



Cisco Virtual Topology System (VTS) 2.6.3 Developer Guide

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Abstract

The Cisco Virtual Topology System (VTS) 2.6.3 Developer Guide gives information on VTS APIs and development features.

The Virtual Topology System (VTS) provides L2 and L3 connectivity to tenant, router, and service VMs. The main components of the VTS are the Virtual Topology Controller (VTC) and the VTSR.

Cisco Virtual Topology System 2.6.3 Developer Guide
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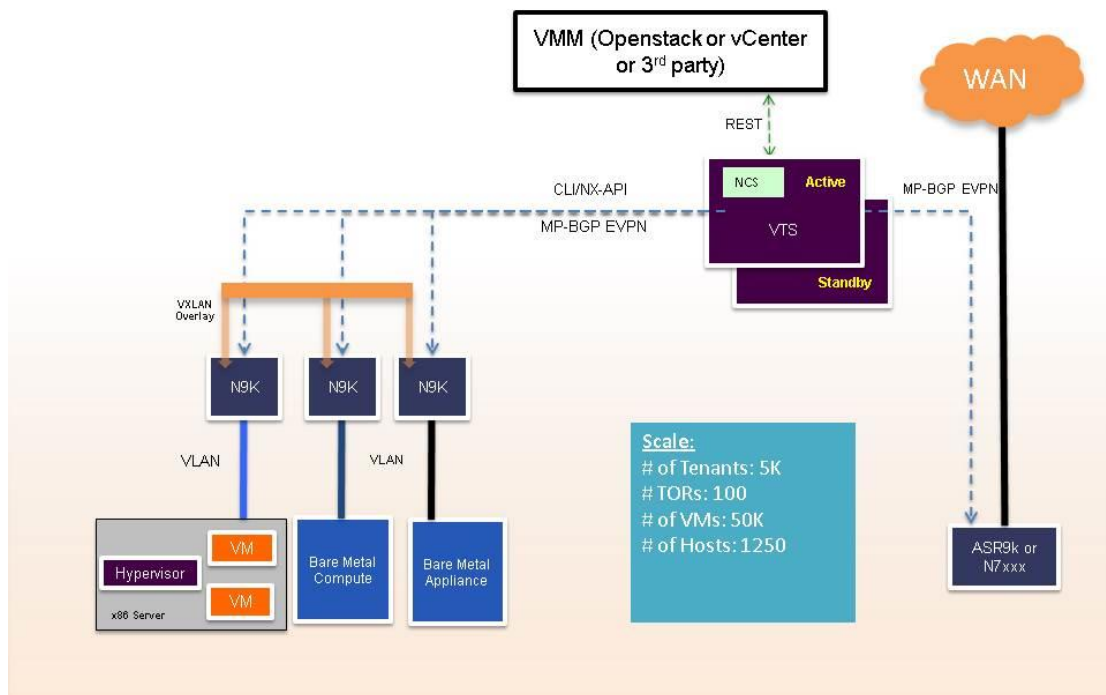
1 Overview of VTS API

The VTS API is exposed north-bound by the VTC component. The API is used to:

- Provision VTC with the Inventory of the DC topology
- Provision VTC with the Hardware VTEP Info
- Provision VTC with the information about the networks that will be serviced by the associated tenants
- Provision VTC with the information about sub-networks
- Provision VTC with the information about VMs attached to the networks
- Provision VTC with the information of L3 router and its interfaces that will be used for L3 connectivity between the tenant VMs

1.1 Architecture

VTS 1.5: EVPN based VxLAN Usecase



1.1.1 Virtual Topology Controller (VTC)

VTC is the topology controller for the VTS; VTC controls all the hardware VTEPs to provide intra DC connectivity between VMs belonging to the same tenant zone in the DC and inter DC/WAN connectivity to remote networks belonging to the same tenant. VTC learns about remote networks by peering using BGP and other routing protocols to remote peers and route reflectors.

The VTC VM will have one VNIC interface which has VIP address:

- One for control, used in the NB API to program VTC.

1.2 Key Concepts

The VTC northbound API is a REST API over HTTPS. A VM managing entity is assumed to create VMs and call the VTC APIs to provide the required information for the creation of the virtual networks.

For security reasons the API implements certificate-based validation both on client side (the Managing Entity) and server side (VTC). The user is responsible for creating and uploading the server-side certificate in VTC, as well as creating and using the certificate on the client side. Instructions for the upload of certificate are specified in section 4.4.

2 Preparing to Use the VTS API

The VTC NB API is used to provision the VTC with all hardware VTEPS that it controls, as well the networks, subnets and VMs that will be deployed on the compute servers.

2.1 Requirements

In order to exercise the API you should be able to issue https requests to VTC. This can be done by a binary or script. This document provides client-side examples using the curl command.

2.2 Installing the VTS API

The VTS API uses server-side certificate for security. The VTS comes with default server-side certificate. The user is responsible for creating and replacing such certificates if needed.

2.2.1 Installing Certificates

- **Key-file:** Specifies which file that contains the private key for the certificate
Copy the key file to /etc/ncs/ssl/cert/host.key
- **Cert-file:** Specifies which file that contains the server certificate.
Copy the cert file to /etc/ncs/ssl/cert/host.cert
- **restart the VTS server process:**

```
sudo service ncs restart
```

2.2.2 REST Semantics

- **Retrieving a Resource**
GET is used to retrieve a representation of a known resource.
The XML representation has the list of container name as the XML document root.
Request query parameters
"deep" : retrieve a resource with all subresources incline
"shallow" : retrieve a resource with no subresources incline
"offset"/"limit" : used to specify a limited set of list entries to retrieve
"select" : used to select which nodes and subresources in a resource to retrieve
- **Replace a resource**
PUT is used to completely replace a known resource.
- **Update some properties of a resource**
PATCH RFC 5789 is used to edit a known resource. PATCH cannot be used to change keys of a resource.
- **Create a Resource**
POST to the parent resource to create a new resource.
- **DELETE a Resource**
DELETE is used to remove a known resource. DELETE can be used to remove the entire resource or part of it.

3 VTS Network Element Driver

3.1 Overview

This section describes the Network Element Drivers (NED) integration for Cisco-VTS.

NED comprises of the network-facing part of NSO. They communicate over the native protocol supported by the device, such as Network Configuration Protocol (NETCONF), Representational State Transfer (REST), Extensible Markup Language (XML), CLI, and Simple Network Management Protocol (SNMP). For more information see, [Network Services Orchestrator Network Element Drivers](#).

3.2 Compiling VTS NED

The NED supports NETCONF mode of communication towards the device (VTS).

In ncs-[4.6.1.6]cisco-vts-[2.6.3]tar.gz:

- NED is compiled with NSO version 4.6.1.6
- NSO version 4.6.1.6 is used by VTS 2.6.3

To use this VTS NED without re-compiling, install the VTS NED with the version of Controller's NSO that should match 4.6.1.6.

Note: This version of VTS NED, 2.6.3, is tested only in the compiled NSO version, 4.6.1.6. Any other NSO version is not qualified.

3.2.1 Loading VTS NED in different NSO Version

If the NSO version is different from that in VTS (ncs-4.6.1.6), then compile NED package using the following steps:

1. Use `ncs-make-package --netconf-ned yangmodules package-name`, where `package-name` will be the name of NED to be created.
2. Compile the NED using `make clean all` from `<package-name>/src`
3. Copy `package-name` folder to `<NCS_RUN_DIR>`:

```
> cp -r package-name <NCS_RUN_DIR>/packages
```
4. Login to `ncs-cli`:

```
> request packages reload
```
5. Configure the device by entering configuration mode in the the NSO CLI.

3.2.2 Loading VTS NED in same NSO version

If the NSO version is the same as that in VTS (ncs-4.6.1.6), then compile NED package using the following steps that are run in top level NSO VM:

1. Extract the contents of `ncs-[4.6.1.6]cisco-vts-[4.6.1.6]tar.gz`. using the following command:

```
> cd /tmp
> mkdir ncs-[x.x.x]cisco-vts-[x.x.x]
> cd ncs-[x.x.x]cisco-vts-[x.x.x]
> tar xvzf ncs-[x.x.x]cisco-vts-[x.x.x].tar.gz
```

2. Copy `cisco-vts` ned to `<NCS_RUN_DIR>`:

```
> cp -r cisco-vts <NCS_RUN_DIR>/packages
```

Note: By default on NSO system, install environment `<NCS_RUN_DIR>` will be `/var/opt/ncs`

3. Login to `ncs_cli`:

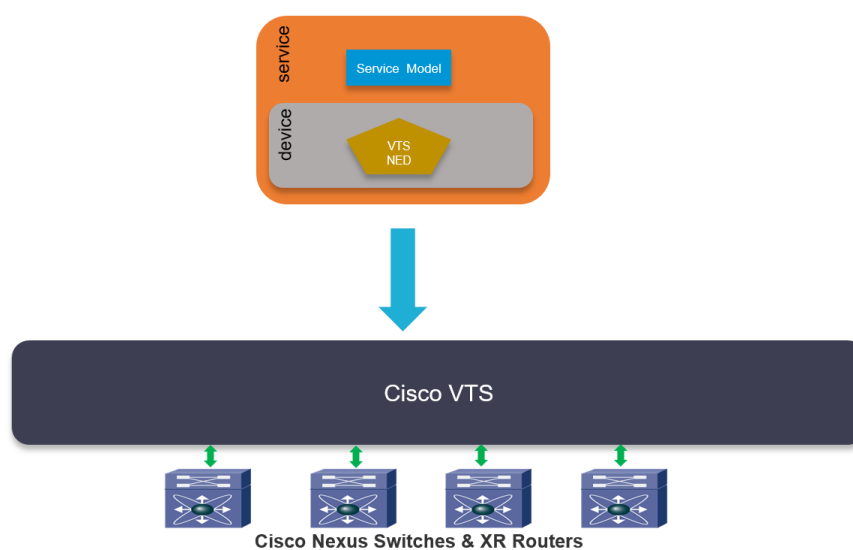
```
> request packages reload
```

4. Configure the device by entering configuration mode in the the NSO CLI.

3.3 Integrating VTS NSO

Cisco VTS can be managed by the top NSO controller through VTS NED. The top NSO Controller can make I2/I3 overlay provision on the fabric through its managed VTS.

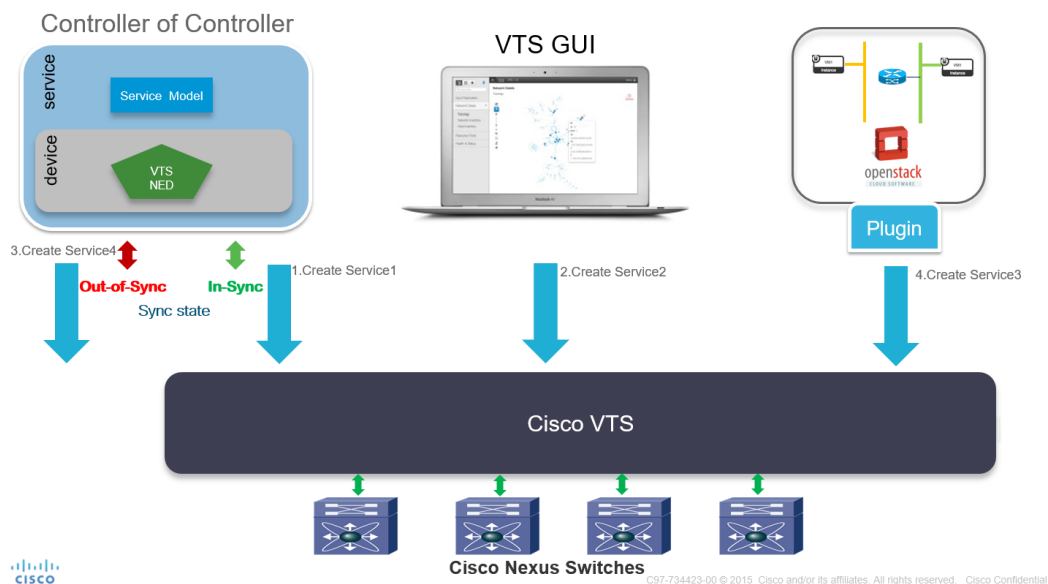
The following block diagram explains the integration of VTS with top-level NSO using VTS NED:



3.4 Multi-Controller Syndrome

In the Controller of Controller (CoC) use cases, configuring directly through VTS GUI or configuring from VTS registered VMMs (openstack in this case) are referred to as **out-of-band** configurations. Any **out-of-band** configuration can cause **out-of-sync** between the orchestrator and Cisco VTS. This blocks NSO Controller to set further update to VTS. If such configurations are expected by the top NSO Controller, then an explicit **sync-from** needs to be done before it can set the update to this managed VTS.

The following block diagram explains the multi-controller issue:



4.4 .1 Explicit sync-from on NSO Controller

In the CoC environment, few cases can cause the NSO Controller to go **out-of-sync** with its managed VTS. Following are the use case scenarios wherein you can do an explicit sync-from on the top level NSO before it can set any further update to this VTS:

- When there is site creation, it is treated as day0 configure for VTS. User needs to create the site from VTS and then trigger it on the top level NSO.
- While updating configuration on a redundant pair of devices such as SMH (Static Multi Homed) or VPC (Virtual Port-Channel), if one of the device go down during a transaction, the top level NSO will trigger it upon recognizing **Link Up on SMH/VPC TOR**.
- When VTSR or VTF is registered on VTS or is directly configured through VMM or VTS GUI, the top level NSO will be out-of-sync to VTS.

4 API Reference

Base URI

Because of multi site support feature in this release, the base URI is changed. Note the highlighted change where you need to provide site id in the path

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<site id>/cisco-vts/>

Headers: All headers Content-Type, Accept and Authorization should be provided

Content-Type: application/vnd.yang.data+json

OR

Content-Type: application/vnd.yang.data+xml

Accept: application/vnd.yang.data+json

OR

Accept: application/vnd.yang.data+xml

Authorization: Basic: (username/password)

4.1 Authgroup

The following APIs are used to create or retrieve the authentication groups for which the username and password that will be used to access the devices are stored.

GET

<https://host:8888/api/running/devices/authgroups> - to get list of authgroups.

PATCH

<https://host:8888/api/running/devices/authgroups/> - to incrementally add the authgroup.

4.1.1 Payload

```
<authgroups>
<group>
<name>default_device</name>
<umap>
<local-user>admin</local-user><!-------Username used for NCS API authentication---
--->
<remote-name>admin</remote-name><!-------Username for Device authentication----
-->
```

```

<remote-password>admin</remote-password><!-------Password on Device for user
account supplied----->
<remote-secondary-password>admin</remote-secondary-password><!-------used for
enable password----->
</umap>
</group>
</authgroups>

```

4.2 Device

The following APIs are used to do CRUD operation of the device.

GET

<https://host:8888/api/running/devices/device> - to get list of devices

PUT

<https://host:8888/api/running/devices/device> - to add device to VTS or replace a device

Note the site-id parameter which is added for multi site feature support. A device belongs to only one site

```

{
  "device": {
    "name": "abc123",
    "address": "1.1.1.5",
    "authgroup": "default",
    "device-type": {
      "cli": {
        "ned-id": "tailf-ned-cisco-nx-id:cisco-nx"
      }
    },
    "vts-service:vts-device-meta-data": {
      "site-id": "<site id>"
    }
  }
}

```

PATCH

<https://host:8888/api/running/devices/device/> - to incrementally add the device (Existing device will not be modified)

4.2.1 Payload to add N9K device

```

<device>
  <name>n9k1</name>
  <address>1.1.1.1</address>
  <authgroup>N9k-authgroup1</authgroup>

```

```

<device-type>
  <cli>
    <ned-id>cisco-nx</ned-id>
    <protocol>ssh</protocol>
  </cli>
</device-type>
<ned-settings>
<cisco-nx-connection>
  <method>nxapi</method>
</cisco-nx-connection>
</ned-settings>
<state>
  <admin-state>unlocked</admin-state>
  <admin-state-description>changed to xyz</admin-state-description>
</state>
<device-info>
  <device-use>LEAF</device-use>
  <bgp-peering>
    <bgp-asn>100</bgp-asn>
    <loopback-if-num>1</loopback-if-num>
    <loopback-if-ip>10.10.10.0/24</loopback-if-ip>
  </bgp-peering>
</device-info>
<vts-device-meta-data>
  <site-id>your site ID</site-id>
</vts-device-meta-data>

</device>

```

4.3 Site CRUD

Following are the APIs for site CRUD operations

4.3.1 To create new site OR to update existing site

(note that site's id is key and can not be updated. Also in 2.6.2 release we do not allow site's vts-data-plane-protocol to be changed from vxlan to mpls and vice a versa after site is created

POST

<https://<VTCHost>:8888/api/running/vts-service/sites>

```

{
  "site": {
    "name": "siteA",
    "description": "site A description",
    "id": "<site uuid>",
    "vts-data-plane-protocol": "cisco-vts-identities:vxlan-encapsulation"
  }
}

```

}

Note that the data-plane-protocol can have one of the two values
 cisco-vts-identities:vxlan-encapsulation
 or

cisco-vts-identities:mpls-encapsulation

4.3.2 To get list of sites

GET

<https://<VTCHost>:8888/api/running/vts-service/sites>

4.3.3 To get information about specific site

GET

<https://<VTCHost>:8888/api/running/vts-service/sites/site/<site id>>

4.3.4 To Delete a site

DELETE

<https://<VTCHost>:8888/api/running/vts-service/sites/site/<site id>>

4.4 Inventory

The following APIs are used to upload / retrieve the inventory of the topology.

GET <https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/hosts> to get list of hosts and their interfaces

GET

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/devices> to get list of device to server mapping

PUT

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/hosts/host/{hostname}{vmm-id}> - to add host info to NCS or replace a hosts information for this device. In case of baremetal hosts, the VMM is VTS

PATCH

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/hosts/host{hostname}{vmm-id}> - to incrementally add the deviceport-server info such as adding a new device interface for the host (Existing info will not be modified)

4.4.1 Payload Example

```
<vts-service xmlns="http://cisco.com/ns/yang/vts-service">
  <sites>
    <site>
```



```

<id>8de7d735-594d-464e-a7fc-0d34c44fca31</id>
<cisco-vts xmlns="http://cisco.com/ns/yang/vts">
  <hosts>
    <host>
      <name>compute1</name>
      <vmm-id>8de7d735-594d-464e-a7fc-0d34c44fca31</vmm-id>
      <host-interfaces>
        <host-interface>
          <device-name>tb3-tor1</device-name>
          <device-port-name>Ethernet1/1</device-port-name>
          <interface-name>eth3</interface-name>
          <connid refcounter="1" >9d45feea-770e-4d16-80f7-
174e41947636</connid>
        </host-interface>
        <host-interface>
          <device-name>n7k2</device-name>
          <device-port-name>Ethernet1/8</device-port-name>
          <interface-name>eth4</interface-name>
          <connid refcounter="1" >6391d7d4-e3fd-42f2-9081-
694fa2aa03ce</connid>
        </host-interface>
      </host-interfaces>
      <type xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:virtual-
server</type>
      <role xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:managed-
server</role>
      <ip>172.20.100.30</ip>
    </host>
  </hosts>
</cisco-vts>
</site>
</sites>
</vts-service>

```

4.4.2 Payload Example with FEX

```

<devices
  xmlns="http://cisco.com/ns/yang/vts"
  xmlns:y="http://tail-f.com/ns/rest"
  xmlns:vts="http://cisco.com/ns/yang/vts">
  <device>
    <name>tb3-tor1</name>
  <ports>
    <port>
      <name>port-channel25</name>
      <connection-type
        xmlns:cisco-vts-
identities="http://cisco.com/ns/yang/vts/identities">cisco-vts-identities:fabric
      </connection-type>
      <fexs>
        <fex>

```

```

        <fex-id>120</fex-id>
      </fex>
    </fexs>
  </port>
</ports>
</device>
</devices>
<hosts>
  <host>
    <name>compute1</name>
    <vmm-id>8de7d735-594d-464e-a7fc-0d34c44fca31</vmm-id>
    <host-interfaces>
      <host-interface>
        <device-name> tb3-tor1</device-name>
        <device-port-name> Ethernet120/1/1</device-port-name>
        <interface-name>eth3</interface-name>
        <connid refcounter="1" >9d45feea-770e-4d16-80f7-174e41947636<connid>
      </host-interface>
    </host-interfaces>
    <type xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:virtual-
server</type>
    <role xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:managed-
server</role>
    <ip>1.0.1.3</ip>
  </host>
</hosts>

```

Starting with VTS2.5.1, two fields have been added additionally to the hosts.

- 1.) virtual-switch
- 2.) vtf-link

Parameter	Value	VMM-ID/Description
virtual-switch	not-defined-st ovs-st dvs-st vtf-vtep-st vtf-l2-st	Openstack/vCenter Openstack vCenter Openstack/vCenter Openstack
vtf-link	vtf-tor-link vtf-vtsr-link	Uplink tor connection Vtsr connection

4.5 Example payload for virtual switch type and vtf-link.

```

<host>
  <name>compute1</name>
  <vmm-id>8de7d735-594d-464e-a7fc-0d34c44fca31</vmm-id>

```

```

<host-interfaces>
<host-interface>
  <device-name> tb3-tor1</device-name>
  <device-port-name>Ethernet1/1</device-port-name>
  <interface-name>eth3</interface-name>
  <virtual-switch> ovs-st </virtual-switch>
  <vtf-link> vtf-tor-link </vtf-link>
  <connid refcounter="1" >9d45feea-770e-4d16-80f7-
174e41947636</connid>
  </host-interface>
</host-interfaces>
<type xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:virtual-
server</type>
<role xmlns:vts-ids="http://cisco.com/ns/yang/vts/identities">vts-ids:managed-
server</role>
<ip>172.20.100.30</ip>
</host>

```

Configuring Tenant Information

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>cisco-vts/tenants/tenant/<name>>

Tenants	Container for set of VTS Tenants
Tenant	List of VTS Tenants
Name	Tenant Name

Configuring Topology Information

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<id>>

Topologies	Container for set of Topologies belonging to a tenant
Topology	List of Topologies
id	Topology Name

4.6 Device-Groups

A device-group can be used to group a set of L2/L3 VTEP devices such that these share a common vlan pool. The VTEPs can be physical or virtual end points. Once added to the device-group, the device specific vlan pools are no longer used.

Operations: CREATE/UPDATE/GET/DELETE

Create (PUT)

Create a device-group in VTS

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group/<device-group-name>>

Parameter	Value	Description
Name	String	Name of the device group
Type	String	Type of device group. Default “device-group-type”
vmmid	String	VMM ID
devices	-	Container for list of devices
device/name	String	Name of device in VTS inventory
device/type	String	Type of device – physical or virtual – p-vtep/v-vtep

Sample Payload

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group/tb12-tor-group>

```
"device-group": [
  {
    "name": "tb12-tor-group"
    "type": "device-group-type",
    "vmmid": "6BA0C760-E840-40A4-A949-B06DD18E0998",
    "devices": {
      "device": [
        {
          "name": "tb12-leaf1",
          "type": "p-vtep"
        },
        {
          "name": "tb12-leaf2",
          "type": "p-vtep"
        }
      ]
    }
  }
]
```

Update (PATCH)

Create a device-group in VTS

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group>

```
"device-group": [
  {
    "name": "tb12-tor-group"
    "type": "device-group-type",
    "vmmid": "6BA0C760-E840-40A4-A949-B06DD18E0998",
    "devices": {
      "device": [
        {
          "name": "tb12-leaf1",
```

```

    "type": "p-vtep"
  },
  {
    "name": "tb12-leaf2",
    "type": "p-vtep"
  },
  {
    "name": "tb12-virtual-leaf1",
    "type": "v-vtep"
  }
]
}
}
]

```

GET

Show device-group details

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group/<device-group-name>>

LIST (GET)

Show list of all device-groups in the system

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group/>

DELETE

Delete a device group.

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-groups/device-group/<device-group-name>>

4.7 Device-Interface-Groups

A device-interface-group can be used to group a set of Physical Interface of Nexus 7000 devices so that user can use common dot1Q pool for Overlay Network provisioning. VTS automatically creates a system defined group per interface during inventory upload and users can use this API to control the group members

Operations: CREATE/UPDATE/GET/DELETE

Create (PUT)

Create a device-interface-group in VTS

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-interface-groups/device-interface-group/<device-interface-group-name>>

Parameter	Value	Description
Name	String	Name of the device Interface group
Type	String	Type of device Interface group. Default "device-interface-group"

Is User Defined Group	Boolean	Flag to determine if the group is user defined or system defined
device-interfaces	-	Container for list of device interfaces
device-interfaces/device-interface	String	device interfaces from devices
device-interface/name	String	Name of the device interface
device-interface/device-name	String	Name of the device the interface belongs to
Device-interface/pool-name	String	Device interface pool this group uses

Sample Payload

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-interface-groups/device-interface-group/tb12-interface-group>

```
{
  "device-interface-group":{
    "name":"tb12-interface-group",
    "type":"cisco-vts-identities:device-interface-group",
    "is-user-defined-group":true,
    "device-interfaces":{
      "device-interface":[
        {
          "name":"Ethernet1\1",
          "device-name":"n7k-1-JenShue-VDC1",
          "pool-name":" tb12-interface-pool "
        },
        {
          "name":"Ethernet1\2",
          "device-name":"n7k-1-JenShue-VDC1",
          "pool-name":" tb12-interface-pool "
        },
        {
          "name":"Ethernet1\3",
          "device-name":"n7k-2-JenShue-VDC1",
          "pool-name":"tb12-interface-pool"
        }
      ]
    }
  }
}
```

Update (PATCH)

Update a device-interface-group in VTS

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-interface-groups/device-interface-group>

<https://172.20.100.126:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/device-interface-groups/device-interface-group/tb12-interface-group>

```

"device-interface-group": [
  {
    "name":"tb12-interface-group",
    "type":"cisco-vts-identities:device-interface-group",
    "is-user-defined-group":true,
    "device-interfaces":{
      "device-interface":[
        {
          "name":"Ethernet1\1",
          "device-name":"n7k-1-JenShue-VDC1",
          "pool-name":" tb12-interface-pool "
        },
        {
          "name":"Ethernet1\2",
          "device-name":"n7k-1-JenShue-VDC1",
          "pool-name":" tb12-interface-pool "
        },
        {
          "name":"Ethernet1\3",
          "device-name":"n7k-2-JenShue-VDC1",
          "pool-name":"tb12-interface-pool"
        }
      ]
    }
  }
]

```

GET

Show device-interface-group details

https://172.20.100.126:8888/api/running/vts-service/sites/site/<your_site_ID>/cisco-vts/device-interface-groups/device-interface-group/<device-interface-group-name>

LIST (GET)

Show list of all device-interface-groups in the system

https://172.20.100.126:8888/api/running/vts-service/sites/site/<your_site_ID>/cisco-vts/device-interface-groups/device-interface-group/

DELETE

Delete a device interface group.

https://172.20.100.126:8888/api/running/vts-service/sites/site/<your_site_ID>/cisco-vts/device-interface-groups/device-interface-group/<device-interface-group-name>

4.8 Network Extensions

Allows to manipulate network extension for a tenant. Settings changed here would affect all the networks that are inheriting the extension, under the tenant. extend the layer 2 network to core.

Create (PUT)

Creates Network Extensions

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/network-extensions>

Payload

Parameter	Value	Description
extend-networks-to-core	no/yes	Yes means extend all inheriting networks to core.

Sample Payload

```
{
  "network-extensions": {
    "extend-networks-to-core": "yes"
  }
}
```

GET

Show network Network Extensions under a tenant <tenant-name>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/network-extensions>

DELETE

Delete Network Extensions under a tenant <tenant-name> and associated resources.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/network-extensions>

4.9 Network

Shows/Lists information for creates, updates and deletes of Network. VTS supports IPv4 and IPv6 overlay networks

Create (PUT)

Create a network in VTS

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/networks/network/<id>>

Payload

Parameter	Value	Description
admin-state-up	true/false	Admin state of the network up or down
Id	Uuid	Network ID

Name	String	Network name
shared	Boolean	Shared across all tenants
status	active/build/down	Network Status
provider-network-type	gre/trunk/vlan/vxlan	Network Type
provider-physical-network	String	Physical Network Name
router-external	Boolean	External access to Network
extend-to-core	no/yes/none	Extend the I2 network to core. None or empty means the values in inherited from Tenant. yes or no means the value is overridden at network level.
Provider-segmentation-id	String	Segmentation ID
arp-suppression	String	Enable or Disable ARP suppression for Network. By default ARP suppression is Disabled.

Sample Payload

```
{
  "network":{
    "id":"14528457-1761-4378-bdaf-1e4b2ff5e999",
    "admin-state-up":true,
    "name":"network-1",
    "provider-physical-network":"physnet1",
    "provider-segmentation-id":"1111",
    "provider-network-type":"cisco-vts-identities:vxlan",
    "router-external":false,
    "extend-to-core":"none",
    "shared":false,
    "status":"cisco-vts-identities:active"
    "arp-suppression":"nwk-arp-suppression-disabled"
  }
}
```

GET

Show network details associated to one VTS Network under topology <topology-name> of a tenant <tenant-name>.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/networks/network/<id>>

LIST (GET)

Show list of all networks under topology <topology-name> of a tenant <tenant-name>.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/networks/network/>

DELETE

Delete Network under topology <topology-name> of a tenant <tenant-name> and associated resources.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/networks/network/<id>>

4.10 Subnet

Shows/Lists information for creates, updates and deletes of Subnet. VTS allows only one IPv4 and one IPv6 subnet per network

Create (PUT)

Create a subnet in VTS

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnetworks/subnetwork/>

Parameter	Value	Description
network-id	Uuid	Network ID
Id	Uuid	Subnet ID
Name	String	Subnet name
shared	Boolean	Shared across all tenants
status	active/build/down	Network Status
enable-dhcp	Boolean	True if DHCP is enabled
Cidr	String	The CIDR
gateway-ip	String	The gateway IP address
ip-version	String	IP version 4 or 6
ipv6-ra-mode	String	IPv6 ra configuration mode
ipv6-address-mode	String	IPv6 address configuration mode

Sample Payload:

IPv4 subnet:

```
{
  "subnet":
  {
    "id": "98944325-eb56-56f1-9468-095028d8d36c", --
    "network-id": "489ed271-9427-4fa0-85ca-1ca7187d29d1",--
    "name": "subnet1",--
    "enable-dhcp": true,
    "cidr": "2.2.2.0/24",
    "gateway-ip": "2.2.2.1",
```

```

    "ip-version": "4",
    "shared": false --
  }
}
IPv6 Subnet:
{
  "subnet":
  {
    "id": "98944325-eb56-56f1-9468-095028d8d36c",
    "network-id": "489ed271-9427-4fa0-85ca-1ca7187d29d1",
    "name": "subnet6",
    "enable-dhcp": true,
    "cidr": "1111::0/64",
    "gateway-ip": "1111::1",
    "ip-version": "6",
    "shared": false
  }
}

```

GET

Show subnet details associated to one VTS Subnet under topology <topology-name> of a tenant <tenant-name>.

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnets/subnet/<id>>

LIST (GET)

Show list of all subnets under topology <topology-name> of a tenant <tenant-name>.

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<site-id>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnetworks>

Response Example:

```

<subnetworks xmlns="http://cisco.com/ns/yang/vts" xmlns:y="http://tail-
f.com/ns/rest" xmlns:vts="http://cisco.com/ns/yang/vts" xmlns:vts-
service="http://cisco.com/ns/yang/vts-service">
  <subnetwork>
    <id>00497461-6441-4d81-9772-ae20699102cd</id>
  </subnetwork>
  <subnetwork>
    <id>0b49c1f5-65e1-46b6-9a56-016bab6b8ef2</id>
  </subnetwork>
  <subnetwork>
    <id>0c488cc1-bf29-4e76-a9ea-2371f55124a5</id>
  </subnetwork>

```

```
</subnetworks>
```

Show Subnet Details (GET)

Show subnet details associated to one VTS Subnet under topology <topology-name> of a tenant <tenant-name>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<site-id>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnetworks/subnetwork/<id>>

Response Example:

```
<subnetwork xmlns="http://cisco.com/ns/yang/vts" xmlns:y="http://tail-f.com/ns/rest"
xmlns:vts="http://cisco.com/ns/yang/vts"                               xmlns:vts-
service="http://cisco.com/ns/yang/vts-service">
  <id>120d0696-4546-4f64-885c-fc3ee8e4c161</id>
  <network-id>802908b3-8520-4ce7-aeba-433933450056</network-id>
  <name>VPER_CLUSTER1_INET_Dummy_IPv4</name>
  <cidr>10.10.10.0/24</cidr>
  <enable-dhcp>>false</enable-dhcp>
  <gateway-ip>10.10.10.1</gateway-ip>
  <ip-version>4</ip-version>
  <shared>>false</shared>
  <y:operations>
    <check-sync>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-8E0C-
02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/check-sync</check-sync>
    <deep-check-sync>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-
8E0C-02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/deep-check-sync</deep-check-
sync>
    <re-deploy>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-8E0C-
02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/re-deploy</re-deploy>
    <reactive-re-deploy>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-
8E0C-02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/reactive-re-deploy</reactive-re-
deploy>
    <touch>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-8E0C-
02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/touch</touch>
    <get-modifications>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-
8E0C-02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
```

```
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/get-modifications</get-
modifications>
  <un-deploy>/api/running/vts-service/sites/site/111C3493-DFC6-4D54-8E0C-
02470CA25111/vts:cisco-
vts/tenants/tenant/Verizon/topologies/topology/Verizon/subnetworks/subnetwork/120
d0696-4546-4f64-885c-fc3ee8e4c161/_operations/un-deploy</un-deploy>
  </y:operations>
</subnetwork>
```

DELETE

Delete subnet under topology <topology-name> of a tenant <tenant-name> and associated resources.

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<site-id>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnetworks/subnetwork/<id>>

Response Example:

204 status no response

Create (PATCH)

Create a subnet in VTS

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<site-id>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/subnetworks/subnetwork>

Sample Payload

IPv4 Subnet

```
{
  "subnetwork": [
    {
      "id": "5c12b9f2-b5d1-4488-9f12-34e9023c47a7",
      "name": "subnet1",
      "cidr": "10.0.0.0/24",
      "network-id": "d9afaf59-0083-46eb-b5b1-d9e3f7b4ac82",
      "gateway-ip": "10.0.0.1",
      "ip-version": "4",
      "enable-dhcp": true,
      "shared": false
    }
  ]
}
```

IPv6 Subnet

```
{
  "subnetwork": [
```

```
{
  "id": "98944325-eb56-56f1-9468-095028d8d3s6",
  "name": "subnet1",
  "cidr": "1111::0/64",
  "network-id": "d9afaf59-0083-46eb-b5b1-d9e3f7b4ac82",
  "gateway-ip": "1111::1",
  "ip-version": "6",
  "enable-dhcp": true,
  "shared": false
}
```

Response

204 Status

Create (PUT)

Create a port in VTS

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/ports/port/<id>>

Parameter	Value	Description
network-id	uuid	Network ID
Id	uuid	port ID
Name	String	Port name
status	cisco-vts-identities:active/cisco-vts-identities:build/cisco-vts-identities:down	Port status
admin-state-up	boolean	Admin state of the network up or down
connid	uuid	Connection id of the device
tagging	optional/mandatory	Indicates whether a baremetal server tags the packets it sends
binding-host-id	String	Host identifier.
type	cisco-vts-identities:baremetal/cisco-vts-identities:virtual-server	Type of server port.
mac-address	mac-address string or unknown-{32,36}	Port Mac Address

Sample Payload:

```
{
  "port":{
    "id":"bb42b3c9-1515-4c23-9af7-bfcf1d11750d",
```

```

    "status":"cisco-vts-identities:active",
    "tagging":"optional",
    "network-id":"0deeba97-e36b-4e99-b43f-6df7d278655e",
    "binding-host-id":"alibaba-compute5",
    "connid":[
      {
        "id":"2ff81bb9-3b75-4f15-9ef5-6ad03b72cf2e"
      }
    ],
    "fixed-ips": {
      "fixed-ip" [{
        "cidr": "10.0.0.10V32",
        "ip-address": "10.0.0.10",
        "subnet-id": "e871cac0-7e39-4808-8684-20e30a6ac7a8"
      }
    ]
  },
  "admin-state-up":"true",
  "type":"cisco-vts-identities:baremetal",
  "mac-address":"unknown-bb42b3c9-1515-4c23-9af7-bfcf1d11750d"
}
}

```

Note: in "fixed-ip", "cidr" for IPv4 can be any IPv4 network address; "cidr" for IPv6 can be any IPv6 network address.

GET

Show port details associated to one VTS Port under topology <topology-name> of a tenant <tenant-name>, belonging to network with id <id>.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/ports/port/<id>>

LIST (GET)

Show list of all ports under topology <topology-name> of a tenant <tenant-name> and network with id <id>.

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/ports/port/>

DELETE

Delete port under topology <topology-name> of a tenant <tenant-name> and network with id <id>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/ports/port/<id>>

4.11 Trunk

Shows/Lists information for creates, updates and deletes of trunks.

Create (PUT)

Create a trunk in VTS

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/trunks/trunk/<id>>

Parameter	Value	Description
Id	String	Trunk ID
Name	String	Trunk name
tenant-name	String	Tenant name
topology-id	String	Topology ID
port-id	String	ID of parent port
sub-ports	-	Container for list of subports
sub-ports/port-id	String	Port ID of subport
sub-ports/segmentation-id	String	Segmentation ID of subport
sub-ports/segmentation-type	String	Segmentation type of subport
sub-ports/mac-address	String	MAC address of subport

Sample Payload:

```
{
  "trunk": {
    "port-id": "afc235a1-92a5-423f-8093-b4d25652ab69",
    "tenant-name": "admin",
    "topology-id": "admin",
    "sub-ports": [
      {
        "port-id": "5688b4de-e26a-4e66-9542-3c2b47809ea9",
        "segmentation-type": "cisco-vts-identities:vlan",
        "segmentation-id": 1001,
        "mac-address": "fa:16:3e:f6:8f:2e"
      },
      {
        "port-id": "d88eb9a9-86ca-488a-ac64-5a9393dc022f",
        "segmentation-type": "cisco-vts-identities:vlan",
        "segmentation-id": 1002,
        "mac-address": "bb:34:78:e6:44:9d"
      }
    ],
    "id": "b960a3e2-eb9f-43cf-98e7-090ad097d5cd",
    "name": "FIRSTTRUNK"
  }
}
```

GET

Show details of a VTS trunk with id <id>

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/trunks/trunk/<id>>

LIST (GET)

Show list of all VTS trunks

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/trunks/trunk/>

DELETE

Delete a VTS trunk with id <id>

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/trunks/trunk/<id>>

4.12 Router

Shows/Lists information for creates, updates and deletes of Routers

Create (PUT)

Create a router in VTS

<https://<vts-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/routers/router/<id>>

Parameter	Value	Description
network-id	uuid	Network ID
Id	uuid	Router ID
Name	String	Router name
router-gateway	String	External network id, if exists
router-gateway-ip-address	String	Router gateway IPv4 address
router-gateway-ipv6-address	String	Router gateway IPv6 address

Sample Payload:

```
{
  "router": [
    {
      "id": "d8c58e0e-50ce-4ef8-923e-5d053ef38888",
      "status": "cisco-vts-identities:active",
      "name": "router3",
      "router-gateway": " dc44545b-0b95-4463-aad9-a310102e5f95 "
      "router-gateway-ip-address":null,
      "router-gateway-ipv6-address":null
    }
  ]
}
```

GET

Show router details associated to one VTS router under topology <topology-name> of a tenant <tenant-name> belonging to a network with id <id>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/routers/router/<id>>

LIST (GET)

Show list of all routers under topology <topology-name> of a tenant <tenant-name> belonging to a network with id <id>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/routers/router/>

DELETE

Delete router under topology <topology-name> of a tenant <tenant-name> belonging to a network with id <id>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/routers/router/<id>>

4.13 Router Interfaces

Shows/Lists information for creates, updates and deletes of Interface

Create (PUT)

Create an interface in VTS

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/interfaces/interface/<id>>

Parameter	Value	Description
Id	uuid	Interface ID
subnet-id	uuid	Subnet ID
router-id	uuid	Router ID

Sample Payload:

```
{
  "interface": [
    {
      "subnet-id": "3faf211d-1fca-4aff-9c1c-086cda772bae",
      "router-id": "3faf211d-1fca-4aff-9c1c-086cda777777",
    }
  ]
}
```

GET

Show interface details associated to one VTS Interface under topology <topology-name> of a tenant <tenant-name>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/interfaces/interface/<id>>

LIST (GET)

Show list of all interfaces under topology <topology-name> of a tenant <tenant-name>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/interfaces/interface/>

DELETE

Delete interface under topology <topology-name> of a tenant <tenant-name>

<https://<vtc-ip>:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/tenants/tenant/<tenant-name>/topologies/topology/<topology-name>/interfaces/interface/<id>>

4.14 Infrastructure Policy

The following APIs are used to do CRUD operations on the infrastructure policy.

4.14.1 Administrative Domains

The following APIs are used to perform CRUD operations on administrative domains.

4.14.1.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/admin-domain/{name}>

4.14.1.2 Payload fields

Field	Data Type	Description
Name	string	Name of the administrative domain. This field is required.

4.14.1.3 Payload example

```
{
  "name": "my-admin-domain"
}
```

4.14.2 Layer 2 Gateway Groups

The following APIs are used to perform CRUD operations on layer 2 gateway groups.

4.14.2.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l2-gateway-groups/l2-gateway-group>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{domain}/l2-gateway-groups/l2-gateway-group{name2}>

4.14.2.2 Payload fields

Field	Data Type	Description
Name	string	Name of the L2 gateway group. This field is required.

4.14.2.3 Payload example

```
{
  "name": "my-L2"
}
```

4.14.3 Devices in a Layer 2 Gateway Groups

The following APIs are used to perform CRUD operations on devices belonging to a layer 2 gateways group.

4.14.3.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l2-gateway-groups/l2-gateway-group/{name2}/devices/device/>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{domain}/l2-gateway-groups/l2-gateway-group/{name2}/devices/device/{name3}>

4.14.3.2 Payload fields

Field	Data Type	Description
Name	string	Name of the device acting as L2 gateway. This field is required.

4.14.3.3 Payload example

```
{
  "name": "my-l2-device"
}
```

4.14.4 Policy Parameters for a Layer 2 Gateway Group

The following APIs are used to perform CRUD operations on policy parameters for a layer 2 gateways group.

