss": 30592,
                        "vsz": 706084,
                        "user": "pcs",
                        "group": "pcs",
                        "time": "P6DT06H01M39S",
                        "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/mlAdapter/mlAdapter.py"
                    },
                    {
                        "timestamp": "2017-08-02T10:03:47.234Z",
                        "name": "npat",
                        "status": "RUNNING",
                        "pid": 6002,
                        "pcpu": "0.0",
                        "rss": 796,
                        "vsz": 16080,
                        "user": "pcs",
                        "group": "pcs",
                        "time": "P6DT06H01M54S",
                        "cmd": "/opt/pcs/bin/npatserver 7000 0"
                    },
                    {
                        "timestamp": "2017-08-02T10:03:47.256Z",
                        "name": "pceserver",
                        "status": "RUNNING",
                        "pid": 5833,
                        "pcpu": "0.0",
                        "rss": 3512,
                        "vsz": 85192,
                        "user": "root",
                        "group": "root",
                        "time": "P6DT06H02M12S",
                        "cmd": "/usr/local/bin/pce_server -d"
                    },
                    {
                        "timestamp": "2017-08-02T10:03:47.290Z",
                        "name": "scheduler",
                        "status": "RUNNING",
                        "pid": 6004,
                        "pcpu": "0.0",
                        "rss": 1456,
                        "vsz": 108192,
                        "user": "pcs",
                        "group": "pcs",
                        "time": "P6DT06H01M54S",
                        "cmd": "/bin/sh /opt/pcs/bin/dcJobScheduler.sh"
                    },
                    {
                        "timestamp": "2017-08-02T10:03:47.313Z",
                        "name": "toposerver",
                        "status": "RUNNING",
                        "pid": 6266,
                        "pcpu": "0.0",
                        "rss": 11524,
                        "vsz": 961784,
                        "user": "pcs",
                        "group": "pcs",
```

```
                "time": "P6DT06H01M49S",
                "cmd": "/opt/pcs/bin/TopoServer /opt/northstar/data/northstar.
cfg"
            },
            {
                "timestamp": "2017-08-02T10:03:47.334Z",
                "name": "PCServer",
                "status": "RUNNING",
                "pid": 6907,
                "pcpu": "0.0",
                "rss": 445508,
                "vsz": 1384368,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT05H59M51S",
                "cmd": "/opt/pcs/bin/PCServer -port 7003 -handlerPort 7915"
            },
            {
                "timestamp": "2017-08-02T10:03:47.352Z",
                "name": "PCViewer",
                "status": "RUNNING",
                "pid": 6906,
                "pcpu": "0.0",
                "rss": 437540,
                "vsz": 1230508,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT05H59M51S",
                "cmd": "/opt/pcs/bin/PCViewer"
            },
            {
                "timestamp": "2017-08-02T10:03:47.373Z",
                "name": "configServer",
                "status": "RUNNING",
                "pid": 6908,
                "pcpu": "0.0",
                "rss": 436548,
                "vsz": 1230512,
                "user": "pcs",
                "group": "pcs",
                "time": "P6DT05H59M51S",
                "cmd": "/opt/pcs/bin/configServer"
            }
        ],
        "time": "2017-08-02T10:03:47.391Z",
        "role": [
            "Standalone"
        ],
        "CPU": {
            "pcpu": "2.76",
            "cpus": [
                {
                    "pcpu": "4.04"
                },
                {
                    "pcpu": "4.04"
                },
                {
                    "pcpu": "2.97"
                },
```

```
                        {
                            "pcpu": "0.00"
                        }
                    ]
            },
            "status": "Up"
        }
]
```

4.25.3. Get the Health of One Node in the NorthStar System

Method	URI	Description
GET	/v2/tenant/{tenant_id}/health/ nodes/{nodeId}{?nodeId}	Returns health information for one node in the NorthStar system.

Normal response codes: 200

4.25.3.1. Request

This table shows the URI parameters for the get the health of one node in the northstar system request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the get the health of one node in the northstar system request:

Name	Type	Description
nodeId	String *(Required)*	Unique node name

4.25.3.2. Response

Example 4.134. Get the Health of One Node in the NorthStar System: JSON response

```
{
    "nodeType": [
        "northstar",
        "dataCollector"
    ],
    "node": "pcs-q-pod08",
    "clusterIPs": [
        "10.49.161.46"
    ],
    "memory": {
        "free": 289800192,
        "usage": 5981896704,
        "total": 6271696896
    },
    "disk": {
        "partitions": [
            {
                "total": 59362,
                "used": 3957,
                "free": 52383,
                "usage": 8,
                "partition": "/"
            },
            {
                "total": 2927,
                "used": 0,
                "free": 2927,
```