4.14.4.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l2-gateway-groups/l2-gateway-group/{name2}/policy-parameters`

4.14.4.2 Payload fields

Field	Data Type / Value	Description
distribution-mode	“decentralized-l2”	Mode of distribution
control-plane-protocol	“bgp-evpn” or “flood-and-learn”	Control plane protocol used to learn end point addresses.
arp-suppression	Flag	Enables BGP EVPN ARP suppression.
packet-replication	“multicast” or “ingress-replication”	Packet replication mechanism. It determines how packets sent to multiple recipients are replicated, so that each recipient gets a copy.

4.14.4.3 Payload example

```
{
  "distribution-mode": "decentralized-l2",
  "arp-suppression": null
}
```

4.14.5 Parent of a Layer 2 Gateway Group

The following APIs are used to perform CRUD operations to assign a parent group to a layer 2 gateways group.

4.14.5.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l2-gateway-groups/l2-gateway-group/{name2}`

4.14.5.2 Payload fields

Note that the ad-l3-gw-parent and l3-gw-parent are mutually exclusive. That is, only one of them can be included in a request (or response) to VTS. l3-dc-gw-parent can be set in parallel to enable Layer 2 VNI service, extend the network to core.

Field	Data Type	Description
-------	-----------	-------------

ad-l3-gw-parent	string	This L2 group's L3 gateway parent in the current administrative domain
l3-gw-parent	string	This L2 group's L3 gateway parent in the infrastructure policy hierarchy
l3-dc-gw-parent	string	This group's L3 datacenter gateway parent in the infrastructure policy hierarchy.

4.14.5.3 Payload example

```
{
  "ad-l3-gw-parent": "my-l3-group"
}
```

or for L2 VNI service extension.

```
{
  "ad-l3-gw-parent": "my-l3-group",
  "l3-dc-gw-parent": "my-dc-group"
}
```

4.14.6 Layer 3 Gateway Groups in an Administrative Domain

The following APIs are used to perform CRUD operations on layer 3 gateway groups in an administrative domain.

4.14.6.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l3-gateway-groups/l3-gateway-group>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{domain}/l3-gateway-groups/l3-gateway-group{name2}>

4.14.6.2 Payload fields

Field	Data Type	Description
Name	string	Name of the L3 gateway group. This field is required.

4.14.6.3 Payload example

```
{
  "name": "my-l3-group"
}
```

4.14.7 Devices in a Layer 3 Gateway Group in an Administrative Domain

The following APIs are used to perform CRUD operations on devices belonging to a layer 3 gateways group in an administrative domain.

4.14.7.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l3-gateway-groups/l3-gateway-group/{name2}/devices/device/`

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{domain}/l3-gateway-groups/l3-gateway-group/{name2}/devices/device/{name3}`

4.14.7.2 Payload fields

Field	Data Type	Description
Name	string	Name of the device acting as L3 gateway in an administrative domain. This field is required.

4.14.7.3 Payload example

```
{
  "name": "my-l3-device"
}
```

4.14.8 Policy Parameters for a Layer 3 Gateway Group in an Administrative Domain

The following APIs are used to perform CRUD operations on policy parameters for a layer 3 gateways group in an administrative domain.

4.14.8.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l3-gateway-groups/l3-gateway-group/{name2}/policy-parameters`

4.14.8.2 Payload fields

Field	Data Type	Description
distribution-mode	“decentralized-l3” or “centralized-l3”	Mode of distribution
control-plane-protocol	“bgp-evpn” or “flood-and-learn”	Control plane protocol used to learn end point addresses.
arp-suppression	Flag	Enables BGP EVPN ARP suppression.
packet-replication	“multicast” or “ingress-replication”	Packet replication mechanism. It determines how

		packets sent to multiple recipients are replicated, so that each recipient gets a copy.
--	--	---

4.14.8.3 Payload example

```
{
  "packet-replication": "multicast"
}
```

4.14.9 Parent of a Layer 3 Gateway Group in an Administrative Domain

The following APIs are used to perform CRUD operations to assign a parent group to a layer 3 gateways group in an administrative domain.

4.14.9.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/admin-domains/administrative-domain/{name}/l3-gateway-groups/l3-gateway-group/{name2}>

4.14.9.2 Payload fields

Note that the fields below are mutually exclusive. That is, only one of them can be included in a request (or response) to VTS.

Field	Data Type	Description
l3-dc-gw-parent	string	This L3 group's L3 datacenter gateway parent in the infrastructure policy hierarchy.
l3-dci-parent	string	This L3 group's datacenter gateway interconnect parent

4.14.9.3 Payload example

```
{
  "l3-dc-gw-parent": "my-dc-group"
}
```

4.14.10 Layer 3 Gateway Groups

The following APIs are used to perform CRUD operations on layer 3 gateways groups.

4.14.10.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group{name}>

4.14.10.2 Payload fields

Field	Data Type	Description
Name	string	Name of the L3 gateway group. This field is required.

4.14.10.3 Payload example

```
{
  "name": "my-other-l3-group"
}
```

4.14.11 Devices in a Layer 3 Gateway Group

The following APIs are used to perform CRUD operations on devices belonging to a layer 3 gateways group.

4.14.11.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group/{name}/devices/device/>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group/{name}/devices/device/{name2}>

4.14.11.2 Payload fields

Field	Data Type	Description
Name	string	Name of the device acting as L3 gateway in an administrative domain. This field is required.

4.14.11.3 Payload example

```
{
  "name": "my-other-l3-device"
}
```

4.14.12 Policy Parameters for a Layer 3 Gateway Group

The following APIs are used to perform CRUD operations on policy parameters for a layer 3 gateways group.

4.14.12.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group/{name}/policy-parameters>

4.14.12.2 Payload fields

Field	Data Type	Description
distribution-mode	"decentralized-l3" or "centralized-l3"	Mode of distribution

control-plane-protocol	“bgp-evpn” or “flood-and-learn”	Control plane protocol used to learn end point addresses.
arp-suppression	Flag	Enables BGP EVPN ARP suppression.
packet-replication	“multicast” or “ingress-replication”	Packet replication mechanism. It determines how packets sent to multiple recipients are replicated, so that each recipient gets a copy.

4.14.12.3 Payload example

```
{
  “distribution-mode”: “decentralized-l2”,
  “arp-suppression”: null
}
```

4.14.13 Parent of a Layer 3 Gateway Group in an Administrative Domain

The following APIs are used to perform CRUD operations to assign a parent group to a layer 3 gateways group in an administrative domain.

4.14.13.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group/{name2}>

4.14.13.2 Payload fields

Note that the fields below are mutually exclusive. That is, only one of them can be included in a request (or response) to VTS.

Field	Data Type	Description
l3-dc-gw-parent	string	This L3 group's L3 datacenter gateway parent in the infrastructure policy hierarchy.
l3-dci-parent	string	This L3 group's datacenter gateway interconnect parent

4.14.13.3 Payload example

```
{
  “l3-dci-parent”: “my-dci-group”
}
```

4.14.14 Data Center Gateway Groups

The following APIs are used to perform CRUD operations on data center gateway groups.

4.14.14.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dc-gateway-group`

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dc-gateway-group{name}`

4.14.14.2 Payload fields

Field	Data Type	Description
Name	string	Name of the data center gateway group. This field is required.

4.14.14.3 Payload example

```
{
  "name": "my-dc-group"
}
```

4.14.15 Devices in a Data Center Gateway Group

The following APIs are used to perform CRUD operations on devices belonging to a data center gateway group.

4.14.15.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dc-gateway-group/{name}/devices/device/`

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dc-gateway-group/{name}/devices/device/{name2}`

4.14.15.2 Payload fields

Field	Data Type	Description
Name	string	Name of the device acting as data center gateway. This field is required.

4.14.15.3 Payload example

```
{
  "name": "my-dc-device"
}
```

4.14.16 Policy Parameters for a Data Center Gateway Group

The following APIs are used to perform CRUD operations on policy parameters for a data center gateway group.

4.14.16.1 URIs

https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dc-gateway-group/{name}/policy-parameters

4.14.16.2 Payload fields

Field	Data Type	Description
distribution-mode	“decentralized-l3” or “centralized-l3”	Mode of distribution

4.14.16.3 Payload example

```
{
  "distribution-mode": "decentralized-l3"
}
```

4.14.17 Parent of a Data Center Gateway Group

The following APIs are used to perform CRUD operations to assign a parent group to a data center gateway group.

4.14.17.1 URIs

https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-gateway-groups/l3-gateway-group/{name}

4.14.17.2 Payload fields

Field	Data Type	Description
l3-dci-parent	string	This data center gateway group's datacenter gateway interconnect parent

4.14.17.3 Payload example

```
{
  "l3-dci-parent": "my-dci-group"
}
```

4.14.18 Data Center Interconnect Groups

The following APIs are used to perform CRUD operations on data center interconnect groups.

4.14.18.1 URIs

https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dci-group

https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dci-group{name}

4.14.18.2 Payload fields

Field	Data Type	Description
-------	-----------	-------------

Name	string	Name of the data center gateway group. This field is required.
------	--------	---

4.14.18.3 Payload example

```
{
  "name": "my-dci-group"
}
```

4.14.19 Devices in a Data Center Gateway Group

The following APIs are used to perform CRUD operations on devices belonging to a data center gateway group.

4.14.19.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dci-group/{name}/devices/device/>

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dc-gateway-groups/l3-dci-group/{name}/devices/device/{name2}>

4.14.19.2 Payload fields

Field	Data Type	Description
Name	string	Name of the device acting as data center gateway This field is required.

4.14.19.3 Payload example

```
{
  "name": "my-dci-device"
}
```

4.14.20 Attach Stitching profile in a Data Center Interconnect group

The following APIs are used to perform CRUD operations on stitching profiles belonging to a data center interconnect group.

4.14.20.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/l3-dci-gateway-groups/l3-dci-group/{name}/stitching-profiles/stitching-profile/{id}>

4.14.20.2 Payload fields

Field	Data Type	Description
Id	String	Reference to the stitching profile id.

4.14.20.3 Payload example

```
{
  "id": "bc993e8c-6b4c-41c2-a4b4-46fc4dc1d3a2"
}
```

```
}

```

4.14.21 Provide redundancy group parameters in a Data Center Interconnect group

The following APIs are used to perform CRUD operations on redundancy group belonging to a data center interconnect group.

4.14.21.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/infrastructure-policy/13-dci-gateway-groups/13-dci-group/{name}/redundancy-group>

4.14.21.2 Payload fields

Field	Data Type	Description
Iccp group id	String	VXLAN (Fabric) Group Number Or MPLS (Core) Group Number Based on group type
Group-type	iccp-group-type	Possible values “iccp-fabric-group” or “iccp-core-group”
Esi – core-esi	String (9 octets)	Ethernet segment id for NVE overlay if configured.

4.14.21.3 Payload example

```
{
  "iccp":{
    "groups":{
      "group":[
        {
          "id":11,
          "group-type":"iccp-fabric-group"
        },
        {
          "id":12,
          "group-type":"iccp-core-group"
        }
      ]
    }
  },
  "esi":{
    "core-esi":"88.00.00.00.00.00.00.01"
  }
}
```

4.15 Route Reflectors

4.15.1 Route Reflector Mode

The following APIs are used to perform CRUD operations on the route reflector mode.

4.15.1.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/global-settings`

4.15.1.2 Payload fields

Field	Data Type	Description
route-reflector-mode	“global-rr” or “in-line-rr”	Determines how the route reflector operate

4.15.1.3 Payload example

```
{
  "route-reflector-mode": "global-rr";
}
```

4.15.2 Global Route Reflectors

The following APIs are used to perform CRUD operations on the set of global route reflectors.

4.15.2.1 URIs

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/global-settings/global-route-reflectors/global-route-reflector`

`https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/global-settings/global-route-reflectors/global-route-reflector/{name}`

4.15.2.2 Payload fields

Field	Data Type	Description
name	string	Name of the route reflector

4.15.2.3 Payload example

```
{
  "name": "my-first-route-reflector"
}
```

4.16 Global Settings

The following APIs are used to do CRUD operations on global settings.

4.16.1 Anycast Gateway Address

The following APIs are used to perform CRUD operations on the common MAC address for all L2 Gateway devices on the Infrastructure Policy hierarchy.

4.16.1.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/global-settings/anycast-gateway/anycast-gw-address>

4.16.1.2 Payload fields

Field	Data Type	Description
anycast-gw-address	MAC address e.g.: AA:BB:CC:DD:EE:FF	Common MAC address for all L2 Gateway devices

4.16.1.3 Payload example

```
{
  "anycast-gw-address": "00:11:22:33:44:55";
}
```

4.16.2 VTF Mode

The following APIs are used to perform CRUD operations on VTF mode to be used in the system.

4.16.2.1 URIs

<https://host:8888/api/running/vts-service/sites/site/<your site ID>/cisco-vts/global-settings/vtf-mode-config/vtf-mode>

Field	Data Type	Description
vtf-mode	vtf-mode-enum values: l2, vtep	Global settings for the mode of operation of VTF mode.

4.17 Vcenter VTS Plugin API

Current VTS-VCenter plugin supports network provisioning operations through VCenter GUI extensions.

NOTE: The user has to log into vSphere WebClient and enter NCS credentials on the VTS plugin, before any of the rest calls are made.

Base URI:

<https://<vCenterIP>:9443/eventMonitorDaemon/EventMonitorWebService>

Headers

- 1.) Create/POST – Content-type – “application/json”
- 2.) Delete – Content-type – “text/plain”
- 3.) Authentication - (Key –Authorization, Value – (vc-username/password))

4.17.1 Resource: Network

Create

POST	/network/	Creates a new network
------	-----------	-----------------------

Sample Payload:

```
{
  "network": { "name": "TestNetwork1",
    "admin-state-up": "true",
    "provider-physical-network": "vlan",
    "provider-network-type": "vts:vxlan",
    "status": "vts:ACTIVE",
    "router-external": "false",
    "tenant-name": "Tenant1",
    "dcname": "DatacenterSample",
    "shared": "true"}}
```

Note:

"shared" is the attribute which indicates the network created is Shared Network or not. It is optional. Set it to "true" if you want the network to be a Shared Network. If "shared" attribute is not in the payload, by default it is set to "false".

Lists

GET	/network/	Lists all the existing networks
-----	-----------	---------------------------------

Sample Payload:

```
{
  "network" : [{"admin-state-up":"true",
    "name":"net8",
    "provider-network-type":"vts:vxlan",
    "provider-physical-network":"vlan",
    "router-external":"false",
    "status":"vts:ACTIVE",
    "tenant-id":"tenant1",
    "tenant-name":"tenant1"
  }],
  {"admin-state-up":"true",
    "name":"net9",
    "provider-network-type":"vts:vxlan",
```

```
"provider-physical-network":"vlan",
"router-external":"false",
"status":"vts:ACTIVE",
"tenant-id":"tenant1",
"tenant-name":"tenant1",
}]
}
```

Delete

DELETE	/network/{network_name}?dcname={dcname}	Deletes an existing network given its name and data center name on which it resides.
--------	---	--

Show

GET	/network/{network_name}/	Lists details of given network named {network_name}
-----	--------------------------	---

Sample Payload:

```
{"network":
{"admin-state-up":"true",
"name":"net8",
"provider-network-type":"vts:vxlan",
"provider-physical-network":"vlan",
"router-external":"false",
"status":"vts:ACTIVE",
"tenant-id":"D32508B0-40FC-27A2-B78F-462A08AB44A3",
"tenant-name":"tenant1",
}}
```

4.17.2 Resource: Subnet

Create

POST	/subnet/	Creates a new subnet
------	----------	----------------------

Sample Payload:

```
{
"subnet": [{
"cidr": "29.0.0.0/24",
"enable-dhcp": "false",
"gateway-ip": "29.0.0.1",
"ip-version": "4",
"name": "Subnet23",
"network-id": "67f75f3d-5cee-45f3-b327-f32885ef8a60",
"shared": "false",
```

```
"tenant-id": "tenant1",
"tenant-name": "tenant1"
}
}
```

Lists

GET	/subnet	Lists all the existing subnets
-----	---------	--------------------------------

Sample Payload:

```
{
  "subnet": [
    {
      "cidr": "19.0.0.0/24",
      "enable-dhcp": "false",
      "gateway-ip": "19.0.0.1",
      "id": "58717685-c9d1-4aeb-918e-3e0f37034ab5",
      "ip-version": "4",
      "name": "Subnet13",
      "network-id": "67f75f3d-5cee-45f3-b327-f32885ef8a60",
      "shared": "false",
      "tenant-id": "tenant1",
      "tenant-name": "tenant1"
    },
    {
      "cidr": "29.0.0.0/24",
      "enable-dhcp": "false",
      "gateway-ip": "29.0.0.1",
      "id": "c626fc93-0708-45eb-b578-0edee528736d",
      "ip-version": "4",
      "name": "Subnet23",
      "network-id": "67f75f3d-5cee-45f3-b327-f32885ef8a60",
      "shared": "false",
      "tenant-id": "tenant1",
      "tenant-name": "tenant1"
    }
  ]
}
```

Delete

DELETE	/subnet/{subnet_name}/	Deletes a subnet named {subnet_name}
--------	------------------------	--------------------------------------

Show

GET	/subnet/{subnet_name}/	Lists details of given subnet named {subnet_name}
-----	------------------------	---

Sample Payload:

```
{
  "subnet": {
    "cidr": "29.0.0.0/24",
    "enable-dhcp": "false",
    "gateway-ip": "29.0.0.1",
    "id": "c626fc93-0708-45eb-b578-0edee528736d",
    "ip-version": "4",
    "name": "Subnet23",
    "network-id": "67f75f3d-5cee-45f3-b327-f32885ef8a60",
    "shared": "false",
    "tenant-id": "tenant1",
    "tenant-name": "tenant1"
  }
}
```

4.17.3 Resource: Router

Create

POST	/router	Creates a new router
------	---------	----------------------

Sample Payload:

```
{ "router" : [{
  "status" : "ACTIVE",
  "name" : "Router100",
  "tenant-id" : "Tenant1",
  "vni_number" : 5170,
  "router-gateway" : null
}]
}
```

Lists

GET	/router	Lists all the existing routers
-----	---------	--------------------------------

Sample Payload:

```
{"router": [
  {
    "id": "4b4bb642-3238-4d31-acb0-56e90a19cf01",
    "name": "Router2",
    "status": "vts:ACTIVE",
    "tenant-id": "tenant1",
    "vni_number": "12007"
  },
  {
    "id": "4d602cb8-4f93-43d1-87e0-fd943f18642e",
    "name": "Router5",
    "status": "vts:ACTIVE",
    "tenant-id": "tenant1",
    "vni_number": "12002"
  }
]}
```

```
]
}
```

Delete

DELETE	/router/{router_name}/	Deletes a router named {router_name}
--------	------------------------	--------------------------------------

Show

GET	/router/{router_name}/	Lists details of given router named {router_name}
-----	------------------------	---

Sample Payload:

```
{
  "router": {
    "id": "4d602cb8-4f93-43d1-87e0-fd943f18642e",
    "name": "Router5",
    "status": "vts:ACTIVE",
    "tenant-id": "tenant1",
    "vni_number": "12002"
  }
}
```

4.17.4 Resource: Interface

Create

POST	/interface	Attach Interface to the router
------	------------	--------------------------------

Sample Payload:

```
{"interfaces" : [{
  "subnet-id": "aabc0bbf-1c63-46a7-99b6-8c7fa91a9ae6",
  "router-id": "aac12354-3573-4472-9370-5e2726bc27eb",
  "ip-address": "46.0.0.1",
  "port-create": "I3:none"
}]
}
```

Lists

GET	/interface	Lists all the existing interfaces
-----	------------	-----------------------------------

Sample Payload:

```
{
  "interfaces": [
    {
      "subnet-id": "114d1323-2458-413f-860d-20bed461fc0b",
      "router-id": "04d014f7-a799-43c6-9443-d075495a2e3c",
      "ip-address": "29.0.0.1",
      "port-create": "I3:none"
    }
  ]
}
```

```

    },
    {
      "subnet-id": "909953fc-9b5c-495d-b428-5464d969101b",
      "router-id": "04d014f7-a799-43c6-9443-d075495a2e3c",
      "ip-address": "14.0.1.1",
      "port-create": "l3:none"
    }
  ]
}

```

Show

GET	/interface/{subnet_name}/	Lists details of given interface with subnet name as {subnet_name }
-----	---------------------------	---

Sample Payload:

```

{"interfaces": [{
  "subnet-id": "114d1323-2458-413f-860d-20bed461fc0b",
  "router-id": "04d014f7-a799-43c6-9443-d075495a2e3c",
  "ip-address": "29.0.0.1",
  "port-create": "l3:none"
}]}

```

Delete

DELETE	/interface/{subnet_name}/	Detaches subnet named {subnet_name} from router
--------	---------------------------	---

External Network Attach

POST	/interface/{router_name}/{external_name}?action=attach	Attaches external network named {external_name} to router {router_name}
------	--	---

External Network Detach

POST	/interface/{router_name}/{external_name}?action=detach	Detaches external network named {external_name} to router {router_name}
------	--	---

4.18 L3 Service Extension Template API

4.18.1 Create a L3 service extension template

POST	/vts-service/sites/site/<site_id>/templates	Create a new L3 service extension template in VTS
------	---	---

Sample Payload:

```
{
  "template": [
    {
      "name": "Sample L3 Template",
      "description": "A sample L3 service extension template",
      "type": "cisco-vts-templates:l3-service-extension",
      "created-on": "2016-05-31T09:05:00",
      "modified-on": "2016-05-31T09:30:00",
      "l3-service-extension-template": {
        "schema-revision-date": "2016-05-31",
        "schema-namespace": "http://tail-f.com/ned/cisco-nx",
        "keypath-values": {
          "keypath-value": [
            {
              "keypath": "config/nx:router/bgp{100}/vrf",
              "value": {"vrf": {"name": "admin-test"}}
            },
            {
              "keypath": "config/nx:vrf/context{admin-TestRouter}/ip",
              "value": {"ip": {"domain-name": "TestDomain"}}
            }
          ]
        }
      }
    }
  ]
}
```

Fields:

Field Name	Possible Value	Mandatory
name	A non-empty string with a maximum of 128 characters	Y
description	A string with a maximum of 128 characters	N

Type	The type for L3 service extension template is "cisco-vts-templates:l3-service-extension"	Y
created-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
modified-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
schema-revision-date	String in YYYY-MM-DD format indicating the schema yang's revision date	Y (if the l3-service-extension template container is specified)
schema-namespace	Namespace for the service extension schema	Y (if the l3-service-extension template container is specified)
Keypath	A unique path to the service extension config	Y (if a keypath is to be added)
value	The config value (in valid JSON format) for the corresponding key path	Y (if a keypath is specified)

4.18.2 Updating a L3 service extension template

*Note: When updating a template, the "modified-on" field is a **REQUIRED** field in the payload. This is to avoid the situation where a user is updating an older version of a template when a newer version is available. A user can get the "modified-on" value upon retrieving a template.

If the "modified-on" value in the latest version of the template does not match with the "modified-on" value sent in the payload of the template update request, the update request will be **REJECTED**, in which case the user will need to fetch the latest "modified-on" value again by retrieving the latest version of the template.

PUT	/vts-service/sites/site/<site_id>/templates/template/<template_name>	Update a L3 service extension template
-----	--	--

Sample Payload:

```
{
  "template": [
    {
      "name": "Sample L3 Template",
      "description": "Updated description",
      "type": "cisco-vts-templates:l3-service-extension",
      "created-on": "2016-05-31T09:05:00",
    }
  ]
}
```



```

"modified-on":"2016-05-31T09:30:00",
"l3-service-extension-template":{
  "schema-revision-date":"2016-05-31",
  "schema-namespace":"http://tail-f.com/ned/cisco-nx",
  "keypath-values":{
    "keypath-value":[
      {
        "keypath":"config/nx:router/bgp{100}/vrf",
        "value":{"vrf":{"name":"updated-vrf-name"}}
      },
      {
        "keypath":"config/nx:vrf/context{admin-TestRouter}/ip",
        "value":{"ip":{"domain-name":"updated-domain-name"}}
      }
    ]
  }
}
]
}

```

4.18.3 Get List of Templates

*Note: This API will get a list of all templates in the system, including both Route and L3 Service Extension templates.

GET	/vts-service/sites/site/<site_id>/templates	Retrieve list of templates
-----	---	----------------------------

Sample Payload:

```

{
  "cisco-vts-templates:templates":{
    "template":[
      {
        "name":"Sample_Route_Template"
      },
      {
        "name":"Sample L3 Template"
      },
      {
        "name":"Another_L3_Template"
      }
    ]
  }
}

```

```
}
}
```

4.18.4 Get a specific template using name

GET	/vts-service/sites/site/<site_id>/templates/template/<template_name>	Gets details about a particular template
-----	--	--

Sample Payload:

```
{
  "cisco-vts-templates:template":{
    "name":"Sample L3 Template",
    "description":"A sample L3 service extension template",
    "type":"cisco-vts-templates:l3-service-extension ",
    "created-on":"2016-05-31T09:05:00",
    "modified-on":"2016-05-31T09:30:00",
    "l3-service-extension-template":{
      "schema-revision-date":"2016-05-31",
      "schema-namespace":"http://tail-f.com/ned/cisco-nx",
      "keypath-values":{
        "keypath-value":[
          {
            "keypath":"config/nx:router/bgp{100}/vrf",
            "value":"{\vrf\":{\name\":\updated-vrf-name\"}}"
          },
          {
            "keypath":"config/nx:vrf/context{admin-TestRouter}/ip",
            "value":"{\ip\":{\domain-name\":\updated-domain-name\"}}"
          }
        ]
      }
    }
  }
}
```

4.18.5 Delete all templates

*Note: This API will delete all templates in the system, including both Route and L3 Service Extension templates.

DELETE	/vts-service/sites/site/<site_id>/templates	Deletes all templates. Note: A template can only be deleted if it is not currently attached to a Tenant or Router.
--------	---	---

4.18.6 Delete a template identified by name

DELETE	/vts-service/sites/site/<site_id>/templates/template/<template-name>	Deletes a template identified by name. Note: A template can only be deleted if it is not currently attached to a Tenant or Router.
--------	--	---

4.18.7 Create a template device group

*Note: Currently VTS does not support the modification of the device list using PUT/PATCH API once the template device group is created. To add or remove devices from the template device group, a user can first use the DELETE API to delete the existing template device group, and then use the POST API to create a new template device group with the updated device list.

POST	/vts-service/sites/site/<site_id>/cisco-vts/template-device-groups	Create a template device group
------	--	--------------------------------

Sample Payload:

```
{
  "template-device-group":[
    {
      "device-group-name":"system-device-group-1",
      "devices":{
        "device":[
          {
            "name":"vts-142-tor1"
          }
        ]
      }
    }
  ]
}
```

Fields:

Field Name	Possible Value	Mandatory
device-group-name	A non-empty string with a maximum of 128 characters.	Y

	A device group name of “ALL” is used to indicate that the device group contains all devices, in which case the name field will have a value of “*”.	
Name	The name of the device that belongs to this device group. In the case where the device-group-name is “ALL”, this field will have a value of “*”.	Y

4.18.8 Get a list of all template device groups

GET	/vts-service/sites/site/<site_id>/cisco-vts/template-device-groups	Get a list of all the template device groups
-----	--	--

Sample Payload:

```
{
  "template-device-groups":{
    "template-device-group":[
      {
        "device-group-name":"system-device-group-1",
        "devices":{
          "device":[
            {
              "name":"vts-142-tor1"
            }
          ]
        }
      },
      {
        "device-group-name":"system-device-group-2",
        "devices":{
          "device":[
            {
              "name":"vts-144-tor2"
            }
          ]
        }
      }
    ]
  }
}
```

4.18.9 Get a specific template device group

GET	/vts-service/sites/site/<site_id>/cisco-vts/template-device-groups/template-device-group/<name_of_device_group>	Get a specific template device group
-----	---	--------------------------------------

Sample Payload:

```
{
  "template-device-group":[
    {
      "device-group-name":"system-device-group-1",
      "devices":{
        "device":[
          {
            "name":"vts-142-tor1"
          }
        ]
      }
    }
  ]
}
```

4.18.10 Delete a specific template device group

DELETE	/vts-service/sites/site/<site_id>/cisco-vts/template-device-groups/template-device-group/<name_of_device_group_to_be_deleted>	Delete a given template device group
--------	---	--------------------------------------

4.18.11 Attach L3 service extension template to a router

Step 1: Associate template to device(s)

Refer to section “Create a template device group” to associate an existing L3 service extension template to a list of devices.

Step 2: Associate template to a router

PATCH	/vts-service/sites/site/<site_id>/cisco-vts/template-target-maps	Attaches an existing L3 service extension template to a router
-------	--	--

Sample Payload:

```

{
  "template-target-maps":{
    "template-target-map":[
      {
        "template-target-id":"/vts-service:vts-service/sites/site{004dbc7e-c68b-4332-9075-ec823b03615a}/vts:cisco-vts/tenants/tenant{Ten1}/topologies/topology{Z1}/routers/router{94397469-07fa-4f7c-933c-2a588cd69a50}",
        "template-target-type":"router-target",
        "template-type":"cisco-vts-templates:l3-service-extension",
        "template-name":"Sample L3 Template",
        "device-group-id":"system-device-group-1",
        "last-changed":"2018-08-29T12:00:00-00:00",
      }
    ]
  }
}

```

Fields:

Field Name	Possible Value	Mandatory
template-target-id	The full path to the router.	Y
template-target-type	The template target type is “router-target”.	N
template-type	The template type for L3 service extension template is “cisco-vts-templates:l3-service-extension”	Y
template-name	The name of the template to be associated.	Y
device-group-id	The name of the device group indicating the group of devices to be applied for this template-target association.	N
last-changed	A timestamp indicating when template configuration applied on devices has changed.	N

4.18.12 Get a list of all the existing L3 service extension template associations

GET	/vts-service/sites/site/<site_id>/cisco-vts/template-target-maps	Gets a list of all the L3 service extension templates that are currently associated with a router
-----	--	---

Sample Payload:

```
{
  "template-target-maps":{
    "template-target-map":[
      {
        "template-target-id":"/vts-service:vts-service/sites/site{004dbc7e-c68b-4332-9075-ec823b03615a}/vts:cisco-vts/tenants/tenant{Ten1}/topologies/topology{Z1}/routers/router{94397469-07fa-4f7c-933c-2a588cd69a50} ",
        "template-target-type":"router-target",
        "template-type":"cisco-vts-templates:l3-service-extension",
        "template-name":"Sample L3 Template",
        "device-group-id":"system-device-group-1",
        "last-changed":"2018-08-12T12:00:00-00:00",
      },
      {
        "template-target-id":"/vts-service:vts-service/sites/site{004dbc7e-c68b-4332-9075-ec823b03615a}/vts:cisco-vts/tenants/tenant{Ten1}/topologies/topology{Z1}/routers/router{94397469-07fa-4f7c-933c-2a588cd69a50}",
        "template-target-type":"router-target",
        "template-type":"cisco-vts-templates:l3-service-extension",
        "template-name":"Another L3 Template",
        "device-group-id":"system-device-group-2",
        "last-changed":"2018-08-29T12:00:00-00:00",
      }
    ]
  }
}
```

4.18.13 Detach L3 service extension template from tenant or router

DELETE	/vts-service/sites/site/<site_id>/cisco-vts/template-target-maps/"<template_target_id>,<template_target_type>,<template_type>"	Detach a given l3 service extension template from specified router
--------	--	--

4.18.14 Dry Run L3 Template

4.18.14.1 Attach API

PUT	/VTS/api/sites/<SITE ID >/templates/tenant/<Tenant Name >/topology/<Topology Name >/router/ <Router ID >/dry-run	Attach the Dry Run L3 Template
-----	--	--------------------------------

Sample Payload :

```
{
  "resource": {
    "routerRequests": {
      "template_device_groups": {
        "template_device_group": [
          {
            "devices": {
              "template_name": "I3_temp",
              "is_all_devices": false,
              "device": [
                {
                  "device_name": "tb24-tor2",
                  "ip_address": "172.20.100.245",
                  "devicePlatform": "N9K",
                  "device_role": "leaf"
                }
              ]
            }
          ]
        ]
      },
      "template_target_maps": {
        "template_target_map": [
          {
            "template_type": "I3-service-extension",
            "template_name": "I3_temp",
            "platform": "N9K",
            "template_target_type": "router-target"
          }
        ]
      },
      "templateName": "I3_temp",
      "tenant_name": "T1",
      "profiles": [
        ],
      "router": {
        "router_name": "r1",

```



```

"provider-router": false,
"vrf_name": "T1-r1",
"router_gateway": "",
"router_gateway_ip": "",
"router_gateway_ipv6": "",
"template_maps": {
  "template_map": [
    ]
  },
"vni": "4098"
},
"static-routes": [
  ]
}
}
}
}

```

Field Name	Possible Value	Mandatory
device name	Name of the device to which template needs to be attached	Y
L3 template name	Template name which needs to be attached	Y
DEVICE IP	IP address of device	Y
device platform	Device platform N3K OR N5K OR N6K OR N7K OR N9K OR ASR9K OR VTSR OR NCS5500 OR XRV9000	Y
switch role type	leaf / spine / spine-rr / border-leaf / bgp-rr / unmanaged / dci	Y
platform	Based on the template created for the platform N5K OR N7K OR N9K OR ASR9K	Y
Tenant Name	Name of tenant	Y
Router Name	Name of router	Y
Provider router value	Get from CDB Provider Router value - false / true	Y
VRF NAME	Format {Tenant Name - Router Name } or {Tenant Name - VNI ID } If tenant name is longer than 10 characters take the first 10> Get from CDB *	Y

VNI ID	VTS ALLOCATED VNI ID *	Y
--------	------------------------	---

4.18.14.2 Detach API

PUT	VTS/api/sites/<SITE ID >/templates/tenant/<Tenant Name >/topology/<Topology Name >/router/ <Router ID >/detachL3Template/dry-run	Detach the Dry Run L3 Template
-----	--	--------------------------------

Sample Payload :

```
{
  "resource": {
    "routerRequests": {
      "template_device_groups": {
        "template_device_group": [

        ]
      },
      "template_target_maps": {
        "template_target_map": [

        ]
      },
      "deleted_templates": [
        "I3_temp"
      ],
      "deleted_templates_types": [
        "I3-service-extension"
      ],
      "templateName": "I3_temp",
      "deletedDevices": [
        "tb24-tor2"
      ],
      "tenant_name": "T1",
      "profiles": [

      ],
      "router": {
        "router_name": "r1",
        "provider-router": false,
        "vrf_name": "T1-r1",
        "router_gateway": "",
        "router_gateway_ip": "",
        "router_gateway_ipv6": "",
        "template_maps": {
          "template_map": [

          ]
        }
      }
    }
  }
}
```



```

"templateRequests": {
  "template-device-group": {
    "devices": {
      "device": [
        {
          "device_name": "tb24-tor1"
        }
      ]
    }
  },
  "template-target-map": {
    "template_target_type": "device-target",
    "template_type": "device",
    "template_name": "DEvTemplate2",
    "template_target_id": "na"
  }
}
}
}

```

Field Name	Possible Value	Mandatory
device name	Name of the device to which template needs to be attached	Y
device template name	Template name which needs to be attached	Y

4.19.2 Detach API

PUT	/VTS/api/sites/{ SITE ID }/templates/detachDeviceTemplate/dry-run	Detach a Dry Run Device Template
-----	---	----------------------------------

Sample Payload:

```

{
  "resource": {
    "templateRequests": {
      "template-device-group": {
        "devices": {
          "device": [
            {
              "device_name": "tb24-tor1"
            }
          ]
        }
      },
      "template-target-map": {
        "template_target_type": "device-target",
        "template_type": "device",
        "template_name": "DEvTemplate2",
        "template_target_id": "na"
      }
    }
  }
}

```

```

    }
  }
}

```

Field Name	Possible Value	Mandatory
device name	Name of the device to which template needs to be detached	Y
device template name	Template name which needs to be detached	Y

4.20 Route Template API

4.20.1 Create Route Template

POST	/vts-service/sites/site/<site_id>/templates	Create a new configuration template in VTS
------	---	--

Sample Payload:

```

{
  "template": [
    {
      "name": "Sample Template",
      "description": "A sample router template",
      "type": "route",
      "created-on": "2016-01-12T09:05:00",
      "modified-on": "2016-01-12T09:30:00",
      "route-template": {
        "rt-seed": "70000",
        "vrf-name": "Sample VRF name",
        "static-routes": {
          "static-route": [
            {
              "destination": "1.1.1.0/24",
              "next-hop": "2.2.2.0/24"
            },
            {
              "destination": "3.3.3.0/24",
              "next-hop": "4.4.4.4/32"
            }
          ]
        }
      }
    }
  ]
}

```

```

    ]
  },
  "import-route-targets":{
    "import-route-target":[
      {
        "stitching":"","
        "route-target":"100:1000",
        "route-target-type":"route-target-internal"
      },
      {
        "route-target":"192.168.1.2:3001",
        "route-target-type":"route-target-external"
      }
    ]
  },
  "export-route-targets":{
    "export-route-target":[
      {
        "route-target":"172.27.184.56:12345",
        "route-target-type":"route-target-internal"
      },
      {
        "stitching":"","
        "route-target":"123:60000",
        "route-target-type":"route-target-external"
      }
    ]
  }
}
]
}
}

```

Fields:

Field Name	Possible Value	Mandatory
name	A string with a maximum of 128 characters	Y
description	A string with a maximum of 128 characters	N

Type	In this release, there is only one template type: route	Y
created-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
modified-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
vrf-name	A string with a maximum of 128 characters	N
rt-seed	An integer value with a range of 1-16777215	N
destination	An IPv4 address with prefix length	Y (if a new static-route element is to be added)
next-hop	An IPv4 address (Note: the prefix length information is optional in this case)	Y (if a new static-route element is to be added)
stitching	Can be either present or not present	N
route-target	Can be of one of the following 4 formats: 1. ASN2:NN4 2. ASN4:NN2 3. IPv4:NN2 where: NN2 and ASN2 has a range of 1-65535 NN4 and ASN4 has a range of 1-4294967295 IPv4 is an IPv4 address in the dotted decimal format	Y (if a new import-route-target/export-route-target element is to be added)
route-target-type	Can be of one of the following types: route-target-internal, route-target-external, route-target-both	Y (if a new import-route-target/export-route-target element is to be added)

4.20.2 Updating a Template

*Note: In this case, only the fields specified in the JSON body will be updated. All the existing

PATCH	/vts-service/sites/site/<site_id>/templates/template/<template_name>	Update a template
-------	--	-------------------

fields will remain the same.

Sample Payload:

```

{
  "template":[
    {
      "router-template":{
        "rt-seed":"8000",
        "static-routes":{
          "static-route":[
            {
              "destination":"10.10.10.0/24",
              "next-hop":"20.20.20.0/24"
            }
          ]
        },
        "import-route-targets":{
          "import-route-target":[
            {
              "stitching": "",
              "route-target":"8888:99",
              "route-target-type":"route-target-internal"
            }
          ]
        }
      }
    }
  ]
}

```

4.20.3 Get List of Templates

GET	/vts-service/sites/site/<site_id>/templates	Retrieve list of templates
-----	---	----------------------------

Sample Payload:

```

{
  "cisco-vts-templates:templates":{
    "template":[
      {
        "name":"SR_RT_Template_1"
      },
      {
        "name":"SR_Template_1"
      }
    ]
  }
}

```



```

    {
      "name":"Sample Template"
    },
    {
      "name":"Temp_3"
    },
    {
      "name":"Temp_4"
    }
  ]
}
}

```

4.20.4 Get a template using name

GET	/vts-service/sites/site/<site_id>/templates/template/{template_name}	Gets details about a particular template
-----	--	--

Sample Payload:

```

{
  "cisco-vts-templates:template":{
    "name":"TemplateA",
    "description":"TempA",
    "type":"cisco-vts-templates:route",
    "created-on":"2016-02-19T23:30:12.128+00:00",
    "modified-on":"2016-02-19T23:30:12.129+00:00",
    "route-template":{
      "static-routes":{
        "static-route":[
          {
            "destination":"1.1.1.0/24",
            "next-hop":"2.2.2.0/24"
          }
        ]
      },
      "import-route-targets":{
        "import-route-target":[
          {
            "route-target":"2.2.2.0:24"
          }
        ]
      },
      "rt-seed":12345
    },
  }
}

```

4.20.5 Delete all templates

DELETE	/vts-service/sites/site/<site_id>/templates	Deletes all templates. Note: Template can be deleted if it is not attached to router.
--------	---	--

4.20.6 Delete a template identified by name

DELETE	/vts-service/sites/site/<site_id>/templates/template/{template-name}	Deletes a template identified by name. Note: Template can be deleted if it is not attached to router.
--------	--	--

4.20.7 Get a list of all existing route template associations

GET	/vts-service/sites/site/<site_id>/cisco-vts/template-target-maps	Gets a list of all the templates that are currently associated with a router
-----	--	--

4.20.8 Attach Route Template to Router

Refer to section 4.18.11 (“Attach L3 service extension template to a router”).

4.20.9 Get Template Type

GET	/vts-service/sites/site/<site_id>/templates/template/{template name}/type	For a given template, list the type
-----	---	-------------------------------------

Sample Payload:

```
{
  "type": "route"
}
```

4.20.10 Get List of Import Route Targets

GET	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target	For a given template, get list of import route targets
-----	--	--

Sample Payload:

```
{
  "import-route-target":[
    {
      "route-target":"65001:23",
      "route-target-type":"route-target-internal"
    }
  ]
}
```

4.20.11 Get List of Export Route Targets

GET	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/export-route-targets/export-route-target	For a given template, get list of export route targets
-----	--	--

Sample Payload:

```
{
  "export-route-target":[
    {
      "route-target":"65004:22",
      "route-target-type":"route-target-internal"
    }
  ]
}
```

4.20.12 Set Import Route Target to Route Template

PUT	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target/{route target}	For a given template, add a import route target
-----	---	---

Sample Payload:

```
{
  "import-route-target":[
    {
      "route-target":"65004:23",
      "route-target-type":"cisco-vts-templates:route-target-external"
    }
  ]
}
```

4.20.13 Set Export Route Target to Route Template

PUT	/vts-service/sites/site/<site_id>/templates/template/{template-	For a given template, add an export route target
-----	---	--

	name}/route-template/export-route-targets/export-route-target/65004:23	
--	--	--

Sample Payload:

```
{
  "export-route-target":[
    {
      "route-target":"65004:23",
      "route-target-type":"cisco-vts-templates:route-target-external"
    }
  ]
}
```

4.20.14 Set Route Target to Internal Device

PUT	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target/{route target}	For a given template, add a route target to a ToR
-----	---	---

Sample Payload:

```
{
  "import-route-target":[
    {
      "route-target":"65004:23",
      "route-target-type":"cisco-vts-templates:route-target-internal"
    }
  ]
}
```

4.20.15 Set Route Target to External Device

PUT	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target/{route target}	For a given template, add a route target to a DCI
-----	---	---

Sample Payload:

```
{
  "import-route-target":[
    {
      "route-target":"65004:23",
      "route-target-type":"cisco-vts-templates:route-target-external"
    }
  ]
}
```

4.20.16 Set Route Target to Both Internal and External Device

PUT	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target/{route target}	For a given template, add a route target to both a ToR and DCI
-----	---	--

Sample Payload:

```
{
  "import-route-target":[
    {
      "route-target":"65004:23",
      "route-target-type":"cisco-vts-templates:route-target-both"
    }
  ]
}
```

4.20.17 Get List of Static Routes in Route Template

GET	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/static-routes	For a given template, get list of export route targets
-----	---	--

Sample Payload:

```
{
  "cisco-vts-templates:static-routes":{
    "static-route":[
      {
        "destination":"1.1.1.0/24",
        "next-hop":"2.2.2.0/24"
      },
      {
        "destination":"10.10.10.0/24",
        "next-hop":"20.20.20.0/24"
      }
    ]
  }
}
```

4.20.18 Set a static route to a route template

PATCH	/vts-service/sites/site/<site_id>/templates/template/{template-	For a given template, add a static route
-------	---	--

	name}/route-template/static-routes/static-route/	
--	--	--

Sample Payload:

```
{
  "static-route":[
    {
      "destination":"8.8.8.8/32",
      "next-hop":"4.4.4.4"
    }
  ]
}
```

4.20.19 Delete a specific static route from Route Template

DELETE	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/static-routes/static-route/"<destination_to_be_deleted>,<next hop to be deleted>"	Delete a specific static route in an existing template
--------	---	--

4.20.20 Delete a specific import route target from route template

DELETE	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/import-route-targets/import-route-target/"<route_target_to_be_deleted>"	Delete a specific import route target in an existing template
--------	---	---

4.20.21 Delete a specific export route target from route template

DELETE	/vts-service/sites/site/<site_id>/templates/template/{template-name}/route-template/export-route-targets/export-route-	Delete a specific export route target in an existing template
--------	--	---

	target/"<route_target_to_be_deleted>"	
--	---------------------------------------	--

4.21 Resource Pools

4.21.1 Vni Pool Creation (for the site with VxLAN Data Plane only)

PUT	/vts-service/sites/site/<site_id>/resource-pools/vni-pool/vnipool	Create the global VNI Pool for VxLAN Data Plane only. Pool name must be "vnipool"
-----	---	---

Sample Payload:

```
{
  "vni-pool": {
    "name": "vnipool",
    "ranges": {
      "range": {
        "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "6001",
        "end": "7000"
      }
    }
  }
}
```

4.21.2 Evi Pool Creation (for the site with MPLS Data Plane only)

PUT	/vts-service/sites/site/<site_id>/resource-pools/evi-pool/srevipool	Create the global EVI Pool for MPLS Data Plane only. Pool name must be "srevipool"
-----	---	--

Sample Payload:

```
{
  "evi-pool": {
    "name": "srevipool",
    "ranges": {
      "range": {
        "id": "7b7be9e4-ad0a-4e47-8ff2-78b30d135b87",
        "start": "6001",

```

```

    "end": "7000"
  }
}
}
}

```

4.21.3 Vlan Pool Creation

PUT	/vts-service/sites/site/<site_id>/resource-pools/vlan-pool/<device name>	Create a vlan pool for a given device
-----	--	---------------------------------------

Sample Payload:

```

{
  "vlan-pool": {
    "name": "n9k",
    "ranges": {
      "range": {
        "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "1001",
        "end": "2000"
      }
    }
  }
}

```

PUT	/vts-service/sites/site/<site_id>/resource-pools/vlan-pool/default	Create the global provider vlan pool (ranges can not overlap with any device or device-interface pool range)
-----	--	--

Sample Payload:

```

{
  "vlan-pool": {
    "name": "default",
    "ranges": {
      "range": {
        "id": "98d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "3001",
        "end": "3500"
      }
    }
  }
}

```

4.21.4 Interface Dot1Q Pool Creation

PUT	/vts-service/sites/site/<site_id>/resource-pools/ device-interface-pool/<device name>	Create an Interface Dot1Q pool for a given device (Only Nexus 7000 devices)
-----	---	---

Sample Payload:

```
{
  "device-interface-pool": {
    "name": "n7k",
    "ranges": {
      "range": {
        "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "1001",
        "end": "2000"
      }
    }
  }
}
```

4.21.5 Multicast Pool Creation

PUT	/vts-service/sites/site/<site_id>/resource-pools/vni-pool/multicastpool	Create the global multicast pool. Pool name must be “multicastpool”
-----	---	---

Sample Payload:

```
{
  "multicast-pool": {
    "name": "multicastpool",
    "ranges": {
      "range": {
        "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "239.0.0.0",
        "end": "239.0.0.255"
      }
    }
  }
}
```

4.21.6 Create a Restricted Range in VNI Pool (for the site with VxLAN Data Plane)

PUT	/vts-service/sites/site/<site_id>/resource-pools/vni-pool/vnipool	Create a range in a vni pool to be restricted
-----	---	---

Sample Payload:

```
{
```

```

"vni-pool": {
  "name": "vnipool",
  "ranges": {
    "range": {
      "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
      "start": "6001",
      "end": "7000"
      "restricted": ""
    }
  }
}
}
}

```

4.21.7 Create a Restricted Range in EVI Pool (for the site with MPLS Data Plane)

PUT	/vts-service/sites/site/<site_id>/resource-pools/vni-pool/vnipool	Create a range in a evi pool to be restricted
-----	---	---

Sample Payload:

```

{
  "evi-pool": {
    "name": "srevipool",
    "ranges": {
      "range": {
        "id": "78d07cfe-b944-49a4-a598-3bcf0b843625",
        "start": "6001",
        "end": "7000"
        "restricted": ""
      }
    }
  }
}
}

```

4.21.8 Unrestricting a Range (for the site with VxLAN Data Plane)

DELETE	/vts-service/sites/site/<site_id>/resource-pools/vni-pool/vnipool/ranges/range/<range id>/restricted	Removing the restrict attribute of a range in vni pool
--------	--	--

4.21.9 Unrestricting a Range (for the site with MPLS Data Plane)

DELETE	/vts-service/sites/site/<site_id>/resource-pools/evi-pool/srevipool/ranges/range/<range_id>/restricted	Removing the restrict attribute of a range in evi pool
--------	--	--

4.21.10 Restricting static allocations to range only

PUT	/cisco-vts/global-settings/resource-allocator-config/allocate-outside-range	Force static allocations to come only from ranges
-----	---	---

Sample Payload:

```
{ "allocate-outside-range": "false" }
```

4.22 Profiles

Allows to manipulate profiles in VTS. Profiles is essentially a logical group of common attributes that can be attached to an existing VTS entities. For example, currently, “Stitching Profile” can be created and attached to DCI functional group in admin domain. This allows to provision some extra services on DCI devices, like L2 VNI.

4.22.1 Stitching profile

4.22.1.1 Create/Update URI

PATCH	/vts-service/sites/site/<site_id>/profiles/profile/	Create Stitching profile
-------	---	--------------------------

4.22.1.2 Sample Payload

```
{
  "profile":{
    "id":"44d738a2-d901-11e6-9c75-005056862217",
    "name":"automationStitchingProfile",
    "type":"stitching",
    "created-on":"2017-01-12T11:56:55",
    "control-protocol-type":"cisco-vts-stitching-profile:control-protocol-mp-bgp",
    "vts-mp-bgp-profile-id":"4460c0a0-d901-11e6-9c75-005056862217",
    "services":{
      "service":[
        {
          "service-type":"cisco-vts-stitching-profile:service-type-internet",
          "route-policy-profile-id":"44a09ebe-d901-11e6-9c75-005056862217"
        }
      ]
    },
    "remote-neighbours":{
      "remote-neighbour":[
        {
          "router-id":"60.60.60.1"
        }
      ]
    }
  }
}
```

4.22.1.3 Payload Fields

Field	Data Type	Mandatory	Description
id	String	Y	Unique identifier
name	String	Y	Name of the profile

description	String	N	Details description if any
type	cisco-vts-profiles:profile-type	Y	This has to cisco-vts-profiles:stitching for stitching profile
remote-neighbours	List of neighbor ips	Y	At least 1 neighbor is needed
services	List	Y	List of services(intern/mps l2vni)
service-type	cisco-vts-stitching-profile: core-network-service-type	Y	supported values are cisco-vts-stitching-profile:service-type-mpls-l2vpn and cisco-vts-stitching-profile:service-type-internet
control-protocol-type	cisco-vts-stitching-profile: core-network-control-protocol	Y	Only supported value so far is cisco-vts-stitching-profile:control-protocol-mp-bgp
vts-mp-bgp-profile-id	Reference of BGP profile Id	Y	stitching

4.22.2 BGP profile

4.22.2.1 Create/Update URI

PATCH	/vts-service/sites/site/<site_id>/profiles/profile/	Create BGP profile
-------	---	--------------------

4.22.2.2 Sample Payload

```
{
  "profile":{
    "name":"bgp-profile",
    "type":"cisco-vts-profiles:bgp",
    "id":"c144f5ef-2cce-4b09-b496-987ff820de9d",
    "bgp-as-number":100,
    "address-families":[
      {
        "address-family":"l2vpn"
      }
    ]
  }
}
```

```

    ],
    "loopback-if-number": 1
  }
}

```

4.22.2.3 Payload Fields

Field	Data Type	Mandatory	Description
name	String	Y	Name of the profile
description	String	N	Details description if any
type	cisco-vts-profiles:profile-type	Y	This has to be cisco-vts-profiles:bgp for bgp profile
bgp-as-number	String	Y	ASN number for core network
Address-families	List of families supported	Y	Only supported value so far l2vpn

4.22.3 Route policy profile

4.22.3.1 Create/Update URI

PATCH	/vts-service/sites/site/<site_id>/profiles/profile/	Create route policy profile
-------	---	-----------------------------

4.22.3.2 Sample Payload

```

{
  "profile": {
    "name": "router-profile",
    "type": "cisco-vts-profiles:route-policy",
    "id": "48763f5e-3444-4809-a491-dddbcbf28963",
    "underlay-route-policy": {
      "dc-fabric-external-policy": {
        "route-advertisements": {
          },
          "route-filter": "route-policy-in"
        },
        "dc-fabric-internal-policy": {
          "route-filter": "route-policy-out"
        }
      }
    }
  }
}

```

4.22.3.3 Payload Fields

Field	Data Type	Mandatory	Description
name	String	Y	Name of the profile
description	String	N	Details description if any
type	cisco-vts-profiles:profile-type	Y	This has to cisco-vts-profiles:route-policy for route policy profile
dc-fabric-external-policy	String	Y	Name of policy to be applied on DCI devices.
dc-fabric-internal-policy	String	Y	Name of policy to be applied on Fabric side devices.

4.22.4 Get any profile

GET	/vts-service/sites/site/<site_id>/profiles/profile/{id}	Get any profile
-----	---	-----------------

4.22.5 Delete any profile

Delete	/vts-service/sites/site/<site_id>/profiles/profile/{id}	Get any profile
--------	---	-----------------

4.23 Global Route Table (GRT) service profile (Route Leak profile)

Global route leaking feature enables you to provide internet/external connectivity to the host inside the Data Center. This feature allows associating/dissociating of Global Route Leaking (also known as Global Routing Table [GRT]) Service to/from the Overlay Router. The following should be done in order to utilize the GRT service. Pre-requisite for GRT is to create a Stitching profile with cisco-vts-stitching-profile:service-type-internet (refer 4.20.1) , BGP Profile (refer 4.20.2)

4.23.1 Create/Update a GRT Profile URI

PATCH	/vts-service/sites/site/<site_id>/profiles/profile/	Create overlay route policy profile
-------	---	-------------------------------------

4.23.2 Sample payload

```
{
  "profile": {
    "id" : "39ca68b7-c522-4d7e-89e4-3019fc526333",
    "name": "Tenant100Grt100",
    "type": "cisco-vts-profiles:route-policy-overlay",
    "overlay-route-policy": {
      "dc-fabric-external-policy": {
        "route-filter": "data-center-vrf-export-policy"
      },
      "dc-fabric-internal-policy": {
        "route-filter": "data-center-vrf-import-policy"
      }
    }
  }
}
```

Field	Data Type	Mandatory	Description
name	String	Y	Name of the profile
description	String	N	Details description if any
type	cisco-vts-profiles:profile-type	Y	This has to be cisco-vts-profiles:route-policy-overlay for GRT service profile
dc-fabric-external-policy	String	Y	Name of already created route-policy filter on DCI -- to be applied as fabric export policy
dc-fabric-internal-policy	String	Y	Name of already created route-policy filter on DCI, to be applied as Fabric import policy to the overlay router.

4.23.3 GET VPN for Overlay Route Policy Profile

Fetch VPN id for overlay route-policy profile created in the step above.

GET	/vpns/vpn {id}	Get all VPN
-----	----------------	-------------

RESULT:

```
{
  "cisco-vts:vpn": {
    "id": "20584262-7568-4068-8b09-3c0b7b0106b4",
    "name": "Tenant100GrtVpn1",
    "type": "cisco-vts:vpn-service-type-internet",
    "service-domain": "cisco-vts:vpn-service-domain-dc-fabric-external",
    "internet": {
      "address-families": {
        "address-family": [
          {
            "family": "ipv4",
            "overlay-route-policy": "39ca68b7-c522-4d7e-89e4-3019fc526333"
          }
        ]
      }
    }
  }
}
```

4.23.4 Associate VPN ID to Router

PATCH	tenants/tenant/Tenant100/topologies/topology/Tenant100/routers/router/	Associate VPN ID with Router
-------	--	------------------------------

```
{
  "cisco-vts:router": {
    "id": "d640096b-1a42-40b6-88f5-7ca8050bb511",
    "name": "T100RT1",
    "router-gateway": "d8451c2d-5a56-4bcd-bbbd-cf78202017c4",
    "status": "cisco-vts-identities:active",
    "vts-allocated-vni": 10231,
    "overlay-router-vpn-id": "20584262-7568-4068-8b09-3c0b7b0106b4"
  }
}
```

Overlay-router-vpn-id	String	VPN id associate with overlay route policy profile is creation
-----------------------	--------	--

4.24 AAA

Allows to manipulate AAA server and accounting configuration in VTS.

4.24.1 Authentication and Authorization

4.24.1.1 Global Timeout – Get and Update

Global timeout is the connection timeout of VTC with a AAA server. The default is 15 secs.

GET	/vts-service/external-authentication/timeout	Get the Global Timeout
-----	---	------------------------

Sample Response

```
{
  "cisco-vts:timeout": 15
}
```

PATCH	/vts-service/external-authentication/timeout	Set the Global Timeout
-------	---	------------------------

Sample Payload

```
{
  "cisco-vts:timeout": 20
}
```

4.24.1.2 Enable and Disable External Auth

In order to use AAA, external auth needs to be enabled.

PATCH	/vts-service/external-authentication	Enable External auth by setting the external-auth flag
-------	---	--

Sample Payload

```
{
  "external-authentication": {
    "external-auth-enabled-info": {
      "external-auth-enabled": [null]
    }
  }
}
```

DELETE	/vts-service/external-authentication/external-auth-enabled-info/external-auth-enabled	Disable External auth by deleting the external-auth flag
--------	---	--

4.24.1.3 Tacacs+ Server Configuration – Create, Update, Delete and Get

A Tacacs+ server can be configured in VTC by adding a Tacacs+ server configuration. This will enable VTC to communicate with Tacacs+ server for authentication, authorization and accounting.

PATCH	/vts-service/external-authentication/external-auth-modes/external-auth-mode	Create an Tacacs External Auth configuration in VTC
-------	---	---

Sample Payload

```
{
  "external-auth-mode" : {
    "order": 0,
    "auth-type": "tacacs-external-auth-mode",
    "auth-mode-enabled": [null],
    "tacacs-server-credentials": {
      "tacacs-server-credential": [
        {
          "key": "tacacskey123",
          "port": "49",
          "ip-hostname": "172.20.100.205",

```

```

        "id": "48763f5e-3444-4809-a491-dddbcbf28963"
      }
    ]
  }
}
}

```

GET	/vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/<tacacs-server-uuid>	Get the details of the a tacacs server credential
-----	---	---

Sample Response

GET [/vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/0ca6434c-408e-42cb-ac59-7acdca56d798](#)

```

{
  "cisco-vts:tacacs-server-credential": {
    "id": "0ca6434c-408e-42cb-ac59-7acdca56d798",
    "ip-hostname": "172.20.100.200",
    "key": "cisco",
    "port": 49
  }
}

```

DELETE	/vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/<tacacs-server-uuid>	Delete a tacacs server configured using the uuid
--------	---	--

Sample Request

DELETE </vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/0ca6434c-408e-42cb-ac59-7acdca56d798>

Note: If all the Tacacs+ server configurations are deleted, the external auth will not get disabled on its own. The external auth needs to be disabled explicitly (as in [4.24.1.2](#)).

4.24.2 Accounting / Logging to Tacacs+ Server

4.24.2.1 Update Logging Interval

The accounting logs are collected at periodic intervals and sent to Tacacs+. The default is set to 30 secs. The logging interval can be changed at any time using a rest call.

PUT	/vts-service/external-authentication/external-auth-enabled-info/logging-interval	Change the log collection interval
-----	---	------------------------------------

Sample Payload

```
{
  "cisco-vts:logging-interval": 30
}
```

4.24.2.2 Enable Accounting

For accounting logs to be sent to the external AAA server, the accounting needs to be enabled.

Please note: We support only 1 AAA server for accounting at a time, so if there is already one enabled, the rest consumer needs to disable it. And then enable the tacacs server

PATCH	<a href="/vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/<tacacs-server-uuid>">/vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/<tacacs-server-uuid>	Enable accounting for a tacacs server
-------	---	---------------------------------------

Sample Payload

[vts-service/external-authentication/external-auth-modes/external-auth-mode/tacacs-external-auth-mode/tacacs-server-credentials/tacacs-server-credential/0ca6434c-408e-42cb-ac59-7acdca56d79d](#)

```
{
  "cisco-vts:tacacs-server-credential": {
    "accounting": {
      "accounting-enabled": [null]
    }
  }
}
```

4.25 Device Objects

Device objects allow you to define parameterized device config (currently supports port-channel and ethernet config). This parameterized device config can later be associated with device by supplying values to the parameterized device config.

The authoring of device object with parameterized keypath/values (a.k.a device object definition) is done using the url

```
api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects
```

The creation of device object instance attached to a device by passing values to parameterized fields (a.k.a device object association) is done using url

```
api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-uuid>
```

NOTE: Please refer to [Important Notes and Caveats](#) section on device objects while creating/using API

4.25.1 Create Ethernet object

POST	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects	Create Ethernet device object with key path param and static value
------	--	--

Sample payload – Ethernet Device object.

```
{
  "device-object": [
    {
      "id": "E725A958-F4EF-439A-9221-7D237FC3C43W",
      "name": "EthernetDO_01",
      "type": "cisco-vts:ethernet",
      "platform": "cisco-vts-identities:N9K",
      "schema-revision-date": "2018-04-02",
      "schema-namespace": "http://tail-f.com/ned/cisco-nx",
      "definition": {
        "created-on": "2018-04-19T17:55:27.496+00:00",
        "modified-on": "2018-04-19T17:55:27.497+00:00",
        "keypath-values": {
          "keypath-value": [
            {
              "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}",
              "value": "{\"Ethernet\": {\"name\": \"${ETHERNET-NAME}\", \"description\": \"${DESC}\", \"shutdown\": \"${SHUT}\", \"mtu\": \"${MTU}\", \"speed\": \"1000\"}}}"
            },
            {
              "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/switchport/trunk/allowed/vlan/ids/${VLAN_IDS-ID}",
              "value": "{\"ids\": {\"id\": \"${VLAN_IDS-ID}\"}}}"
            }
          ]
        }
      }
    }
  ]
}
```

Fields:

Field Name	Possible Value	Mandatory
Id	UUID string which acts like a key	Y
name	A non-empty string with a maximum of 128 characters	Y
description	A string with a maximum of 128 characters	N
Type	The type of the device-object. cisco-vts:port-channel or cisco-vts:ethernet	Y
created-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
modified-on	Date-time information in the format CCYY-MM-DDTHH:MM:SS	N (This will be system generated)
platform	cisco-vts-identities:N9K, cisco-vts-identities:N7K	Indicates which device platform config this device object contains
schema-revision-date	String in YYYY-MM-DD format indicating the platform NED last revision date	Y (e.g. if cisco-vts-identities:N9K is selected as the platform – this would be the tailf-ned-cisco-nx.yang last revision date)
schema-namespace	Namespace for the device object schema based on platform selection	Y (e.g. if cisco-vts-identities:N9K is selected as the platform – this would be the tailf-ned-cisco-nx.yang namespace “ http://tail-f.com/ned/cisco-nx ”)
keypath	A unique path to the device config. This path can be parameterized as needed or can contain static values.	Y (at least one should be specified)
value	The config value (in valid JSON format) for the corresponding key path. The fields in the value can be parameterized as needed or can contain static values	Y (at least one should be specified to corresponding at least one keypath)
param-name	string – starting with “\$”	N(Optional:) The entire params block in payload is optional. If not provided -- VTC will automatically generate it based on \$<params> in keypath/values. The parametrized name if provided should be part of keypath or value else device object cannot be saved.

param-type	string	<p>N(Optional)</p> <p>Capturing the type of the corresponding param-name if supplied. type can be int, string, list etc.</p> <p>This needs to be supplied if param-name field is being supplied. If not, VTC will automatically generate the same.</p>
------------	--------	--

4.25.2 Create port-channel device object

POST	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects	Create port-channel device object with key path param and static value
------	--	--

```
{
  "cisco-vts:device-object": {
    "id": "7dc01ab3-5eda-403c-8a4a-4e53f1abdc8",
    "name": "DO_PO_Eth_mix",
    "description": "DO_PO_Eth_mix",
    "type": "cisco-vts:port-channel",
    "platform": "cisco-vts-identities:N9K",
    "schema-revision-date": "2018-04-02",
    "schema-namespace": "http://tail-f.com/ned/cisco-nx",
    "definition": {
      "created-on": "2018-08-24T22:51:10.107+00:00",
      "modified-on": "2018-08-24T22:51:10.11+00:00",
      "keypath-values": {
        "keypath-value": [
          {
            "keypath": "config/nx:interface/Ethernet{ $ETHERNET-NAME}",
            "value": "{\"Ethernet\":{\"name\":\"$ETHERNET-NAME\"}}"
          },
          {
            "keypath": "config/nx:interface/Ethernet{ $ETHERNET-NAME}/enable",
            "value": "{\"enable\":{\"switchport\":\"$SWITCHPORT\"}}"
          },
          {
            "keypath": "config/nx:interface/port-channel{ $PORT-CHANNEL-NAME}",
            "value": "{\"port-channel\":{\"name\":\"$PORT-CHANNEL-NAME\",\"description\":\"$DESC\"}}"
          },
          {
            "keypath": "config/nx:interface/port-channel{ $PORT-CHANNEL-NAME}/switchport/trunk/allowed/vlan/ids{ $VLAN_IDS-ID}",
            "value": "{\"ids\":{\"id\":\"$VLAN_IDS-ID\"}}"
          }
        ]
      }
    }
  }
}
```

4.25.3 Update of existing device object with keypath/value modification.

PUT	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects/device-	Update existing DO with key paths in definition
-----	--	---

	object/<device-object-UUID>	
--	-----------------------------	--

```
{
  "cisco-vts:device-object": {
    "id": "e72bb0bd-9d60-4034-a76d-6a371a621fe4",
    "name": "Ethernet_DO2",
    "description": "Ethernet_DO2 more keypaths",
    "type": "cisco-vts:ethernet",
    "platform": "cisco-vts-identities:N9K",
    "schema-revision-date": "2018-04-02",
    "schema-namespace": "http://tail-f.com/ned/cisco-nx",
    "definition": {
      "created-on": "2018-08-24T17:39:08.446+00:00",
      "modified-on": "2018-08-24T17:47:44.874+00:00",
      "keypath-values": {
        "keypath-value": [
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}",
            "value": "{\"Ethernet\":{\"name\":\"$ETHERNET-NAME\", \"shutdown\":\"$shutdown\", \"description\":\"$desc\", \"mtu\":\"1500\", \"speed\":\"$Speed\"}}"}
          },
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/enable",
            "value": "{\"enable\":{\"switchport\":\"$SW_Enable\"}}"}
          },
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/switchport",
            "value": "{\"switchport\":{\"mode\":\"$SW_Mode\"}}"}
          },
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/switchport/trunk/allowed/vlan/ids{$VLAN_IDS-ID}",
            "value": "{\"ids\":{\"id\":\"$VLAN_IDS-ID\"}}"}
          },
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/vrrpv3{$ETHERNET_VRRPV3-VR $ETHERNET_VRRPV3-ADDRESS-FAMILY}",
            "value": "{\"vrrpv3\":{\"vr\":\"$ETHERNET_VRRPV3-VR\", \"address-family\":\"$ETHERNET_VRRPV3-ADDRESS-FAMILY\"}}"}
          },
          {
            "keypath": "config/nx:interface/Ethernet{$ETHERNET-NAME}/vrrpv3{$ETHERNET_VRRPV3-VR $ETHERNET_VRRPV3-ADDRESS-FAMILY}/address/primary-list{$ADDRESS_PRIMARY-LIST-ADDRESS}",
            "value": "{\"primary-list\":{\"address\":\"$ADDRESS_PRIMARY-LIST-ADDRESS\"}}"}
          }
        ]
      }
    }
  }
}
```

4.25.4 Delete of device object with no association to devices

DELETE	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects/device-object/<device-object-UUID>	Delete of device object Note: device object can only be deleted if they are no instances of device object associated to devices i.e. no instance entry under /api/running/vts-
--------	---	---

		service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-uuid>devices/
--	--	--

4.25.5 Getting a particular device object

GET	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects/device-object/<device-object-UUID>?deep&operations=false	Gets details about particular device object Note: The “params” returned is for internal processing and are automatically generated when device object is created.
-----	---	--

```
{
  "cisco-vts:device-object": {
    "id": "7dc01ab3-5eda-403c-8a4a-4e53f1abdc8",
    "name": "DO_PO_Eth_mix",
    "description": "DO_PO_Eth_mix",
    "type": "cisco-vts:port-channel",
    "platform": "cisco-vts-identities:N9K",
    "schema-revision-date": "2018-04-02",
    "schema-namespace": "http://tail-f.com/ned/cisco-nx",
    "definition": {
      "created-on": "2018-08-24T22:51:10.107+00:00",
      "modified-on": "2018-08-24T22:51:10.11+00:00",
      "keypath-values": {
        "keypath-value": [
          {
            "keypath": "config/nx:interface/Ethernet{ $ETHERNET-NAME }",
            "value": "{ \"Ethernet\": { \"name\": \"$ETHERNET-NAME\" } }"
          },
          {
            "keypath": "config/nx:interface/Ethernet{ $ETHERNET-NAME }/enable",
            "value": "{ \"enable\": { \"switchport\": \"$switchport\" } }"
          },
          {
            "keypath": "config/nx:interface/Ethernet{ $ETHERNET-NAME }/channel-group",
            "value": "{ \"channel-group\": { \"id\": $PORT-CHANNEL-NAME } }"
          }
        ]
      },
      {
        "keypath": "config/nx:interface/port-channel{ $PORT-CHANNEL-NAME }",
        "value": "{ \"port-channel\": { \"name\": \"$PORT-CHANNEL-NAME\", \"description\": \"$desc\" } }"
      },
      {
        "keypath": "config/nx:interface/port-channel{ $PORT-CHANNEL-NAME }/switchport/trunk/allowed/vlan/ids{ $VLAN_IDS-ID }",
        "value": "{ \"ids\": { \"id\": \"$VLAN_IDS-ID\" } }"
      }
    ]
  },
  "params": {
    "param": [
      {
        "name": "$ETHERNET-NAME",
        "properties": "{ \"type\": \"list\" }"
      }
    ]
  }
}
```

```

    },
    {
      "name": "$PORT-CHANNEL-NAME",
      "properties": "{\"type\": \"string\"}"
    },
    {
      "name": "$VLAN_IDS-ID",
      "properties": "{\"type\": \"list\"}"
    },
    {
      "name": "$desc",
      "properties": "{\"type\": \"string\"}"
    },
    {
      "name": "$switchport",
      "properties": "{\"type\": \"boolean\"}"
    }
  ]
}
}
}
}
}

```

4.25.6 Get List of device-objects

Note: This API will get a list of all device-objects in the system, including both port-channel and ethernet-channel

GET	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects?deep&operations=false	Gets list of device objects giving all details of each device-object Note: If you just need uuid of the device object remove ?deep from the URL
-----	--	--

4.25.7 Get a particular device-object's definition params

GET	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-objects/device-object/<device-objectUUID>/definition/params?deep	Gets a list of \$PARAMS name in device-object keypath/values that need to be supplied with values when associating device object with a device.
-----	---	---

```

{
  "cisco-vts:params": {
    "param": [
      {
        "name": "$DESC",
        "properties": "{\"type\": \"string\"}"
      },
      {
        "name": "$ETHERNET-NAME",
        "properties": "{\"type\": \"string\"}"
      },
      {
        "name": "$MTU",

```

```

    "properties": "{\"type\": \"string\"}"
  },
  {
    "name": "$NATIVE",
    "properties": "{\"type\": \"boolean\"}"
  },
  {
    "name": "$SHUT",
    "properties": "{\"type\": \"string\"}"
  },
  {
    "name": "$SWITCH_MODE",
    "properties": "{\"type\": \"boolean\"}"
  },
  {
    "name": "$VLAN_IDS-ID",
    "properties": "{\"type\": \"list\"}"
  }
]
}
}

```

4.25.8 Associating device-object to a device by creating an instance

POST	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances	Associates a device object definition to device by providing values to the \$PARAM names (\$PARAM name in device object can be got using the above API).
------	--	--

```

{
  "instance": [
    {
      "params": {
        "param": [
          {
            "name": "$ETHERNET-NAME",
            "properties": "{\"value\": \"1/3\"}"
          },
          {
            "name": "$desc",
            "properties": "{\"value\": \"desc test 1/3\"}"
          },
          {
            "name": "$VLAN_IDS-ID",
            "properties": "{\"value\": [200,230]}"
          }
        ]
      },
      "name": "DO_Instance-TOR3",
      "type": "cisco-vts:ethernet"
    }
  ]
}

```

4.25.9 Updating a particular device-object association instance on device

PUT	/api/running/vts-service/sites/site/<site-id>/cisco-	Updates a device object instance on device with
-----	--	---

	vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances/instance/<instance-name>,<instance-type>	supplying of new \$PARAM names values or update of existing \$PARAM values. <instance-type> is either Ethernet or Port-channel
--	---	---

```
{
  "instance": [
    {
      "params": {
        "param": [
          {
            "name": "$ETHERNET-NAME",
            "properties": "{\"value\": \"1/3\"}"
          },
          {
            "name": "$desc",
            "properties": "{\"value\": \"desc test 1/3\"}"
          },
          {
            "name": "$VLAN_IDS-ID",
            "properties": "{\"value\": [200,230,400]}"
          }
        ]
      }
    },
    {
      "name": "DO_Instance-TOR3",
      "type": "cisco-vts:ethernet"
    }
  ]
}
```

4.25.10 Updating of multiple instances of device object associated with device

PUT	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances/	Updates a device object that has multiple instances on device buy supplying of new \$PARAM names values or update of existing \$PARAM values.
-----	---	---

```
{
  "instances": {
    "instance": [
      {
        "params": {
          "param": [
            {
              "name": "$ETHERNET-NAME",
              "properties": "{\"value\": \"1/3\"}"
            },
            {
              "name": "$desc",
              "properties": "{\"value\": \"desc test 1/3\"}"
            },
            {
              "name": "$VLAN_IDS-ID",
              "properties": "{\"value\": [200,230]}"
            }
          ]
        }
      }
    ]
  }
}
```

```

    ]
  },
  "name": "DO_Instance1-TOR3",
  "type": "cisco-vts:ethernet"
},
{
  "params": {
    "param": [
      {
        "name": "$ETHERNET-NAME",
        "properties": {"value": "1/9"}
      },
      {
        "name": "$desc",
        "properties": {"value": "desc test 1/9"}
      },
      {
        "name": "$VLAN_IDS-ID",
        "properties": {"value": "[200,230]"}
      }
    ]
  },
  "name": "DO_Instance2-TOR3",
  "type": "cisco-vts:ethernet"
}
]
}

```

Adding a new instance as part of the update (as show highlighted)

```

{
  "instances": {
    "instance": [
      {
        "params": {
          "param": [
            {
              "name": "$ETHERNET-NAME",
              "properties": {"value": "1/3"}
            },
            {
              "name": "$desc",
              "properties": {"value": "desc test 1/3"}
            },
            {
              "name": "$VLAN_IDS-ID",
              "properties": {"value": "[200,230]"}
            }
          ]
        },
        "name": "DO_Instance1-TOR3",
        "type": "cisco-vts:ethernet"
      },
      {
        "params": {
          "param": [
            {
              "name": "$ETHERNET-NAME",
              "properties": {"value": "1/9"}
            },
            {
              "name": "$desc",
              "properties": {"value": "desc test 1/9"}
            },
            {

```

```

        "name": "$VLAN_IDS-ID",
        "properties": {"value": [200,230]}
    }
  ],
},
"name": "DO_Instance2-TOR3",
"type": "cisco-vts:ethernet"
},
{
  "params": {
    "param": [
      {
        "name": "$ETHERNET-NAME",
        "properties": {"value": "1/10"}
      },
      {
        "name": "$desc",
        "properties": {"value": "desc test 1/10"}
      },
      {
        "name": "$VLAN_IDS-ID",
        "properties": {"value": [200,230]}
      }
    ]
  },
},
"name": "DO_Instance3-TOR3",
"type": "cisco-vts:ethernet"
}
]
}

```

4.25.11 Get of device-object device association instance(s)

GET	<p>/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances/instance/"<instance-name>,<instance-type>"?deep&operations=false</p>	<p>Gets details of a device object instance associated to a particular device. It shows the \$PARAM and values given to those params</p> <p>To get all instances of device object association to device use</p> <p>/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances</p>
-----	--	---

```

{
  "cisco-vts:instance": {
    "name": "Ethernet_DO2_1/23_b11",
    "type": "cisco-vts:ethernet",
    "modified-on": "2018-08-24T19:10:03.156+00:00",
    "params": {
      "param": [
        {
          "name": "$ADDRESS_PRIMARY-LIST-ADDRESS",

```



```

    "properties": "{\"value\":[\"100.100.100.10\"]}"
  },
  {
    "name": "$ETHERNET-NAME",
    "properties": "{\"value\": \"1/23\"}"
  },
  {
    "name": "$ETHERNET_VRRPV3-ADDRESS-FAMILY",
    "properties": "{\"value\":[\"ipv4\"]}"
  },
  {
    "name": "$ETHERNET_VRRPV3-VR",
    "properties": "{\"value\":[\"1\"]}"
  },
  {
    "name": "$SW_Enable",
    "properties": "{\"value\": \"false\"}"
  },
  {
    "name": "$VLAN_IDS-ID",
    "properties": "{\"value\":[2400,2500]}"
  },
  {
    "name": "$desc",
    "properties": "{\"value\": \"desc test 1/23\"}"
  }
]
}
}
}

```

4.25.12 Get of <do-edit-applied> flag of a device to check if device-object edit got applied or not

<p>GET</p>	<p>/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>?deep&operations=false</p>	<p>When we have device-object associated with devices by creating instance of the device object, and then when device-object definition is updated with modification to keypath/values “do-edit-applied” flag is set to false under each device.</p> <p>api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>.</p> <p>This flag is per device associated with device object.</p> <p>When any instance of the device-object gets updated, the “do-edit-applied” flag is reset to true (default value) indicating the DO edit</p>
------------	---	---

		changes are applied on that device
--	--	------------------------------------

```

{
  "cisco-vts:device": {
    "name": "b11",
    "do-edit-applied": false,
    "instances": {
      "instance": [
        {
          "name": "Ethernet_DO2_1/23_b11",
          "type": "cisco-vts:ethernet",
          "description": "Ethernet_DO2 more keypaths",
          "modified-on": "2018-08-24T17:46:36.328+00:00",
          "params": {
            "param": [
              {
                "name": "$ETHERNET-NAME",
                "properties": "{\"value\":\"1/23\"}"
              },
              {
                "name": "$SW_Enable",
                "properties": "{\"value\":\"true\"}"
              },
              {
                "name": "$SW_Mode",
                "properties": "{\"value\":\"trunk\"}"
              }
            ]
          }
        }
      ]
    }
  }
}

```

```

{
  "name": "$Speed",
  "properties": "{\"value\":\"1000\"}"
},
{
  "name": "$VLAN_IDS-ID",
  "properties": "{\"value\":[\"1001\"]}"
},
{
  "name": "$desc",
  "properties": "{\"value\":\"test 1/23 desc\"}"
},
{
  "name": "$shutdown",
  "properties": "{\"value\":\"true\"}"
}
]
}
}
}
]
}
}
}
}

```

4.25.13 DELETE of a particular device object instance associated with a device

DELETE	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-	Deletes a particular device object instance associate with device
--------	---	---

	name>/instances/instance/<instance-name>,<instance-type>	identified by <instance-name>,<instance-type> <instance-type> is Ethernet or Port-Channel
--	--	--

4.25.14 DELETE all instances of device object instances

DELETE	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances	Deletes all device object instances associated with device
--------	--	--

4.25.15 DELETE of a particular device object instance associated with a device

DELETE	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances/instance/<instance-name>,<instance-type>	Deletes a particular device object instance associate with device identified by <instance-name>,<instance-type> <instance-type> is Ethernet or Port-Channel
--------	---	--

4.25.16 DELETE all instances of device object instances

DELETE	/api/running/vts-service/sites/site/<site-id>/cisco-vts/device-object-associations/device-object-association/<device-object-UUID>/devices/device/<device-name>/instances	Deletes all device object instances associated with device
--------	--	--

4.25.17 IMPORTANT NOTES AND CAVEATS RELATED TO DEVICE OBJECTS

Item	Description
<p>1. Instance Name convention for API created DO to work without issues in VTS UI</p>	<p>A. The Device Object Instance name should strictly match the following convention <device object name>_<port_channel_interface_number>_<device_name> for port-channel device object e.g. DO name : DO1 Port-channel interface number: 100 Device name: ToR1 Then instance name should be DO1_100_ToR1</p> <p>B. The Device Object instance name should strictly match the following convention <device_object_name>_<ethernet_interface>_<device_name> for Ethernet device object e.g. DO name: DO1 Ethernet interface: 1/1 Device Name : ToR2 Then instance name should be DO1_1/1_ToR2</p>
<p>2. Configuration</p>	<p>Using “switch port trunk allowed vlan none” config as part of device template or device object will wipe off the vlan id configs at later points (redeploy, reconcile and upgrade of services) on device with port attach on same interface. Hence, configure and use it with expected impact in all functional flows. E.g: Port-attach and then attaching device template will wipe off the vlan id of port attach config.</p>
<p>3. API</p>	<p>When using API ensure that the config keypath and config keypath value case matches. Also, If a \$PARAM e.g \$ETHERNET-NAME is in keypath/value then while giving instance value ensure that the same case \$ETHERNET-NAME is used. Instances have been seen that the config is ignored if the case doesn't match between keypath and config keypath value.</p>
<p>4. Sample Device objects</p>	<p>We have 4 Sample device objects (Port-channel DO, Ethernet DO each for N9k and N7k platform types respectively) for read-only from UI. If user edits these Device objects from Manage/Authoring and Associate page, valid error will be displayed on UI "Sample Device Objects cannot be updated. Copy Sample Device Object for further usage"</p>
<p>5. Configuration</p>	<p>N7K configurations under "isis" container config should be configured as day0 on device. NED needs to provide the sub-level configs support under "isis" container config. RT#34389</p>
<p>6. Sub-config under a config with composite-keys</p>	<p>If a normal config (non-composite keys config) contains two \$PARAMS of list type in keypath, combination of them m * n for the values, given to list is used to create that many substituted config keypaths. But in case of config with composite-key, that is having a list subconfig, combination cannot be done for the same and should have 1-1 mapping.</p>

	<p>For example: Here is the config for “VR and Address family” and addresses within that composite key.</p> <pre>"config/nx:interface/Ethernet{\$ETHERNET-NAME}/vrrpv3{\$ETHERNET_VRRPV3-VR "\$ETHERNET_VRRPV3-ADDRESS-FAMILY}"</pre> <p>it has sub config of primary addresses (which are of list type)</p> <pre>“config/nx:interface/Ethernet{\$ETHERNET-NAME}/vrrpv3{\$ETHERNET_VRRPV3-VR \$ETHERNET_VRRPV3-ADDRESS-FAMILY}/address/primary-list{\$ADDRESS_PRIMARY-LIST-ADDRESS}</pre> <p>If user provides values for \$ETHERNET_VRRPV3-VR as 100, 200 and for \$ETHERNET_VRRPV3-ADDRESS-FAMILY as ipv4, ipv6 and for ADDRESS_PRIMARY-LIST-ADDRESS as 10.10.10.10, 2001:db8:abcd:0012::0/64</p> <p>In this case, cannot do a combination of primary addresses to the composite keys i.e. composite key { 100, ipv4} having both the addresses 10.10.10.10 and 2001:db8:abcd:0012::0/64 -- This will not work as address family is ipv4..</p> <p>Hence 1-1 mapping of the list values under composite-key needs to be done so it should look like</p> <pre>{ 100,ipv4} having just 10.10.10.10 { 200,ipv6} having just 2001:db8:abcd:0012::0/64</pre> <p>Currently this creates a limitation that the user cannot supply multiple primary addresses to address family</p>
<p>7. Configuration</p>	<p>Device specific behavior: Wherein cleanup is not working properly for vlan ids for Ethernet interface configs with channel-group id referenced in it.</p> <p>The “switchport trunk allowed vlan <id>” was pushed to both port-channel and Ethernet interface referencing it. But, while detaching the config “switchport trunk allowed vlan <id>” was not removed from Ethernet interface. We need to enable the “switchport” config in device object definition under port-channel container for the cleanup to work properly on device. Note: Device was not rejecting the config push “switchport trunk allowed vlan <id>” without enable “switchport” config.</p>
<p>8. Port-channel Ethernet supported config</p>	<p>Under Port-channel device object, the only ethernet config allowed and supported from VTS UI is</p> <pre>keypath-value "config/nx:interface/Ethernet{\$ETHERNET-NAME}" { value "{\$ETHERNET-NAME": {"name": "{\$ETHERNET-NAME"}, "shutdown": "{\$SHUT1"}"}";</pre>

	<pre> } keypath-value "config/nx:interface/Ethernet{\$ETHERNET- NAME}/channel-group" { value "{\"channel-group\": {\"id\": \"\${PORT-CHANNEL-NAME}\"}}"; } keypath-value "config/nx:interface/Ethernet{\$ETHERNET- NAME}/enable" { value "{\"enable\": {\"switchport\": \"true\"}}"; } </pre>
--	---

4.26 Full Text Search of Device Objects

Full text search enables the user to search for any details of device objects importantly the config contained in the device object.