```
                    "usage": 0,
                    "partition": "/dev/shm"
                }
            ]
        },
        "processes": [
            {
                "timestamp": "2017-07-28T05:20:10.409Z",
                "name": "elasticsearch",
                "status": "RUNNING",
                "pid": 6077,
                "pcpu": "16.9",
                "rss": 489404,
                "vsz": 4816320,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M15S",
                "cmd": "/usr/bin/java -Xms256m -Xmx1g -Djava.awt.headless=true -
XX:+UseParNewGC -XX:+UseConcMarkSweepGC -XX:CMSInitiatingOccupancyFraction=
75 -XX:+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -
XX:+DisableExplicitGC -Dfile.encoding=UTF-8 -Djna.nosys=true -Des.path.
home=/opt/northstar/thirdparty/elasticsearch -cp /opt/northstar/thirdparty/
elasticsearch/lib/elasticsearch-2.4.0.jar:/opt/northstar/thirdparty/
elasticsearch/lib/* org.elasticsearch.bootstrap.Elasticsearch start -p /opt/
northstar/data/elasticsearch/elasticsearch.pid -Des.default.path.home=/opt/
northstar/thirdparty/elasticsearch -Des.default.path.logs=/opt/northstar/logs
 -Des.default.path.data=/opt/northstar/data/elasticsearch -Des.default.path.
conf=/opt/northstar/data/elasticsearch/config"
            },
            {
                "timestamp": "2017-07-28T05:20:10.436Z",
                "name": "esauthproxy",
                "status": "RUNNING",
                "pid": 6046,
                "pcpu": "0.0",
                "rss": 68528,
                "vsz": 4925568,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M16S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/northstar/esauthproxy/esauthproxy.js"
            },
            {
                "timestamp": "2017-07-28T05:20:10.452Z",
                "name": "logstash",
                "status": "RUNNING",
                "pid": 6541,
                "pcpu": "3.3",
                "rss": 470352,
                "vsz": 5783868,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H17M46S",
                "cmd": "/usr/bin/java -XX:+UseParNewGC -XX:+UseConcMarkSweepGC
 -Djava.awt.headless=true -XX:CMSInitiatingOccupancyFraction=75 -XX:
+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -Djava.
io.tmpdir=/opt/northstar/thirdparty/logstash -Xmx2g -Xss2048k -Djffi.
boot.library.path=/opt/northstar/thirdparty/logstash/vendor/jruby/lib/
jni -XX:+UseParNewGC -XX:+UseConcMarkSweepGC -Djava.awt.headless=true -
```

```
XX:CMSInitiatingOccupancyFraction=75 -XX:+UseCMSInitiatingOccupancyOnly -
XX:+HeapDumpOnOutOfMemoryError -Djava.io.tmpdir=/opt/northstar/thirdparty/
logstash -XX:HeapDumpPath=/opt/northstar/thirdparty/logstash/heapdump.hprof -
Xbootclasspath/a:/opt/northstar/thirdparty/logstash/vendor/jruby/lib/jruby.jar
 -classpath : -Djruby.home=/opt/northstar/thirdparty/logstash/vendor/jruby -
Djruby.lib=/opt/northstar/thirdparty/logstash/vendor/jruby/lib -Djruby.script=
jruby -Djruby.shell=/bin/sh org.jruby.Main --1.9 /opt/northstar/thirdparty/
logstash/lib/bootstrap/environment.rb logstash/runner.rb agent -f /opt/
northstar/data/logstash/config -l /opt/northstar/logs/logstash.log --allow-
env"
        },
        {
            "timestamp": "2017-07-28T05:20:10.473Z",
            "name": "cassandra",
            "status": "RUNNING",
            "pid": 4959,
            "pcpu": "0.5",
            "rss": 918716,
            "vsz": 3502228,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H20M07S",
            "cmd": "/opt/northstar/thirdparty/jdk//bin/java -ea -javaagent:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/jamm-0.3.0.jar -XX:
+CMSClassUnloadingEnabled -XX:+UseThreadPriorities -XX:ThreadPriorityPolicy=
42 -Xms1495M -Xmx1495M -Xmn373M -XX:+HeapDumpOnOutOfMemoryError -Xss256k
 -XX:StringTableSize=1000003 -XX:+UseParNewGC -XX:+UseConcMarkSweepGC -XX:
+CMSParallelRemarkEnabled -XX:SurvivorRatio=8 -XX:MaxTenuringThreshold=1
 -XX:CMSInitiatingOccupancyFraction=75 -XX:+UseCMSInitiatingOccupancyOnly
 -XX:+UseTLAB -XX:+PerfDisableSharedMem -XX:CompileCommandFile=/opt/
northstar/data/apache-cassandra/conf/hotspot_compiler -XX:CMSWaitDuration=
10000 -XX:+CMSParallelInitialMarkEnabled -XX:+CMSEdenChunksRecordAlways -
XX:CMSWaitDuration=10000 -Djava.net.preferIPv4Stack=true -Dcassandra.jmx.
local.port=7199 -XX:+DisableExplicitGC -Djava.library.path=/opt/northstar/
thirdparty/apache-cassandra/bin/../lib/sigar-bin -Dlogback.configurationFile=
logback.xml -Dcassandra.logdir=/opt/northstar/thirdparty/apache-cassandra/bin/
../logs -Dcassandra.storagedir=/opt/northstar/thirdparty/apache-cassandra/bin/
../data -Dcassandra-foreground=yes -cp /opt/northstar/data/apache-cassandra/
conf:/opt/northstar/thirdparty/apache-cassandra/bin/../build/classes/main:/
opt/northstar/thirdparty/apache-cassandra/bin/../build/classes/thrift:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/airline-0.6.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/antlr-runtime-3.5.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/apache-cassandra-2.2.4.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/apache-cassandra-
clientutil-2.2.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/
apache-cassandra-thrift-2.2.4.jar:/opt/northstar/thirdparty/apache-cassandra/
bin/../lib/cassandra-driver-core-2.2.0-rc2-SNAPSHOT-20150617-shaded.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-cli-1.1.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-codec-1.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-lang3-3.1.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/commons-math3-3.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/compress-lzf-0.8.4.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/concurrentlinkedhashmap-
lru-1.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/crc32ex-0.
1.1.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/disruptor-3.0.
1.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ecj-4.4.2.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/guava-16.0.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/high-scale-lib-1.0.6.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/jackson-core-asl-1.9.
2.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jackson-mapper-
```