4.26.1 Get search results

Fetch device objects matching the search term with GET rest call

https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=* &type=&instType=&category=deviceObjectDefinition|deviceObjectInstance

Below are the query params passed

searchString: It is the term user wants to search. Search string can be customized further to get more relevant results. Below are the supported options for searchString text:

Text: Normal text-based search

Example: ethernet - to search for all ethernet matches

“ “ : Double quotes to search complete phrases and IP addresses

Example: "service extension", "ETHERNET_DEVICE_OBJECT_N9K", "10.1.1.0/26", "2001:0db8:85a3:0000:0000:8a2e:0370:7334", "mtu:1000"

* : Wildcard search

Example: * - to display all search results

swi* - to search for any word that starts with 'swi'

virt*tch - to search for any word that starts with 'virt' and ends with 'tch'

? : Single character wildcard search

Example: te?t - to match test, text etc.

AND : Search where both terms exist. AND must be in Uppercase.

Example: vrf AND bgp

OR : Search where either of the term exists. OR must be in Uppercase.

Example: vrf OR bgp

NOT : Search excludes terms that are mentioned after NOT. NOT must be in Uppercase.

Example: vrf NOT bgp, (vrf AND bgp) NOT ipv6

type: type corresponds to the device object definition type. Possible type values are deviceObjectPortChannel and deviceObjectEthernet.

instType: instType corresponds to the device object instance type. Possible instType values are deviceObjectPortChannelInst and deviceObjectEthernetInst.

category: Possible category values are deviceObjectDefinition and deviceObjectInstance.

User has to specify searchString query param and category query param default value 'deviceObjectDefinition|deviceObjectInstance' to get search results. type, instType are passed to further filter the results.

Note: query params are case insensitive.

Apart from the device object specific details, search on query term returns additional fields in the result and is explained below.

highlightSnippets : When you search for a term from extension device object configs (aka Key-Path value), corresponding matched snippets are displayed under this section. Snippets are the fragment of the device object document.

facets: Based on the filters specified in the request, facets shows the count of device objects found for each filter category in the search result.

facetAdjustment: The facetAdjustment contains the adjustment values that is needed to be done to the result Facet counts per VTS application requirements.

4.26.1.1 Sample request with term "ethernet" search

<https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=ethernet&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance>

Response:

```
"documents": [
  {
    "modifiedOn": " Fri Mar 16 20:07:22 UTC 2018",
    "facetAdjustment": {
      "facetFieldAdjustments": {
    }
  },
  "deviceObjectName": "DeviceObjectSample",
  "highlightSnippets": [
    "config/nx:interface/Ethernet{1/4}",
    "config/nx:interface/Ethernet{1/4}/channel-group",
    "config/nx:interface/port-channel{100}"
  ],
  "name": "DeviceObjectSample_100_alibaba-tor2",
  "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
  "keypathValueMap": {
    "config/nx:interface/Ethernet{1/4}": "{\"Ethernet\":{\"name\":\"1/4\"}}",
    "config/nx:interface/Ethernet{1/4}/channel-group": "{\"channel-group\":{\"id\":\"100\"}}",
    "config/nx:interface/port-channel{100}": "{\"port-channel\":{\"name\":\"100\",\"mtu\":\"1500\",\"shutdown\":\"false\"}}"
```



```

    },
    "id":
"com.cisco.vts.search.document.DeviceObjectInstance:DeviceObjectSample_100_alibaba-
tor2:alibaba-tor2",
    "type": "port-channel-instance",
    "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
    "device": "alibaba-tor2",
    "platform": "N9K"
  }
],
  "facets": {
    "type": {
      "ethernet": 0,
      "port-channel-instance": 0,
      "route": 0,
      "ethernet-instance": 0,
      "device": 0,
      "port-channel": 1
    },
    "document-type": {
      "com.cisco.vts.search.document.DeviceObject": 1,
      "com.cisco.vts.search.document.Template": 0,
      "com.cisco.vts.search.document.DeviceObjectInstance": 0
    }
  }
}

```

4.26.1.2 Sample request with search term in quotes

[https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString="mtu%3A1500"&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance](https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=)

Search for documents with term “mtu:1500”

Response:

```

{
  "documents": [
    {
      "modifiedOn": "Mon Aug 27 22:42:08 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {
          }
        },
      "deviceObjectName": "DeviceObjectSample",
      "highlightSnippets": [
        "{\"port-channel\":{\"name\":\"100\",\"mtu\":\"1500\",\"shutdown\":\"false\"}}",
      ],
      "name": "DeviceObjectSample_100_tor2",
      "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
      "keypathValueMap": {
        "config/nx:interface/Ethernet{1/4}": "{\"Ethernet\":{\"name\":\"1/4\"}}",
        "config/nx:interface/Ethernet{1/4}/channel-group": "{\"channel-
group\":{\"id\":\"100\"}}",

```

```

    "config/nx:interface/port-channel{100}": "{\"port-
channel\":{\"name\":\"100\",\"mtu\":\"1500\",\"shutdown\":\"false\"}}",
    },
    "id":
"com.cisco.vts.search.document.DeviceObjectInstance:DeviceObjectSample_100_tor2:tor2",
    "type": "port-channel-instance",
    "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
    "device": "tor2",
    "platform": "N9K"
  },
  {
    "modifiedOn": "Mon Aug 27 22:41:19 UTC 2018",
    "facetAdjustment": {
      "facetFieldAdjustments": {

        }
      },
    "highlightSnippets": [
      "{\"port-channel\":{\"name\":\"$PORT-CHANNEL-
NAME\",\"mtu\":\"1500\",\"shutdown\":\"$SHUT\"}}",
    ],
    "name": "DeviceObjectSample",
    "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
    "keypathValueMap": {
      "config/nx:interface/port-channel{$PORT-CHANNEL-NAME}": "{\"port-
channel\":{\"name\":\"$PORT-CHANNEL-
NAME\",\"mtu\":\"1500\",\"shutdown\":\"$SHUT\"}}",
      "config/nx:interface/Ethernet{$ETHERNET-NAME}":
"{\"Ethernet\":{\"name\":\"$ETHERNET-NAME\"}}",
      "config/nx:interface/Ethernet{$ETHERNET-NAME}/channel-group": "{\"channel-
group\":{\"id\":\"$PORT-CHANNEL-NAME\"}}",
    },
    "schemaNamespace": "http://tail-f.com/ned/cisco-nx",
    "id": "com.cisco.vts.search.document.DeviceObject:31abb316-34f8-4de4-acc3-
c3e7c124082b",
    "type": "port-channel",
    "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
    "createdOn": "Mon Aug 27 22:41:19 UTC 2018",
    "platform": "N9K"
  }
],
"facets": {
  "type": {
    "ethernet": 0,
    "port-channel-instance": 1,
    "route": 0,
    "ethernet-instance": 0,
    "device": 0,
    "port-channel": 1
  },
  "document-type": {
    "com.cisco.vts.search.document.DeviceObject": 1,
    "com.cisco.vts.search.document.Template": 0,
    "com.cisco.vts.search.document.DeviceObjectInstance": 1
  }
}

```

```

}
}
}

```

4.26.1.3 Sample request with Wildcard character in the search term

https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=*500&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance

Search for document with the term ending with 500

Response:

```

{
  "documents": [
    {
      "modifiedOn": "Mon Aug 27 22:42:08 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {

        }
      },
      "deviceObjectName": "DeviceObjectSample",
      "highlightSnippets": [
        "{\\"port-channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
      ],
      "name": "DeviceObjectSample_100_tor2",
      "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
      "keypathValueMap": {
        "config/nx:interface/Ethernet{ 1/4}": "{\\"Ethernet\\":{\\"name\\":\\"1/4\\"}}",
        "config/nx:interface/Ethernet{ 1/4}/channel-group": "{\\"channel-
group\\":{\\"id\\":\\"100\\"}}",
        "config/nx:interface/port-channel{ 100}": "{\\"port-
channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
      },
      "id":
      "com.cisco.vts.search.document.DeviceObjectInstance:DeviceObjectSample_100_tor2:tor2",
      "type": "port-channel-instance",
      "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
      "device": "tor2",
      "platform": "N9K"
    },
    {
      "modifiedOn": "Mon Aug 27 22:41:19 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {

        }
      },
      "highlightSnippets": [
        "{\\"port-channel\\":{\\"name\\":\\"$PORT-CHANNEL-
NAME\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"$SHUT\\"}}"
      ],
      "name": "DeviceObjectSample",

```

```

    "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
    "keypathValueMap": {
      "config/nx:interface/port-channel{$PORT-CHANNEL-NAME}": "{\"port-channel\":{\"name\":\"$PORT-CHANNEL-NAME\",\"mtu\":\"1500\",\"shutdown\":\"$SHUT\"}}",
      "config/nx:interface/Ethernet{$ETHERNET-NAME}":
        "{\"Ethernet\":{\"name\":\"$ETHERNET-NAME\"}}",
      "config/nx:interface/Ethernet{$ETHERNET-NAME}/channel-group": "{\"channel-group\":{\"id\":\"$PORT-CHANNEL-NAME\"}}",
    },
    "schemaNamespace": "http://tail-f.com/ned/cisco-nx",
    "id": "com.cisco.vts.search.document.DeviceObject:31abb316-34f8-4de4-acc3-c3e7c124082b",
    "type": "port-channel",
    "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
    "createdOn": "Mon Aug 27 22:41:19 UTC 2018",
    "platform": "N9K"
  }
],
"facets": {
  "type": {
    "ethernet": 0,
    "port-channel-instance": 1,
    "route": 0,
    "ethernet-instance": 0,
    "device": 0,
    "port-channel": 1
  },
  "document-type": {
    "com.cisco.vts.search.document.DeviceObject": 1,
    "com.cisco.vts.search.document.Template": 0,
    "com.cisco.vts.search.document.DeviceObjectInstance": 1
  }
}
}

```

4.26.1.4 Sample request with Single character wildcard search

<https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=1?00&type=&instType=&category=deviceObjectDefinition/deviceObjectInstance>

Search for document with term of format 1?00

Response:

```

{
  "documents": [
    {
      "modifiedOn": "Mon Aug 27 22:42:08 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {

```

```

    },
    "deviceObjectName": "DeviceObjectSample",
    "highlightSnippets": [
      "{\\"port-channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
    ],
    "name": "DeviceObjectSample_100_tor2",
    "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
    "keypathValueMap": {
      "config/nx:interface/Ethernet{1/4}": "{\\"Ethernet\\":{\\"name\\":\\"1/4\\"}}",
      "config/nx:interface/Ethernet{1/4}/channel-group": "{\\"channel-
group\\":{\\"id\\":\\"100\\"}}",
      "config/nx:interface/port-channel{100}": "{\\"port-
channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
    },
    "id":
"com.cisco.vts.search.document.DeviceObjectInstance:DeviceObjectSample_100_tor2:tor2",
    "type": "port-channel-instance",
    "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
    "device": "tor2",
    "platform": "N9K"
  },
  {
    "modifiedOn": "Mon Aug 27 22:41:19 UTC 2018",
    "facetAdjustment": {
      "facetFieldAdjustments": {

    }
  },
  "highlightSnippets": [
    "{\\"port-channel\\":{\\"name\\":\\"$PORT-CHANNEL-
NAME\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"$SHUT\\"}}"
  ],
  "name": "DeviceObjectSample",
  "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
  "keypathValueMap": {
    "config/nx:interface/port-channel{$PORT-CHANNEL-NAME}": "{\\"port-
channel\\":{\\"name\\":\\"$PORT-CHANNEL-
NAME\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"$SHUT\\"}}",
    "config/nx:interface/Ethernet{$ETHERNET-NAME}":
"{\\"Ethernet\\":{\\"name\\":\\"$ETHERNET-NAME\\"}}",
    "config/nx:interface/Ethernet{$ETHERNET-NAME}/channel-group": "{\\"channel-
group\\":{\\"id\\":\\"$PORT-CHANNEL-NAME\\"}}"
  },
  "schemaNamespace": "http://tail-f.com/ned/cisco-nx",
  "id": "com.cisco.vts.search.document.DeviceObject:31abb316-34f8-4de4-acc3-
c3e7c124082b",
  "type": "port-channel",
  "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
  "createdOn": "Mon Aug 27 22:41:19 UTC 2018",
  "platform": "N9K"
}
],
"facets": {
  "type": {

```

```

"ethernet": 0,
"port-channel-instance": 1,
"route": 0,
"ethernet-instance": 0,
"device": 0,
"port-channel": 1
},
"document-type": {
  "com.cisco.vts.search.document.DeviceObject": 1,
  "com.cisco.vts.search.document.Template": 0,
  "com.cisco.vts.search.document.DeviceObjectInstance": 1
}
}
}

```

4.26.1.5 Sample search request with boolean AND or OR

<https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=%24SHUT AND MTU&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance>

<https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=%24SHUT OR MTU&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance>

Search for document that has term \$SHUT and MTU / Search for document that has term \$SHUT OR \$MTU

Response:

```

{
  "documents": [
    {
      "modifiedOn": "Mon Aug 27 22:42:08 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {
          }
        }
      },
      "deviceObjectName": "DeviceObjectSample",
      "highlightSnippets": [
        "{\\"port-channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
      ],
      "name": "DeviceObjectSample_100_tor2",
      "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
      "keypathValueMap": {
        "config/nx:interface/Ethernet{1/4}": "{\\"Ethernet\\":{\\"name\\":\\"1/4\\"}}",
        "config/nx:interface/Ethernet{1/4}/channel-group": "{\\"channel-group\\":{\\"id\\":\\"100\\"}}",
        "config/nx:interface/port-channel{100}": "{\\"port-channel\\":{\\"name\\":\\"100\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"false\\"}}"
      },
      "id":
      "com.cisco.vts.search.document.DeviceObjectInstance:DeviceObjectSample_100_tor2:tor2",
      "type": "port-channel-instance",
    }
  ]
}

```

```

"uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
"device": "tor2",
"platform": "N9K"
},
{
"modifiedOn": "Mon Aug 27 22:41:19 UTC 2018",
"facetAdjustment": {
"facetFieldAdjustments": {

}
},
"highlightSnippets": [
"{\"port-channel\":{\"name\": \"$PORT-CHANNEL-NAME\", \"mtu\": \"1500\", \"shutdown\": \"$SHUT\"}}"
],
"name": "DeviceObjectSample",
"siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
"keypathValueMap": {
"config/nx:interface/port-channel{$PORT-CHANNEL-NAME}": "{\"port-channel\":{\"name\": \"$PORT-CHANNEL-NAME\", \"mtu\": \"1500\", \"shutdown\": \"$SHUT\"}}",
"config/nx:interface/Ethernet{$ETHERNET-NAME}":
"{\"Ethernet\":{\"name\": \"$ETHERNET-NAME\"}}",
"config/nx:interface/Ethernet{$ETHERNET-NAME}/channel-group": "{\"channel-group\":{\"id\": \"$PORT-CHANNEL-NAME\"}}"
},
"schemaNamespace": "http://tail-f.com/ned/cisco-nx",
"id": "com.cisco.vts.search.document.DeviceObject:31abb316-34f8-4de4-acc3-c3e7c124082b",
"type": "port-channel",
"uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
"createdOn": "Mon Aug 27 22:41:19 UTC 2018",
"platform": "N9K"
}
],
"facets": {
"type": {
"ethernet": 0,
"port-channel-instance": 1,
"route": 0,
"ethernet-instance": 0,
"device": 0,
"port-channel": 1
},
}
"document-type": {
"com.cisco.vts.search.document.DeviceObject": 1,
"com.cisco.vts.search.document.Template": 0,
"com.cisco.vts.search.document.DeviceObjectInstance": 1
}
}
}
}

```

4.26.1.6 Sample search request with boolean NOT

[https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=%24SHUT NOT instance&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance](https://localhost:8443/VTS/rs/sites/004dbc7e-c68b-4332-9075-ec823b03615a/search/deviceobject?searchString=%24SHUT%20NOT%20instance&type=&instType=&category=deviceObjectDefinition|deviceObjectInstance)

Search for document which has term \$SHUT but not instance.

Response:

```
{
  "docs": [
    {
      "modifiedOn": "Mon Aug 27 22:41:19 UTC 2018",
      "facetAdjustment": {
        "facetFieldAdjustments": {
        }
      },
      "highlightSnippets": [
        "{\\"port-channel\\":{\\"name\\":\\"$PORT-CHANNEL-NAME\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"$SHUT\\"}}",
      ],
      "name": "DeviceObjectSample",
      "siteId": "004dbc7e-c68b-4332-9075-ec823b03615a",
      "keypathValueMap": {
        "config/nx:interface/port-channel{$PORT-CHANNEL-NAME}": "{\\"port-channel\\":{\\"name\\":\\"$PORT-CHANNEL-NAME\\",\\"mtu\\":\\"1500\\",\\"shutdown\\":\\"$SHUT\\"}}",
        "config/nx:interface/Ethernet{$ETHERNET-NAME}": "{\\"Ethernet\\":{\\"name\\":\\"$ETHERNET-NAME\\"}}",
        "config/nx:interface/Ethernet{$ETHERNET-NAME}/channel-group": "{\\"channel-group\\":{\\"id\\":\\"$PORT-CHANNEL-NAME\\"}}",
      },
      "schemaNamespace": "http://tail-f.com/ned/cisco-nx",
      "id": "com.cisco.vts.search.document.DeviceObject:31abb316-34f8-4de4-acc3-c3e7c124082b",
      "type": "port-channel",
      "uuid": "31abb316-34f8-4de4-acc3-c3e7c124082b",
      "createdOn": "Mon Aug 27 22:41:19 UTC 2018",
      "platform": "N9K"
    }
  ],
  "facets": {
    "type": {
      "ethernet": 0,
      "port-channel-instance": 0,
      "route": 0,
      "ethernet-instance": 0,
      "device": 0,
      "port-channel": 1
    },
  },
  "document-type": {
```



```

    "com.cisco.vts.search.document.DeviceObject": 1,
    "com.cisco.vts.search.document.Template": 0,
    "com.cisco.vts.search.document.DeviceObjectInstance": 0
  }
}
}

```

4.27 L2 Template dry run API

4.27.1 Attach template while adding a network

Request URL:

https://<<VTC_IP>>/VTS/api/sites/<<SITE_ID>>/templates/tenantTopology/<<TENANT_NAME>>/<<TOPOLOGY_ID>>/network/dry-run

Request Method: POST

Request Payload:

```

{
  "resource": {
    "networkRequests": {
      "template_device_groups": {
        "template_device_group": [
          {
            "devices": {
              "template_name": "<<L2 Template Name>>",
              "is_all_devices": false,
              "device": [
                {
                  "device_name": "<<Device Name>>",
                  "ip_address": "<<Device IP Address>>",
                  "devicePlatform": "<<Device Platform>>",
                  "device_role": "<<Device Role>>"
                }
              ]
            }
          ]
        }
      ],
    },
    "template_target_maps": {
      "template_target_map": [
        {
          "template_target_id": "",
          "template_type": "l2-extension",
          "template_name": "<<Template Name>>",
          "platform": "<<Platform>>",
        }
      ]
    }
  }
}

```

```

    "template_target_type": "<<Target Type>>"
  }
]
},
"templateName": "<<Template Name>>",
"tenant_id": "<<Tenant Id>>",
"tenant-name": "<<Tenant Name>>",
"tenantContext": "<<Tenant Context>>",
"topologyContext": "samplezone",
"network": {
  "network_name": "<<Network Name>>",
  "router-external": false,
  "arp-suppression": "nwk-arp-suppression-disabled",
  "template_maps": {
    "template_map": []
  },
  "extend-to-core": "no"
},
"vpns": []
}
}
}

```

Example

Request URL:

<https://172.20.100.201:8443/VTS/api/sites/6c363796-999f-416a-b69d-8a3297a028a2/templates/tenantTopology/sample-t1/samplezone/network/dry-run>

Request Body:

```

{
  "resource": {
    "networkRequests": {
      "template_device_groups": {
        "template_device_group": [
          {
            "devices": {
              "template_name": "Atin_test_l2",
              "is_all_devices": false,
              "device": [
                {
                  "device_name": "tb19-tor1",
                  "ip_address": "172.20.100.194",
                  "devicePlaform": "N9K",
                  "device_role": "leaf"
                }
              ]
            }
          ]
        }
      }
    }
  }
}

```

```

    }
  ]
},
"template_target_maps": {
  "template_target_map": [
    {
      "template_target_id": "",
      "template_type": "l2-extension",
      "template_name": "Atin_test_l2",
      "platform": "N9K",
      "template_target_type": "network-target"
    }
  ]
},
"templateName": "Atin_test_l2",
"tenant_id": "sample-t1",
"tenant-name": "sample-t1",
"tenantContext": "sample-t1",
"topologyContext": "samplezone",
"network": {
  "network_name": "ravi_test",
  "router-external": false,
  "arp-suppression": "nwk-arp-suppression-disabled",
  "template_maps": {
    "template_map": []
  },
  "extend-to-core": "no"
},
"vpns": []
}
}
}

```

Response Status Code: 200

Response Body:

```

{
  "dryRunOutput": {
    "tb19-tor1%Atin_test_l2": {
      "status": "noDiff",
      "message": "No Difference",
      "checksum": "-498697704"
    }
  },
  "dryRunTimestamp": "2018-10-26 07:25:18"
}

```

4.27.2 Attach template while editing a network

Request URL:

https://<<VTC_IP>>/VTS/api/sites/<<SITE_ID>>/templates/tenantTopology/<<TENANT_NAME>>/<<TOPOLOGY_ID>>/network/<<NETWORK_ID>>/dry-run

Request Method: PUT

Request Payload:

```
{
  "resource": {
    "networkRequests": {
      "template_device_groups": {
        "template_device_group": [
          {
            "devices": {
              "template_name": "<<Template Name>>",
              "is_all_devices": false,
              "device": [
                {
                  "device_name": "<<Device Name>>",
                  "ip_address": "<<IP Address>>",
                  "devicePlatform": "<<Device Platform>>",
                  "device_role": "<<Device Role>>"
                }
              ]
            }
          ]
        }
      ],
      "template_target_maps": {
        "template_target_map": [
          {
            "template_target_id": "<<Template Id>>",
            "template_type": "l2-extension",
            "template_name": "<<Template Name>>",
            "platform": "<<Platform>>",
            "template_target_type": "<<Target Type>>"
          }
        ]
      },
      "templateName": "<< Template Name >>",
      "tenant_id": "<<Tenant Id>>",
      "tenant-name": "<<Tenant Name>>",
      "tenantContext": "<<Tenant Context>>",
      "topologyContext": "samplezone",
      "network": {
```

```

"network_name": "<<Network Name>>",
"shared": false,
"router-external": false,
"arp-suppression": "nwk-arp-suppression-disabled",
"template_maps": {
  "template_map": []
},
"extend-to-core": "no"
},
"vpns": []
}
}
}

```

Example

Request URL:

<https://172.20.100.201:8443/VTS/api/sites/6c363796-999f-416a-b69d-8a3297a028a2/templates/tenantTopology/sample-t1/samplezone/network/6567bec2-fa44-42f2-877a-afc33efb6434/dry-run>

Request Body:

```

{
  "resource": {
    "networkRequests": {
      "template_device_groups": {
        "template_device_group": [
          {
            "devices": {
              "template_name": "Atin_test_l2",
              "is_all_devices": false,
              "device": [
                {
                  "device_name": "tb19-tor1",
                  "ip_address": "172.20.100.194",
                  "devicePlaform": "N9K",
                  "device_role": "leaf"
                }
              ]
            }
          ]
        }
      ]
    },
    "template_target_maps": {
      "template_target_map": [
        {
          "template_target_id": "atin_test",

```

```

    "template_type": "l2-extension",
    "template_name": "Atin_test_l2",
    "platform": "N9K",
    "template_target_type": "network-target"
  }
]
},
"templateName": "Atin_test_l2",
"tenant_id": "sample-t1",
"tenant-name": "sample-t1",
"tenantContext": "sample-t1",
"topologyContext": "samplezone",
"network": {
  "network_name": "atin_test",
  "shared": false,
  "router-external": false,
  "arp-suppression": "nwk-arp-suppression-disabled",
  "template_maps": {
    "template_map": []
  },
  "extend-to-core": "no"
},
"vpns": []
}
}
}

```

Response Code: 200

Response Body:

```

{
  "dryRunOutput": {
    "tb19-tor1%Atin_test_l2": {
      "status": "noDiff",
      "message": "No Difference",
      "checksum": "-498697704"
    }
  },
  "dryRunTimestamp": "2018-10-26 10:12:14"
}

```

4.27.3 Detach L2 Template

Request URL:

https://<<VTC_IP>>/VTS/api/sites/<<SITE_ID>>/templates/tenantTopology/<<TENANT_NAME>>/<<TOPOLOGY_ID>>/network/<<NETWORK_ID>>/detachL2Template/dry-run

Request Method: PUT**Request Payload:**

```

{
  "resource": {
    "networkRequests": {
      "template_device_groups": {
        "template_device_group": []
      },
      "template_target_maps": {
        "template_target_map": []
      },
      "templateName": "<<Template Name>>",
      "deletedDevices": [
        "<<List of Device Names>>"
      ],
      "tenant_id": "<<Tenant Id>>",
      "tenant-name": "<<Tenant Name>>",
      "tenantContext": "<<Tenant Context>>",
      "topologyContext": "samplezone",
      "network": {
        "network_name": "<<Network Name>>",
        "shared": false,
        "router-external": false,
        "arp-suppression": "nwk-arp-suppression-disabled",
        "template_maps": {
          "template_map": []
        },
        "extend-to-core": "no"
      },
      "vpns": []
    }
  }
}

```

Example**Request URL:**

<https://172.20.100.201/VTS/api/sites/6c363796-999f-416a-b69d-8a3297a028a2/templates/tenantTopology/sample-t1/samplezone/network/11e3b187-0a50-4d56-afc8-d1d69230b293/detachL2Template/dry-run>

Request Body:

```

{

```

```

"resource": {
  "networkRequests": {
    "template_device_groups": {
      "template_device_group": []
    },
    "template_target_maps": {
      "template_target_map": []
    },
    "deleted_templates": [
      "Atin_test_l2"
    ],
    "templateName": "Atin_test_l2",
    "deletedDevices": [
      "tb19-tor1"
    ],
    "tenant_id": "sample-t1",
    "tenant-name": "sample-t1",
    "tenantContext": "sample-t1",
    "topologyContext": "samplezone",
    "network": {
      "network_name": "test1",
      "shared": false,
      "router-external": false,
      "arp-suppression": "nwk-arp-suppression-disabled",
      "template_maps": {
        "template_map": []
      },
      "extend-to-core": "no"
    },
    "vpns": []
  }
}

```

Response Code: 200**Response Body:**

```

{
  "dryRunOutput": {
    "tb19-tor1%Atin_test_l2": {
      "status": "noDiff",
      "message": "No Difference",
      "checksum": "-498697704"
    }
  },
  "dryRunTimestamp": "2018-10-26 10:24:41"
}

```


4.28 Static Routes:

The following API allows to perform CRUD operations on static routes. There are three kinds of static-routes:

- 1) Fabric Scoped
- 2) Port Scoped
- 3) External Scoped

4.28.1 Get Static Routes:

Request Method: GET

Request URL:

```
https://localhost:8888/api/running/vts-service/sites/site/<site_id>/cisco-  
vts/tenants/tenant/<TENANT>/topologies/topology/<TOPOLOGY>/router-static-  
routes/router-static-route/<ROUTER_ID>
```

Sample Response Payload:

```
{  
  "cisco-vts:router-static-route": {  
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",  
    "static-routes": {  
      "static-route": [  
        {  
          "prefix": "2.2.2.0/32",  
          "route-scope": "route-scope-external",  
          "next-hops": {  
            "next-hop": [  
              {  
                "index": 0,  
                "nh-addr": "2.2.2.0",  
                "ext-nh-vrf": "vrf",  
                "weight": 33  
              }  
            ]  
          },  
          "route-tag": 23  
        }  
      ]  
    }  
  }  
}
```

4.28.2 Create Static Route

Request Method: PUT

Request URL:

https://localhost:8888/api/running/vts-service/sites/site/<site_id>/cisco-vts/tenants/tenant/<TENANT>/topologies/topology/<TOPOLOGY>/router-static-routes/router-static-route/<ROUTER_ID>

4.28.2.1 Sample Payload:

```
{
  "router-static-route": {
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",
    "static-routes": {
      "static-route": [
        {
          "prefix": "1.1.1.0/32",
          "route-scope": "route-scope-fabric",
          "next-hops": {
            "next-hop": [
              {
                "index": 0,
                "nh-addr": "2.2.2.0",
                "nh-vrf": "vrf"
              }
            ]
          }
        },
        {
          "prefix": "2.2.2.0/32",
          "route-scope": "route-scope-external",
          "next-hops": {
            "next-hop": [
              {
                "index": 0,
                "weight": 56,
                "nh-addr": "3.3.3.0"
              },
              {
                "index": 1,
                "nh-addr": "4.4.4.0",
                "ext-nh-vrf": "vrf"
              }
            ]
          }
        }
      ]
    }
  },
  {
    "prefix": "3.3.3.0/32",
    "route-scope": "route-scope-port",
    "next-hops": {
      "next-hop": [
        {
          "index": 0,
          "bfd": "",
          "nh-addr": "5.5.5.0",
          "nh-port": "602c6673-4a8a-48a7-9d9c-4073abbcdf45"
        }
      ]
    }
  }
]
```

```

    }
  ]
}
}
}

```

4.28.2.2 Fabric Scoped:

4.28.2.2.1 Payload Fields

Field	Data Type	Mandatory	Description
“router-id”	String	Yes	Router UUID
“prefix”	String	Yes	Ip Prefix Address
“route-scope”	String	Yes	Scope Value– ‘route-scope-fabric’
“route-tag”	Number	No	
“index”	Number	Yes	Unique Index value for next hop entries
“nh-addr”	String	Yes	Next address value
“weight”	String	No	Next hop Preference
“nh-vrf”	String	No	Next Hop vrf

4.28.2.2.2 Sample Payload

```

{
  "router-static-route": {
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",
    "static-routes": {
      "static-route": [
        {
          "prefix": "1.1.1.0/32",
          "route-scope": "route-scope-fabric",
          "next-hops": {
            "next-hop": [
              {
                "index": 0,
                "nh-addr": "2.2.2.0",
                "nh-vrf": "vrf"
              }
            ]
          }
        }
      ]
    }
  }
}

```

}

4.28.2.3 Port Scoped

4.28.2.3.1 Payload Fields

Field	Data Type	Mandatory	Description
“router-id”	String	Yes	Router UUID
“prefix”	String	Yes	Ip Prefix Address
“route-scope”	String	Yes	Scope Value– ‘route-scope-port’
“route-tag”	Number	No	
“index”	Number	Yes	Index Id value for next hop entries
“nh-addr”	String	Yes	Next address value
“weight”	String	No	Next hop Preference
“nh-port”	String	No	Port UUID
“bfd”	String	No	Pass empty string “” to enable and null to disable

4.28.2.3.2 Sample Payload

```
{
  "router-static-route": {
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",
    "static-routes": {
      "static-route": [
        {
          "prefix": "3.3.3.0/32",
          "route-scope": "route-scope-port",
          "next-hops": {
            "next-hop": [
              {
                "index": 0,
                "bfd": "",
                "nh-addr": "5.5.5.0",
                "nh-port": "602c6673-4a8a-48a7-9d9c-4073abbcdf45"
              }
            ]
          }
        }
      ]
    }
  }
}
```

4.28.2.4 External Scoped

4.28.2.4.1 Payload Fields

Field	Data Type	Mandatory	Description
"router-id"	String	Yes	Router UUID
"prefix"	String	Yes	Ip Prefix Address
"route-scope"	String	Yes	Scope – 'route-scope-external'
"route-tag"	Number	No	
"index"	Number	Yes	Index Id value for next hop entries
"nh-addr"	String	Yes	Next address value
"weight"	String	No	Next hop Preference
"ext-nh-vrf"	String	No	VRF Name

4.28.2.4.2 Sample Payload

```
{
  "router-static-route": {
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",
    "static-routes": {
      "static-route": [
        {
          "prefix": "2.2.2.0/32",
          "route-scope": "route-scope-external",
          "next-hops": {
            "next-hop": [
              {
                "index": 0,
                "nh-addr": "3.3.3.0"
              }
            ]
          }
        }
      ]
    }
  }
}
```

4.28.3 Update Static Route

Request Method: PATCH

Request URL:

```
https://localhost:8888/api/running/vts-service/sites/site/<site_id>/cisco-  
vts/tenants/tenant/<TENANT>/topologies/topology/<TOPOLOGY>/router-static-  
routes/router-static-route/<ROUTER_ID>
```

4.28.3.1 Sample Payload

```
{  
  "router-static-route": {  
    "router-id": "1db02534-806f-4c09-a929-8adde91fc933",  
    "static-routes": {  
      "static-route": [  
        {  
          "prefix": "1.1.1.0/32",  
          "route-scope": "route-scope-fabric",  
          "next-hops": {  
            "next-hop": [  
              {  
                "index": 0,  
                "nh-addr": "4.4.4.0"  
              }  
            ]  
          }  
        }  
      ]  
    }  
  }  
}
```

4.28.4 Delete Static Route**Request Method:** DELETE**Request URL:**

```
https://localhost:8888/api/running/vts-service/sites/site/<site_id>/cisco-  
vts/tenants/tenant/<TENANT>/topologies/topology/<TOPOLOGY>/router-static-  
routes/router-static-route/<ROUTER_ID>
```

4.29 BGP Port extension:

4.29.1 Payload for Port Extension create:

Request URL: <https://<VTC IP>:8888/api/running/vts-service/sites/site/ddf2ec9c-ab59-49ba-8ade-efb8468d5e13/cisco-vts/tenants/tenant/TenantA/topologies/topology/Zone1/port-extensions>

Request Method: POST

Content-Type Header application/vnd.yang.data+json

Request Payload:

```
{
  "port-extension":{
    "id":"ddf2ec9c-ab59-49ba-8ade-efb8468d5e15",
    "name":"PortExtensionExample",
    "description":"Port Extension 2",
    "bgp-peering-profile":{
      "bgp-global-config":{
        "route-reflector-mode":"cisco-vts-identities:bgp-rr-none-mode"
      },
      "bgp-neighbors":[
        {
          "neighbor-id":"12.12.12.2",
          "bgp-neighbor-info":{
            "keepalive-interval":10,
            "hold-time":30,
            "suppress-4-byte-asn":false,
            "bfd":false,
            "address-families":[
              {
                "default-originate":false,
                "soft-reconfig":false,
                "type":"cisco-vts-identities:ipv4-unicast",
                "send-community":"standard"
              }
            ]
          }
        }
      ]
    }
  }
}
```

4.29.2 Payload for PortExtension -> Port association API:

Request URL: <https://<VTC IP>:8888/api/running/vts-service/sites/site/ddf2ec9c-ab59-49ba-8ade-efb8468d5e13/cisco-vts/tenants/tenant/TenantA/topologies/topology/Zone1/pe-mappings>

Request Method: POST

Content-Type Header application/vnd.yang.data+json

Request Payload:

```
{
  "pe-mapping":[
    {
      "port-id":"f03047b9-d90e-4091-82ef-730c94951ed8",
      "port-extensions":{
        "port-extension":[
          {
            "pe-id":"ddf2ec9c-ab59-49ba-8ade-efb8468d5e15"
          }
        ]
      }
    }
  ]
}
```


5 Debugging and troubleshooting

5.1 VTS

5.1.1 Services

There are 4 VTS specific services on VTC :

- 1) ncs.: The controller and handles NB API etc.
- 2) tomcat7: Handles the user interface
- 3) vtsWebServer: Handles Auto Discovery API and Openstack Plugin installation etc.

The above services are managed via the Linux service commands, e.g. “service <service-name> status” to query a service.

- 4) vts_Solr: Docker container on VTS that has the Solr Engine for template full search. To check the status of the vts_Solr you can enter “docker ps -a”

5.1.2 Logs

You can execute “show_tech_support -ax” command as “root” user to get a .tar file of all VTC logs.

6 Appendix

This appendix explains the YANG model for the VTS REST API.

6.1 VTS Types

```
module cisco-vts-types {  
  
    namespace "http://cisco.com/ns/yang/vts/types";  
  
    prefix vts-types;  
    import tailf-common {prefix tailf;}  
    import ietf-yang-types {prefix ietf-yang;}  
    import ietf-inet-types {prefix inet;}  
  
    organization "Cisco Systems, Inc.";  
  
    contact  
        "Cisco Systems, Inc.  
        Customer Service  
  
        Postal: 170 West Tasman Drive  
        San Jose, CA 95134
```

Tel: +1 800 533-NETS";

description

"This module contains a collection of YANG definitions for Cisco's VTS's management. Specifically, it defines types used in the context of VTS.

Copyright (c) 2015-2016 by Cisco Systems, Inc.
All rights reserved.";

revision "2017-05-30" {

description

"VTS 2.5.1

Enhancements:

- Added enum based typedef vtf-mode-enum

Corrections:

";

}

revision "2016-11-15" {

description

"VTS 2.4

Enhancements:

- Added types for ip-prefix. These are the same types defined in RFC 6021. They have been added because NCS seems not to handled properly those types for the use cases in VTS 2.4.