```
asl-1.9.2.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jamm-0.
3.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/javax.inject.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jbcrypt-0.3m.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/jcl-over-slf4j-1.7.7.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/jna-4.0.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/joda-time-2.4.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/json-simple-1.1.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/libthrift-0.9.2.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/log4j-over-slf4j-1.7.7.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/logback-classic-1.1.3.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/logback-core-1.1.
3.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/lz4-1.3.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/metrics-core-3.1.0.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/metrics-logback-3.1.0.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/netty-all-4.0.23.
Final.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ohc-core-0.3.
4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ohc-core-j8-0.3.4.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/reporter-config3-3.
0.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/reporter-config-
base-3.0.0.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/sigar-1.
6.4.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/slf4j-api-1.7.
7.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/snakeyaml-1.11.
jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/snappy-java-1.1.1.
7.jar:/opt/northstar/thirdparty/apache-cassandra/bin/../lib/ST4-4.0.8.jar:/
opt/northstar/thirdparty/apache-cassandra/bin/../lib/stream-2.5.2.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/super-csv-2.1.0.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/thrift-server-0.3.7.jar:/opt/
northstar/thirdparty/apache-cassandra/bin/../lib/jsr223/*/*.jar org.apache.
cassandra.service.CassandraDaemon"
        },
        {
            "timestamp": "2017-07-28T05:20:10.496Z",
            "name": "ha_agent",
            "status": "RUNNING",
            "pid": 4588,
            "pcpu": "2.8",
            "rss": 29292,
            "vsz": 369696,
            "user": "root",
            "group": "root",
            "time": "P1DT01H20M13S",
            "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/ha_agent.py"
        },
        {
            "timestamp": "2017-07-28T05:20:10.511Z",
            "name": "healthmonitor",
            "status": "RUNNING",
            "pid": 4590,
            "pcpu": "0.1",
            "rss": 71832,
            "vsz": 5132096,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H20M13S",
            "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/northstar/healthMonitor/index.js"
        },
        {
            "timestamp": "2017-07-28T05:20:10.527Z",
```

```
                "name": "license_monitor",
                "status": "RUNNING",
                "pid": 4589,
                "pcpu": "0.0",
                "rss": 6988,
                "vsz": 435532,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H20M13S",
                "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/license_watcher.py"
          },
          {
                "timestamp": "2017-07-28T05:20:10.543Z",
                "name": "nodejs",
                "status": "RUNNING",
                "pid": 6391,
                "pcpu": "0.0",
                "rss": 151800,
                "vsz": 5863816,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M02S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/pcs/NodeJS/app.js"
          },
          {
                "timestamp": "2017-07-28T05:20:10.558Z",
                "name": "prunedb",
                "status": "RUNNING",
                "pid": 4585,
                "pcpu": "0.0",
                "rss": 60412,
                "vsz": 4915760,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H20M13S",
                "cmd": "/opt/northstar/thirdparty/node-v6.10.1-linux-x64/bin/
node /opt/pcs/NodeJS/util/prune_db.js"
          },
          {
                "timestamp": "2017-07-28T05:20:10.574Z",
                "name": "rabbitmq",
                "status": "RUNNING",
                "pid": 4769,
                "pcpu": "0.9",
                "rss": 56856,
                "vsz": 2333552,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H20M11S",
                "cmd": "/opt/northstar/thirdparty/erlang/lib/erlang/erts-7.0/bin/
beam.smp -W w -A 64 -P 1048576 -K true -- -root /opt/northstar/thirdparty/
erlang/lib/erlang -progname erl -- -home /opt/northstar/ -- -pa /opt/
northstar/thirdparty/rabbitmq/sbin/../ebin -noshell -noinput -s rabbit boot -
sname rabbit@pcs-q-pod08 -boot start_sasl -config /opt/northstar/thirdparty/
rabbitmq/sbin/../etc/rabbitmq/rabbitmq -kernel inet_default_connect_options
 [{nodelay,true}] -sasl errlog_type error -sasl sasl_error_logger false -
rabbit error_logger {file,\"/opt/northstar/thirdparty/rabbitmq/sbin/../var/
log/rabbitmq/rabbit@pcs-q-pod08.log\"} -rabbit sasl_error_logger {file,\
```

```
"/opt/northstar/thirdparty/rabbitmq/sbin/../var/log/rabbitmq/rabbit@pcs-q-
pod08-sasl.log\"} -rabbit enabled_plugins_file \"/opt/northstar/thirdparty/
rabbitmq/sbin/../etc/rabbitmq/enabled_plugins\" -rabbit plugins_dir \"/opt/
northstar/thirdparty/rabbitmq/sbin/../plugins\" -rabbit plugins_expand_dir
 \"/opt/northstar/thirdparty/rabbitmq/sbin/../var/lib/rabbitmq/mnesia/
rabbit@pcs-q-pod08-plugins-expand\" -os_mon start_cpu_sup false -os_mon
 start_disksup false -os_mon start_memsup false -mnesia dir \"/opt/northstar/
thirdparty/rabbitmq/sbin/../var/lib/rabbitmq/mnesia/rabbit@pcs-q-pod08\" -
kernel inet_dist_listen_min 25672 -kernel inet_dist_listen_max 25672"
        },
        {
            "timestamp": "2017-07-28T05:20:10.597Z",
            "name": "zookeeper",
            "status": "RUNNING",
            "pid": 4943,
            "pcpu": "0.0",
            "rss": 97164,
            "vsz": 4608868,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H20M07S",
            "cmd": "/opt/northstar/thirdparty/jdk//bin/java -Dzookeeper.
log.dir=/opt/northstar/thirdparty/zookeeper/bin/../logs -Dzookeeper.log.
file=zookeeper--server-pcs-q-pod08.log -Dzookeeper.root.logger=INFO,CONSOLE
 -XX:+HeapDumpOnOutOfMemoryError -XX:OnOutOfMemoryError=kill -9 %p -cp /
opt/northstar/thirdparty/zookeeper/bin/../build/classes:/opt/northstar/
thirdparty/zookeeper/bin/../build/lib/*.jar:/opt/northstar/thirdparty/
zookeeper/bin/../lib/slf4j-log4j12-1.7.5.jar:/opt/northstar/thirdparty/
zookeeper/bin/../lib/slf4j-api-1.7.5.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/servlet-api-2.5-20081211.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/netty-3.10.5.Final.jar:/opt/northstar/thirdparty/zookeeper/
bin/../lib/log4j-1.2.17.jar:/opt/northstar/thirdparty/zookeeper/bin/../
lib/jline-2.11.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/jetty-
util-6.1.26.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/jetty-6.
1.26.jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/javacc.jar:/opt/
northstar/thirdparty/zookeeper/bin/../lib/jackson-mapper-asl-1.9.11.jar:/
opt/northstar/thirdparty/zookeeper/bin/../lib/jackson-core-asl-1.9.11.
jar:/opt/northstar/thirdparty/zookeeper/bin/../lib/commons-cli-1.2.jar:/
opt/northstar/thirdparty/zookeeper/bin/../zookeeper-3.5.2-alpha.jar:/opt/
northstar/thirdparty/zookeeper/bin/../src/java/lib/*.jar:/opt/northstar/
thirdparty/zookeeper/bin/../conf: -Xmx1000m -Dzookeeper.admin.enableServer=
false -Dcom.sun.management.jmxremote -Dcom.sun.management.jmxremote.port=
9999 -Dcom.sun.management.jmxremote.authenticate=false -Dcom.sun.management.
jmxremote.ssl=false -Dzookeeper.jmx.log4j.disable=true org.apache.zookeeper.
server.quorum.QuorumPeerMain /opt/northstar/thirdparty/zookeeper/bin/../conf/
zoo.cfg"
        },
        {
            "timestamp": "2017-07-28T05:20:10.627Z",
            "name": "listener1_00",
            "status": "RUNNING",
            "pid": 4584,
            "pcpu": "2.8",
            "rss": 15544,
            "vsz": 390752,
            "user": "root",
            "group": "root",
            "time": "P1DT01H20M13S",
            "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/haagent/event_listener.py"
```

```
            },
            {
                "timestamp": "2017-07-28T05:20:10.645Z",
                "name": "mladapter",
                "status": "RUNNING",
                "pid": 6389,
                "pcpu": "0.0",
                "rss": 40624,
                "vsz": 706084,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M02S",
                "cmd": "/opt/northstar/thirdparty/python/bin/python /opt/
northstar/mlAdapter/mlAdapter.py"
            },
            {
                "timestamp": "2017-07-28T05:20:10.663Z",
                "name": "npat",
                "status": "RUNNING",
                "pid": 6002,
                "pcpu": "0.0",
                "rss": 884,
                "vsz": 16080,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M17S",
                "cmd": "/opt/pcs/bin/npatserver 7000 0"
            },
            {
                "timestamp": "2017-07-28T05:20:10.681Z",
                "name": "pceserver",
                "status": "RUNNING",
                "pid": 5833,
                "pcpu": "0.0",
                "rss": 5104,
                "vsz": 85192,
                "user": "root",
                "group": "root",
                "time": "P1DT01H18M35S",
                "cmd": "/usr/local/bin/pce_server -d"
            },
            {
                "timestamp": "2017-07-28T05:20:10.709Z",
                "name": "scheduler",
                "status": "RUNNING",
                "pid": 6004,
                "pcpu": "0.0",
                "rss": 1456,
                "vsz": 108192,
                "user": "pcs",
                "group": "pcs",
                "time": "P1DT01H18M17S",
                "cmd": "/bin/sh /opt/pcs/bin/dcJobScheduler.sh"
            },
            {
                "timestamp": "2017-07-28T05:20:10.725Z",
                "name": "toposerver",
                "status": "RUNNING",
                "pid": 6266,
                "pcpu": "0.0",
```

```
            "rss": 16884,
            "vsz": 961784,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H18M12S",
            "cmd": "/opt/pcs/bin/TopoServer /opt/northstar/data/northstar.cfg"
        },
        {
            "timestamp": "2017-07-28T05:20:10.741Z",
            "name": "PCServer",
            "status": "RUNNING",
            "pid": 6907,
            "pcpu": "0.0",
            "rss": 447792,
            "vsz": 1384368,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H16M14S",
            "cmd": "/opt/pcs/bin/PCServer -port 7003 -handlerPort 7915"
        },
        {
            "timestamp": "2017-07-28T05:20:10.756Z",
            "name": "PCViewer",
            "status": "RUNNING",
            "pid": 6906,
            "pcpu": "0.0",
            "rss": 439740,
            "vsz": 1230508,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H16M14S",
            "cmd": "/opt/pcs/bin/PCViewer"
        },
        {
            "timestamp": "2017-07-28T05:20:10.773Z",
            "name": "configServer",
            "status": "RUNNING",
            "pid": 6908,
            "pcpu": "0.0",
            "rss": 438700,
            "vsz": 1230512,
            "user": "pcs",
            "group": "pcs",
            "time": "P1DT01H16M14S",
            "cmd": "/opt/pcs/bin/configServer"
        }
    ],
    "time": "2017-07-28T05:20:10.790Z",
    "role": [
        "Standalone"
    ],
    "CPU": {
        "pcpu": "16.24",
        "cpus": [
            {
                "pcpu": "6.00"
            },
            {
                "pcpu": "4.04"
            },
```

```
                {
                    "pcpu": "3.00"
                },
                {
                    "pcpu": "5.00"
                }
            ]
        }
}
```

4.25.4. Get the Node-Specific Time

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `nodes/{nodeId}/time{?nodeId}`	Returns the time of a specific node.

Normal response codes: 200

4.25.4.1. Request

This table shows the URI parameters for the get the node-specific time request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the get the node-specific time request:

Name	Type	Description
`nodeId`	String *(Required)*	Unique node name

4.25.4.2. Response

Example 4.135. Get the Node-Specific Time: JSON response

```
{
    "node": "pcs-q-pod08",
    "time": "2017-07-27T07:59:15.730Z"
}
```

4.25.5. Process the Status of a Specific Node

Method	URI	Description
GET	/v2/tenant/{tenant_id}/health/ nodes/{nodeId}/{processName}{? nodeId,processName}	Processes the status of a specific node.

Normal response codes: 200

4.25.5.1. Request

This table shows the URI parameters for the process the status of a specific node request:

Name	Type	Description
{tenant_id}	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the process the status of a specific node request:

Name	Type	Description
nodeId	String *(Required)*	Unique node name
processName	String *(Required)*	Process name

4.25.5.2. Response

Example 4.136. Process the Status of a Specific Node: JSON response