Corrections:

";

}

revision "2016-07-15" {

description

"VTS 2.3.0

Enhancements:

- Added string-based typedefs non-empty-string255 and non-empty-string-max
- Added typedef date-yyyy-mm-dd for dates
- Added typedef multicast-reuse-count (a uint32)
- Added typedef alphanumeric24
(an alphanumeric string of 24 or less characters)

Corrections:

- Renamed typedef ip-mask to ipv4-mask to reflect the expected version

";

}

revision "2015-06-13" {

description

"Initial revision.";

}

```
/*
 * Typedefs
 */
typedef uuid {
    type string {
        length "32|36";
    }
}
typedef string128 {
    type string {
        length "0..128" {
            error-message "This string cannot exceed 128 characters.";
        }
    }
}

typedef alphanumeric-specialchar-128{
    type string {
        pattern "[a-zA-Z0-9\-\_./]+";
        length "1..128" {
            error-message "This string cannot exceed 128 characters and only alphabets,
numbers, '.', '-', '/' or '_' are
                allowed.";
        }
    }
}

typedef dollar-alphanumeric-specialchar-128{
    type string {
        pattern "(\$)[a-zA-Z0-9\-\_./]+";
        length "1..128" {
            error-message "This string cannot exceed 128 characters and only alphabets,
numbers, '.', '-', or '_' are
                allowed and should start with $";
        }
    }
}

typedef alphanumeric-specialchar-80{
    type string {
        pattern "[^>?]+";
        length "0..80" {
            error-message "This string cannot exceed 80 characters and does not allow >
and ? characters.";
        }
    }
}

typedef non-empty-string128 {
```

```
type string {
  length "1..128" {
    error-message "This string cannot be empty and cannot exceed 128 characters.";
  }
}

typedef alphanumeric128 {
  description "Alphanumeric string with max length 128";
  type string {
    pattern "[a-zA-Z0-9\\-_]+";
    length "1..128" {
      error-message "This string cannot exceed 128 characters and only alphabets,
numbers, '.', '-' or '_' are
      allowed.";
    }
  }
}

typedef alphanumeric63 {
  description "Alphanumeric string with max length 63 without space and without ?";
  type string {
    pattern "[^\\s?]+";
    length "1..63" {
      error-message "This string cannot exceed 63 characters and string can not
include whitespace or ?.";
    }
  }
}

typedef non-empty-string255 {
  type string {
    length "1..255" {
      error-message "This string cannot be empty and cannot exceed 255
characters.";
    }
  }
}

typedef string255 {
  type string {
    length "0..255" {
      error-message "This string cannot exceed 255 characters.";
    }
  }
}

typedef string512 {
  type string {
    length "0..512" {
      error-message "This string cannot exceed 512 characters.";
    }
  }
}
```

```
    }
  }
}
typedef string1024 {
  type string {
    length "0..1024" {
      error-message "This string cannot exceed 1024 characters.";
    }
  }
}
typedef string15 {
  type string {
    length "0..15" {
      error-message "This string cannot exceed 15 characters.";
    }
  }
}
typedef string64 {
  type string {
    length "0..64" {
      error-message "This string cannot exceed 64 characters.";
    }
  }
}

typedef non-empty-string-max{
  type string {
    length "1..max";
  }
}

typedef vlan-id {
  type uint32 {
    range "2..4094";
  }
}
typedef subinterface-id {
  type uint32 {
    range "1..511";
  }
}
typedef vni {
  type uint32 {
    range "4096..16777214";
  }
}

typedef evi-id {
  type uint32 {
    range "1..65535";
  }
}
```

```

}
}

typedef ipv4-mask {
  type string {
    pattern '((([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}'
    + '([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])'
    + '/((([0-9])|([1-2][0-9])|(3[0-2])))');
  }
}

typedef ipv6-prefix {
  type string {
    pattern '((:[0-9a-fA-F]{0,4}):)([0-9a-fA-F]{0,4}:){0,5}'
    + '((([0-9a-fA-F]{0,4}:)?(:|[0-9a-fA-F]{0,4}))|'
    + '(((25[0-5]|2[0-4][0-9]|01?[0-9]?[0-9])\.){3}'
    + '(25[0-5]|2[0-4][0-9]|01?[0-9]?[0-9])))'
    + '/((([0-9])|([0-9]{2})|(1[0-1][0-9])|(12[0-8])))';
    pattern '((([[:]]+){6}([[:]]+:[[:]]+)(.*\..*))|'
    + '((([:]]+)*[[:]]+)?::([[:]]+)*[[:]]+)?'
    + '/(.+)');
  }
}

typedef ipv4-prefix {
  type string {
    pattern
    '(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}'
    + '([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])'
    + '/((([0-9])|([1-2][0-9])|(3[0-2])))';
  }
}

typedef ip-prefix {
  type union {
    type vts-types:ipv4-prefix;
    type vts-types:ipv6-prefix;
  }
}

typedef vts-multicast-ip {
  type string {
    pattern '(239\.)' +
    '(([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){2}' +
    '([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])';
  }
}

typedef mac {
  type string {
    pattern '[0-9a-fA-F]{2}(:[0-9a-fA-F]{2}){5}';
  }
}

```

```

    }
}

typedef unknown-mac {
    type string {
        pattern 'unknown-.{32,36}';
    }
}

typedef fex-identifier {
    type uint8 {
        range "100..199";
    }
}

typedef asn2-nn4 {
    type string {
        pattern
            '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])'
            + ':'
            + '([1-9][0-9]{0,8}|199999999[0-8]|([1-3][0-9]{1,9}|4[01][0-9]{8}|42[0-8][0-9]{7}|429[0-3][0-9]{6}|4294[0-8][0-9]{5}|42949[0-5][0-9]{4}|429496[0-6][0-9]{3}|4294967[01][0-9]{2}|42949672[0-8][0-9]|429496729[0-5])';
    }
}

typedef asn4-nn2 {
    type string {
        pattern
            '([1-9][0-9]{0,8}|199999999[0-8]|([1-3][0-9]{1,9}|4[01][0-9]{8}|42[0-8][0-9]{7}|429[0-3][0-9]{6}|4294[0-8][0-9]{5}|42949[0-5][0-9]{4}|429496[0-6][0-9]{3}|4294967[01][0-9]{2}|42949672[0-8][0-9]|429496729[0-5])'
            + ':'
            + '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])';
    }
}

typedef asn2-asn2-nn2 {
    type string {
        pattern
            '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])'
            + '\.'
            + '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])'
            + ':'
            + '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])';
    }
}

```

```

    }
}

typedef asn-type {
    type union {
        type uint32 {
            tailf:info "<1-4294967295>;Autonomous system number";
            range "1..4294967295";
        }
        type string {
            tailf:info "<1-65535>[.<0-65535>;Autonomous system number";
            pattern "[0-9]+\.[0-9]+";
        }
    }
}

typedef ipv4-nn2 {
    type string {
        pattern
            '((([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.){3}'
            + '([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])'
            + ':'
            + '([1-9][0-9]{0,3}|[1-5][0-9]{1,4}|6[0-4][0-9]{3}|65[0-4][0-9]{2}|655[0-2][0-9]|6553[0-5])');
    }
}

typedef route-target {
    type union{
        type vts-types:asn2-nn4;
        type vts-types:asn4-nn2;
        type vts-types:ipv4-nn2;
    }
    description
        "Three allowed types for route target
        1. ASN2:NN4
        2. ASN4:NN2
        3. IPV4:NN2";
    tailf:info
        "Three allowed types for route target:
        1. ASN2:NN4
        2. ASN4:NN2
        3. IPV4:NN2";
}

typedef vpc-identifier {
    description
        "identifier for virtual port channel number";
    type uint16 {
        range "1..4096";
    }
}

```



```
    }
  }

typedef vts-assigned-vpc-identifier {
  description
    "used for ether-channel working of VTS";
  type int16 {
    range "-1000..0";
  }
}

typedef vpc-id{
  type union{
    type vts-types:vpc-identifier;
    type vts-types:vts-assigned-vpc-identifier;
  }
}

typedef yes-no-none-enum{
  type enumeration {
    enum yes {
      description "Value is Yes.";
      tailf:info "Value is Yes.";
    }
    enum no {
      description "Value is No.";
      tailf:info "Value is No.";
    }
    enum none {
      description "Flag does not apply anymore.";
      tailf:info "Flag does not apply anymore.";
    }
  }
}

grouping MODIFIED-TIME-ELEMENT {
  leaf last-updated {
    description "Last time this element was updated";
    tailf:info "Last time this element was updated";
    type ietf-yang:date-and-time;
  }
}

typedef address-family{
  type enumeration {
    enum l2vpn {
      description "l2vpn";
      tailf:info "l2vpn";
    }
    enum evpn {
```

```
    description "evpn";
    tailf:info "evpn";
}
enum vpnv4 {
    description "vpnv4";
    tailf:info "vpnv4";
}
enum vpnv6 {
    description "vpnv6";
    tailf:info "vpnv6";
}
enum ipv4 {
    description "ipv4";
    tailf:info "ipv4";
}
enum ipv6 {
    description "ipv6";
    tailf:info "ipv6";
}
}
}

typedef vts-ip-type {
    description
    "Four allowed types for ip
    A.B.C.D    IPv4 address
    A.B.C.D/LEN IPv4 prefix
    A:B::C:D   IPv6 address
    A:B::C:D/LEN IPv6 prefix";
    tailf:info
    "Four allowed types for ip
    A.B.C.D    IPv4 address
    A.B.C.D/LEN IPv4 prefix
    A:B::C:D   IPv6 address
    A:B::C:D/LEN IPv6 prefix";
    type union{
        type inet:ip-address;
        type tailf:ip-address-and-prefix-length;
    }
}

typedef date-yyyy-mm-dd{
    description "date in YYYY-MM-DD format. Valid date values is service code
responsibility";
    tailf:info "Date string in YYYY-MM-DD format.";
    type string{
        pattern '\d{4}-\d{2}-\d{2}';
    }
}
```

```
typedef multicast-reuse-count {
    type uint32 {
        range "0..max";
    }
}

typedef alphanumeric24 {
    description
        "Alphanumeric string with max length 24";
    type string {
        pattern '[_a-zA-Z0-9]*';
        length "0..24" {
            error-message "This string cannot exceed 24 characters.";
        }
    }
}

typedef alphanumeric64 {
    description
        "Alphanumeric string with max length 64";
    type string {
        pattern '[a-zA-Z0-9\-\_\.]+';
        length "1..64" {
            error-message "This string cannot exceed 64 characters. Only alphabets,
numbers, '.', '-', '_' are allowed";
        }
    }
}

typedef instance-id {
    type uint16 {
        range "0..4094";
    }
}

typedef vtf-mode-enum{
    type enumeration {
        enum l2 {
            description "VTF mode is L2.";
            tailf:info "VTF mode is L2.";
        }
        enum vtep {
            description "VTF mode is VTEP.";
            tailf:info "VTF mode is VTEP.";
        }
    }
}
}
```

6.2 VTS Identities

```
module cisco-vts-identities {  
  
    namespace "http://cisco.com/ns/yang/vts/identities";  
  
    prefix vts-ids;  
  
    import tailf-common {  
        prefix tailf;  
    }  
  
    organization "Cisco Systems, Inc.";  
  
    contact  
        "Cisco Systems, Inc.  
        Customer Service  
  
        Postal: 170 West Tasman Drive  
        San Jose, CA 95134  
  
        Tel: +1 800 533-NETS";  
  
    description  
        "This module contains a collection of YANG definitions  
        for Cisco's VTS's management. Specifically, it defines identities used in  
        the context of VTS.  
  
        Copyright (c) 2015 by Cisco Systems, Inc.  
        All rights reserved.";  
  
    revision "2018-01-11" {  
        description  
            "VTS 2.6.1  
            Enhancements:  
            - Added identities to serve Port Extension definitions."  
        ";  
    }  
  
    revision "2017-10-03" {  
        description  
            "VTS 2.6  
            Enhancements:  
            - Added VVM component validation identifiers for OSPD integration."  
        ";  
    }  
}
```

```
revision "2017-08-22" {
  description
  "VTS 2.6
  Enhancements:
    - Added types for network level arp suppression;
  ";
}

revision "2017-06-26" {
  description
  "VTS 2.6
  Enhancements:
    - Added types for port type
    - Enhancements for Security Groups feature:
      - Added identities: ether-type, protocol, direction
  ";
}

revision "2017-04-17" {
  description
  "VTS 2.6
  Enhancements:
    - Added identities virtual-switch type and vtf-links.
    - Added identities for l2 virtual switch group type.
  ";
}

revision "2016-08-30" {
  description
  "VTS 2.3.1
  Enhancements:
    - Added identities for custom and vpc device groups
  Corrections:
  ";
}

revision "2016-07-15" {
  description
  "VTS 2.3.0
  Enhancements:
    - Added identity for VMM version Openstack Liberty(RHEL)
    - Added identities for VTF installation mode for Kilo
    - Added identities for IPv6 address assignment
    - Added identities for VTF deployment mode
  Corrections:
  ";
```

```
}

revision "2015-06-13" {
    description
    "Initial revision.";
}

/*
 * Identities
 */

identity nwk-arp-suppression-type{
    description "Base identity from which network level arp suppression types are
derived. ";
}

identity nwk-arp-suppression-enabled{
    base "nwk-arp-suppression-type";
    description "Indicates arp suppression enabled at network level.";
}

identity nwk-arp-suppression-disabled{
    base "nwk-arp-suppression-type";
    description "Indicates arp suppression disabled at network level.";
}

identity known-provider-status {
    description "Base identity telling if the network is a known provider network. ";
}

identity known-provider-network {
    base "known-provider-status";
    description "The network is a known provider network.";
}

identity not-known-if-provider-network {
    base "known-provider-status";
    description "It is unknown if the network is or is not a provider network.";
}

identity network-type {
    description "Based identity from which network types are " +
        "derived.";
}

identity vlan {
    base "network-type";
    description "Vlan network.";
    tailf:info "Vlan network.";
}

identity trunk {
```

```
base "network-type";
description "Trunk network.";
tailf:info "Trunk network.";
}
identity gre {
base "network-type";
description "GRE network.";
tailf:info "GRE network.";
}
identity vxlan {
base "network-type";
description "VXLAN network.";
tailf:info "VXLAN network.";
}
identity flat {
base "network-type";
description "Flat network.";
tailf:info "Flat network.";
}

identity entity-status {
description "Based identity from which entities' status are " +
"derived.";
}
identity active {
base "entity-status";
description "Entity is active.";
tailf:info "Entity is active.";
}
identity down {
base "entity-status";
description "Entity is down.";
tailf:info "Entity is down.";
}
identity build {
base "entity-status";
description "Entity is being built.";
tailf:info "Entity is being built.";
}

identity binding-type {
description "Based identity from which port binding types " +
"are derived.";
}
identity ovs {
base "binding-type";
description "Ovs port binding type.";
tailf:info "Ovs port binding type.";
}
identity unbound {
```

```
base "binding-type";
description "No binding provided.";
tailf:info "No binding provided.";
}
identity vhostuser {
base "binding-type";
description "Vhostuser port binding type..";
tailf:info "Vhostuser port binding type.";
}
identity hw-veb {
base "binding-type";
description "hw-veb supporting sriov port binding type..";
tailf:info "hw-veb supporting sriov port binding type.";
}
// TODO: Consider semantics of a "failed" type. Mind we have port-status.
identity binding-failed {
base "binding-type";
description "Port binding failed.";
tailf:info "Port binding failed.";
}
identity switch-platform {
description "Based identity from which switch platform types " +
"are derived.";
}
identity N3K {
base "switch-platform";
description "Cisco N3K.";
tailf:info "Cisco N3K.";
}
identity N5K {
base "switch-platform";
description "Cisco N5K.";
tailf:info "Cisco N5K.";
}
identity N6K {
base "switch-platform";
description "Cisco N6K.";
tailf:info "Cisco N6K.";
}
identity N7K {
base "switch-platform";
description "Cisco N7K.";
tailf:info "Cisco N7K.";
}
identity N9K {
base "switch-platform";
description "Cisco N9K.";
tailf:info "Cisco N9K.";
}
identity ASR9K {
```



```
base "switch-platform";
description "Cisco ASR9K.";
tailf:info "Cisco ASR9K.";
}
identity VTSR {
base "switch-platform";
description "Cisco VTSR.";
tailf:info "Cisco VTSR.";
}
identity NCS5500 {
base "switch-platform";
description "Cisco NCS5500.";
tailf:info "Cisco NCS5500.";
}
identity XRV9000 {
base "switch-platform";
description "Cisco XRv9000.";
tailf:info "Cisco XRv9000.";
}
identity NOTAPPLICABLE {
base "switch-platform";
description "Platform unknown to VTS.";
tailf:info "Platform unknown to VTS.";
}

identity switch-role {
description "Based identity from which switch role types " +
"are derived.";
}
identity leaf {
base "switch-role";
description "The device is acting as a leaf.";
tailf:info "Leaf.";
}
identity spine {
base "switch-role";
description "The device is acting as a spine.";
tailf:info "Spine.";
}
identity border-leaf {
base "switch-role";
description "The device is acting as a border-leaf.";
tailf:info "Border-eaf.";
}
identity dci {
base "switch-role";
description "The device is acting as a DCI.";
tailf:info "DCI.";
}
identity bgp-rr {
```

```
base "switch-role";
description "The device is acting as a BGP RR.";
tailf:info "BGP-RR.";
}
identity spine-rr {
base "switch-role";
description "The device is acting as a spine and also as a RR";
}
identity unmanaged {
base "switch-role";
description "The device is not managed by VTS";
}

identity network-layer {
description "Based identity from which network layers are " +
"derived.";
}
identity l2 {
base "network-layer";
description "Layer 2.";
tailf:info "Layer 2.";
}
identity l3 {
base "network-layer";
description "Layer 3.";
tailf:info "Layer 3.";
}

identity l2-mode {
description "Based identity from which layer 2 modes are " +
"derived.";
}
identity l2-access {
base "l2-mode";
description "Access mode.";
tailf:info "Access.";
}
identity l2-trunk {
base "l2-mode";
description "Trunk mode.";
tailf:info "Trunk.";
}

identity server-type {
description "Based identity from which server types are " +
"derived.";
}
identity baremetal {
base "server-type";
description "Baremetal server.";
```

```
    tailf:info "Baremetal.";
}
identity virtual-server {
    base "server-type";
    description "Virtual server.";
    tailf:info "Virtual server.";
}
identity fex {
    base "server-type";
    description "Fabrix extender.";
    tailf:info "Fabric extender.";
}

//DO NOT USE THIS IN CODE - LEAVING FOR UPGRADE
identity vtf {
    base "server-type";
    description "VTF";
    tailf:info "VTF.";
}

//DO NOT USE THIS IN CODE - LEAVING FOR UPGRADE
identity vtf-physical-uplink {
    base "server-type";
    description "Uplink TOR of a VTF";
    tailf:info "Uplink TOR of a VTF";
}

identity switch-type{
    description "Base identity of virtual switch type in case of virtual server";
}

identity not-defined-st{
    base "switch-type";
    description "Virtual server switch type is not set yet.";
}
identity ovs-st{
    base "switch-type";
    description "Virtual server switch type is set as ovs.";
}

identity dvs-st{
    base "switch-type";
    description "Virtual server switch type is set as dvs.";
}

identity vtf-vtep-st{
    base "switch-type";
    description "Virtual server switch type is set as vtep.";
}
```

```
identity vtf-l2-st{
  base "switch-type";
  description "Virtual server switch type is set as vtf l2.";
}

identity vtf-link {
  description "Base identity of VTF link, identifying uplink to ToR or VTSr link.";
}

identity vtf-tor-link {
  base "vtf-link";
  description "Identifies VTF host connection to ToR. This will be applicable to
    V-side in multicast mode";
}

identity vtf-vtsr-link {
  base "vtf-link";
  description "Identifies VTF host connection to VTSR. This will be applicable in
    VTF as VTEP, VTF as L2";
}

identity l2-vs-group-type{
  description "Base identity of L2 virtual switch group type";
}

identity ovs-l2-vs-group{
  base "l2-vs-group-type";
  description "L2 virtual switch group - hosts managed by OVS";
  tailf:info "L2 virtual switch group - hosts managed by OVS";
}

identity vtc-interface-type {
  description "VTC interface type -- management (default) or underlay.";
}

identity management {
  base "vtc-interface-type";
  description "Management interface.";
  tailf:info "Management interface.";
}

identity underlay {
  base "vtc-interface-type";
  description "Underlay interface.";
  tailf:info "Underlay interface.";
}

identity dvs-l2-vs-group{
  base "l2-vs-group-type";
  description "L2 virtual switch group - hosts managed by DVS";
}
```

```
tailf:info "L2 virtual switch group - hosts managed by DVS";
}

identity vtf-l2-vs-group{
  base "l2-vs-group-type";
  description "L2 virtual switch group - hosts managed by vtf-l2 switch";
  tailf:info "L2 virtual switch group - hosts managed by vtf-l2 switch";
}

identity peer-type {
  description "Based identity from which connection peer types " +
    "are derived.";
}

identity server {
  base "peer-type";
  description "Server.";
  tailf:info "Server.";
}

identity fabric {
  base "peer-type";
  description "Fabric node.";
  tailf:info "Fabric node.";
}

identity port-channel-type {
  description "Based identity from which port channel types " +
    "are derived.";
}

identity vpc {
  base "port-channel-type";
  description "Virtual port channel type.";
  tailf:info "Virtual port channel.";
}

identity no-port-channel {
  base "port-channel-type";
  description "None.";
  tailf:info "None.";
}

identity control-plane-protocol {
  description "Base identity from which control plane protocols " +
    "for learning end points' addresses are derived.";
}

identity bgp-evpn {
  base "control-plane-protocol";
  description "BGP-EVPN control plane protocol.";
  tailf:info "BGP-EVPN.";
  reference
    "http://www.cisco.com/c/en/us/products/collateral/routers/asr-9000-series-
```

```

aggregation-services-routers/whitepaper_c11-731864.pdf";
}
identity flood-and-learn {
  base "control-plane-protocol";
  description "The flood-and-learn control plane for learning " +
    "the addresses of end points.";
  tailf:info "Flood-and-learn.";
}
identity l3vpn {
  base "control-plane-protocol";
  description "L3VPN control plane protocol.";
  tailf:info "L3VPN.";
}
identity data-plane-encapsulation-protocol {
  description "Base identity from which data plane protocols " +
    " for encapsulating data packets are derived.";
}
identity vxlan-encapsulation {
  base "data-plane-encapsulation-protocol";
  description "The vxlan data plane encapsulation protocol.";
  tailf:info "vxlan encapsulation.";
}
identity mpls-encapsulation {
  base "data-plane-encapsulation-protocol";
  description "The mpls data plane encapsulation protocol.";
  tailf:info "mpls encapsulation.";
}

identity packet-replication-mode {
  description "Base identity from which modes of packet " +
    "replication are derived. Packet replication is " +
    "required for packets sent to multiple recipients";
}
identity multicast {
  base packet-replication-mode;
  description "Packet replication via multicast.";
  tailf:info "Multicast.";
}
identity ingress-replication {
  base packet-replication-mode;
  description "Packet replication by ingress-replication, whereby " +
    "a unicast packet is generated per recipient.";
  tailf:info "Ingress replication.";
}

identity route-reflector-mode {
  // TODO: improve description
  description "Base identity from which modes of route " +
    "reflectors.";
}

```

```
identity in-line-rr {
  // TODO: improve description
  base route-reflector-mode;
  description "In-line route reflectors.";
  tailf:info "In-line.";
}
identity global-rr {
  // TODO: improve description
  base route-reflector-mode;
  description "Global route reflectors.";
  tailf:info "Global.";
}

identity l3-distribution-mode {
  tailf:info "Base identity from which l3 distribution types are derived.";
}
identity centralized-l3 {
  base l3-distribution-mode;
  description "Centralized L3.";
  tailf:info "Centralized L3.";
}
identity decentralized-l3 {
  base l3-distribution-mode;
  description "Decentralized L3.";
  tailf:info "Decentralized L3.";
}

identity l2-distribution-mode {
  tailf:info "Base identity from which l2 distribution types are derived.";
}
identity decentralized-l2 {
  base l2-distribution-mode;
  description "Decentralized L2.";
  tailf:info "Decentralized L2.";
}

identity op-type {
  tailf:info "Base identity from which operation types are derived.";
}
identity create {
  base op-type;
  description "Create operation.";
  tailf:info "Create operation.";
}
identity delete {
  base op-type;
  description "Delete operation.";
  tailf:info "Delete operation.";
}
```

```
identity transaction-type {
  tailf:info "Base identity from which transaction types are derived.";
}
identity port {
  base transaction-type;
  description "Port operation.";
  tailf:info "Port operation.";
}
identity interface {
  base transaction-type;
  description "Interface operation.";
  tailf:info "Interface operation.";
}

identity device-group-type {
  description "Based identity from which the device group types are derived.";
}
identity dvs {
  base "device-group-type";
  description "DVS.";
  tailf:info "DVS.";
}
identity vpc-group {
  base "device-group-type";
  description "VPC.";
  tailf:info "VPC.";
}
identity esi-group {
  base "device-group-type";
  description "ESI.";
  tailf:info "ESI.";
}
identity device-interface-group {
  base "device-group-type";
  description "Device Interface Group.";
  tailf:info "Device Interface Group.";
}
identity fex-interface-group {
  base "device-group-type";
  description "Device Interface Group.";
  tailf:info "Device Interface Group.";
}
identity dvs-device-interface-group {
  base "device-group-type";
  description "DVS Device Interface Group.";
  tailf:info "DVS Device Interface Group.";
}
identity dvs-fex-interface-group {
  base "device-group-type";
  description "DVS Fex Interface Group.";
```



```
    tailf:info "DVS Fex Interface Group.";
  }
  identity custom {
    base "device-group-type";
    description "Custom.";
    tailf:info "Custom.";
  }

  identity device-group-device-type {
    description "Based identity from which the device in the device group types are
derived.";
  }
  identity v-vtep {
    base "device-group-device-type";
    description "Virtual device type for VTF.";
    tailf:info "Virtual device type for VTF.";
  }
  identity p-vtep {
    base "device-group-device-type";
    description "Physical device type for TOR.";
    tailf:info "Physical device type for TOR.";
  }
  identity service-policy-mode{
    tailf:info "Base identity from which service policy modes are derived.";
  }
  identity no-policy-mode{
    base service-policy-mode;
    description "No service policy mode.";
    tailf:info "No service policy mode.";
  }
  identity network-to-epg-mode{
    base service-policy-mode;
    description "Network mapped to Endpoint Group.";
    tailf:info "Network mapped to Endpoint Group.";
  }
  identity security-group-to-epg-mode{
    base service-policy-mode;
    description "Security Group mapped to Endpoint Group.";
    tailf:info "Security Group mapped to Endpoint Group.";
  }

  identity setup-state{
    description "Base identity for the states in which a component can be during setup";
    tailf:info "Base identity for the states in which a component can be during setup";
  }
  identity setup-state-completed{
    base setup-state;
    description "A state to indicate that component has been setup";
    tailf:info "A state to indicate that component has been setup";
  }
}
```

```
identity setup-state-initial{
  base setup-state;
  description "A state to indicate that component has not been setup";
  tailf:info "A state to indicate that component has not been setup";
}
identity setup-state-skipped{
  base setup-state;
  description "A state to indicate that component setup has been skipped";
  tailf:info "A state to indicate that component setup has been skipped";
}

identity vmm-type {
  tailf:info "Base identity for vmm type.";
}
identity openstack {
  base "vmm-type";
  tailf:info "An openstack vmm.";
}
identity vcenter {
  base "vmm-type";
  tailf:info "A vcenter vmm.";
}
identity baremetal-type {
  base "vmm-type";
  tailf:info "Baremetal";
}

identity vmm-version {
  tailf:info "Base identity for vmm version.";
}
identity baremetal-version {
  base "vmm-version";
  tailf:info "Baremetal 'vmm'.";
}
identity openstack-version {
  base "vmm-version";
  tailf:info "Base identity for openstack version.";
}
identity openstack-icehouse {
  base "openstack-version";
  tailf:info "Openstack icehouse version.";
}
identity openstack-juno {
  base "openstack-version";
  tailf:info "Openstack juno version.";
}
identity openstack-kilo {
  base "openstack-version";
  tailf:info "Openstack kilo version.";
}
```

```
identity openstack-liberty-centos {
    base "openstack-version";
    tailf:info "Openstack Liberty(CentOS) version.";
}
identity openstack-liberty-rhel {
    base "openstack-version";
    tailf:info "Openstack Liberty(RHEL) version.";
}
identity openstack-newton {
    base "openstack-version";
    tailf:info "Openstack Newton version.";
}
identity openstack-queens {
    base "openstack-version";
    tailf:info "Openstack Queens version.";
}
identity vcenter-version {
    base "vmm-version";
    tailf:info "Base identity for vcenter version.";
}
identity vcenter-6.5 {
    base "vcenter-version";
    tailf:info "Vcenter 6.5";
}
identity vcenter-6 {
    base "vcenter-version";
    tailf:info "Vcenter 6.";
}
identity vcenter-5.5 {
    base "vcenter-version";
    tailf:info "Vcenter 5.5.";
}

identity vmm-registration-state{
    description "Base identity for the vmm registration.";
    tailf:info "Base identity for the vmm registration.";
}

identity vmm-registration-not-started{
    base vmm-registration-state;
    description "A state to indicate that vmm registration has not started.";
    tailf:info "A state to indicate that vmm registration has not started.";
}

identity vmm-registration-completed{
    base vmm-registration-state;
    description "A state to indicate that vmm registration is complete.";
    tailf:info "A state to indicate that vmm registration is complete.";
}
identity vmm-registration-initial{
```

```
base vmm-registration-state;
description "A state to indicate that vmm registration has not been started.";
tailf:info "A state to indicate that vmm registration has not been started.";
}
identity vmm-registration-failed{
base vmm-registration-state;
description "A state to indicate that vmm registration has failed.";
tailf:info "A state to indicate that vmm registration has failed.";
}
identity vmm-registration-in-progress{
base vmm-registration-state;
description "A state to indicate that vmm registration is in progress.";
tailf:info "A state to indicate that vmm registration is in progress.";
}

identity vmm-validation-not-started{
base vmm-registration-state;
description "A state to indicate that vmm registration validation is not started.";
tailf:info "A state to indicate that vmm registration validation is not started.";
}

identity vmm-validation-completed{
base vmm-registration-state;
description "A state to indicate that vmm registration validation is complete.";
tailf:info "A state to indicate that vmm registration validation is complete.";
}

identity vmm-validation-failed{
base vmm-registration-state;
description "A state to indicate that vmm registration validation has failed.";
tailf:info "A state to indicate that vmm registration validation has failed.";
}

identity vmm-validation-in-progress{
base vmm-registration-state;
description "A state to indicate that vmm registration validation is in progress.";
tailf:info "A state to indicate that vmm registration validation is in progress.";
}

identity vmm-id-baremetal {
description "Base for baremetal vmm id";
}
identity VTS {
base vmm-id-baremetal;
description "Baremetal servers belong to generic 'vmm' VTS";
tailf:info "Baremetal servers belong to generic 'vmm' VTS";
}

identity server-capability {
```

```
description "Base identity for the capability of the server.";
tailf:info "Base identity for the capability of the server.";
}
identity no-virtual-switch {
  base server-capability;
  description "Server has no virtual-switch capability. " +
    "Server can only be connected to physical switches.";
  tailf:info "Server has no virtual-switch capability.";
}
identity virtual-switch {
  base server-capability;
  description "Server has virtual-switch capability.";
  tailf:info "Server has virtual-switch capability.";
}
identity install-status {
  description "Status of the installation.";
  tailf:info "Status of the installation.";
}
identity not-applicable {
  base install-status;
  description "Nothing to be installed.";
  tailf:info "Nothing to be installed.";
}
identity vtf-installed {
  base install-status;
  description "VTF installed.";
  tailf:info "VTF installed.";
}
identity host-agent-installed {
  base install-status;
  description "Host Agent installed.";
  tailf:info "Host Agent installed.";
}
identity vtf-host-agent-installed {
  base install-status;
  description "VTF and host agent installed.";
  tailf:info "VTF and host agent installed.";
}
identity vtf-install-failed {
  base install-status;
  description "VTF installation failed.";
  tailf:info "VTF installation failed.";
}

identity vtf-installation-not-started {
  base install-status;
  description "VTF installation is not started.";
  tailf:info "VTF installation is not started.";
}
```

```
identity vtf-validation-not-started {
  base install-status;
  description "VTF validation is not started.";
  tailf:info "VTF validation is not started.";
}

identity vtf-validation-in-progress {
  base install-status;
  description "VTF validation is in progress.";
  tailf:info "VTF validation is in progress.";
}

identity vtf-validation-failed {
  base install-status;
  description "VTF validation failed.";
  tailf:info "VTF validation failed.";
}

identity vtf-validation-completed {
  base install-status;
  description "VTF validation completed.";
  tailf:info "VTF validation completed.";
}

identity host-agent-install-not-started{
  base install-status;
  description "Host Agent installation not started.";
  tailf:info "Host Agent installation not started.";
}

identity host-agent-install-failed {
  base install-status;
  description "Host Agent installation failed.";
  tailf:info "Host Agent installation failed.";
}

identity host-agent-validation-failed {
  base install-status;
  description "Host Agent validation failed.";
  tailf:info "Host Agent validation failed.";
}

identity host-agent-validation-in-progress {
  base install-status;
  description "Host Agent validation progress.";
  tailf:info "Host Agent validation progress.";
}

identity host-agent-validation-not-started {
```

```
base install-status;
description "Host Agent validation not started.";
tailf:info "Host Agent validation not started.";
}

identity host-agent-validation-completed {
base install-status;
description "Host Agent validation completed.";
tailf:info "Host Agent validation completed.";
}

identity vtf-host-agent-install-not-started {
base install-status;
description "VTF and host agent installation not started.";
tailf:info "VTF and host agent installation not started.";
}

identity vtf-host-agent-install-failed {
base install-status;
description "VTF and host agent installation failed.";
tailf:info "VTF and host agent installation failed.";
}

identity vtf-installation-in-progress {
base install-status;
description "VTF installation in progress.";
tailf:info "VTF installation in progress.";
}

identity host-agent-installation-in-progress {
base install-status;
description "Host Agent installation in progress.";
tailf:info "Host Agent installation in progress.";
}

identity vtf-host-agent-installation-in-progress {
base install-status;
description "VTF and host agent installation in progress.";
tailf:info "VTF and host agent installation in progress.";
}

identity host-agent-uninstallation-in-progress {
base install-status;
description "Host Agent uninstallation in progress.";
tailf:info "Host Agent uninstallation in progress.";
}

identity host-agent-uninstalled {
base install-status;
description "Host Agent uninstalled.";
tailf:info "Host Agent uninstalled.";
}

identity host-agent-uninstall-failed {
base install-status;
description "Host Agent uninstallation failed.";
```

```
tailf:info "Host Agent uninstallation failed.";
}
identity vtf-uninstallation-in-progress {
  base install-status;
  description "VTF uninstallation in progress.";
  tailf:info "VTF uninstallation in progress.";
}
identity vtf-uninstalled {
  base install-status;
  description "VTF uninstalled.";
  tailf:info "VTF uninstalled.";
}
identity vtf-uninstall-failed {
  base install-status;
  description "VTF uninstallation failed.";
  tailf:info "VTF uninstallation failed.";
}
// Identities for VTF installation mode for Kilo
identity vtf-mode {
  description "VTF Installation mode for Kilo";
  tailf:info "VTF Installation mode for Kilo";
}
identity VM {
  base vtf-mode;
  description "Install VTF as a VM.";
  tailf:info "Install VTF as a VM.";
}
identity vhost {
  base vtf-mode;
  description "Install VTF as a host process on compute.";
  tailf:info "Install VTF as a host process on compute.";
}

// Identities for IPv6 address assignment
identity ipv6-address-assignment {
  description "Based identity from which different mechanisms " +
"for assignement of IPv6 addresses.";
}
identity slaac {
  base "ipv6-address-assignment";
  description "Stateless address autoconfiguration.";
  tailf:info "Stateless address autoconfiguration.";
}
identity dhcpv6-stateful {
  base "ipv6-address-assignment";
  description "DHCP Stateful.";
  tailf:info "DHCP Stateful.";
}
identity dhcpv6-stateless {
  base "ipv6-address-assignment";
```



```
description "DHCP Stateless.";
tailf:info "DHCP Stateless.";
}

// Identities for VTF deployment mode
identity vtf-deployment-mode {
  description "Base identity for the VTF installation mode.";
  tailf:info "Base identity for the VTF installation mode.";
}
identity vtf-vhost {
  base vtf-deployment-mode;
  description "VTF running in vhost mode.";
  tailf:info "VTF running in vhost mode.";
}
identity vtf-as-vm {
  base vtf-deployment-mode;
  description "VTF running as a virtual machine.";
  tailf:info "VTF running as a virtual machine.";
}

// Identities for NIC bonding modes
identity nic-bond-mode {
  description "Base identity for the nic bonding modes.";
  tailf:info "Base identity for the nic bonding modes.";
}
identity active-backup {
  base nic-bond-mode;
  description "Active Backup nic bonding mode.";
  tailf:info "Active Backup nic bonding mode.";
}
identity balance-xor-l23 {
  base nic-bond-mode;
  description "Balance xor l23 nic bonding mode.";
  tailf:info "Balance xor l23 nic bonding mode.";
}
identity balance-xor-l34 {
  base nic-bond-mode;
  description "Balance xor l34 nic bonding mode.";
  tailf:info "Balance xor l34 nic bonding mode.";
}
identity balance-xor-l2 {
  base nic-bond-mode;
  description "Balance xor l2 nic bonding mode.";
  tailf:info "Balance xor l2 nic bonding mode.";
}

// Identities for pci driver
identity pci-driver-type {
  description "Base identity for pci driver type.";
  tailf:info "Base identity for pci driver type.";
```

```
}
identity uio_pci_generic {
    base pci-driver-type;
    description "uio_pci_generic pci driver type.";
    tailf:info "uio_pci_generic pci driver type.";
}
identity vfio-pci {
    base pci-driver-type;
    description "vfio-pci driver type.";
    tailf:info "vfio-pci driver type.";
}
// Identities for Port type
identity port-type {
    description "Base identity for the port type.";
    tailf:info "Base identity for the port type.";
}
identity regular-port {
    base port-type;
    description "Regular port.";
    tailf:info "Regular port.";
}
identity parent-port {
    base port-type;
    description "Parent port attached to a trunk.";
    tailf:info "Parent port attached to a trunk.";
}
identity sub-port {
    base port-type;
    description "Subport attached to a trunk.";
    tailf:info "Subport attached to a trunk.";
}

/*
 * Ether Type Identities
 */
identity ether-type {
    description "Base identity from which ether types are derived.";
}
identity ipv4 {
    base "ether-type";
    description "Ether Type IPv4.";
    tailf:info "Ether Type IPv4.";
}
identity ipv6 {
    base "ether-type";
    description "Ether Type IPv6.";
    tailf:info "Ether Type IPv6.";
}

/*
```

```
* Protocol Identities(Mostly IP protocols but can include others as well)
*/
identity protocol {
    description "Base identity from which protocol types are derived.";
}
identity tcp {
    base "protocol";
    description "IP Protocol Type TCP.";
    tailf:info "IP Protocol Type TCP.";
}
identity sctp {
    base "protocol";
    description "SCTP Protocol.";
    tailf:info "SCTP Protocol.";
}
identity udp {
    base "protocol";
    description "IP Protocol Type UDP.";
    tailf:info "IP Protocol Type UDP.";
}
identity udplite {
    base "protocol";
    description "IP Protocol Type UDP.";
    tailf:info "IP Protocol Type UDP.";
}
identity icmp {
    base "protocol";
    description "IP Protocol Type ICMP.";
    tailf:info "IP Protocol Type ICMP.";
}
identity ipv6-icmp {
    base "protocol";
    description "IPv6 Protocol Type ICMP.";
    tailf:info "IPv6 Protocol Type ICMP.";
}
identity ipv6-opts {
    base "protocol";
    description "IPv6 Options.";
    tailf:info "IPv6 Options.";
}
identity vrrp {
    base "protocol";
    description "Protocol VRRP.";
    tailf:info "Protocol VRRP.";
}
identity ah {
    base "protocol";
    description "Protocol AH.";
    tailf:info "Protocol AH.";
}
```

```
identity dccp {
  base "protocol";
  description "Protocol DCCP.";
  tailf:info "Protocol DCCP.";
}
identity esp {
  base "protocol";
  description "Protocol ESP.";
  tailf:info "Protocol ESP.";
}
identity ip-any {
  base "protocol";
  description "Any IP Protocol Type.";
  tailf:info "Any IP Protocol Type.";
}

/*
 * Security Group Rule Direction
 */
identity direction {
  description "Base identity from which ingress/egress directions are derived.";
}
identity ingress {
  base "direction";
  description "Ingress direction.";
  tailf:info "Ingress direction.";
}
identity egress {
  base "direction";
  description "Egress direction.";
  tailf:info "Egress direction.";
}

// Identities for server role
identity server-role {
  description "Base identity from which server roles " +
    "are derived.";
  tailf:info "Base identity from which server roles are derived.";
}
identity unmanaged-server {
  base "server-role";
  description "The server is not managed by VTS";
  tailf:info "unmanaged server role";
}
identity managed-server {
  base "server-role";
  description "The server is managed by VTS";
  tailf:info "managed server role";
}
```

```
/* Route Filter Types */
identity route-filter-type {
  description "Base identity from which other route filter types are derived.";
}

identity route-map-type {
  base route-filter-type;
  description "Route Map.";
  tailf:info "Route Map.";
}

identity prefix-list-type {
  base route-filter-type;
  description "Prefix List.";
  tailf:info "Prefix List.";
}

/* Routes Direction */
identity route-filter-direction {
  description "Base type that captures in/out nature of routes processed.";
}

identity filter-in {
  base route-filter-direction;
  description "Import routes.";
  tailf:info "Import routes.";
}

identity filter-out {
  base route-filter-direction;
  description "Export Routes.";
  tailf:info "Export Routes.";
}

/* Route Reflector Modes */
identity bgp-rr-mode {
  description "Based type capturing different BGP Route Reflector Modes.";
}

identity bgp-rr-client-mode {
  base bgp-rr-mode;
  description "BGP Route Reflector Client Mode.";
  tailf:info "BGP Route Reflector Client Mode.";
}

identity bgp-rr-none-mode {
  base bgp-rr-mode;
  description "BGP Route Reflector Mode N/A.";
  tailf:info "BGP Route Reflector Mode N/A.";
}
```

```
identity address-family-type {
  description "Base type capturing different address-families.";
}

identity ipv4-unicast {
  base address-family-type;
  description "Address Family: IPv4 Unicast.";
  tailf:info "Address Family: IPv4 Unicast.";
}

identity ipv4-multicast {
  base address-family-type;
  description "Address Family: IPv4 Multicast.";
  tailf:info "Address Family: IPv4 Multicast.";
}

identity ipv6-unicast {
  base address-family-type;
  description "Address Family: IPv6 Unicast.";
  tailf:info "Address Family: IPv6 Unicast.";
}

identity ipv6-multicast {
  base address-family-type;
  description "Address Family: IPv6 Multicast.";
  tailf:info "Address Family: IPv6 Multicast.";
}

identity loopback-if-type {
  description "Base identity from which loopback interface types are derived";
  tailf:info "Base identity from which loopback interface types are derived";
}

identity underlay-loopback {
  base loopback-if-type;
  description "Underlay loopback";
  tailf:info "Underlay loopback";
}

identity overlay-loopback {
  base loopback-if-type;
  description "Overlay loopback";
  tailf:info "Overlay loopback";
}

identity switch-port-type {
  description "Switch Port type.";
}

identity access-port {
```

```
base "switch-port-type";
description "Access Port.";
tailf:info "Access Port.";
}

identity trunk-port {
base "switch-port-type";
description "Trunk Port.";
tailf:info "Trunk Port.";
}

identity remove-private-as-choice {
description "Remove private ASN from outbound updates.";
}

identity disable {
base "remove-private-as-choice";
description "Do not remove private ASNs from outbound updates.";
tailf:info "Do not remove private ASNs from outbound updates.";
}

identity enable {
base "remove-private-as-choice";
description "Remove private ASNs from the outbound updates.";
tailf:info "Remove private ASNs from the outbound updates.";
}

identity replace-as {
base "remove-private-as-choice";
description "Replace private ASNs being removed from outbound updates with the
local ASN.";
tailf:info "Replace private ASNs being removed from outbound updates with the
local ASN.";
}

identity remove-all {
base "remove-private-as-choice";
description "Remove private ASNs from outbound updates even when public ASNs
are present.";
tailf:info "Remove private ASNs from outbound updates even when public ASNs
are present.";
}
}
```

6.3 VTS-SERVICE

```
module vts-service {

namespace "http://cisco.com/ns/yang/vts-service";
prefix vts-service;
```

```
import tailf-ncs {
  prefix ncs;
}

import tailf-common {
  prefix tailf;
}

import cisco-vts-types {
  prefix vts-types;
}

import cisco-vts-identities {
  prefix vts-ids;
}

include cisco-vts-authentication {
  revision-date 2018-05-28;
}

include cisco-vts-config-change-tracker {
  revision-date 2018-07-19;
}

container vts-service {
  description "vts-service root container.
    This serves as a root for all vts objects including Cisco VTS sites as well as
  global settings.";
  tailf:info "vts-service root container.
    This serves as a root for all vts objects including Cisco VTS sites as well as
  global settings.";

  container sites {
    description "Set of Cisco VTS Sites. Site represents a grouping of fabric devices,
    with its independent resource (VLAN/VNI/McastIP) management, tenant namespace
    isolation and border gateways.";
    tailf:info "Set of Cisco VTS Sites. Site represents a grouping of fabric devices,
    with its independent resource (VLAN/VNI/McastIP) management, tenant namespace
    isolation and border gateways.";

    list site {
      description "List of Sites.";
      tailf:info "List of Sites.";

      key id;
      unique name;

      leaf id {
        description "Site Identifier.";
```



```

    tailf:info "Site Identifier.";
    type vts-types:uuid;
}

leaf name {
    description "Site name.";
    tailf:info "Site Name.";
    type vts-types:alphanumeric64;
    mandatory true;
}

leaf description {
    description "Site description.";
    tailf:info "Site Description.";
    type vts-types:string255;
}
leaf vts-data-plane-protocol {
    description "Determines the network protocol VTS supports -- VxLAN or
MPLS";
    tailf:info "VTS network protocol.";
    type identityref {
        base "vts-ids:data-plane-encapsulation-protocol";
    }
    default "vts-ids:vxlan-encapsulation";
}
}
}

uses AUTHENTICATION-CONFIG;

uses VTS-CONFIG-CHANGE-STATUS-JOBS;

container global-settings {
    description "Global settings that are site independant.";
    tailf:info "Global settings that are site independant.";

    // This container is augmented by other modules like cisco-vts.
} // global-settings
}

augment "/ncs:devices/ncs:device" {

    container vts-device-meta-data {
        tailf:info "VTS meta data";
        description "VTS meta data to be stored for each device.";

        presence "Creates site id reference";
        uses ncs:service-data;
        ncs:servicepoint vts-device-meta-data-servicepoint;
    }
}

```

```
leaf site-id {
  tailf:info "Site to which this device belongs.";
  description "Site to which this device belongs.";

  type leafref {
    path "/vts-service/sites/site/id";
  }
} // container vts-device-meta-data
} //augmentation

}
```

6.4 VTS

```
module cisco-vts {

  namespace "http://cisco.com/ns/yang/vts";

  prefix vts;

  import tailf-common {
    prefix tailf;
  }

  include cisco-vts-common {
    revision-date 2017-06-26;
  }
  include cisco-vts-system-config {
    revision-date 2017-12-15;
  }
  import cisco-vts-types {
    prefix vts-types;
  }
  include cisco-vts-network {
    revision-date 2015-06-12;
  }
  include cisco-vts-inventory {
    revision-date 2016-08-30;
  }
  include cisco-vts-custom-template {
    revision-date 2015-06-15;
  }
  include cisco-vts-infrastructure-policy {
    revision-date 2017-04-28;
  }
  include cisco-vts-device-operational-data {
    revision-date 2015-06-15;
  }
}
```

```
include cisco-vts-uuid-server {
  revision-date 2017-04-20;
}

include cisco-vts-vpns {
  revision-date 2016-12-20;
}

include cisco-vts-mvmm-policy {
  revision-date 2017-01-26;
}

include cisco-vts-security-groups {
  revision-date 2017-10-31;
}

include static-route {
  revision-date 2017-06-22;
}

include cisco-vts-upgrade {
  revision-date 2017-12-04;
}

include cisco-vts-port-extensions {
  revision-date 2018-01-11;
}

include cisco-vts-collectd-config {
  revision-date 2018-05-24;
}

import tailf-ncs {
  prefix ncs;
}

import ietf-inet-types {
  prefix inet;
}

import ietf-yang-types {
  prefix ietf-yang;
}

import cisco-vts-identities {
  prefix vts-ids;
}

import resource-allocator {
```

```
    prefix ralloc;
  }
  import vni-allocator {
    prefix vnialloc;
  }

  import cisco-vts-templates {
    prefix templates;
  }

  import cisco-vts-templates-target-mapping{
    prefix cisco-vts-templates-target-mapping;
  }

  include cisco-vts-service-policy {
    revision-date 2017-07-21;
  }

  include cisco-vts-monit-config {
    revision-date 2018-06-12;
  }

  include openconfig-bgp {
    revision-date 2018-01-11;
  }

  include cisco-vts-device-objects {
    revision-date 2018-04-04;
  }

  include cisco-vts-device-object-associations{
    revision-date 2018-08-15;
  }

  import vts-service {
    prefix vts-service;
  }

  organization "Cisco Systems, Inc.";

  contact
    "Cisco Systems, Inc.
    Customer Service

    Postal: 170 West Tasman Drive
    San Jose, CA 95134

    Tel: +1 800 533-NETS";

  description
```

"This module contains a collection of YANG definitions for Cisco's VTS.

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All rights reserved.";

```

revision "2018-01-11" {
  description
    "VTS 2.6.1
    Enhancements:
      - Added Port Extensions.
      - Removing tagging option and introduce switch-port-type and port-tag-native.
    ";
}

revision "2017-09-19" {
  description
    "VTS 2.6
    Enhancements:
      - Added leaf install-vmm-components to VMMs model
    ";
}

revision "2017-08-26" {
  description
    "VTS 2.6
    Enhancements:
      - Support of ARP suppression at network level
    ";
}

revision "2017-06-26" {
  description
    "VTS 2.6
    Enhancements:
      - Added trunk model and trunk details for ports.
    ";
}

revision "2017-03-13" {
  description
    "VTS 2.5
    Enhancements:
      - Removed the constraint for only allow OpenStack to create Shared Network.
    ";
}

revision "2017-03-10" {

```

```
description
  "VTS 2.5
  Enhancements:
    - Added multi vmm policies.
    - Added VTS-SHARED-SUBNETS
  ";
}

revision "2016-12-15" {
  description
    "VTS 2.4.1
    Enhancements:
      - Added leaf overlay-router-vpn-id to routers container that leaf-ref
        the Global Route Leaking Service definition in submodule cisco-vts-vpns
    Corrections:
      - None
    ";
}

revision "2016-11-15" {
  description
    "VTS 2.4
    Enhancements:
      - Added leaf router-gateway-ipv6-address under list router.
    Corrections:
      - Under router interface list, leaves ip-address and
        router-gateway-ip-address modified to support both v4
        and v6. Previously, only v4 was supported.
      - Added constraint so that a network can only support one
        subnet per ip version.
      - Added constraint so that the subnet cidr and gateway match
        the provided ip-version.
    ";
}

revision "2016-08-30" {
  description
    "VTS 2.3.1
    Enhancements:
      - Added leaf vpn-id to networks container
      - Added group VTS-VPNS to cisc-vts container
    Corrections:
      - Removed unique constraint for subnetworks
      - Relaxed must constraint in the leaf interface-name
    ";
}
```

```

revision "2016-07-15" {
  description
  "VTS 2.3.0
  Enhancements:
    - Added leaf vrf-name under list router. The name must be unique
      across tenants. A must statement enforces this.
    - Added identities for template targets
    - Added leaf vtf-deployment under list vmm
    - Added groupings TEMPLATES-DEVICE-GROUP and TEMPLATE-
TARGET-MAPS
      used under cisco-vts
  Corrections:
    - Removed must constraint for subnet name as it can be any string
    - Added unique statement for leaf name under list router
    - Added must statement so that the name of a subnetwork is unique
      within the scope of a network
    - Added must statement so that an external network cannot contain
      subnetworks attached to a router
    - Modified types used for ip addresses from generic to v4 to reflect
      accurately the expected type
  ";
}

revision "2015-06-15" {
  description
  "Enhancements:
  Added cisco-vts container which serves as
  root for all cisco-vts objects.
  Added tenants and topologies.
  Included cisco-vts-system-config submodule.
  Corrections:
  ";
}

revision "2015-02-28" {
  description
  "Initial revision.";
}

/*
 * Identities
 */
identity network-tag-type {
  description "Based identity from which network tag types are " +
    "derived.";
}
identity vlan-tag {
  base "network-tag-type";
}

```

```
description "Vlan tagging.";
tailf:info "Vlan tagging.";
}

identity tag-scope-type {
  description "Based identity from which tag scope types are " +
    "derived.";
}
identity global {
  base "tag-scope-type";
  description "The scope of the tag is global.";
  tailf:info "The scope of the tag is global.";
}
identity port {
  base "tag-scope-type";
  description "The scope of the tag is the port.";
  tailf:info "The scope of the tag is the port.";
}

identity port-creation {
  tailf:info "Base identity from which port creation options are derived.";
}
identity none {
  base "port-creation";
  tailf:info "No port creation.";
}
identity create {
  base "port-creation";
  tailf:info "Create port.";
}

identity router-gateway-creation {
  tailf:info "Base identity from which router gateway creation options are derived.";
}
identity unset {
  base "router-gateway-creation";
  tailf:info "No router gateway creation.";
}
identity set {
  base "router-gateway-creation";
  tailf:info "Set router gateway.";
}

// VMM Modes
identity vmm-mode {
  description "Base identity for mode of VMM";
}

identity trusted {
  base "vmm-mode";
```



```

description "Trusted mode.";
tailf:info "Trusted mode.";
}

identity untrusted {
  base "vmm-mode";
  description "Untrusted mode.";
  tailf:info "Untrusted mode.";
}

// VMM REST protocol
identity rest-protocol {
  description "Base identity for protocol used for calling REST APIs of VMM";
}

identity http {
  base "rest-protocol";
  description "http protocol.";
  tailf:info "http protocol.";
}

identity https {
  base "rest-protocol";
  description "https protocol.";
  tailf:info "https protocol.";
}

grouping VXLAN-NETWORK-ID {
  choice vxlan-network-identifier {
    case user-assigned {
      leaf vni {
        description "Vni to use for this virtual entity";
        type vts-types:vni;
        //must "1 = count(/ralloc:resource-pools/ralloc:vni-pool/vnialloc:range[" +
        //  "vnialloc:start <= current()/../vni " +
        //  "and vnialloc:end >= current()/../vni])" {
        // error-message "The vni must belong to a vni range.";
        // tailf:dependency "/ralloc:resource-pools/ralloc:vni-pool/vnialloc:range";
        //}
      }
    } // case user-assigned
    case vts-allocated {
      leaf vts-allocated-vni {
        description "Vni allocated by VTC for this virtual entity. The
          allocation can be dynamic or statically pre-allocated
          by the user.";
        type vts-types:vni;
        //must "1 = count(/ralloc:resource-pools/ralloc:vni-pool/vnialloc:range[" +
        //  "vnialloc:start <= current()/../vts-allocated-vni " +
        //  "and vnialloc:end >= current()/../vts-allocated-vni])" {

```

```

    // error-message "The vni must belong to a vni range.";
    // tailf:dependency "/ralloc:resource-pools/ralloc:vni-pool/vnialloc:range";
    //}
  }
} // case vts_allocated
} // choice vxlan_network_identifier
} // grouping VXLAN-NETWORK-ID

```

```

grouping SEGMENTATION-ID {
  choice segmentation-identifier {
    case user-assigned-evi {
      leaf evi {
        description "Evi to use for this virtual entity";
        type vts-types:evi-id;
      }
    } // case user-assigned
    case vts-allocated-sr-evi {
      leaf vts-allocated-sr-evi {
        description "Evi allocated by VTC for this virtual entity. The
                    allocation can be dynamic or statically pre-allocated
                    by the user.";
        type vts-types:evi-id;
      }
    } // case vts_allocated
  } // choice segmentation-identifier
} // grouping SEGMENTATION-ID

```

```

grouping MULTICAST-ADDRESS-IDENTIFIER {
  choice multicast-ip-address {
    case user-assigned {
      leaf multicast-address {
        description "Multicast address to use for this virtual entity";
        type vts-types:vts-multicast-ip;
      }
    } // case user-assigned
    case vts-allocated {
      leaf vts-allocated-multicast {
        description "Multicast allocated by VTC for this virtual entity. The
                    allocation can be dynamic or statically pre-allocated
                    by the user.";
        type inet:ipv4-address;
      }
    } // case vts-allocated-multicast
  } // choice multicast-ip-address
} // grouping MULTICAST-ADDRESS-IDENTIFIER

```

```

grouping VTS-PORTS {
  container ports {

```

```
description "Set of ports.";
tailf:info "Ports.";
list port {
  description "List of ports.";
  tailf:info "Port.";

  ncs:servicepoint vts-port-servicepoint;

  key id;
  leaf id {
    description "Port identifier.";
    tailf:info "ID.";
    type vts-types:uuid;
  }

  uses ncs:service-data;
  uses vts-types:MODIFIED-TIME-ELEMENT;

  leaf network-id {
    description "Identifier of the associated network.";
    tailf:info "ID of the associated network.";
    type vts-types:uuid;
    mandatory "true";
  }

  uses vts:COMMON-PORT;

  leaf binding-vif-type {
    description "Binding VIF type.";
    tailf:info "Binding VIF type.";
    type identityref {
      base "vts-ids:binding-type";
    }
    default vts-ids:ovs;
  }

  container vhostuser-details {
    leaf vhostuser-mode {
      description "vhost user mode.";
      tailf:info "vhostuser mode";
      type vts-types:string128;
    }

    leaf vhostuser-socket {
      tailf:info "vhostuser socket path";
      type vts-types:string128;
    }
  }

  leaf status {
```

```

description "Port status.";
tailf:info "Status.";
type identityref {
  base "vts-ids:entity-status";
}
mandatory true;
}

choice vlan-network-identifier {
case user-assigned {
  leaf vlan-id {
    description "Vlan id to use for this port.";
    tailf:info "Vlan for the port.";
    type vts-types:vlan-id;
  }
} // case user-assigned
case vts-allocated {
  leaf vts-allocated-vlan-id {
    description "Vlan id allocated by VTC for this port. The allocation can be
      dynamic or statically pre-allocated by the user.";
    tailf:info "Vlan id allocated for the port.";
    type vts-types:vlan-id;
  }
} // case vts-allocated
} // choice vlan_network_identifier

choice device-interface-vlan-network-identifier {
case user-assigned {
  leaf interface-vlan-id {
    description "Device Interface Vlan id to use for this port.";
    tailf:info "Device Interface Vlan for the port.";
    type vts-types:vlan-id;
  }
} // case user-assigned
case vts-allocated {
  leaf vts-allocated-interface-vlan-id {
    description "Device Interface Vlan id allocated by VTC for this port. The
allocation can be
      dynamic or statically pre-allocated by the user.";
    tailf:info "Device Interface Vlan id allocated for the port.";
    type vts-types:vlan-id;
  }
} // case vts-allocated
} // choice vlan_network_identifier

//Baremetal-specific fields
leaf type {
  description "Type of server port.";
  tailf:info "Type of server port.";
  type identityref {

```

```
    base "vts-ids:server-type";
  }
  default vts-ids:virtual-server;
}
leaf ignore-trunk-vlan {
  description "Flag to ignore L2 config push to Tor ports";
  tailf:info "Flag to ignore L2 config push to Tor ports";
  type boolean;
  default false;
  //when "../type = 'vts-ids:baremetal'";
}

leaf network-tag {
  description "Type of network tag used by a baremetal " +
    "server.";
  tailf:info "Type of network tag used by a baremetal " +
    "server.";
  type identityref {
    base "network-tag-type";
  }
  default vlan-tag;
  //when "../type = 'vts-ids:baremetal'";
}

leaf tag-scope {
  description "Scope of the network tag used by a baremetal " +
    "server.";
  tailf:info "Scope of the network tag used by a baremetal " +
    "server.";
  type identityref {
    base "tag-scope-type";
  }
  default global;
  //when "../type = 'vts-ids:baremetal'";
}

leaf switch-port-type {
  description "Switch Port Type -- Trunk or Access.";
  tailf:info "Switch Port Type -- Trunk or Access.";
  type identityref {
    base vts-ids:switch-port-type;
  }
  default vts-ids:trunk-port;
}

leaf port-tag-native {
  description "When set to true, the VLAN tag used by this BM Port is treated as
native VLAN tag .";
  tailf:info "When set to true, the VLAN tag used by this BM Port is treated as
native VLAN tag .";
  type boolean;
```

```

    must "../switch-port-type = 'vts-ids:trunk-port'" {
      error-message "Native property can only apply for switch ports of type
trunk.";
    }
    when "../switch-port-type = 'vts-ids:trunk-port'";
    default false;
  }

```

```

container fixed-ips {
  description "Set of fixed IP addresses.";
  tailf:info "IP addresses.";

```

```

  list fixed-ip {
    // TODO: this list needs to be revisited
    // 1) is the IP address mandatory?
    // 2) subnet-id comes from OS as a list of subnets
    //   our template concatenates them into the subnet-id leaf.
    //   How is this used? Needs to be revisited
    description "List of fixed IP addresses.";
    tailf:info "Fixed IP address.";
    key ip-address;

```

```

  leaf ip-address {
    description "IP address.";
    tailf:info "IP address.";
    type inet:ip-address;
  }

```

```

  leaf subnet-id {
    description "Subnetwork identifier.";
    tailf:info "Subnetwork ID.";
    type vts-types:string128;
  }

```

```

  leaf cidr {
    description "CIDR for security group";
    tailf:info "CIDR for security group";
    type tailf:ip-address-and-prefix-length;
    when "../..../type = 'vts-ids:baremetal'";
    mandatory true;
  }

```

```

} // list fixed-ips
} // container fixed-ips

```

```

container binding-capabilities {
  description "List of port binding capabilities.";
  tailf:info "Binding capability.";
  leaf port-filter {
    description "Port filter.";
    tailf:info "Port filter.";
    type boolean;

```

```
        default "false";
    }
}
list connid {
    key id;
    ordered-by user;
    leaf id {
        tailf:info "Unique ID for a ToR, ToR port, server name and server port.";
        type leafref {
            path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/uuid-servers/uuid-server/connid";
        }
        //type vts-types:uuid;
    }
} // list connid
leaf port-type {
    description "Regular, parent, subport";
    tailf:info "Regular, parent, subport";
    type identityref {
        base "vts-ids:port-type";
    }
    default "vts-ids:regular-port";
}
leaf parent-port {
    description "Parent port of subport";
    tailf:info "Parent port of subport";
    type leafref {
        path "../..port/id";
    }
}

list endpoint-groups {

    description "List of endpoint groups.";
    tailf:info "Endpoint Group.";

    key epg-id-ref;

    leaf epg-id-ref {
        description "EPG identifier.";
        tailf:info "EPG identifier.";
        type leafref {
            path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/tenants/tenant/endpoint-groups/endpoint-group/id";
        }
    }
} // list endpoint-groups

leaf vmm-id {
```

```

    description "VMM which manages the server or Baremetal.";
    tailf:info "VMM which manages the server or Baremetal.";
    type leafref {
      path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vmms/vmm/id";
    }
  }

  leaf port-edit-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when this port was edited last.";
    tailf:info "The timestamp when this port was edited last.";
  }
} // list port
} // container ports
} // grouping VTS_PORTS

grouping VTS-SUBNETWORKS {
  container subnetworks {
    description "Set of subnetworks.";
    tailf:info "Subnetworks.";

    list subnetwork {
      description "List of subnetworks.";
      tailf:info "Subnetwork.";

      ncs:servicepoint vts-subnet-servicepoint;

      key id;

      leaf id {
        description "Subnetwork identifier.";
        tailf:info "ID.";
        type vts-types:uuid;
      }
      uses ncs:service-data;

      must "(./ip-version = 6 and contains(/cidr, ':') and contains(/gateway-ip, ':')) or "
+
      "(./ip-version !=6 and contains(/cidr, '!') and contains(/gateway-ip, '!')) " {
        error-message "The cidr and gateway-ip format must match the ip-version.";
        tailf:dependency ".";
      }

      leaf network-id {
        description "Identifier of the associated network.";
        tailf:info "ID of the associated network.";
        type vts-types:uuid;
        mandatory "true";
      }
    }
  }
}

```



```

uses COMMON-SUBNETWORK;

container allocation-pools {
  description "Set of allocation pools of IP addresses.";
  tailf:info "Allocation pools.";
  list allocation-pool {
    description "List of allocation pools of IP addresses.";
    tailf:info "Allocation pool.";
    key start;
    // TODO: add "must" constraint so that pools do not overlap
    leaf start {
      description "Allocation pool's first IP address.";
      tailf:info "Pool's first IP address.";
      type inet:ip-address;
    }
    leaf end {
      description "Allocation pool's last IP address.";
      tailf:info "Pool's last IP address.";
      type inet:ip-address;
      must "../start <= ../end" {
        error-message "The end of the allocation pool " +
          "must cannot be less than or " +
          "equal to the start";
        tailf:dependency "../start";
      }
    }
  } // allocation-pool
} // allocation-pools

container dns-nameservers {
  description "Set of DNS name servers.";
  tailf:info "DNS name servers.";
  leaf-list dns-nameserver {
    description "List of DNS name servers.";
    tailf:info "DNS name server.";
    type inet:ip-address;
  } // dns-nameserver
} // dns-nameservers

container host-routes {
  description "Set of host routes.";
  tailf:info "Host routes";
  list host-route {
    description "List of host routes.";
    tailf:info "Host route.";
    key destination;
    leaf destination {
      description "Route's destination.";
      tailf:info "Destination.";
      type tailf:ipv4-address-and-prefix-length;
    }
  }
}

```

```

    leaf nexthop {
      description "Route's nexthop gateway.";
      tailf:info "Nexthop gateway.";
      type inet:ip-address;
    }
  } // host-route
} // host-routes
} // subnetwork
} // subnetworks
} // VTS_SUBNETWORKS

grouping VTS-SHARED-NETWORKS {
  container shared-networks {
    description "Set of shared networks in VTC";
    tailf:info "Shared Networks";

    list shared-network {
      key id;
      leaf id {
        description "Identifier of the shared network.";
        tailf:info "ID of the shared network.";
        type leafref {
          path "../../tenants/tenant/topologies/topology/networks/network/id";
        }
      }
      leaf tenant-id {
        description "tenant id of the network";
        tailf:info "tenant id of the network";
        type leafref {
          path "../../tenants/tenant/name";
        }
      }
      leaf topology-id {
        description "topology id of the network";
        tailf:info "topology id of the network";
        type leafref {
          path "../../tenants/tenant/topologies/topology/id";
        }
      }
    }
  }
}

grouping VTS-SHARED-SUBNETS {
  container shared-subnets {
    description "Set of shared subnets in VTC";
    tailf:info "Shared Subnets";

    list shared-subnet {
      key id;

```

```

leaf id {
  description "Identifier of the shared subnet.";
  tailf:info "ID of the shared subnet.";
  type leafref {
    path "../../tenants/tenant/topologies/topology/subnetworks/subnetwork/id";
  }
}
leaf tenant-id {
  description "tenant id of the subnet";
  tailf:info "tenant id of the subnet";
  type leafref {
    path "../../tenants/tenant/name";
  }
}
leaf topology-id {
  description "topology id of the subnet";
  tailf:info "topology id of the subnet";
  type leafref {
    path "../../tenants/tenant/topologies/topology/id";
  }
}
} // shared-subnet
} // VTS-SHARED-SUBNETS

```

```

grouping VTS-ROUTER-INTERFACE-ABSTRACTION {
  container l3-abstraction {
    description "VTS abstraction for L3 services";
    tailf:info "VTS L3 Abstraction.";
    container devices {
      description "L3 devices.";
      tailf:info "L3 devies.";
      list device {
        description "L3 devices.";
        tailf:info "L3 devies.";
        key name;
        leaf name {
          description "Device Name.";
          tailf:info "Device Name.";
          type vts-types:string128;
        }
      }
    }
    container l3-vnis {
      description "L3 Vnis.";
      tailf:info "L3 Vnis.";
      list l3-vni {
        description "L3 Vnis.";
        tailf:info "L3 Vnis.";
        ncs:servicepoint vts-router-interface-abstraction-servicepoint;
        uses ncs:service-data;
        key vni;
      }
    }
  }
}

```

```

    leaf vni {
      description "L3 Vni.";
      tailf:info "L3 Vni.";
      type vts-types:vni;
    }
  }
}
}
}
}
}
}

grouping ENCAP-PROFILE-ABSTRACTION {
  container encap-profile-abstraction {
    description "Encap profile Abstraction container.";
    tailf:info "Encap profile Abstraction.";
    container devices {
      description "VTS device.";
      tailf:info "Device.";
      list device {
        description "Device.";
        tailf:info "Device.";
        key name;
        leaf name {
          description "Device name.";
          tailf:info "Device name.";
          type vts-types:string128;
        }
      }
      container interfaces {
        description "Device Interfaces.";
        tailf:info "Device Interface";
        list interface {
          description "Device Interfaces.";
          tailf:info "Device Interface";
          key name;
          leaf name {
            description "Interface name.";
            tailf:info "Interface name.";
            type vts-types:string128;
          }
        }
      }
      leaf encap-profile-name {
        description "Profile name.";
        tailf:info "Profile name.";
        type vts-types:string128;
      }
      leaf pool-name {
        description "Device Interface Pool Name.";
        tailf:info "Device Interface Pool Name.";
        type vts-types:string128;
      }
    }
  }
}

```

```

    leaf service-instance-id {
      description "Service Instance Id";
      tailf:info "Service Instance Id.";
      type vts-types:instance-id;
      default 0;
    }
    leaf in-use {
      description "Leaf to describe if this interface is in use.";
      tailf:info "Leaf to describe if this interface is in use.";
      type boolean;
      default false;
    }
  }
}
}
}
}
}
}
}
}

```

```

grouping VTS-SERVICE-ABSTRACTION {
  container abstractions {
    description "Top level VTS service abstraction.";
    tailf:info "Service Abstraction.";
    uses ENCAP-PROFILE-ABSTRACTION;
    uses VTS-ROUTER-INTERFACE-ABSTRACTION;
  }
}

```

```

grouping VTS-METADATA {
  container metadata {
    container router-vrf-name {
      description "List of routers with vrf-names";
      tailf:info "router names with associated vrf-names";
      list routers {
        description "List of Routers.";
        tailf:info "Routers.";
        key id;
        unique vrf-name;
        leaf id {
          description "Router id.";
          tailf:info "Router.";
          type vts-types:uuid;
        }
        leaf vrf-name {
          description "Vrf Name.";
          tailf:info "Vrf Name.";
          type vts-types:alphanumeric24;
        }
      }
    }
  }
}

```

```
container device-interface-pool {
  description "List of device interface pools with devices and interfaces";
  tailf:info "List of device interface pools";
  container devices {
    description "VTS device.";
    tailf:info "Device.";
    list device {
      description "Device.";
      tailf:info "Device.";
      key name;
      leaf name {
        description "Device name.";
        tailf:info "Device name.";
        type vts-types:string128;
      }
    }
  }
  container fexs {
    description "Device Fexs.";
    tailf:info "Device Fexs";
    list fex {
      description "Device Fex.";
      tailf:info "Device Fex";
      key id;
      leaf id {
        description "Fex Id.";
        tailf:info "Fex Id.";
        type vts-types:string128;
      }
    }
  }
  container peers {
    description "Peer Fexs.";
    tailf:info "Peer Fexs";
    list device {
      description "Peer Device.";
      tailf:info "Peer Device.";
      key name;
      leaf name {
        description "Device name.";
        tailf:info "Device name.";
        type vts-types:string128;
      }
    }
  }
  container fexs {
    description "Device Fexs.";
    tailf:info "Device Fexs";
    list fex {
      description "Device Fex.";
      tailf:info "Device Fex";
      key id;
      leaf id {
        description "Fex Id.";
        tailf:info "Fex Id.";
        type vts-types:string128;
      }
    }
  }
}
```



```

}
container in-use-links {
  description "Links in the group.";
  tailf:info "Links in the group.";
  list in-use-link {
    description "Link in the MH group.";
    tailf:info "Link in the MH group.";
    key "device interface";
    leaf device {
      description "Device.";
      tailf:info "Device.";
      type vts-types:string128;
    }
    leaf interface {
      description "Device Interface.";
      tailf:info "Device Interface.";
      type vts-types:string128;
    }
  }
}
}
}
}

grouping VTS-NETWORKS {
  container networks {
    description "Set of networks.";
    tailf:info "Networks.";

    list network {
      description "List of Networks.";
      tailf:info "Network.";
      ncs:servicepoint vts-network-servicepoint;

      key id;

      leaf id {
        description "Network identifier.";
        tailf:info "ID.";
        type vts-types:uuid;
      }

      uses ncs:service-data;

      leaf bridge-domain-id {
        description "Identifier of the associated network.";
        tailf:info "ID of the associated network.";
        type leafref {
          path "../..../bridge-domains/bridge-domain/id";
        }
        // TODO: Commenting out the mandatory flag for now. This needs

```



```

// to be added back in once the network model is validated
// and the use case for mandating is confirmed
// mandatory "true";
//
}

uses COMMON-NETWORK;

leaf extend-to-core {
  description "Should network be extended to core (yes/no) or inherit the state
(none)";
  tailf:info "Should network be extended to core (yes/no) or inherit the state
(none)";
  type vts-types:yes-no-none-enum;
  default none;

  must "((current() = 'yes') or (current() = 'none') or ((current() = 'no') and
(current()/../router-external = 'false'))
or ((current() = 'no') and (current()/../router-external = 'true' and (0 =
count(..../ports/port[network-id=current()/../id])))
" {
    error-message "Network cannot be L3 extended if ports are attached";
    tailf:dependency ".";
  }
}

leaf vpn-id {
  description "VPN object to use for stitching this network";
  type leafref {
    path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vpns/vpn/id";
  }
  must "1 = count(..../network[vpn-id=current()])" {
    error-message "The Data Connectivity Service is already assigned to a
network";
    tailf:dependency ".";
  }
}

leaf known-provider-network {
  description "It is a known provider network";
  tailf:info "Known provider network.";
  type identityref {
    base "vts-ids:known-provider-status";
  }
  default "vts-ids:not-known-if-provider-network";
}

leaf status {
  description "Network status.";

```

```

tailf:info "Status.";
type identityref {
  base "vts-ids:entity-status";
}
mandatory true;
}
leaf network-creation-timestamp {
  type ietf-yang:date-and-time;
  description "The timestamp when the network was triggered";
  tailf:info "The timestamp when the network was triggered";
}
leaf vni-pool {
  description "Vni pool name.";
  tailf:info "Vni pool name.";
  type vts-types:string128;
  // TODO: consider using a leafref to the pool
  default "vnipool";
}
choice data-plane-protocol {
  case vxlan{
    uses VXLAN-NETWORK-ID {
      refine "vxlan-network-identifier/user-assigned/vni" {
        description "Vni to use for this network.";
        tailf:info "Vni for the network.";
      }
      refine "vxlan-network-identifier/vts-allocated/vts-allocated-vni" {
        description "Vni allocated by VTC for this network. The
          allocation can be dynamic or statically pre-allocated
          by the user.";
      }
    }
  }
  case mpls{
    uses SEGMENTATION-ID {
      refine "segmentation-identifier/user-assigned-evi/evi" {
        description "Vni to use for this network.";
        tailf:info "Vni for the network.";
      }
      refine "segmentation-identifier/vts-allocated-sr-evi/vts-allocated-sr-evi" {
        description "Vni allocated by VTC for this network. The
          allocation can be dynamic or statically pre-allocated
          by the user.";
      }
    }
  }
}
}
uses MULTICAST-ADDRESS-IDENTIFIER {
  refine "multicast-ip-address/user-assigned/multicast-address" {
    description "Multicast ip address to use for this network.";
    tailf:info "Multicast ip address for the network.";
  }
}

```

```

    }
    refine "multicast-ip-address/vts-allocated/vts-allocated-multicast" {
        description "Multicast ip address allocated by VTC for this network. The
            allocation can be dynamic or statically pre-allocated
            by the user.";
    }
}
leaf arp-suppression{
    when "../vts:router-external = 'false'";
    description "Enables BGP EVPN ARP Suppression.";
    tailf:info "ARP suppression.";
    type identityref {
        base "vts-ids:nwk-arp-suppression-type";
    }
    default "vts-ids:nwk-arp-suppression-disabled";
}
container vmms {
    list vmm {
        key vmm-id;
        leaf vmm-id {
            description "VMM which has this network.";
            tailf:info "VMM which has this network.";
            type leafref {
                path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:vmms/vts:vmm/vts:id";
            }
        }
    }
}
leaf vts-allocated-evi {
    description "Evi id to use for this virtual entity";
    type vts-types:evi-id;
}

leaf dummy-port {
    description "Id of a network dummy port";
    tailf:info "Id of a network dummy port";
    type string;
}
} // network
} // networks
} // grouping VTS-NETWORKS

grouping VTS-BRIDGE-DOMAINS {
    container bridge-domains {
        description "Set of Bridge Domains.";
        tailf:info "Bridge Domains.";

        list bridge-domain {
            description "List of Bridge Domains.";

```

```
tailf:info "Bridge Domain.";

key id;

leaf id {
  description "Network identifier.";
  tailf:info "ID.";
  type vts-types:uuid;
}

} // bridge-domain
} // bridge-domains
} // grouping VTS-BRIDGE-DOMAINS

grouping VTS-ROUTER-INTERFACES {
  container interfaces {
    list interface {
      description "List of (router) interfaces.";
      tailf:info "Router interfaces.";
      ncs:servicepoint vts-router-interface-servicepoint;
      uses ncs:service-data;

      key subnet-id;

      leaf subnet-id {
        description "Subnetwork identifier.";
        tailf:info "Subnetwork ID.";
        type vts-types:uuid;
        mandatory "true";
      }

      leaf router-id {
        description "Router identifier.";
        tailf:info "Router ID.";
        type vts-types:uuid;
        mandatory "true";
      }

      leaf ip-address {
        description "Router interface IP address.";
        tailf:info "IP address.";
        type inet:ip-address;
      }

      leaf port-edit-timestamp {
        type ietf-yang:date-and-time;
        description "The timestamp when a port in this interface was edited last.";
        tailf:info "The timestamp when a port in this interface was edited last.";
      }

      leaf router-gateway-set {
        description "Router gateway set operation";
```

```

    tailf:info "Router gateway set operation";
    type identityref {
      base "router-gateway-creation";
    }
    default "unset";
  }
  leaf router-gateway-ip-address {
    description "Router gateway interface IP address.";
    tailf:info "IP address.";
    type vts-types:ip-prefix;
  }
  leaf routerinterface-creation-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when the router interface was triggered";
    tailf:info "The timestamp when the router interface was triggered";
  }

} // list interfaces
} // container interfaces
} // grouping VTS-ROUTER-INTERFACES

grouping TEMPLATE-MAPS {
  list template-map {
    description "List of VTS configuration template applied.";
    tailf:info "VTS Configuration Template Applied.";

    key "template-type";

    leaf template-type {
      description "Template type.";
      tailf:info "Template Type.";
      type vts-types:string128 {
        pattern "route";
      }
    }

    leaf template-name {
      description "Template name.";
      tailf:info "Template Name.";
      mandatory "true";
      type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-
service:site/templates:templates/templates:template/templates:name";
      }
    }

    leaf last-changed {
      description "A timestamp indicating when template configuration applied on
device has changed.
      This is used to trigger applying of configuration to devices";
    }
  }
}

```

```

    tailf:info "A timestamp indicating when template configuration applied on
device has changed. ";
    type ietf-yang:date-and-time;
  }
} // template-map
} // grouping TEMPLATE-MAPS

grouping VTS-ROUTERS {
  container routers {
    description "Set of routers.";
    tailf:info "Routers.";

    list router {
      description "List of routers.";
      tailf:info "Router.";
      uses ncs:service-data;
      ncs:servicepoint vts-router-servicepoint;

      key id;
      unique "name";
      unique "vrf-name";
      leaf id {
        description "Router identifier.";
        tailf:info "Router ID.";
        type vts-types:uuid;
      }
      leaf name {
        description "Router name.";
        tailf:info "Name.";
        type vts-types:string15;
      }
      leaf vrf-name {
        description "VRF name of the router";
        tailf:info "VRF name.";
        type vts-types:alphanumeric24;
      }
      leaf router-gateway {
        description "Router gateway.";
        tailf:info "Router gateway.";
        type vts-types:uuid;
      }
      leaf router-gateway-ip-address {
        when "../router-gateway";
        description "Router gateway interface IP address.";
        tailf:info "IP address.";
        type string {
          pattern '([1-9][1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.((([0-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])\.)|{2}([1-9]|[1-9][0-9]|1[0-9][0-9]|2[0-4][0-9]|25[0-5])|((([1-9])|([1-2][0-9])|(3[0-2])))' {
            error-message "Invalid format or invalid ip for router gateway ip address";
          }
        }
      }
    }
  }
}

```

```

    }
  }
}
leaf router-gateway-ipv6-address {
  when "../router-gateway";
  description "Router gateway interface IPv6 address.";
  tailf:info "IPv6 address.";
  type vts-types:ipv6-prefix;
}
leaf provider-router {
  description "Provider router.";
  tailf:info "Provider router.";
  type boolean;
  default false;
}

leaf status {
  description "Router status.";
  tailf:info "Router status.";
  type identityref {
    base "vts-ids:entity-status";
  }
  mandatory true;
}
leaf router-creation-timestamp {
  type ietf-yang:date-and-time;
  description "The timestamp when the router was triggered";
  tailf:info "The timestamp when the router was triggered";
}

choice data-plane-protocol {
  case vxlan{
    uses VXLAN-NETWORK-ID {
      refine "vxlan-network-identifier/user-assigned/vni" {
        description "Vni to use for this router";
        tailf:info "Vni for the network.";
      }
      refine "vxlan-network-identifier/vts-allocated/vts-allocated-vni" {
        description "Vni allocated by VTC for this router The
          allocation can be dynamic or statically pre-allocated
          by the user.";
      }
    }
  }
  case mpls{
    uses SEGMENTATION-ID {
      refine "segmentation-identifier/user-assigned-evi/evi" {
        description "EVI to use for this router.";
        tailf:info "Evi for the Router.";
      }
    }
  }
}

```

```

    refine "segmentation-identifier/vts-allocated-sr-evi/vts-allocated-sr-evi" {
        description "Evi allocated by VTC for this router. The
            allocation can be dynamic or statically pre-allocated
            by the user.";
    }
}
}

leaf overlay-router-vpn-id {
    description "Identifies which Global Route Leaking Service is associated with
Router";
    tailf:info "Identifies which Global Route Leaking Service is associated with
Router";
    type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-service:site/cisco-
vts/vpns/vpn/id";
    }
    must "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vpns/vts:vpn[id=current()]/vts:type='vts:vpn-service-type-internet'" {
        error-message "Overlay-router-vpn-id is pointing to a service that is not of
type internet";
    }
    tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vpns/vpn";
}

container template-maps {
    description "Container for VTS configuration template to router mappings.";
    tailf:info "VTS Configuration template-router mappings.";
    uses TEMPLATE-MAPS;
} // container template-maps

container vmms {
    list vmm {
        key vmm-id;
        leaf vmm-id {
            description "VMM which has this router.";
            tailf:info "VMM which has this router.";
            type leafref {
                path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vmms/vts:vmm/vts:id";
            }
        }
    } // list vmm
} // container vmms

leaf enable-default-route {
    description "Set default route.";
    tailf:info "Set default route.";
}

```



```
        type boolean;
        default true;
    }
} // list router
} // container routers
} // grouping VTS-ROUTERS

/////////////////////////////////////////////////////////////////
//  Template Target Association Types and Groupings definitions
/////////////////////////////////////////////////////////////////

//target types
identity target-type {
    description "Base identity for template association target from which others are
derived.";
}

identity tenant-target {
    base "target-type";
    description "Tenant as template association target.";
    tailf:info "Tenant as template association target.";
}

identity router-target {
    base "target-type";
    description "Router as template association target.";
    tailf:info "Router as template association target.";
}

identity network-target {
    base "target-type";
    description "Network as template association target.";
    tailf:info "Network as template association target.";
}

identity device-target {
    base "target-type";
    description "Device as template association target.";
    tailf:info "Device as template association target.";
}

identity router-interface-target {
    base "target-type";
    description "Router Interface as template association target.";
    tailf:info "Router Interface as template association target.";
}

grouping TEMPLATES-DEVICE-GROUP {
    container template-device-groups {
        description "List of device groups that belong to templates";
        tailf:info "List of device groups that belong to templates";
    }
}
```

```

config true;

list template-device-group {
  description "Set of devices";
  tailf:info "Set of devices";

  uses ncs:service-data;
  ncs:servicepoint template-device-group-servicepoint;

  key device-group-name;

  leaf device-group-name {
    description "Name of the device-group";
    tailf:info "Name of the device-group";
    type vts-types:non-empty-string255;
  }

  container devices {
    description "List of device in the device group";
    tailf:info "List of device in the device group";

    list device {
      description "device in the device group";
      tailf:info "device in the device group";
      key name;

      leaf name {
        description "Name of the device";
        tailf:info "Name of the device";
        type vts-types:non-empty-string128;
        must "(/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:template-device-groups/vts:template-device-group[device-group-name='ALL']
and current()!='*') or
(/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:template-device-groups/vts:template-device-group[device-group-name !=
'ALL'] and /ncs:devices/ncs:device[ncs:name = current()])"{
          error-message "deleting device not allowed while devices are still
associated with templates OR
device name is not in ncs:devices/ncs:device list OR
device group ALL should have device name as * ";
          tailf:dependency "/ncs:devices/ncs:device/ncs:name";
          tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vts:template-device-groups/vts:template-device-
group/vts:device-group-name";
          tailf:dependency ".";
        }
      }
    } //list device
  } // container devices

```

```

    } // list template-device-group
  } // container template-device-groups
} // grouping TEMPLATES-DEVICE-GROUP
grouping TEMPLATE-TARGET-MAPS {
  container template-target-maps{

    tailf:info "Repository of VTS templates and associated targets.";

    config true;

    list template-target-map {
      description "List of VTS templates and targets associated with.";
      tailf:info "List of VTS templates and targets associated with.";

      uses ncs:service-data;
      ncs:servicepoint template-target-maps-servicepoint;

      key "template-target-id template-type template-name";

      leaf template-target-id{
        tailf:info "Target being path to tenant like /vts-service:vts-service/sites/site{site
id}/vts:cisco-vts/tenants/tenant{<name of tenant>} or
        target being path to router like
        /vts-service:vts-service/sites/site{site id}/vts:cisco-vts/tenants/tenant{<name of
tenant>}/topologies/topology{<name of topology>}/routers/router{<id of the
router>} or
        target being path to network like
        /vts-service:vts-service/sites/site{site id}/vts:cisco-vts/tenants/tenant{<name of
tenant>}/topologies/topology{<name of topology>}/networks/network{<id of the
network>}";
        type vts-types:non-empty-string-max;
        //condition for underlay template
        must "((current() = 'na') or ../template-target-type != 'vts:device-target')"{
          error-message "target id should be na for device templates";
          tailf:dependency "../type";
          tailf:dependency ".";
        }
      }

    }

    leaf template-target-type{
      tailf:info "Target like tenant, router,router interface,network, device to which
the template gets associated";
      type identityref {
        base "target-type";
      }
      /*
      * Only tenant-target type is validated here. The router-target is validated as
part of vtsRouterRFS postModification
      * For device-target type the check is performed for template-target-id

```

** TODO: performance evaluate inclusion of route id validation as part of must condition and include it here*

```

*/

    must "(current() = 'vts:tenant-target' and
        (count(/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:tenants/vts:tenant[vts:name = substring-before(substring-
after(current()/../template-target-id,\"{\"},\"}\")]) = 1)) or
        (current() = 'vts:router-target') or
        (current() = 'vts:network-target') or
        (current() = 'vts:router-interface-target') or
        (current() = 'vts:device-target'))" {
    error-message "deleting tenant not allowed while templates are still associated
OR
        template-target-id passed is not valid for tenant-target type OR
        template-target-type is not tenant-target or router-target or network-
target";
    tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vts:tenants/vts:tenant/vts:name";
    tailf:dependency ".";
    }
    mandatory true;
}

```

*/*TODO:*

1. removed the must condition to check template name and template type matching as we changed the template to pattern due to NCS issue with using a leaf that is identity-ref as a key of list.
2. The REST POST call doesn't work while passing the value for the identity-ref.
3. Once that issue is resolved we can make the change in this model hence we are using qualified names for that reason in the pattern
4. The pattern being on a single line is required as I didn't find a way to mention that it is continuation of OR condition on the new line. Once we have new line the pattern was not getting matched.