```
{
    "timestamp": "2017-07-27T08:03:43.828Z",
    "name": "elasticsearch",
    "status": "RUNNING",
    "pid": 6077,
    "pcpu": "7.0",
    "rss": 429736,
    "vsz": 4723060,
    "user": "pcs",
    "group": "pcs",
    "time": "PT04H01M48S",
    "cmd": "/usr/bin/java -Xms256m -Xmx1g -Djava.awt.headless=true -XX:
+UseParNewGC -XX:+UseConcMarkSweepGC -XX:CMSInitiatingOccupancyFraction=
75 -XX:+UseCMSInitiatingOccupancyOnly -XX:+HeapDumpOnOutOfMemoryError -
XX:+DisableExplicitGC -Dfile.encoding=UTF-8 -Djna.nosys=true -Des.path.
home=/opt/northstar/thirdparty/elasticsearch -cp /opt/northstar/thirdparty/
elasticsearch/lib/elasticsearch-2.4.0.jar:/opt/northstar/thirdparty/
elasticsearch/lib/* org.elasticsearch.bootstrap.Elasticsearch start -p /opt/
northstar/data/elasticsearch/elasticsearch.pid -Des.default.path.home=/opt/
northstar/thirdparty/elasticsearch -Des.default.path.logs=/opt/northstar/logs
 -Des.default.path.data=/opt/northstar/data/elasticsearch -Des.default.path.
conf=/opt/northstar/data/elasticsearch/config",
    "history": [
        {
            "timestamp": "2017-07-27T07:01:29.503Z",
            "pcpu": "6.2",
            "rss": 428192,
```

```
            "vsz": 4718616
        },
        {
            "timestamp": "2017-07-27T07:11:31.072Z",
            "pcpu": "6.3",
            "rss": 428384,
            "vsz": 4719296
        },
        {
            "timestamp": "2017-07-27T07:21:32.679Z",
            "pcpu": "6.4",
            "rss": 430732,
            "vsz": 4719968
        },
        {
            "timestamp": "2017-07-27T07:31:34.302Z",
            "pcpu": "6.6",
            "rss": 431048,
            "vsz": 4723216
        },
        {
            "timestamp": "2017-07-27T07:41:35.871Z",
            "pcpu": "6.7",
            "rss": 428768,
            "vsz": 4721548
        },
        {
            "timestamp": "2017-07-27T07:51:37.577Z",
            "pcpu": "6.8",
            "rss": 431556,
            "vsz": 4724820
        },
        {
            "timestamp": "2017-07-27T08:01:39.141Z",
            "pcpu": "6.9",
            "rss": 429764,
            "vsz": 4722932
        },
        {
            "timestamp": "2017-07-27T04:11:02.034Z",
            "pcpu": "11.6",
            "rss": 366572,
            "vsz": 4702888
        },
        {
            "timestamp": "2017-07-27T04:21:03.676Z",
            "pcpu": "8.3",
            "rss": 409876,
            "vsz": 4703492
        },
        {
            "timestamp": "2017-07-27T04:31:05.404Z",
            "pcpu": "6.8",
            "rss": 410432,
            "vsz": 4705336
        },
        {
            "timestamp": "2017-07-27T04:41:07.051Z",
            "pcpu": "6.2",
            "rss": 413532,
```

```
            "vsz": 4705724
    },
    {
        "timestamp": "2017-07-27T04:51:08.634Z",
        "pcpu": "5.8",
        "rss": 414224,
        "vsz": 4706860
    },
    {
        "timestamp": "2017-07-27T05:01:10.208Z",
        "pcpu": "5.6",
        "rss": 415696,
        "vsz": 4709092
    },
    {
        "timestamp": "2017-07-27T05:11:11.925Z",
        "pcpu": "5.5",
        "rss": 416604,
        "vsz": 4711372
    },
    {
        "timestamp": "2017-07-27T05:21:13.443Z",
        "pcpu": "5.4",
        "rss": 416448,
        "vsz": 4711280
    },
    {
        "timestamp": "2017-07-27T05:31:15.085Z",
        "pcpu": "5.4",
        "rss": 417620,
        "vsz": 4712728
    },
    {
        "timestamp": "2017-07-27T05:41:16.629Z",
        "pcpu": "5.5",
        "rss": 416912,
        "vsz": 4712464
    },
    {
        "timestamp": "2017-07-27T05:51:18.274Z",
        "pcpu": "5.6",
        "rss": 417344,
        "vsz": 4713424
    },
    {
        "timestamp": "2017-07-27T06:01:19.797Z",
        "pcpu": "5.6",
        "rss": 420080,
        "vsz": 4716988
    },
    {
        "timestamp": "2017-07-27T06:11:21.449Z",
        "pcpu": "5.7",
        "rss": 419820,
        "vsz": 4715032
    },
    {
        "timestamp": "2017-07-27T06:21:23.354Z",
        "pcpu": "5.8",
        "rss": 426464,
```

```
                "vsz": 4715688
        },
        {
                "timestamp": "2017-07-27T06:31:24.903Z",
                "pcpu": "5.9",
                "rss": 427692,
                "vsz": 4716340
        },
        {
                "timestamp": "2017-07-27T06:41:26.482Z",
                "pcpu": "6.0",
                "rss": 427884,
                "vsz": 4717164
        },
        {
                "timestamp": "2017-07-27T06:51:27.999Z",
                "pcpu": "6.1",
                "rss": 427984,
                "vsz": 4717912
        }
    ]
}
```

4.25.6. Get the Status History of a Specific Node

Method	URI	Description

GET	`/v2/tenant/{tenant_id}/health/`
	`nodes/{nodeId}/{processName}/his-`
	`tory{?nodeId,processName}`
		Returns the health history of a specific node.

Normal response codes: 200

4.25.6.1. Request

This table shows the URI parameters for the get the status history of a specific node request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the get the status history of a specific node request:

Name	Type	Description
`nodeId`	String *(Required)*	Unique node name
`processName`	String *(Required)*	Process name

4.25.6.2. Response

Example 4.137. Get the Status History of a Specific Node: JSON response