**/*

```

leaf template-type {
    description "Template type";
    tailf:info "Template Type
        cisco-vts-templates:l2-extension or
        cisco-vts-templates:l3-service-extension or
        cisco-vts-templates:external-gateway-service-extension or
        cisco-vts-templates:bgp-service-extension or
        cisco-vts-templates:route or
        cisco-vts-templates:device";
    type vts-types:string128 {

```

```

    pattern 'cisco-vts-templates:external-gateway-service-extension|cisco-vts-
templates:l2-extension|cisco-vts-templates:l3-service-extension|cisco-vts-
templates:bgp-service-extension|cisco-vts-templates:route|cisco-vts-templates:device';
    }
}

leaf template-name {
    description "Template name.";
    tailf:info "Template Name.";
    mandatory true;
    type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-
service:site/templates:templates/templates:template/templates:name";
    }
}

leaf last-changed {
    description "A timestamp indicating when template configuration applied on
device has changed.
        This is used to trigger applying of configuration to devices";
    tailf:info "A timestamp indicating when template configuration applied on
device has changed. ";
    type ietf-yang:date-and-time;
}

leaf device-group-id{
    tailf:info "device group name referring the group of devices selected by the user
        for this template-target association";
    type leafref{
        path "../.../template-device-groups/template-device-group/device-group-
name";
    }
}
} // list template-target-map
} // container templates-target-map
} // grouping TEMPLATE-TARGET-MAPS

grouping LOOPBACKS {
    container loopbacks {
        list loopback-profile {
            key if-type;
            leaf name {
                type string;
            }
            leaf if-type {
                tailf:info "The service for which the Loopback will be used";
                type identityref {
                    base "vts-ids:loopback-if-type";
                }
            }
        }
    }
}

```

```

leaf loopback-num {
  description "Loopback interface number.";
  tailf:info "Loopback interface number.";
  type uint16;
}
leaf loopback-ip {
  description "Loopback interface IP address.";
  tailf:info "A.B.C.D/LEN;;IP prefix and network mask " +
    "length in format x.x.x.x/m";
  type inet:ip-prefix;
}
} // list of loopback profile names
} // container loopbacks
} // grouping loopbacks

grouping VTS-TENANTS {
  container tenants {
    description "Set of VTS tenants.";
    tailf:info "Set of VTS tenants.";

    list tenant {
      description "List of VTS tenants.";
      tailf:info "Tenants.";

      key name;
      leaf name {
        description "Tenant name.";
        tailf:info "Name.";
        type vts-types:string64;
      }

      container endpoint-groups {
        uses VTS-EPG;
      }

      container contracts {
        uses VTS-CONTRACT;
      }

      uses VTS-SFI;

      uses COMMON-VTS-TENANT-GROUPING;
      uses POLICY-CONTAINER;

      container network-extensions {
        presence "Need to invoke network extension service point.";
        description "Container to store properties extensible by network and to invoke
network extension service.";
        tailf:info "Container to store properties extensible by network and to invoke
network extension service.";

```

```

uses ncs:service-data;
ncs:servicepoint network-extensions-servicepoint;
leaf extend-networks-to-core {
  description "Extend all inherited networks to core.";
  tailf:info "Extend all inherited networks to core.";
  type vts-types:yes-no-none-enum;
  default no;
}
}

container topologies {
  description "Set of topologies belonging to a tenant.";
  //Todo: Add an example for topologies
  tailf:info "Set of topologies belonging to a tenant.";

  list topology {
    description "List of topologies.";
    tailf:info "List of topologies.";

    key id;
    leaf id {
      description "Topology name.";
      tailf:info "Topology name.";
      type vts-types:string128;
    }
    uses vts:VTS-BRIDGE-DOMAINS;
    uses vts:VTS-NETWORKS;
    uses vts:VTS-SUBNETWORKS;
    uses vts:VTS-PORTS;
    uses vts:VTS-ROUTERS;
    uses STATIC-ROUTES;
    uses vts:VTS-ROUTER-INTERFACES;
    uses vts:VTS-PORT-EXTENSIONS;
    uses vts:PE-MAPPING;
    uses vts:INVERSE-PE-MAPPING;
  } // list topology
} // container topologies
} //list tenants
} // container tenant
} // grouping VTS-TENANTS

grouping VTS-VMMS {
  container vmms {

    grouping IP-PORT-PROTOCOL {
      leaf ip-address {
        description "IP address for VMM.";
        tailf:info "IP address for VMM";
        type inet:ip-address;
      }
    }
  }
}

```

```

leaf port {
  description "Port used for calling REST APIs of VMM.";
  tailf:info "Port used for calling REST APIs of VMM";
  type uint32;
  //default 35357;
}
leaf protocol {
  description "Protocol used for calling REST APIs of VMM";
  tailf:info "Protocol used for calling REST APIs of VMM";
  type identityref {
    base "rest-protocol";
  }
  //default https;
}
} // IP-PORT-PROTOCOL

grouping COMMON-VMM-REGISTRATION_DETAILS {
  container api-endpoint {
    uses IP-PORT-PROTOCOL;
    leaf userid {
      description "VMM SSH user id";
      tailf:info "VMM SSH user id";
      type vts-types:string128;
      when "../..../vmm/type = 'vts-ids:vcenter'";
    }

    leaf password {
      description "VMM SSH user passphrase.";
      tailf:info "VMM SSH user passphrase";
      type vts-types:string128;
      when "../..../vmm/type = 'vts-ids:vcenter'";
    }
  }
} //COMMON-VMM-REGISTRATION_DETAILS

grouping OPENSTACK-VMM-REGISTRATION_DETAILS {

  container keystone {

    uses IP-PORT-PROTOCOL;

    leaf tenant-name {
      description "Tenant name.";
      tailf:info "Name.";
      type vts-types:string64;
    }

    leaf tenant-userid {
      description "VMM tenant user id";
      tailf:info "VMM tenant user id";
    }
  }
}

```



```

    type vts-types:string128;
  }

  leaf tenant-password-phrase {
    description "VMM tenant user password.";
    tailf:info "VMM tenant user password";
    type vts-types:string128;
  }

  leaf domain-id {
    description "domain id.";
    tailf:info "domain id";
    type vts-types:string128;
  }

  when "../vmm/type = 'vts-ids:openstack'";
} //keystone

container osp-director {
  leaf userid {
    description "OSP Director SSH user id for OSPD Openstack VMM.";
    tailf:info "OSP Director SSH user id for OSPD Openstack VMM.";
    type vts-types:string128;
  }

  leaf password {
    description "OSP Director SSH user passphrase for OSPD Openstack VMM.";
    tailf:info "OSP Director SSH user passphrase for OSPD Openstack VMM.";
    type vts-types:string128;
  }

  leaf ip-address {
    description "IP address of OSP Director for OSPD Openstack VMM.";
    tailf:info "IP address of OSP Director for OSPD Openstack VMM.";
    type inet:ip-address;
  }
  when "../vmm/type = 'vts-ids:openstack'";
} //osp-director
} //OPENSTACK-VMM-REGISTRATION_DETAILS

description "Set of VMM instances registered with VTC.";
list vmm {
  description "List of VMM instances registered with VTC.
    Either standalone or clusters.";
  tailf:info "VMM instance.";

  key id;
  unique api-endpoint/ip-address;
  unique osp-director/ip-address;

```

```
leaf id {
  description "VMM identifier.";
  tailf:info "ID.";
  type union {
    type vts-types:uuid;
    type string;
  }
}

leaf type {
  description "Type of vmm.";
  tailf:info "Type of vmm.";
  type identityref {
    base "vts-ids:vmm-type";
  }
  mandatory true;
}

leaf install-vmm-components{
  description "Determines if VTS Installs VMM components or not";
  tailf:info "Determines if VTS installs VMM components or not";
  type boolean;
  default true;
}

leaf version {
  description "vmm version.";
  tailf:info "vmm version.";
  type identityref {
    base "vts-ids:vmm-version";
  }
  must "false() = starts-with(current(), current()../type)" {
    error-message "VMM version must match the VMM type.";
    tailf:dependency "../type";
  }
  mandatory true;
}

leaf status {
  description "Registration status.";
  tailf:info "Registration status.";
  type identityref {
    base "vts-ids:vmm-registration-state";
  }
  default vts-ids:vmm-registration-initial;
}

leaf message {
  description "Detailed message about current registration state.";
```

```

    tailf:info "Detailed message about current registration state.";
    type vts-types:string255;
}

leaf datacenter {
    description "Datacenter for vcenter.";
    tailf:info "Datacenter for vcenter.";
    type vts-types:string128;
    when "../type = 'vts-ids:vcenter'";
}

list controller-nodes {
    description "List of controller nodes";
    tailf:info "List of controller nodes";
    key id;
    unique ip-address;

    leaf id {
        description "controller node identifier.";
        tailf:info "controller node identifier.";
        type vts-types:uuid;
    }

    leaf ip-address {
        description "IP addresses of the VMM. For standalone VMMs, a single IP
address will be provided.
        For clustered VMMs, each IP address correspond to a cluster node.";
        tailf:info "Controller/Network node ip address";
        type inet:ip-address;
        must "boolean("../osp-director/ip-address) or (count("../vmm/controller-
nodes[ip-address=current()]) = 1)" {
            error-message "The provided controller IP is already associated with
another VMM";
            tailf:dependency "../osp-director/ip-address";
            tailf:dependency ".";
        }
        //min-elements 1;
        //must "../type = 'vts-ids:openstack' or (../type = 'vts-ids:vcenter' and
count(..ip-address) = 1)" {
            // error-message "Only 1 ip-address can be specified for vcenter";
            // tailf:dependency "../type";
            //}
            //must "count("../vmm[ip-address=current()])=1" {
            // error-message "The provided ip-address is already assigned to a VMM.";
            // tailf:dependency ".";
            //}
        } // Question we should remove the above must conditions and min-elements?

    leaf port {

```

```
description "host port.";
tailf:info "host port.";
type uint32;
default 443;
when "../type = 'vts-ids:vcenter'";
}

leaf userid {
description "VMM SSH user id";
tailf:info "VMM SSH user id";
type vts-types:string128;
}

leaf password {
description "VMM SSH user passphrase.";
tailf:info "VMM SSH user passphrase";
type vts-types:string128;
}

leaf status {
description "Installation status.";
tailf:info "Installation status.";
type identityref {
base "vts-ids:vmm-registration-state";
}
default vts-ids:vmm-registration-initial;
}

leaf message {
description "Detailed message about current installation state.";
tailf:info "Detailed message about current installation state.";
type vts-types:string255;
}
}

leaf vtf-deployment {
description "Deployment mode for the VTFs.";
tailf:info "Deployment mode for the VTFs.";
type identityref {
base "vts-ids:vtf-deployment-mode";
}
when "../type = 'vts-ids:openstack' and (../version = 'vts-ids:openstack-liberty-
centos' or ../version = 'vts-ids:openstack-liberty-rhel')";
}

leaf name {
description "A name of the VMM";
tailf:info "A name of the VMM";
type vts-types:non-empty-string128;
must "not(current() = 'VTS') and not(current() = 'Vts')";
}
```

```

    and not(current() = 'vts') and not(current() = 'VTs')
    and not(current() = 'vTs') and not(current() = 'vtS')
    and not(current() = 'vTS') and not(current() = 'VtS')" {
      error-message "VMM name cannot be VTS.";
      tailf:dependency ".";
    }
    mandatory true;
  }

  leaf mode {
    description "Indicates mode of VMM";
    tailf:info "Indicates mode of VMM";
    type identityref {
      base "vmm-mode";
    }
    default trusted;
  }

  uses COMMON-VMM-REGISTRATION_DETAILS;
  uses OPENSTACK-VMM-REGISTRATION_DETAILS;

} //vmm
} //vmms
} // grouping VTS-VMMS

grouping VTS-TRUNKS {
  container trunks {
    description "Set of trunks.";
    tailf:info "Trunks.";
    list trunk {
      description "List of trunks";
      tailf:info "Trunk.";
      uses ncs:service-data;
      ncs:servicepoint vts-trunk-servicepoint;

      key id;

      leaf id {
        description "Trunk identifier";
        tailf:info "Trunk ID.";
        type vts-types:uuid;
      }
      uses vts:COMMON-TRUNK;

      leaf tenant-name {
        description "Tenant derived from parent port.";
        tailf:info "Tenant derived from parent port.";
        type leafref {
          path "../..../tenants/tenant/name";
        }
      }
    }
  }
}

```

```

    }
    leaf topology-id {
      description "Topology derived from parent port.";
      tailf:info "Topology derived from parent port.";
      type leafref {
        path "../../tenants/tenant/topologies/topology/id";
      }
    }
  }
}
} //grouping VTS-TRUNKS

grouping CISCO-VTS {
  container cisco-vts {
    description "cisco-vts root container.
      This serves as a root for all cisco-vts objects.";
    tailf:info "cisco-vts root container.";

    uses SYSTEM-CONFIG;
    uses VTS-INVENTORY;
    // TODO: enforce in backend code that a device can be in only one vertical in
the infra-policy
    uses INFRA-POLICY;
    uses UUID-SERVER;
    uses VTS-DEVICE-GROUP;
    uses VTS-DEVICE-INTERFACE-GROUP;
    uses VTS-NETWORK-TO-PORTS-MAPPING;
    uses TEMPLATES-DEVICE-GROUP;
    uses TEMPLATE-TARGET-MAPS;
    uses VTS-VPNS;
    uses VTS-SERVICE-ABSTRACTION;
    uses MVMM-POLICY;
    uses VTS-SFD;
    uses VTS-VMMS;
    uses VTS-TENANTS;
    uses VTS-TRUNKS;
    uses vts:VTS-SHARED-NETWORKS;
    uses vts:VTS-SHARED-SUBNETS;
    uses vts:VTS-METADATA;
    uses VTS-UPGRADE;
    uses COLLECTD-VTF-CONFIG-DETAILS;
    uses MONITD-VTF-VTSR-CONFIG-DETAILS;
    uses DEVICE-OBJECTS;
    uses DEVICE-OBJECT-ASSOCIATIONS;
    uses VTS-HOSTS;
  } //container cisco-vts
} // grouping CISCO-VTS

// Site specific augmentations

```

```
augment "/vts-service:vts-service/vts-service:sites/vts-service:site" {
  uses CISCO-VTS;
} // site augmentation

// Global level augmentations
augment "/vts-service:vts-service/vts-service:global-settings" {
  uses GLOBAL_SYSTEM_CONFIG;
  uses MONITD-POLICY-CONFIG-DETAILS;
  uses COLLECTD-POLICY-CONFIG-DETAILS;
} // global augmentation

} // module cisco-vts
```

6.5 VTS Common

```
submodule cisco-vts-common {

  belongs-to cisco-vts {
    prefix vts;
  }

  import ietf-inet-types {
    prefix inet;
  }
  import ietf-yang-types {
    prefix yang;
  }

  import tailf-common {
    prefix tailf;
  }
  import tailf-ncs {
    prefix ncs;
  }
  import cisco-vts-types {
    prefix vts-types;
  }
  import cisco-vts-identities {
    prefix vts-ids;
  }

  import vts-service {
    prefix vts-service;
  }

  organization "Cisco Systems, Inc.";
}
```

contact

"Cisco Systems, Inc.
Customer Service

Postal: 170 West Tasman Drive
San Jose, CA 95134

Tel: +1 800 533-NETS";

description

"This module contains a collection of YANG definitions
for Cisco's VTS.

Copyright (c) 2015 by Cisco Systems, Inc.
All rights reserved.";

revision "2017-06-26" {

description

"VTS 2.6

Enhancements:

- Added common trunk model and subports for trunk-details.
- Enhancements for Security Groups feature:
 - Cleaned up 'security-group' definitions from COMMON-PORT grouping

";

}

revision "2017-04-20" {

description

"VTS 2.6

Enhancements:

- Added leaf virtual-switch to the grouping COMMON-SERVER.
- Added leaf nodes sriov-enabled and physnet-name to the grouping

COMMON-SERVER.

";

}

revision "2016-07-15" {

description

"VTS 2.3.0

Enhancements:

- Added leaves to grouping COMMON-SUBNETWORK
 - IPv6-related fields: ipv6-ra-mode, ipv6-address-mode
 - subnetpool-id
- Added COMMON-ESI-GROUPING grouping for ESI nodes

Corrections:

- Modified cidr type from
tailf:ipv4-address-and-prefix-length to
tailf:ip-address-and-prefix-length

";


```
}

revision "2015-02-28" {
description
  "Initial revision.";
}

/*
 * Groupings
 */
grouping COMMON-NETWORK {
description "Set of common data nodes for virtual networks.";
leaf admin-state-up {
description "The network administrative state is UP.";
tailf:info "Administrative state up.";
type boolean;
default "true";
}
leaf name {
description "Network name.";
tailf:info "Name.";
type vts-types:alphanumeric-specialchar-128;
}
leaf provider-physical-network {
description "Physical network.";
tailf:info "Physical network.";
type vts-types:string128;
}
leaf provider-segmentation-id {
description "Segmentation identifier.";
tailf:info "Segmentation ID.";
type vts-types:string128;
}
leaf provider-network-type {
description "Network type.";
tailf:info "Network type.";
type identityref {
base "vts-ids:network-type";
}
}
leaf router-external {
description "External network.";
tailf:info "External network.";
type boolean;
default "false";
}
leaf shared {
description "Shared network.";
tailf:info "Shared.";
```

```
    type boolean;
    default "false";
  }
}

grouping COMMON-SUBNETWORK {
  description "Set of common data nodes for virtual subnetworks.";
  leaf name {
    description "Subnetwork name.";
    tailf:info "Name.";
    type vts-types:string128;
  }
  leaf cidr {
    description "Subnetwork address.";
    tailf:info "Subnetwork address.";
    type tailf:ip-address-and-prefix-length;
    mandatory true;
  }
  leaf enable-dhcp {
    description "Enable DHCP.";
    tailf:info "Enable DHCP.";
    type boolean;
    default "false";
  }
  leaf gateway-ip {
    description "Gateway IP address.";
    tailf:info "Gateway IP address.";
    type inet:ip-address;
    mandatory true;
  }
  leaf ip-version {
    description "IP version.";
    tailf:info "IP version.";
    type enumeration {
      enum 4;
      enum 6;
    }
    default 4;
  }
  leaf shared {
    description "Shared subnetwork.";
    tailf:info "Shared.";
    type boolean;
    default "false";
  }
  leaf subnetpool-id {
    description "Identifier for the subnetpool from where to obtain subnet address.";
    tailf:info "Subnetpool identifier.";
    type vts-types:uuid;
  }
}
```

```
// IPv6-related fields
leaf ipv6-ra-mode {
  description "Determines how router advertisement is handled.";
  tailf:info "Router advertisement handled.";
  type identityref {
    base "vts-ids:ipv6-address-assignment";
  }
}
leaf ipv6-address-mode {
  description "Determines how addressing is handled.";
  tailf:info "Addressing handling.";
  type identityref {
    base "vts-ids:ipv6-address-assignment";
  }
}
}

grouping TRUNK-SUBPORTS {
  list sub-ports {
    description "Subports of Trunk.";
    tailf:info "Trunk subports";
    key port-id;

    leaf port-id {
      description "Id of subport";
      tailf:info "Id of subport.";
      type vts-types:uuid;
    }
    leaf segmentation-id {
      description "Segmentation ID.";
      tailf:info "Segmentation ID.";
      type vts-types:string128;
    }
    leaf segmentation-type {
      description "Segmentation type.";
      tailf:info "Segmentation type.";
      type identityref {
        base "vts-ids:network-type";
      }
    }
    leaf mac-address {
      description "Mac address of subport.";
      tailf:info "Mac address of subport.";
      type yang:mac-address;
    }
  }
}

grouping COMMON-PORT {
```

```

description "Set of common data nodes for virtual ports.";
leaf name {
  description "Port name.";
  tailf:info "Name.";
type vts-types:string128;
}
leaf admin-state-up {
  description "The network administrative state is UP.";
  tailf:info "Administrative state up.";
  type boolean;
  default "true";
}
leaf mac-address {
  description "Port MAC address.";
  tailf:info "MAC address.";
  type union {
    type yang:mac-address;
    type vts-types:unknown-mac;
  }
  mandatory true;
}
leaf device-id {
  description "Device Identifier.";
  tailf:info "Device Identifier.";
  type vts-types:string128;
}
leaf device-owner {
  description "Device owner.";
  tailf:info "Device owner.";
type vts-types:string128;
}
leaf binding-host-id {
  description "Host identifier";
  tailf:info "Host identifier";
  type vts-types:string128;
}

leaf physnet-name {
  description "Name of the physnet associated with physical interface mentioned in
interface-name";
  tailf:info "Name of the physnet associated with physical interface mentioned in
interface-name";
  type vts-types:string128;
}

container trunk-details {
  leaf trunk-id {
    description "Trunk identifier.";
    tailf:info "Trunk identifier.";
    //Todo - leafref?

```

```

    type vts-types:uuid;
  }
  uses TRUNK-SUBPORTS;
}
list allowed-address-pairs {
  key "ip-address mac-address";
  leaf ip-address {
    type union {
      type inet:ip-address;
      type tailf:ip-address-and-prefix-length;
    }
  }
  leaf mac-address {
    type yang:mac-address;
  }
}
leaf port-security-enabled {
  description "Enable porty security at network level";
  tailf:info "Port Security Flag.";
  type boolean;
  default false;
}
}

grouping COMMON-TRUNK {
  description "Set of common data nodes for trunk ports.";
  leaf name {
    description "Trunk name.";
    tailf:info "Trunk name.";
    type vts-types:string128;
  }
  leaf port-id {
    description "Parent port of trunk.";
    tailf:info "Parent port of trunk.";
    //To do - make this a leaf ref to openstack/vmm/ports so that that port can't be
deleted until trunk is
    type vts-types:uuid;
  }
  uses TRUNK-SUBPORTS;
}

grouping COMMON-PHYSICAL-PORT {
  description "Set of common data nodes for physical ports.";
  leaf name {
    description "Port name.";
    tailf:info "Name.";
    type vts-types:string128;
  }
  leaf local-mac {
    description "Mac address of the port.";

```

```
    tailf:info "Mac address.";
    type yang:mac-address;
}
leaf connection-type {
    description "The type of the connection. That is, to " +
        "what type of device this port is connected " +
        "to.";
    tailf:info "Type of device this port is connected to.";
    type identityref {
        base "vts-ids:peer-type";
    }
}
leaf mode {
    description "Mode of the port.";
    tailf:info "Port mode.";
    type identityref {
        base "vts-ids:network-layer";
    }
}
leaf group-name {
    description "Group Name.";
    tailf:info "Group Name.";
    type vts-types:string128;
}
}

// Device grouping
grouping VTS-DEVICE-METADATA {
    leaf group-tag {
        description "Group Tagging of Device";
        tailf:info "Group Tag";
        type vts-types:string128;
    }
}
grouping COMMON-HOST-INTERFACE {

    leaf mac {
        description "Mac address of the server interface " +
            "connected to this switch port.";
        tailf:info "Mac address of the server interface " +
            "connected to this switch port.";
        type yang:mac-address;
    }
    leaf interface-name {
        description "Name of the server interface connected " +
            "to this switch port.";
        tailf:info "Name of the server interface connected " +
            "to this switch port.";
        type vts-types:string128;
    }
}
```

```

leaf sriov-enabled {
  description "Indicates if SRIOV is enabled or not on this physical interface.";
  tailf:info "Indicates if SRIOV is enabled or not on this physical interface.";
  type boolean;
}
leaf physnet-name {
  description "Name of the physnet associated with physical interface mentioned in
interface-name";
  tailf:info "Name of the physnet associated with physical interface mentioned in
interface-name";
  type vts-types:string128;
}

leaf capability {
  description "Capability of the server.";
  tailf:info "Capability of the server. " +
    "physical or virtual.";
  type identityref {
    base "vts-ids:server-capability";
  }
  //must "(../type='vts-ids:virtual-server'" {
  //error-message "Capability can be provided only for virtual servers.";
  //}
}

leaf virtual-switch {
  description "Type of switch.";
  tailf:info "Type of switch.";
  type identityref {
    base "vts-ids:switch-type";
  }
  //must "(../type='vts-ids:virtual-server'" {
  //error-message "Virtual Switch can be provided only for virtual servers.";
  //tailf:dependency "../type";
  //}
  //must "(current() = 'vts-ids:not-defined-st') or (current() != 'vts-ids:dvs-st' and
(current()../vmm-id and /vts:cisco-vts/vts:vmms/vts:vmm[id = current()../vmm-
id]/vts:type='vts-ids:openstack')) or
  //((current() != 'vts-ids:ovs-st' and current() != 'vts-ids:vtf-l2-st') and
(current()../vmm-id and /vts:cisco-vts/vts:vmms/vts:vmm[id = current()../vmm-
id]/vts:type='vts-ids:vcenter'))
  //" {
  //error-message "The following combination Virtual Switch OVS can be set only
for host managed by Openstack. OR
  // Virtual Switch DVS can be set only for host managed by vCenter. OR
  // Virtual Switch VTF-L2 can be set only for host managed by
Openstack";
  //tailf:dependency ".";
  //}
}

```

```

leaf vtf-link {
  description "Type of vtf-connection.";
  tailf:info "Type of vtf-connection.";
  type identityref {
    base "vts-ids:vtf-link";
  }
}
}
// Server groupings
grouping COMMON-SERVER {
  description "Set of common data nodes for servers.";
  leaf name {
    description "Name of the server (Hostname typically).";
    tailf:info "Server name.";
    must "not(..../connection-type = 'vts-ids:fabric') or " +
      " (../connection-type = 'vts-ids:fabric' and /ncs:devices/ncs:device[ncs:name
= current()])" {
      error-message "In fabric connection-type, valid device should be present.
Else connection-type should be server or empty.";
      tailf:dependency " ../connection-type";
    }
    type vts-types:string128;
  }
  leaf type {
    description "Type of server.";
    tailf:info "Type of server.";
    type identityref {
      base "vts-ids:server-type";
    }
    must "not(current()='vts-ids:virtual-server') or current()../ip" {
      error-message "For virtual servers and VTFs an ip address must be
provided.";
    }
  }
}

leaf vmm-id {
  description "VMM which manages the server.";
  tailf:info "VMM which manages the server.";
  type leafref {
    path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vmms/vmm/id";
  }
}

uses COMMON-HOST-INTERFACE;

leaf username {
  description "Username of server.";
  tailf:info "Username of server.";
}

```



```
    type string;
  }
  leaf password {
    description "Password of server.";
    tailf:info "Password of server.";
    type string;
  }
  leaf install-status {
    description "Status of installation.";
    tailf:info "Status of installation.";
    type identityref {
      base "vts-ids:install-status";
    }
    must "(./type='vts-ids:virtual-server')" {
      error-message "Install-status is applicable only for virtual servers.";
    }
  }
  leaf install-status-message {
    description "Detailed message describing " +
      "status of installation.";
    tailf:info "Detailed message describing " +
      "status of installation.";
    type vts-types:string255;
    must "(./type='vts-ids:virtual-server')" {
      error-message "Install-status-message is applicable only for virtual servers.";
    }
  }
}

leaf status-update-time {
  type yang:date-and-time;
  description "The timestamp when status is updated.";
  tailf:info "The timestamp when status is updated.";
}

leaf ip {
  description "Management IP address of the server ";
  tailf:info "Management IP address of the server ";
  type inet:ip-address;
}

leaf role {
  description "Role of server.";
  tailf:info "Role of server.";
  type identityref {
    base "vts-ids:server-role";
  }
  default "vts-ids:managed-server";
}
}
```

```

// TODO: If allocators do not go under cisco-vts, move this out
grouping POOL-ALLOCATIONS {
  description "List of allocations from the pool.";
  list allocation {
    description "List of pool allocations.";
    tailf:info "Pool allocation.";
    tailf:cli-suppress-mode;
    key "id";
    leaf id {
      description "Pool allocation identifier.";
      tailf:info "ID.";
      type uint32;
    }
    list owner {
      description "List of owners of the pool allocation.";
      tailf:info "Owner of the pool allocation.";
      key owner_name;
      leaf owner_name {
        description "Name of the owner of the pool allocation.";
        tailf:info "Name.";
        type vts-types:string128;
      }
    }
  }
}

grouping COMMON-VTS-TENANT-GROUPING {
  description "Set of common data nodes for vts tenants.";
  leaf description {
    description "Tenant description.";
    tailf:info "Description.";
    type vts-types:string128;
  }
  // Is this required? Should it be a leafref to uuid of tenant in vmm?
  leaf vmm-tenant-id {
    description "Tenant identifier.";
    tailf:info "ID.";
    type vts-types:string128;
  }
}

container vmms {
  list vmm {
    key vmm-id;
    leaf vmm-id {
      description "VMM which has this tenant.";
      tailf:info "VMM which has this tenant.";
      type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:vmms/vts:vmm/vts:id";
      }
    }
  }
}

```

```

    }
  }
}

grouping COMMON-ESI-GROUPING {
  description "Set of common ESI nodes.";
  leaf es-id {
    description "Ethernet segment identifier.";
    tailf:info "Ethernet segment identifier.";
    type uint32;
  }
  leaf system-mac {
    description "System Mac address.";
    tailf:info "System Mac address.";
    type string {
      tailf:info "eeee.eeee.eeee;;Specify system mac address (Option 4)";
      pattern "[0-9a-f]{4}(\.[0-9a-f]{4}){2}";
    }
  }
}

grouping SYNC-STATUS-GROUPING {
  container sync-status {
    description "VTS sync operation status.";
    tailf:info "VTS sync operation status.";

    config false;

    tailf:cdb-oper {
      tailf:persistent true;
    }

    leaf oper-type {
      description "VTS sync operation type.";
      tailf:info "VTS sync operation type.";
      type enumeration {
        enum sync-from; // sync-from operation
        enum sync-to; // sync-to operation
        enum reconcile; // reconcile operation
      }
    }

    leaf status {
      description "Status of last sync operation.";
      tailf:info "Status of last sync operation.";
      type enumeration {
        enum sync-in-progress; // Sync operation in progress
        enum sync-success; // Sync operation succeeded
      }
    }
  }
}

```

```
        enum sync-error;      // Sync operation failed (including sync-from of
reconcile)
        enum reconcile-error; // Reconcile operation failed
    }
}

leaf message {
    description "Detailed success/error message for last sync operation.";
    tailf:info "Detailed success/error message for last sync operation.";
    type string;
}

leaf update-timestamp {
    description "The timestamp when the status was updated.";
    tailf:info "The timestamp when the status was updated.";
    type yang:date-and-time;
}
}
}
}
```

6.6 UUID Server

```
submodule cisco-vts-uuid-server {

    belongs-to cisco-vts {
        prefix vts;
    }

    import cisco-vts-types {
        prefix vts-types;
    }
    include cisco-vts-common {
        revision-date 2017-06-26;
    }

    import tailf-common {
        prefix tailf;
    }
    import tailf-ncs {
        prefix ncs;
    }

    include cisco-vts-inventory {
        revision-date 2016-08-30;
    }
    import cisco-vts-identities {
        prefix vts-ids;
    }
}
```

```
import vts-service {
  prefix vts-service;
}

organization "Cisco Systems, Inc.";

contact
  "Cisco Systems, Inc.
  Customer Service

  Postal: 170 West Tasman Drive
  San Jose, CA 95134

  Tel: +1 800 533-NETS";

description
  "This module contains a collection of YANG definitions
  for Cisco's VTS's management. Specifically, for the inventory
  of the physical topology.

  Copyright (c) 2015 by Cisco Systems, Inc.
  All rights reserved.";

revision "2017-04-20" {
  description
    "VTS 2.6
    Enhancements:
    - Added leaves virtual-switch and vtf-link to the grouping UUID-SERVER.
    - Added leaf nodes sriov-enabled and physnet-name to the grouping UUID-
SERVER."
  ";
}

revision "2016-08-30" {
  description
    "VTS 2.3.1
    Enhancements:

    Corrections:
    - Relaxed must constraint in the leaf interface-name
  ";
}

revision "2016-07-15" {
  description
    "VTS 2.3.0
    Enhancements:
    - Added esi container for Ethernet segment identifier
```

```

    Corrections:
    ";

}

revision "2015-06-23" {
  description
    "Initial revision.";
}

grouping UUID-SERVER {
  container uuid-servers {
    description "Set of UUID servers";
    tailf:info "Set of UUID servers";
    list uuid-server {

      uses ncs:service-data;

      tailf:info "UUID to Server mapping";

      key "connid";

      leaf connid {
        tailf:info "Unique ID for a tor name, tor port, server name and server port";
        type vts-types:uuid;
      }

      leaf vpcid {
        tailf:info "VPC ID for this mapping";
        type vts-types:string128;
        mandatory false;
      }

      container esi {
        description "Ethernet segment identifier for port-channel interface.";
        tailf:info "Ethernet segment identifier.";
        presence "ESI";

        uses vts:COMMON-ESI-GROUPING;
      } // container esi

      leaf torname {
        tailf:info "Tor name";
        type leafref {
          path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:devices/vts:device/vts:name";
        }
      }
    }
  }

  leaf portname {

```

```

tailf:info "Port name";
type vts-types:string512;
must "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:devices/vts:device/vts:ports/vts:port/vts:name or " +
    "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:devices/vts:device/vts:ports/vts:port/vts:fexs/vts:fex/vts:ports/vts:port/vts:nam
e" {
    error-message "portname should be one of the ports/port/name " +
        " or ports/port/fexs/fex/ports/port/name";
    tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vts:devices/vts:device/vts:ports/vts:port/vts:name";
    tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-
vts/vts:devices/vts:device/vts:ports/vts:port/vts:fexs/vts:fex/vts:ports/vts:port/vts:nam
e";
}
}
leaf server-id {
    tailf:info "ID of server returned by openstack";
    type vts-types:string512;
    must "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/hosts/host/name or " +
        "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/devices/device/ports/port/servers/server/name or " +
        "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/devices/device/ports/port/fexs/fex/fex-id" {
        error-message "server name should be one of the hosts/host/name " +
            " or ports/port/servers/server/name " +
            " or ports/port/fexs/fex/name";
        tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/hosts/host/name";
        tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/devices/device/ports/port/fexs/fex/fex-id";
        tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/devices/device/ports/port/servers/server/name";
    }
}
leaf interface-name {
    tailf:info "Port on which the server is attached";
    type vts-types:string512;
    //must "/cisco-vts/devices/device/ports/port/servers/server/interface-name or " +
    //    "/cisco-vts/devices/device/ports/port/fexs/fex/ports/port/name" {
    //    error-message "server interface should be one of the ports/port/servers/server
" +
    //        " or ports/port/fexs/fex/ports/port/name";
    //    tailf:dependency "/cisco-
vts/devices/device/ports/port/servers/server/interface-name";
    //    tailf:dependency "/cisco-
vts/devices/device/ports/port/fexs/fex/ports/port/name";
    //}
}

```

```

} // interface-name
leaf server-type {
  description "Type of server.";
  tailf:info "Type of server.";
  type identityref {
    base "vts-ids:server-type";
  }
}
leaf sriov-enabled {
  description "Indicates if SRIOV is enabled or not on this physical interface.";
  tailf:info "Indicates if SRIOV is enabled or not on this physical interface.";
  type boolean;
}
leaf physnet-name {
  description "Name of the physnet associated with physical interface mentioned
in interface-name";
  tailf:info "Name of the physnet associated with physical interface mentioned in
interface-name";
  type vts-types:string128;
}
leaf virtual-switch {
  description "Type of switch.";
  tailf:info "Type of switch.";
  type identityref {
    base "vts-ids:switch-type";
  }
  default vts-ids:not-defined-st;
}

leaf vtf-link {
  must "../server-type='vts-ids:virtual-server'";
  description "Type of vtf-connection.";
  tailf:info "Type of vtf-connection.";
  type identityref {
    base "vts-ids:vtf-link";
  }
}
leaf group-id {
  description "Multi Homing group Id";
  tailf:info "Multi Homing group.";
  type vts-types:string128;
}
leaf role {
  description "Connection role.";
  tailf:info "Connection role.";
  type identityref {
    base "vts-ids:server-role";
  }
  default "vts-ids:managed-server";
}

```



```
    } // list of uuid-server
  } // container uuid-servers
} // grouping UUID-SERVER
} // submodule cisco-vts-uuid-server
```

6.7 Infrastructure Policy

```
submodule cisco-vts-infrastructure-policy {
```

```
  belongs-to cisco-vts {
    prefix vts;
  }
```

```
  import tailf-common {
    prefix tailf;
  }
```

```
  import tailf-ncs {
    prefix ncs;
  }
```

```
  import cisco-vts-profiles {
    prefix vts-profiles;
  }
```

```
  import ietf-inet-types {
    prefix inet;
  }
```

```
  import ietf-yang-types {
    prefix ietf-yang;
  }
```

```
  include cisco-vts-common {
    revision-date 2017-06-26;
  }
```

```
  include cisco-vts-inventory {
    revision-date 2016-08-30;
  }
```

```
  import cisco-vts-types {
    prefix vts-types;
  }
```

```
  import cisco-vts-identities {
    prefix vts-ids;
  }
```

```
  import vts-service {
    prefix vts-service;
  }
```

organization "Cisco Systems, Inc.";

contact

"Cisco Systems, Inc.
Customer Service

Postal: 170 West Tasman Drive
San Jose, CA 95134

Tel: +1 800 533-NETS";

description

"This module contains a collection of YANG definitions
for Cisco's VTS management. Specifically, for the
management of the infrastructure policy.

Copyright (c) 2015 by Cisco Systems, Inc.
All rights reserved.";

revision "2017-04-28" {

description

"VTS 2.6

Enhancements:

- Added l2-vs-groups to group the host based on the virtual switch type usage.