```
[
    {
        "timestamp": "2017-07-27T07:01:29.503Z",
        "pcpu": "6.2",
        "rss": 428192,
        "vsz": 4718616
    },
    {
        "timestamp": "2017-07-27T07:11:31.072Z",
        "pcpu": "6.3",
        "rss": 428384,
        "vsz": 4719296
    },
    {
        "timestamp": "2017-07-27T07:21:32.679Z",
        "pcpu": "6.4",
        "rss": 430732,
        "vsz": 4719968
    },
    {
        "timestamp": "2017-07-27T07:31:34.302Z",
        "pcpu": "6.6",
        "rss": 431048,
        "vsz": 4723216
```

```
        },
        {
            "timestamp": "2017-07-27T07:41:35.871Z",
            "pcpu": "6.7",
            "rss": 428768,
            "vsz": 4721548
        },
        {
            "timestamp": "2017-07-27T07:51:37.577Z",
            "pcpu": "6.8",
            "rss": 431556,
            "vsz": 4724820
        },
        {
            "timestamp": "2017-07-27T08:01:39.141Z",
            "pcpu": "6.9",
            "rss": 429764,
            "vsz": 4722932
        },
        {
            "timestamp": "2017-07-27T04:11:02.034Z",
            "pcpu": "11.6",
            "rss": 366572,
            "vsz": 4702888
        },
        {
            "timestamp": "2017-07-27T04:21:03.676Z",
            "pcpu": "8.3",
            "rss": 409876,
            "vsz": 4703492
        },
        {
            "timestamp": "2017-07-27T04:31:05.404Z",
            "pcpu": "6.8",
            "rss": 410432,
            "vsz": 4705336
        },
        {
            "timestamp": "2017-07-27T04:41:07.051Z",
            "pcpu": "6.2",
            "rss": 413532,
            "vsz": 4705724
        },
        {
            "timestamp": "2017-07-27T04:51:08.634Z",
            "pcpu": "5.8",
            "rss": 414224,
            "vsz": 4706860
        },
        {
            "timestamp": "2017-07-27T05:01:10.208Z",
            "pcpu": "5.6",
            "rss": 415696,
            "vsz": 4709092
        },
        {
            "timestamp": "2017-07-27T05:11:11.925Z",
            "pcpu": "5.5",
            "rss": 416604,
            "vsz": 4711372
```

```
    },
    {
        "timestamp": "2017-07-27T05:21:13.443Z",
        "pcpu": "5.4",
        "rss": 416448,
        "vsz": 4711280
    },
    {
        "timestamp": "2017-07-27T05:31:15.085Z",
        "pcpu": "5.4",
        "rss": 417620,
        "vsz": 4712728
    },
    {
        "timestamp": "2017-07-27T05:41:16.629Z",
        "pcpu": "5.5",
        "rss": 416912,
        "vsz": 4712464
    },
    {
        "timestamp": "2017-07-27T05:51:18.274Z",
        "pcpu": "5.6",
        "rss": 417344,
        "vsz": 4713424
    },
    {
        "timestamp": "2017-07-27T06:01:19.797Z",
        "pcpu": "5.6",
        "rss": 420080,
        "vsz": 4716988
    },
    {
        "timestamp": "2017-07-27T06:11:21.449Z",
        "pcpu": "5.7",
        "rss": 419820,
        "vsz": 4715032
    },
    {
        "timestamp": "2017-07-27T06:21:23.354Z",
        "pcpu": "5.8",
        "rss": 426464,
        "vsz": 4715688
    },
    {
        "timestamp": "2017-07-27T06:31:24.903Z",
        "pcpu": "5.9",
        "rss": 427692,
        "vsz": 4716340
    },
    {
        "timestamp": "2017-07-27T06:41:26.482Z",
        "pcpu": "6.0",
        "rss": 427884,
        "vsz": 4717164
    },
    {
        "timestamp": "2017-07-27T06:51:27.999Z",
        "pcpu": "6.1",
        "rss": 427984,
        "vsz": 4717912
```

```
        }
]
```

4.25.7. Get Health Thresholds

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `thresholds`	Returns the health thresholds for the nodes.

Normal response codes: 200

4.25.7.1. Request

This table shows the URI parameters for the get health thresholds request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.7.2. Response

Example 4.138. Get Health Thresholds: JSON response

```
[
    {
        "id": "diskUtilization",
        "partition": "/",
        "node": "pcs-q-pod08",
        "critical": "95%",
        "warning": "80%"
    }
]
```

4.25.8. Get Disk Utility Thresholds

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `thresholds/diskUtilization`	Returns the disk utility thresholds.

Normal response codes: 200

4.25.8.1. Request

This table shows the URI parameters for the get disk utility thresholds request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.8.2. Response

Example 4.139. Get Disk Utility Thresholds: JSON response

```
[
    {
        "id": "diskUtilization",
        "partition": "/",
        "node": "pcs-q-pod08",
        "critical": "95%",
        "warning": "80%"
    }
]
```

4.25.9. Update Disk Utility Thresholds

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/health/` `thresholds/diskUtilization`	Updates the disk utility thresholds using the following schema: health.json#/definitions/diskThreshold

Normal response codes: 200

4.25.9.1. Request

This table shows the URI parameters for the update disk utility thresholds request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.9.2. Response

Example 4.140. Update Disk Utility Thresholds: JSON response

```
{
    "links": [
        {
            "href": "nodes",
            "rel": "nodes",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}",
            "rel": "node",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/time",
            "rel": "node",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/{processName}",
            "rel": "processDetail",
            "type": "application/json"
        },
        {
            "href": "nodes/{nodeId}/{processName}/history",
            "rel": "processDetailHistory",
            "type": "application/json"
        },
        {
            "href": "thresholds",
            "rel": "thresholds",
            "type": "application/json"
        },
        {
```

```
                "href": "thresholds/<threshholdId>",
                "rel": "threshold",
                "type": "application/json"
            },
            {
                "href": "smtpconfig",
                "rel": "smtpconfig",
                "type": "application/json"
            },
            {
                "href": "subscribers",
                "rel": "subscribers",
                "type": "application/json"
            }
        ]
}
```

4.25.10. GET SMTP Config

Method	URI	Description
GET	`/v2/tenant/{tenant_id}/health/` `nodes/smtpconfig`	Returns the SMTP configuration.

Normal response codes: 200

4.25.10.1. Request

This table shows the URI parameters for the get smtp config request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.10.2. Response

Example 4.141. GET SMTP Config: JSON response

```
{
    "enabled": true,
    "isPasswdSet": true
}
```

4.25.11. Update SMTP Config

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/health/ nodes/smtpconfig{?host,port,se- cure,username,password,enabled}`	Updates the SMTP configuration using the following the schema: health.json#/definitions/updateSmtpconfig and sample

Normal response codes: 200

4.25.11.1. Request

This table shows the URI parameters for the update smtp config request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This table shows the query parameters for the update smtp config request:

Name	Type	Description
`host`	String *(Required)*	Host address
`port`	Int *(Required)*	Port
`secure`	Bool *(Required)*	Is it using SSL?
`username`	String *(Required)*	Username
`password`	String *(Required)*	Password
`enabled`	Bool *(Required)*	SMTP server enabled?

Example 4.142. Update SMTP Config: JSON request

```
{
 "host":"127.0.0.1",
 "secure":false,
 "username":"sample",
 "password":"sample123",
 "port":587,
    "enabled": true
}
```

4.25.11.2. Response

Example 4.143. Update SMTP Config: JSON response

```
{
```

```
    "host": "127.0.0.1",
    "secure": false,
    "username": "test",
    "port": 587,
    "enabled": true
}
```

4.25.12. Update Email Alert Subscribers

Method	URI	Description
PUT	`/v2/tenant/{tenant_id}/health/` `nodes/subscribers`	Updates the list of subscribers for Email Alerts using the following schema: health.json#/definitions/subscriberList

4.25.12.1. Request

This table shows the URI parameters for the update email alert subscribers request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.25.13. Delete Email Alert Subscribers

Method	URI	Description
DELETE	`/v2/tenant/{tenant_id}/health/nodes/subscribers`	Deletes subscribers for Email Alerts using the following schema: health.json#/definitions/subscriber

4.25.13.1. Request

This table shows the URI parameters for the delete email alert subscribers request:

Name	Type	Description
`{tenant_id}`	Int	A unique identifier for the tenant or account. In NorthStar version 2, the unique identifier is set to 1.

This operation does not accept a request body.

4.26. Notification examples

4.26.1. Node events

Example 4.144. Node update example

```
 1                        {"action": "update", "notificationType": "node",
"object":    {
        "topoObjectType": "node","topologyIndex": 1,"id": "192.0.2.1",
"nodeIndex": 1,"layer": "IP","AutonomousSystem": {"asNumber": 11},
        "protocols": {"ISIS": {
 5          "routerId": "192.0.2.1",
            "TERouterId": "192.0.2.1",
            "isoAddress": "0110.0000.0101",
            "area": "490011"},
         "PCEP": {"operationalStatus": "Up","pccAddress": "192.0.2.1"}}}}
10
```

Example 4.145. Node removal example

```
 1
 2                        {"action": "remove", "notificationType":
"node", "object": {"nodeIndex": 1, "topologyIndex": 1, "id": "192.0.2.1",
"topoObjectType": "node"}}
 3
 4
```

4.26.2. Link events

Example 4.146. Link update example

```
 1                        {"action": "remove", "notificationType": "link",
"object": {
        "topoObjectType": "link","topologyIndex": 1,
        "linkIndex": 1,"id": "L192.0.2.13_192.0.2.14",
```

```
 5      "endA": {
            "topoObjectType": "interface","TEcolor": 0, "TEmetric": 10,
"delay" : 600,
            "bandwidth": 40000000000,
            "node"        : {"id": "192.0.2.3","topoObjectType": "node",
"topologyIndex": 1},
            "ipv4Address": {"address": "192.0.2.13","topoObjectType": "ipv4"},
10          "protocols": {"ISIS": { "TEMetric": 10,"level": "L2"},
                          "RSVP": {"bandwidth": 40000000000}},
            "unreservedBw": [39970000896, 39970000896, 39970000896,
39469998080, 39469998080, 39469998080, 39469998080, 39469998080]
        },
        "endZ": {
15          "topoObjectType": "interface","TEcolor": 0, "TEmetric": 10,
"delay" : 600,
            "bandwidth": 40000000000,
            "node"        : {"id": "192.0.2.7","topoObjectType": "node",
"topologyIndex": 1},
            "ipv4Address": {"address": "192.0.2.14","topoObjectType": "ipv4"},
            "protocols": {"ISIS": { "TEMetric": 10,"level": "L2"},
20                        "RSVP": {"bandwidth": 40000000000}},
            "unreservedBw": [39289999360, 38790000640, 38790000640,
38790000640, 38790000640, 38790000640, 38790000640, 38790000640]
        },
        "operationalStatus": "Up"}}

25
```

Example 4.147. Link removal example

```
 1
 2                              {"action": "remove", "object": {"id": "192.
0.2.13", "topologyIndex": 1, "linkIndex": 1, "topoObjectType": "link"},
 "notificationType": "link"},
 3
 4
```

4.26.3. TE-LSPs events

Example 4.148. LSP update example

```
 1
                                {"action": "remove", "notificationType": "lsp",
"object":{
        "lspIndex": 2,
        "name": "LP_101_103",
 5      "from": {"address": "62.0.0.101", "topoObjectType": "ipv4"},
        "to":   {"address": "62.0.0.103", "topoObjectType": "ipv4"},
        "controlType": "Delegated",
        "plannedProperties": {
    "bandwidth": "10M",
10  "setupPriority": 7,
    "holdingPriority": 0,
    "calculatedEro": [
        {"topoObjectType": "ipv4","address": "62.101.105.2","loose": false},
        {"topoObjectType": "ipv4","address": "62.102.105.1","loose": false},
15      {"topoObjectType": "ipv4","address": "62.102.106.2","loose": false},
        {"topoObjectType": "ipv4","address": "62.104.106.1","loose": false},
```

```
              {"topoObjectType": "ipv4","address": "62.104.107.2","loose": false},
              {"topoObjectType": "ipv4","address": "62.103.107.1","loose": false}
        ],
 20   "pathName": "Path_Node101_Node103_Strict_1",
        "adminStatus": "Up",
        "routingStatus": "Up",
        "lastStatusString": "<Active PCS initialization"
          },
 25     "liveProperties": {
             "adminStatus": "Up",
             "bandwidth": 10000000,
             "ero": [
                 {"address": "62.101.105.2", "loose": false, "topoObjectType":
"ipv4" },
 30              {"address": "62.105.107.2", "loose": false, "topoObjectType":
"ipv4" },
                 {"address": "62.103.107.1", "loose": false, "topoObjectType":
"ipv4" }
             ],
             "holdingPriority": 0,
             "metric": 40,
 35          "pathName": "Path_Node101_Node103_Strict_1",
             "rro": [
                 {"address": "62.0.0.105",   "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                 {"address": "62.101.105.2", "protectionAvailable": true,
"protectionInUse": false, "topoObjectType": "ipv4"},
                 {"address": "62.0.0.107",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
 40              {"address": "62.105.107.2", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                 {"address": "62.0.0.103",   "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"},
                 {"address": "62.103.107.1", "protectionAvailable": false,
"protectionInUse": false, "topoObjectType": "ipv4"}
             ],
             "setupPriority": 7
 45     },
        "operationalStatus": "Active",
        "pathType": "primary",
        "tunnelId": 56614
    }}
 50
```

Example 4.149. LSP removal example

```
 1
 2                               {"action": "remove", "object": {"lspIndex": 74},
"notificationType": "lsp"},
 3
 4
```

4.26.4. P2MP Groups

Example 4.150. P2MP update example

The following example illustrates updating a P2MP group with a new LSP. The result is, in fact, two updates, one for the group and one for the newly added LSP. The results are simi-

lar when an LSP is removed from the group; the group is updated (or removed if no LSP remains), then the member itself is removed.

```
1
2                                {"action": "update", "object": {"from":
{"address": "11.0.0.101", "topoObjectType": "ipv4"}, "name": "1-d",
 "lsps": [{"lspIndex": 90}, {"lspIndex": 91}], "p2mpIndex": 184549477,
 "topoObjectType": "p2mpGroup", "p2mpGroupIndex": 8}, "notificationType":
 "p2mpGroup"},
3
4
```

```
1
2                                {"action": "add", "object": {"p2mpName": "1-
d", "from": {"address": "11.0.0.101", "topoObjectType": "ipv4"}, "name":
 "p2mpMember-02", "p2mpIndex": 184549477, "liveProperties": {"adminStatus":
 "Up", "rro": [{"address": "11.101.105.2", "protectionAvailable": false,
 "protectionInUse": false, "topoObjectType": "ipv4"}, {"address": "11.105.107.
2", "protectionAvailable": false, "protectionInUse": false, "topoObjectType":
 "ipv4"}, {"address": "11.104.107.1", "protectionAvailable": false,
 "protectionInUse": false, "topoObjectType": "ipv4"}], "setupPriority": 7,
 "metric": 0, "bandwidth": 0, "holdingPriority": 0, "ero": []}, "pathType":
 "primary", "to": {"address": "11.0.0.104", "topoObjectType": "ipv4"},
 "controller": "External", "operationalStatus": "Up", "controlType": "PCC",
 "lspIndex": 91}, "notificationType": "lsp"},
3
4
```

Example 4.151. P2MP group removal example

When the Last LSP of the P2MP group is removed, the P2MP group is removed.

NOTE: LSP removal notification is described in the LSP notification examples.

```
1
2                                {"action": "remove", "object": {"p2mpGroupIndex":
8, "topologyIndex": 1, "topoObjectType": "p2mpGroup"}, "notificationType":
 "p2mpGroup"},
3
4
```

4.26.5. Node events

Example 4.152. Node update example

```
1
                                {"action": "update", "notificationType": "node",
 "object":    {
      "topoObjectType": "node","topologyIndex": 1,"id": "192.0.2.1",
"nodeIndex": 1,"layer": "IP","AutonomousSystem": {"asNumber": 11},
      "protocols": {"ISIS": {
5        "routerId": "192.0.2.1",
         "TERouterId": "192.0.2.1",
         "isoAddress": "0110.0000.0101",
         "area": "490011"},
       "PCEP": {"operationalStatus": "Up","pccAddress": "192.0.2.1"}}}}
10
```

Example 4.153. Node removal example

```
1
2                         {"action": "remove", "notificationType":
"node", "object": {"nodeIndex": 1, "topologyIndex": 1, "id": "192.0.2.1",
"topoObjectType": "node"}}
3
4
```

4.26.6. Topology events

Example 4.154. Topology reset example

```
1
                          {"action": "add", "object": {"topoObjectType" :
"topology", "topologyIndex" : 1}, "notificationType": "topology"}


5
```

4.26.7. High Availability events

Example 4.155. Node status update

```
1
                          {"action": "add","notificationType": "host",
"object" :{
      "hostname" : "node1.northstar.example.net",
      "status" : "Up",
5     "role" : "Active"
   }}
```