";

}

revision "2016-08-30" {

description

"VTS 2.3.1

Enhancements:

- Added leaf gwgroup-change-timestamp to all the devices which track gateway group changes

Corrections:

- changed dc-gw-parent from choice to presence container
- changed cisco-vts-profiles prefix from profiles to vts-profiles

";

}

revision "2016-07-15" {

description

"VTS 2.3.0

Enhancements:

Corrections:

- Modified leafref paths from
/cisco-vts/devices/device/name to

```
    /ncs:devices/ncs:device/ncs:name

";
}

revision "2015-06-21" {
  description
    "Initial revision.";
}

identity iccp-group-type {
  description "Base identity for iccp groups - either fabric or core";
}

identity iccp-fabric-group {
  base iccp-group-type;
  description "Fabric (VXLAN) group type";
  tailf:info "Fabric (VXLAN) group type";
}

identity iccp-core-group {
  base iccp-group-type;
  description "Core (MPLS) group type";
  tailf:info "Core (MPLS) group type";
}

grouping DCI-GROUP-REDUNDANCY-SETTINGS {
  container redundancy-group {
    description "Nodes in this container control the " +
      "Redundancy/Availability settings of an l3-dci-group.";
    tailf:info "Redundancy/Availability parameters.";

    presence "DCI Group Redundancy";
    uses ncs:service-data;
    ncs:servicepoint dc1-group-redundancy-settings-servicepoint;
  }

  container iccp {
    description "Nodes in this container control the " +
      "redundancy ICCP behavior of an l3-dci-group.";
    tailf:info "ICCP parameters.";

    container groups {
      description "Nodes in this container control the " +
        "redundancy ICCP fabric and core groups of an l3-dci-group.";
      tailf:info "Redundancy ICCP group parameters.";
      list group {
```

```

    key id;
    leaf id {
      type uint32 {
        tailf:info "<1-4294967295>;Enter group number";
        range "1..4294967295";
      }
      mandatory true;
    }
    leaf group-type {
      description "ICCP Group Type (Fabric or Core).";
      tailf:info "ICCP Group Type (Fabric or Core).";
      type identityref {
        base iccp-group-type;
      }
      mandatory true;
    }
  } // container groups
} // container iccp

container esi {
  description "Nodes in this container control the " +
    "redundancy ESI core-esi of an l3-dci-group.";
  tailf:info "ESI core-esi parameter.";

  leaf core-esi {
    type string;
    description "Configure ESI core group number <0-ff>;9-octet ESI value";
    tailf:info "Configure ESI core group number <0-ff>;9-octet ESI value";
  }
}

container anycast {
  description "Nodes in this container control the " +
    "redundancy anycast parameters of an l3-dci-group.";
  tailf:info "Anycast parameters.";

  leaf loopback-id {
    tailf:info "loopback id number.";
    type uint32 {
      tailf:info "<0-2147483647>";
      range "0..2147483647";
    }
  } // leaf loopback-id
} // container anycast

uses vts-types:MODIFIED-TIME-ELEMENT;
} // container redundancy-group
} // grouping DCI-GROUP-REDUNDANCY-SETTINGS

```

```

grouping GROUP-POLICY-PARAMS {
  leaf control-plane-protocol {
    description
      "Control plane protocol used to learn end point addresses.";
    tailf:info "Control plane protocol.";
    type identityref {
      base "vts-ids:control-plane-protocol";
    }
  }
  leaf data-plane-encapsulation-protocol {
    description
      "Data plane encapsulation protocol used to encapsulate data packets.";
    tailf:info "Data plane encapsulation protocol.";
    type identityref {
      base "vts-ids:data-plane-encapsulation-protocol";
    }
  }
  leaf arp-suppression {
    description
      "Enables BGP EVPN ARP suppression.";
    tailf:info "ARP suppression.";
    type empty;
  }
  leaf packet-replication {
    description
      "Packet replication mechanism. It determines how" +
      "packets sent to multiple recipients are " +
      "replicated, so that each recipient gets a copy.";
    tailf:info "Packet replication.";
    type identityref {
      base "vts-ids:packet-replication-mode";
    } // type identityref
  } // leaf packet-replication
} // grouping GROUP-POLICY-PARAMS

```

```

grouping GROUP-POLICY-PARAMS-L3GW {
  container policy-parameters {
    description "Nodes in this container control the " +
      "behavior of an L3 group of " +
      "the infrastructure policy.";
    tailf:info "Policy parameters.";
    leaf distribution-mode {
      description
        "Mode of distribution.";
      tailf:info "Distribution mode.";
      type identityref {
        base "vts-ids:l3-distribution-mode";
      }
    }
  }
  uses GROUP-POLICY-PARAMS {

```

```

    refine "packet-replication" {
      must "count(..../l3-gateway-group/policy-parameters/packet-replication !=
current()/../packet-replication) = 0" {
        error-message "L3 gateway groups within the same administrative " +
          "domain must use the same packet replication mechanism.";
        tailf:dependency ".";
      }
    } // refine "packet-replication"
  } // uses GROUP-POLICY-PARAMS
} // container policy-parameters
} // grouping GROUP-POLICY-PARAMS-L3GW

grouping INFRA-POLICY {
  container infra-policy {
    container admin-domains {
      description "Set of administrative domains.";
      tailf:info "Administrative domains.";
      list admin-domain {
        description "List of administrative domains.";
        tailf:info "Administrative domain.";
        key name;
        leaf name {
          description "Name of the administrative domain.";
          tailf:info "Name.";
          type vts-types:string128;
        }
        leaf description {
          description "Description of the administrative domain.";
          tailf:info "Description.";
          type vts-types:string128;
        }
        leaf global-route-reflector-mode {
          description "Enable the Global Route Reflector mode.";
          tailf:info "Global route reflector mode.";
          type empty;
        }
      }
      container l2-vs-groups {
        description "Sets of layer 2 virtual switch groups.";
        tailf:info "Layer 2 virtual switch groups.";
        list l2-vs-group {
          description "List of layer 2 virtual switch group.";
          tailf:info "Layer 2 virtual switch group.";
          key name;
          leaf name {
            description "Name of the L2 virtual switch group.";
            tailf:info "Name.";
            type vts-types:string128;
            must "count(..../admin-domain/l2-vs-groups/l2-vs-group[name =
current()/../name]) = 1" {
              error-message "The name of a l2 virtual switch group must be unique

```

```

system wide.";
    tailf:dependency ".";
  }
}
leaf description {
  description "Description of Layer 2 virtual switch group.";
  tailf:info "Description.";
  type vts-types:string128;
}

container vtsr-devices {
  list vtsr-device {
    description "List of associated vtsr devices when group-type is vtf-l2-vs-
group";
    tailf:info "List of associated vtsr devices when group-type is vtf-l2-vs-
group";
    key name;
    leaf name {
      description "Name of VTSR device that is part of VTS inventory.";
      tailf:info "Name of VTSR device that is part of VTS inventory.";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
    }
  } // list vtsr-device
} //container vtsr-devices

container hosts {
  description "Set of hosts, acting as layer 2 virtual switches.";
  tailf:info "Hosts in the L2 virtual switch group.";
  list host {
    key "name group-type";
    leaf name {
      description "Name of the host.";
      tailf:info "Host Name.";
      type vts-types:string128;
    } // leaf name
  }

  leaf group-type {
    description "Type of the L2 virtual switch group this host belongs";
    tailf:info "Type of the L2 virtual switch group this host belongs.";
    type identityref {
      base "vts-ids:l2-vs-group-type";
    }
  }

  leaf vtf_ip {
    when "../vts:group-type = 'vts-ids:vtf-l2-vs-group'";
    description "IP address of the VTF instance on the host, when group-type

```

```

is vtf-l2-vs-group";
    tailf:info "IP address of the VTF instance on the host, when group-type is
vtf-l2-vs-group";
    type inet:ip-address;
    } // leaf vtf_ip

    leaf l2-vs-group-change-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when the group change was triggered";
    tailf:info "The timestamp when the group change was triggered";
    } // leaf forwarder-group-change-timestamp
    } // list host
} // container hosts
leaf ad-l2-gw-parent {
    description "This group's L2 gateway parent in " +
        "the current administrative domain " +
        "in the infrastructure policy hierarchy.";
    tailf:info "L2 gateway in current admin domain.";
    type leafref {
        path "../..../l2-gateway-groups/l2-gateway-group/name";
    }
} // leaf ad-l2-gw-parent
} // list l2-vs-group
} // container l2-vs-groups

container l2-gateway-groups {
    description "Set of layer 2 gateway groups.";
    tailf:info "Layer 2 gateway groups.";
    list l2-gateway-group {
        description "List of layer 2 gateway groups.";
        tailf:info "Layer 2 gateway group.";
        key name;
        leaf name {
            description "Name of the L2 gateway group.";
            tailf:info "Name.";
            type vts-types:string128;
            must "count("../..../admin-domain/l2-gateway-groups/l2-gateway-
group[name = current()../name]) =1" {
                error-message "The name of a l2 gateway group must be unique system
wide.";
            }
            tailf:dependency ".";
        }
    }
    leaf description {
        description "Description of Layer 2 gateway group.";
        tailf:info "Description.";
        type vts-types:string128;
    }

    container devices {

```



```

description "Set of layer 2 devices, acting as layer 2 gateways.";
tailf:info "Devices.";
list device {
  uses ncs:service-data;
  ncs:servicepoint l2-gateway-group-servicepoint;
  key name;
  leaf name {
    description "Name of the device.";
    tailf:info "Name.";
    type leafref {
      path "/ncs:devices/ncs:device/ncs:name";
    }
    must "count(..../admin-domain/l2-gateway-groups/l2-gateway-
group/devices/device[name = current()../name]) = 1" {
      error-message "A device can only belong to one l2 gateway group.";
      tailf:dependency ".";
    }
    must "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:global-settings/vts:anycast-gateway/vts:anycast-gw-address" {
      error-message "L2 gateway requires an anycast gateway mac address.";
      tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vts:global-settings/vts:anycast-gateway/vts:anycast-gw-
address";
    }
  } // leaf name
  leaf gwgroup-change-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when the gateway group change was
triggered";
    tailf:info "The timestamp when the gateway group change was
triggered";
  } // leaf gwgroup-change-timestamp
} // list device
} // container devices

choice parent {
  case ad-l3-gw-parent-case {
    leaf ad-l3-gw-parent {
      description "This group's L3 gateway parent in " +
        "the current administrative domain " +
        "in the infrastructure policy hierarchy.";
      tailf:info "L3 gateway in current admin domain.";
      type leafref {
        path "..../l3-gateway-groups/l3-gateway-group/name";
      }
    }
  } // l3-gw-parent-case
  case l3-gw-parent-case {
    leaf l3-gw-parent {
      description "This group's L3 gateway parent in the infrastructure policy

```

```

hierarchy.";
    tailf:info "L3 gateway.";
    type leafref {
      path "../..../l3-gateway-groups/l3-gateway-group/name";
    }
  } // l3-gw-parent-case
} // choice parent
container dc-gw-parameters {
  presence "Creates dc gw parameters.";
  description "Parameters for the DC gw reference.";
  tailf:info "Parameters for the DC gw reference.";
  uses ncs:service-data;
  ncs:servicepoint l3-dc-gw-parameters-servicepoint;
  choice dc-gw-parent {
    case l3-dc-gw-parent-case {
      leaf l3-dc-gw-parent {
        description "This group's L3 datacenter gateway parent in the
infrastructure policy hierarchy.";
        tailf:info "L3 datacenter gateway.";
        type leafref {
          path "../..../l3-dc-gateway-groups/l3-dc-gateway-group/name";
        }
      }
    } // case l3-dc-gw-parent-case
  } // choice dc-gw-parent
} // container dc-gw-parameters
container policy-parameters {
  description "Nodes in this container control the " +
    "behavior of an L2 group of " +
    "the infrastructure policy.";
  tailf:info "Policy parameters.";
  leaf distribution-mode {
    description
      "Mode of distribution.";
    tailf:info "Distribution mode.";
    type identityref {
      base "vts-ids:l2-distribution-mode";
    }
  }
}
uses GROUP-POLICY-PARAMS {
  refine "packet-replication" {
    must "count(..../l2-gateway-group/policy-parameters/packet-
replication != current()../packet-replication) = 0" {
      error-message "L2 gateway groups within the same administrative " +
        "domain must use the same packet replication mechanism.";
      tailf:dependency ".";
    }
  }
} // uses GROUP-POLICY-PARAMS

```

```

    } // container policy-parameters
  } // list l2-gateway-groups
} // container l2-gateway-groups

container l3-gateway-groups {
  description "Set of layer 3 gateway groups.";
  tailf:info "Layer 3 gateway groups.";
  list l3-gateway-group {
    description "List of layer 3 gateway groups.";
    tailf:info "Layer 3 gateway group.";
    key name;
    leaf name {
      description "Name of the L3 gateway group.";
      tailf:info "Name.";
      type vts-types:string128;
    }
    leaf current-dc-gw-parent {
      description "Name of the current L3 DC gateway group parent chosen to
achieve load balancing.";
      tailf:info "Name of current L3 DC gateway group parent.";
      type vts-types:string128;
    }
    leaf description {
      description "Description of the layer 3 gateway group.";
      tailf:info "Description.";
      type vts-types:string128;
    }
    choice parent {
      case l3-dc-gw-parent-case {
        container l3-dc-gw-parents {
          description "This groups's set of (L3 datacenter gateway group) parents in
the infrastructure policy hierarchy. " +
          "When multiple parents are defined, they are used for load
balancing. ";
          tailf:info "L3 datacenter gateway group parents.";

          list l3-dc-gw-parent {
            description "List of this groups's set of L3 datacenter gateway parents in
the infrastructure policy hierarchy.";
            tailf:info "L3 datacenter gateway group parent.";

            key name;
            leaf name {
              description "A L3 datacenter gateway group acting as parent of this
group in the infrastructure policy hierarchy.";
              tailf:info "Name.";
              type leafref {
                path "../..../l3-dc-gateway-groups/l3-dc-gateway-
group/name";
              }
            }
          }
        }
      }
    }
  }
}

```

```

    }
    } // list l3-dc-gw-parent
  } // container l3-dc-gw-parents
} // case l3-dc-gw-parent-case
} // choice parent

container devices {
  description "Set of layer 3 devices, acting as site-wide data center
gateways.";
  tailf:info "Devices.";
  list device {
    uses ncs:service-data;
    ncs:servicepoint l3-gateway-group-servicepoint;
    key name;
    leaf name {
      description "Set of layer 3 devices, acting as layer 3 gateways.";
      tailf:info "Name.";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
      must "count(..../..../admin-domain/l3-gateway-groups/l3-gateway-
group/devices/device[name = current()../name]) = 1" {
        error-message "A device can only belong to one l3 gateway group.";
        tailf:dependency ".";
      }
    } // leaf name
    leaf gwgroup-change-timestamp {
      type ietf-yang:date-and-time;
      description "The timestamp when the gateway group change was
triggered";
      tailf:info "The timestamp when the gateway group change was
triggered";
    } // leaf gwgroup-change-timestamp
  } // list device
} // container devices
uses GROUP-POLICY-PARAMS-L3GW;
} // list l3-gateway-groups
} // container l3-gateway-groups

container route-reflectors {
  description "Set of route-reflectors.";
  tailf:info "Route Reflectors.";
  list route-reflector {
    description "List of route reflector.";
    tailf:info "Route Reflector.";
    uses ncs:service-data;
    ncs:servicepoint route-reflector-device-servicepoint;
    key name;
    leaf name {
      description "Name of the route reflector.";

```

```

    tailf:info "Name.";
    type leafref {
      path "/ncs:devices/ncs:device/ncs:name";
    }
  }
  leaf gwgroup-change-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when the route reflector device change was
triggered";
    tailf:info "The timestamp when the route reflector device change was
triggered";
  } // leaf gwgroup-change-timestamp
} // list route-reflector
} // container route-reflectors
} // list admin-domain
} // container admin-domains

container l3-gateway-groups {
  description "Set of layer 3 gateway groups.";
  tailf:info "Layer 3 gateway groups.";
  list l3-gateway-group {
    description "List of layer 3 gateway groups.";
    tailf:info "Layer 3 gateway group.";
    key name;
    leaf name {
      description "Name of the L3 gateway group.";
      tailf:info "Name.";
      type vts-types:string128;
    }
    leaf current-dc-gw-parent {
      description "Name of the current L3 DC gateway group parent chosen to
achieve load balancing.";
      tailf:info "Name of current L3 DC gateway group parent.";
      type vts-types:string128;
    }
    leaf description {
      description "Description of the layer 3 gateway group.";
      tailf:info "Description.";
      type vts-types:string128;
    }
  }
  choice parent {
    case l3-dc-gw-parent-case {
      container l3-dc-gw-parents {
        description "This groups's set of (L3 datacenter gateway group) parents in
the infrastructure policy hierarchy. " +
          "When multiple parents are defined, they are used for load
balancing. ";
        tailf:info "L3 datacenter gateway group parents.";
      }
      list l3-dc-gw-parent {

```

```

        description "List of this groups's set of L3 datacenter gateway parents in
the infrastructure policy hierarchy.";
        tailf:info "L3 datacenter gateway group parent.";

        key name;
        leaf name {
            description "A L3 datacenter gateway group acting as parent of this
group in the infrastructure policy hierarchy.";
            tailf:info "Name.";
            type leafref {
                path "../..../l3-dc-gateway-groups/l3-dc-gateway-group/name";
            }
        }
    } // list l3-dc-gw-parent
} // container l3-dc-gw-parents
} // case l3-dc-gw-parent-case
} // choice parent

container devices {
    description "Set of layer 3 devices, acting as layer 3 gateways.";
    tailf:info "Devices.";
    list device {
        uses ncs:service-data;
        ncs:servicepoint l3-gateway-group-servicepoint;
        key name;
        leaf name {
            description "Name of the device.";
            tailf:info "Name.";
            type leafref {
                path "/ncs:devices/ncs:device/ncs:name";
            }
            must "count(..../l3-gateway-group/devices/device[name =
current()../name]) = 1" {
                error-message "A device can only belong to one l3 gateway group.";
                tailf:dependency ".";
            }
        } // leaf name
        leaf gwgroup-change-timestamp {
            type ietf-yang:date-and-time;
            description "The timestamp when the gateway group change was triggered";
            tailf:info "The timestamp when the gateway group change was triggered";
        } // leaf gwgroup-change-timestamp
    } // list device
} // container device
uses GROUP-POLICY-PARAMS-L3GW;
} // list l3-gateway-groups
} // container l3-gateway-groups

container l3-dc-gateway-groups {
    description "Set of layer 3 gateway groups, acting " +

```

```

        "as data center gateways at the site level.";
    tailf:info "Layer 3 gateway (site DCGW) groups.";
    list l3-dc-gateway-group {
        description "List of layer 3 gateway groups, acting " +
            "as data center gateways. " +
            "Devices in a group must be configured to provide redundancy among
themselves";
        tailf:info "Layer 3 gateway (site DCGW) group.";
        key name;
        leaf name {
            description "Name of the L3 gateway group " +
                "(data center gateway).";
            tailf:info "Name.";
            type vts-types:string128;
        }
        leaf description {
            description "Description of the layer 3 data center gateway group.";
            tailf:info "Description.";
            type vts-types:string128;
        }
        leaf l3-dci-parent {
            description "This group's datacenter gateway interconnect parent in the
infrastructure policy hierarchy.";
            tailf:info "DCI.";
            type leafref {
                path "../..../l3-dci-groups/l3-dci-group/name";
            }
            mandatory true;
        }
    }

    container devices {
        description "Set of layer 3 devices, acting as site-wide data center gateways.";
        tailf:info "Devices.";
        list device {
            uses ncs:service-data;
            ncs:servicepoint dcgw-gateway-group-servicepoint;
            description "List of the devices.";
            tailf:info "device.";

            key name;
            leaf name {
                description "Name of the device.";
                tailf:info "Name.";
                type leafref {
                    path "/ncs:devices/ncs:device/ncs:name";
                }

                must "count("../..../l3-dc-gateway-group/devices/device[name =
current()../name]) = 1" {
                    error-message "A device can only belong to one l3 site-wide data center

```

```

gateway group.";
    tailf:dependency ".";
  }
} // leaf name
leaf gwgroup-change-timestamp {
  type ietf-yang:date-and-time;
  description "The timestamp when the gateway group change was triggered";
  tailf:info "The timestamp when the gateway group change was triggered";
} // leaf gwgroup-change-timestamp
} // list device
} // devices

```

```

container policy-parameters {
  description "Nodes in this container control the " +
    "behavior of an L2 group of " +
    "the infrastructure policy.";
  tailf:info "Policy parameters.";
  leaf control-plane-protocol {
    description
      "Control plane protocol used to learn end point addresses.";
    tailf:info "Control plane protocol.";
    type identityref {
      base "vts-ids:control-plane-protocol";
    }
  } // leaf control-plane-protocol
  leaf data-plane-encapsulation-protocol {
    description
      "Data plane encapsulation protocol used to encapsulate data packets.";
    tailf:info "Data plane encapsulation protocol.";
    type identityref {
      base "vts-ids:data-plane-encapsulation-protocol";
    }
  } // data-plane-encapsulation-protocol
} // container policy-parameters
} // list l3-gateway-site-dcgw-group
} // container l3-gateway-site-dcgw-groups

```

```

container l3-dci-groups {
  description "Set of layer 3 gateway groups, acting " +
    "as data center interconnects.";
  tailf:info "Layer 3 gateway (DCI) groups.";
  list l3-dci-group {
    description "List of layer 3 gateway groups, acting " +
      "as data center interconnects.";
    tailf:info "Layer 3 gateway (DCI) group.";
    key name;
    leaf name {
      description "Name of the L3 gateway group " +

```



```

        "(data center gateway).";
    tailf:info "Name.";
    type vts-types:string128;
}
leaf description {
    description "Description of the layer 3 data center interconnect group.";
    tailf:info "Description.";
    type vts-types:string128;
}

container devices {
    description "Set of layer 3 devices, acting as data center interconnects.";
    tailf:info "Devices.";
    list device {
        uses ncs:service-data;
        ncs:servicepoint dci-gateway-group-servicepoint;
        key name;
        leaf name {
            description "Name of the device.";
            tailf:info "Name.";
            type leafref {
                path "/ncs:devices/ncs:device/ncs:name";
            }
            must "count(..../13-dci-group/devices/device[name = current()../name])
= 1" {
                error-message "A device can only belong to one data center interconnect
group.";
                tailf:dependency ".";
            }
        } // leaf name
        leaf gwgroup-change-timestamp {
            type ietf-yang:date-and-time;
            description "The timestamp when the gateway group change was triggered";
            tailf:info "The timestamp when the gateway group change was triggered";
        } // leaf gwgroup-change-timestamp
    } // list device
} // container devices

uses DCI-GROUP-REDUNDANCY-SETTINGS;

container stitching-profiles {
    description "Set of stitching profiles.";
    tailf:info "Stitching Profiles.";
    list stitching-profile {
        uses ncs:service-data;
        ncs:servicepoint dci-gateway-group-stitching-servicepoint;
        key id;
        leaf id {
            description "Id of the stitching profile.";
            tailf:info "Id.";
        }
    }
}

```

```

    type leafref {
      path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts-
profiles:profiles/vts-profiles:profile/vts-profiles:id";
    }
    //must "/vts-service:vts-service/vts-service:sites/vts-service:site/vts-
profiles:profiles/vts-profiles:profile[id = current()]/type = 'vts-profiles:stitching'";
  }
  uses vts-types:MODIFIED-TIME-ELEMENT;
} // list stitching-profile
} // stitching-profiles
} // list l3-gateway-dci-group
} // container l3-gateway-dci-groups
} // container infra-policy
} // grouping INFRA-POLICY
}

```

6.8 Device Extension

6.8.1 N9K

```

//module cisco-vts-n9k-extension {
module n9k-extension {
  namespace "http://cisco.com/ns/yang/services/n9k-extension";
  prefix n9k-extension;

  import ietf-inet-types {
    prefix inet;
  }
  import ietf-yang-types {
    prefix yang;
  }
  import tailf-common {
    prefix tailf;
  }
  import tailf-ncs {
    prefix ncs;
  }
  import vts-service {
    prefix vts-service;
  }
  import cisco-vts {
    prefix vts;
  }
  import cisco-vts-types {
    prefix vts-types;
  }
  import cisco-vts-identities {
    prefix vts-ids;
  }

```

```

}

organization "Cisco Systems, Inc.";

contact
  "Cisco Systems, Inc.
  Customer Service

  Postal: 170 West Tasman Drive
  San Jose, CA 95134

  Tel: +1 800 533-NETS";

description
  "This module contains a collection of YANG definitions
  for Cisco's VTS's management. Specifically, for the management
  of the Cisco N9K devices.

  Copyright (c) 2015-2016 by Cisco Systems, Inc.
  All rights reserved.";

revision "2016-07-15" {
  description
    "VTS 2.3.0
    Enhancements:
      - Added container esi under list port-channel
      - Added container ethernet-segments under container device-info
    Corrections:
    ";
}

revision "2015-02-28" {
  description
    "Initial revision.";
}

augment "/ncs:devices/ncs:device" {
  when "ncs:device-type/ncs:cli/ncs:ned-id='cisco-nx-id:cisco-nx'";

  container device-info {

    presence "Creates device info";

    // TODO: remove. This is a copy of another leaf in the same container w/ the
    same name

    uses vts:VTS-DEVICE-METADATA;
    uses vts:LOOPBACKS;

```

```

uses vts:SYNC-STATUS-GROUPING;

uses ncs:service-data;
ncs:servicepoint device-info-servicepoint;

leaf name {
  tailf:info "Device name ( Switch )";
  type leafref {
    path "/ncs:devices/ncs:device/ncs:name";
  }
}

leaf platform {
  // TODO: reconsider having a leaf saying this is a N9K on a N9k-specific
extension
  // consider we may different subtypes of N9K platforms
  description "Device platform.";
  tailf:info "Platform.";
  type identityref {
    base "vts-ids:switch-platform";
  }
}
leaf pending-sync {
  description "Does the device need to be synced?";
  tailf:info "Sync status.";
  type empty;
}
leaf OS {
  description "Operating System.";
  tailf:info "Operating System.";
  type vts-types:string128;
}
leaf version {
  description "Operating System version.";
  tailf:info "Operating System version.";
  type string;
}
leaf device-use {
  description "Role of the switch. How it is being used.";
  tailf:info "Usage (role) of the switch.";
  type identityref {
    base "vts-ids:switch-role";
  }
}
leaf group-id {
  tailf:info "Group id";
  type string;
}
leaf peering-mode {
  tailf:info "Mode in which DC-GW operates";
}

```

```

    type enumeration { enum VRF-PEERING; enum INTEGRATED; }
  }
  leaf vrf-capacity {
    tailf:info "Vrf Capacity of the device";
    default 900;
    type uint32;
  }
  container bgp-peering-info {
    description "BGP peering information.";
    tailf:info "BGP peering information.";
    leaf bgp-asn {
      description "BGP ASN number.";
      tailf:info "BGP ASN number.";
      type uint32;
    }
    leaf loopback-profile-name {
      type leafref {
        path "../..../loopbacks/loopback-profile/name";
      }
    }
  }
}
list port {
  description "List of switch ports.";
  tailf:info "Switch port.";
  key name;

  uses vts:COMMON-PHYSICAL-PORT;
}

leaf port-channel-membership {
  // TODO: remove
  description "Port channel membership.";
  tailf:info "Port channel membership.";
  type vts-types:string128;
  // TODO: consider semantics of this default
  default "none";
}
leaf remote-interface-name {
  description "Interface name of the remote node connected " +
    "to the port.";
  tailf:info "Interface name of the remote node connected " +
    "to the port.";
  type vts-types:string128;
}

leaf remote-mac {
  description "MAC address of the remote node connected " +
    " to the port.";
  tailf:info "Remote MAC address.";
  type yang:mac-address;
}

```

```

leaf remote-type {
  description "Type of the remote server connected " +
    "to the port.";
  tailf:info "Type of the remote server connected " +
    "to the port.";
  type identityref {
    base "vts-ids:server-type";
  }
}
list remote-server-id {
  key name;
  leaf name {
    description "Identifier of the remote server connected " +
      "to the port.";
    tailf:info "ID of the remote server connected " +
      "to the port.";
    type vts-types:string128;
  }
}
} //port
container vpc {
  leaf vpc-id {
    tailf:info "<-1000 - 4096> Domain id.";
    type vts-types:vpc-id;
  }
  container vpc-peer {
    leaf vpc-peer-ip {
      tailf:info "Specify destination ip address of peer switch.";
      type inet:ip-address;
    }
    leaf vpc-peer-name {
      tailf:info "Specify peer switch name.";
      type vts-types:string128;
    }
  }
  leaf vpc-peer-link {
    description "Peer link of the virtual port channel.";
    tailf:info "<1-4096>;Port Channel number.";
    type uint16 {
      range "1..4096";
    }
  }
} // container vpc

container ethernet-segments {
  description "Ethernet segments.";
  tailf:info "Ethernet segments.";

  list ethernet-segment {
    description "Ethernet segment.";
  }
}

```

```

tailf:info "Ethernet segment.";

key "es-id system-mac";

uses vts:COMMON-ESI-GROUPING;

container ethernet-segment-peers {
  description "Ethernet segment peers.";
  tailf:info "Ethernet segment peers.";

  list ethernet-segment-peer {
    description "Ethernet segment peer.";
    tailf:info "Ethernet segment peer.";

    key name;

    leaf name {
      description "Ethernet segment peer device name.";
      tailf:info "Ethernet segment peer device name.";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
    }
  } // list ethernet-segment-peer
} // container ethernet-segment-peers
} // list ethernet-segment
} // container ethernet-segments

list port-channel {
  description "List of port channel the switch belongs to.";
  tailf:info "Port channel.";
  key name;
  leaf name {
    description "Port channel name.";
    tailf:info "<1-4096>;Port Channel number.";
    // TODO: reconsider this into an integer
    type uint16 {
      range "1..4096";
    }
  }
}

leaf vpc-id {
  tailf:info ";<-1000-4096> VPC id.";
  type vts-types:vpc-id;
}

leaf is-vpc-peer-link {
  description "Interface is a vpc peer link.";
  tailf:info "Interface is a vpc peer link.";
  type boolean;
}

container esi {

```

```

description "Ethernet segment identifier for port-channel interface.";
tailf:info "Ethernet segment identifier.";
presence "ESI";

uses vts:COMMON-ESI-GROUPING;
} // container esi
leaf type {
description "Type of port channel.";
tailf:info "Type.";
type identityref {
base "vts-ids:port-channel-type";
}
}
list ports {
description "Set of ports belonging to the port channel.";
tailf:info "Port inthe port channel.";
key name;

leaf name {
description "Port name.";
tailf:info "Port name.";
type vts-types:string128;
}
} //port-channel-list

container servers {
description "Servers connected to the switch.";
tailf:info "Servers.";

list server {
description "List of servers connected to the switch.";
tailf:info "Server.";
key server-id;
leaf server-id {
description "Server identifier.";
tailf:info "ID.";
type vts-types:string128;
}
list nic {
description "List of network controller interfaces on " +
"the server.";
tailf:info "NIC.";
key id;
leaf id {
description "Identifier of the network controller " +
"interface";
tailf:info "ID.";
type vts-types:string128;
}
}
}

```



```

leaf mac {
    // TODO: note how the same data is in multiple places
    description "MAC address of the network controller " +
        "interface";
    tailf:info "MAC.";
    type leafref {
        path "../..../port/remote-mac" ;
    }
}
leaf ip {
    description "IP address of the network controller " +
        "interface";
    tailf:info "IP.";
type inet:ip-address;
}
leaf remote-mac {
    // TODO: note how the same data is in multiple places
    description "MAC address of the switch port the " +
        "server NIC is connected to";
    tailf:info "Switch port MAC.";
    type leafref {
        path "../..../port/local-mac" ;
    }
}
} //nic
} //server
} //servers
leaf device-group {
    description "Refers the device-group";
    tailf:info "Refers the device-group";
    type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:device-groups/vts:device-group/vts:name";
    }
} //device-group
} //device-info
} //augment
} //module

```

6.8.2 ASR9K

```

module asr9k-extension {
    namespace "http://cisco.com/ns/yang/services/asr9k-extension";
    prefix asr9k-extension;

import vts-service {
    prefix vts-service;

```

```
}

import ietf-inet-types {
  prefix inet;
}
import ietf-yang-types {
  prefix yang;
}
import tailf-common {
  prefix tailf;
}
import tailf-ncs {
  prefix ncs;
}
import cisco-vts {
  prefix vts;
}
import cisco-vts-types {
  prefix vts-types;
}
import cisco-vts-identities {
  prefix vts-ids;
}

organization "Cisco Systems, Inc.";

contact
  "Cisco Systems, Inc.
  Customer Service

  Postal: 170 West Tasman Drive
  San Jose, CA 95134

  Tel: +1 800 533-NETS";

description
  "This module contains a collection of YANG definitions
  for Cisco's VTS's management. Specifically, for the management
  of the Cisco ASR9K devices.

  Copyright (c) 2015-2016 by Cisco Systems, Inc.
  All rights reserved.";

revision "2016-08-30" {
  description
    "VTS 2.3.1
    Enhancements:
      - Support bundles between DcGw and Dci for VRF peering
    Corrections:
      - corrected naming conversion port-channel to bundle-ether
```

```

";
}

revision "2015-02-28" {
  description
    "Initial revision.";
}

augment "/ncs:devices/ncs:device" {
  when "ncs:device-type/ncs:cli/ncs:ned-id='cisco-ios-xr-id:cisco-ios-xr'";

  container device-info {

    presence "Creates device info";

    // TODO: remove. This is a copy of another leaf in the same container w/ the
same name
    uses vts:VTS-DEVICE-METADATA;
    uses vts:LOOPBACKS;
    uses vts:SYNC-STATUS-GROUPING;

    uses ncs:service-data;
    ncs:servicepoint device-info-servicepoint;

    leaf name {
      tailf:info "Device name ( Switch)";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
    }
    leaf platform {
      // TODO: reconsider having a leaf saying this is a ASR9K on a ASR9k-specific
extension
      // consider we may different subtypes of ASR9K platforms
      description "Device platform.";
      tailf:info "Platform.";
      type identityref {
        base "vts-ids:switch-platform";
      }
      default vts-ids:ASR9K;
    }
    leaf pending-sync {
      description "Does the device need to be synced?";
      tailf:info "Sync status.";
      type empty;
    }
    leaf OS {
      description "Operating System.";
      tailf:info "Operating System.";
      type vts-types:string128;

```

```

}
leaf version {
  description "Operating System version.";
  tailf:info "Operating System version.";
  type string;
}
leaf device-use {
  description "Role of the switch. How it is being used.";
  tailf:info "Usage (role) of the switch.";
  type identityref {
    base "vts-ids:switch-role";
  }
}
leaf group-id {
  tailf:info "Group id";
  type string;
}
leaf peering-mode {
  tailf:info "Mode in which DC-GW operates";
  type enumeration { enum VRF-PEERING; enum INTEGRATED; }
}
leaf vrf-capacity {
  tailf:info "Vrf Capacity of the device";
  default 900;
  type uint32;
}
container bgp-peering-info {
  description "BGP peering information.";
  tailf:info "BGP peering information.";
  leaf bgp-asn {
    description "BGP ASN number.";
    tailf:info "BGP ASN number.";
    type uint32;
  }
  leaf loopback-profile-name {
    type leafref {
      path "../loopbacks/loopback-profile/name";
    }
  }
}
list port {
  description "List of switch ports.";
  tailf:info "Switch port.";
  key name;

  uses vts:COMMON-PHYSICAL-PORT;

  leaf bundle-ether-id {
    description "Bundle Ether Id";
    tailf:info "Bundle Ether Id";
  }
}

```

```

    type vts-types:string128;
    default "none";
  }
  leaf remote-interface-name {
    description "Interface name of the remote node connected " +
      "to the port.";
    tailf:info "Interface name of the remote node connected " +
      "to the port.";
    type vts-types:string128;
  }

  leaf remote-mac {
    description "MAC address of the remote node connected " +
      " to the port.";
    tailf:info "Remote MAC address.";
    type yang:mac-address;
  }
  leaf remote-type {
    description "Type of the remote server connected " +
      "to the port.";
    tailf:info "Type of the remote server connected " +
      "to the port.";
    type identityref {
      base "vts-ids:server-type";
    }
  }
}
list remote-server-id {
  key name;
  leaf name {
    description "Identifier of the remote server connected " +
      "to the port.";
    tailf:info "ID of the remote server connected " +
      "to the port.";
    type vts-types:string128;
  }
}
} //port
container vpc {
  leaf vpc-id {
    tailf:info "<-1000 - 4096> Domain id.";
    type vts-types:vpc-id;
  }
  container vpc-peer {
    leaf vpc-peer-ip {
      tailf:info "Specify destination ip address of peer switch.";
      type inet:ip-address;
    }
    leaf vpc-peer-name {
      tailf:info "Specify peer switch name.";
      type vts-types:string128;
    }
  }
}

```

```

    }
  }
  leaf vpc-peer-link {
    description "Peer link of the virtual port channel.";
    tailf:info "<1-4096>;Port Channel number.";
    type uint16 {
      range "1..4096";
    }
  }
} // container vpc
list bundle-ether {
  description "List of port channel the switch belongs to.";
  tailf:info "Port channel.";
  key name;
  leaf name {
    description "Port channel name.";
    tailf:info "<1-4096>;Port Channel number.";
    // TODO: reconsider this into an integer
    type uint16 {
      range "1..4096";
    }
  }
}
list ports {
  description "Set of ports belonging to the port channel.";
  tailf:info "Port inthe port channel.";
  key name;
  leaf name {
    description "Port name.";
    tailf:info "Port name.";
    type vts-types:string128;
  }
}
leaf type {
  description "Type of port channel.";
  tailf:info "Type.";
  type identityref {
    base "vts-ids:port-channel-type";
  }
}
} //port-channel-list

container servers {
  description "Servers connected to the switch.";
  tailf:info "Servers.";

  list server {
    description "List of servers connected to the switch.";
    tailf:info "Server.";
  }
  key server-id;
  leaf server-id {

```

```

        description "Server identifier.";
        tailf:info "ID.";
    type vts-types:string128;
}
    list nic {
        description "List of network controller interfaces on " +
            "the server.";
        tailf:info "NIC.";
    key id;
    leaf id {
        description "Identifier of the network controller " +
            "interface";
        tailf:info "ID.";
    type vts-types:string128;
    }
    leaf mac {
        // TODO: note how the same data is in multiple places
        description "MAC address of the network controller " +
            "interface";
        tailf:info "MAC.";
        type leafref {
            path "../..../port/remote-mac" ;
        }
    }
}
    leaf ip {
        description "IP address of the network controller " +
            "interface";
        tailf:info "IP.";
    type inet:ip-address;
    }
        leaf remote-mac {
            // TODO: note how the same data is in multiple places
            description "MAC address of the switch port the " +
                "server NIC is connected to";
            tailf:info "Switch port MAC.";
            type leafref {
                path "../..../port/local-mac" ;
            }
        }
    }
} //nic
} //server
} //servers

leaf device-group {
    description "Refers the device-group";
    tailf:info "Refers the device-group";
    type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:device-groups/vts:device-group/vts:name";
    }
}

```

```
    } //device-group
  } //device-info
} //augment
} //module
```

6.8.3 Device Extension Infra

```
module device-extension-infra-policy {
  namespace "http://cisco.com/ns/yang/services/device-extension-infra-policy";
  prefix dev-infra-policy;

  import tailf-common {
    prefix tailf;
  }
  import tailf-ncs {
    prefix ncs;
  }

  import vts-service {
    prefix vts-service;
  }
  import cisco-vts {
    prefix vts;
  }

  organization "Cisco Systems, Inc.";

  contact
    "Cisco Systems, Inc.
    Customer Service

    Postal: 170 West Tasman Drive
    San Jose, CA 95134

    Tel: +1 800 533-NETS";

  description
    "This module contains a collection of YANG definitions
    for Cisco's VTS's management. Specifically, for the management
    of the NCS devices in conjunction with the infrastructure policy.

    Copyright (c) 2015 by Cisco Systems, Inc.
    All rights reserved.";

  revision "2015-06-21" {
    description
      "Initial revision.";
  }
}
```



```

augment "/ncs:devices/ncs:device" {
  leaf l2-gateway-group {
    description "Layer 2 gateway group this device belongs to.";
    tailf:info "L2 gateway group.";
    type leafref {
      path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:infra-policy/vts:admin-domains/vts:admin-domain/vts:l2-gateway-
groups/vts:l2-gateway-group/vts:name";
    }
  } // leaf l2-gateway-group
} //augment
} //module

```

6.9 Inventory

```

submodule cisco-vts-inventory {

  belongs-to cisco-vts {
    prefix vts;
  }

  import ietf-inet-types {
    prefix inet;
  }

  import tailf-common {
    prefix tailf;
  }
  import tailf-ncs {
    prefix ncs;
  }
  import cisco-vts-types {
    prefix vts-types;
  }
  import cisco-vts-identities {
    prefix vts-ids;
  }
  import vts-service {
    prefix vts-service;
  }
  import ietf-yang-types {
    prefix ietf-yang;
  }
  include cisco-vts-common {
    revision-date 2017-06-26;
  }
  include cisco-vts-device-operational-data {
    revision-date 2015-06-15;
  }
}

```

```
import ietf-yang-types {
  prefix yang;
}

organization "Cisco Systems, Inc.";

contact
  "Cisco Systems, Inc.
  Customer Service

  Postal: 170 West Tasman Drive
  San Jose, CA 95134

  Tel: +1 800 533-NETS";

description
  "This module contains a collection of YANG definitions
  for Cisco's VTS's management. Specifically, for the inventory
  of the physical topology.

  Copyright (c) 2015 by Cisco Systems, Inc.
  All rights reserved.";

revision "2016-08-30" {
  description
    "VTS 2.3.1
    Enhancements:
      - Added leaf underlay-vlan-id to vtf's container, which tracks vlan-id used
      by the underlay bridge/port group
      - Added leaf disable-validations to disable ports and admin domain
      validations
      Corrections:
      - Moved connid leaf from fex ports to fex
    ";
}

revision "2016-07-15" {
  description
    "VTS 2.3.0
    Enhancements:
      - Added leaves name, mode, interfacem and container
      bonds under vtf list
      - Added leaves for timestamping the creation of entities:
      vtf-creation-timestamp and
      devicegroup-device-creation-timestamp
    Corrections:
      - Added unique statements for local-mac and
      binding-host-name under vtf list
    ";
```

```
}

revision "2015-06-11" {
  description
    "Initial revision.";
}

grouping VTS-INVENTORY {
  container devices {
    description "Devices that VTS manages as part of the inventory.";
    tailf:info "VTS device inventory.";
    list device {
      description "List of switches with the servers and other " +
        "devices connected to them.";
      tailf:info "Device (Switch) Port mapping.";
      ncs:servicepoint portserver;
      uses ncs:service-data;
      key name;
      leaf name {
        description "Name of switch that is part of VTS inventory.";
        tailf:info "Device (Switch) name.";
        type leafref {
          path "/ncs:devices/ncs:device/ncs:name";
        }
      }
      leaf inventory-trigger-timestamp {
        type ietf-yang:date-and-time;
        description "The timestamp when inventory is triggered";
        tailf:info "The timestamp when inventory is triggered";
      }
      uses VTS-DEVICE-NETWORK-OPER-DATA;
      container ports {
        description "Device interfaces that VTS manages as part of " +
          "inventory.";
        tailf:info "VTS port inventory.";
        list port {
          description "List of physical ports on the switch that VTS " +
            "manages as part of inventory.";
          tailf:info "Device (switch) port.";
          key name;
          uses vts:COMMON-PHYSICAL-PORT;
          choice connected-entities {
            description "A port/port-channel can have connected to it " +
              "either servers of fabric extenders.";
            case connected-servers {
              description "Servers connected to a port/port-channel.";
              container servers {
                description "Servers that VTS manages as part of inventory.";
              }
            }
          }
        }
      }
    }
  }
}
```

```

tailf:info "VTS server inventory.";
list server {
  description "List of servers attached to device interfaces " +
    "that is managed by VTS.";
  tailf:info "VTS server inventory.";
  key name;
  uses vts:COMMON-SERVER;
  leaf connid {
    tailf:info "Unique ID for port server mapping";
    type vts-types:uuid;
  } // connid

  leaf vtf_ip {
    tailf:info "VTF VM IP address";
    type inet:ip-address;
  }
} // server
} // servers
} // case connected-servers
case connected-fexs {
  description "Fabrix extenders connected to a port/port-channel.";
  container fexs {
    description "Set of FEXs under a physical port of port channel.";
    tailf:info "Fabric extenders.";
    list fex {
      description "List of FEXs under a physical port or port channel.";
      tailf:info "Fabric extender.";
      key fex-id;
      leaf fex-id {
        description "Fex identifier.";
        tailf:info "Id.";
        type vts-types:fex-identifier;
      }
      leaf connid {
        description "ID for the port-fex mapping.";
        tailf:info "Unique ID for port fex mapping";
        type vts-types:uuid;
      } //connid
    }
    container ports {
      description "Set of host interfaces on the FEX.";
      tailf:info "Ports.";
      list port {
        description "List of host interfaces on the FEX.";
        tailf:info "Port.";
        key name;
        uses vts:COMMON-PHYSICAL-PORT;
        container servers {
          description "Set of servers connected to this host interface on
the FEX.";
          tailf:info "Servers.";

```

```

        list server {
            description "List of servers connected to this host interface on
the FEX.";
            tailf:info "Server.";
            key name;
            uses vts:COMMON-SERVER;
            leaf connid {
                description "ID for the port-server mapping.";
                tailf:info "Unique ID for port server mapping";
                type vts-types:uuid;
            } // connid
        } // server
    } // servers
} // port
} // ports
} // fex
} // fexs
} // case connected-fexs
} // choice connected-entities
} // port
} // ports
} // device
} // devices

```

```

container vtfs {
    list vtf {
        description "List of VTF VM ips under this server.
            If this list is non-empty, it indicates that
            VTF VMs have been spawned on this server";
        tailf:info "List of VTF VM ids under this server.";
        ncs:servicepoint vtf-registration-servicepoint;
        uses ncs:service-data;

        key ip;
        unique "local-mac";
        unique "binding-host-name";

        leaf ip {
            tailf:info "VTF VM IP address";
            type inet:ip-address;
        }

        leaf name {
            description "VTF VM Name.";
            tailf:info "VTF VM Name.";
            type string{
                length "0..128" {
                    error-message "This string cannot exceed 128 characters.";
                }
                pattern '[a-zA-Z0-9-]*[a-zA-Z0-9][a-zA-Z0-9-]*';
            }
        }
    }
}

```

```
    }
  }

  leaf local-mac {
    tailf:info "Local MAC address";
    //type yang:mac-address;
    type string {
      pattern '[0-9a-fA-F]{2}(:[0-9a-fA-F]{2}){5}';
    }
  }
  leaf username {
    tailf:info "Username of VTF instance";
    type string;
  }
  leaf password {
    tailf:info "Encrypted password of VTF instance";
    type string;
  }
  leaf gateway-ip {
    description "Gateway/Next Hop IP for the VTF VM";
    tailf:info "Gateway/Next Hop IP for the VTF VM";
    type inet:ip-address;
  }
  leaf binding-host-name {
    description "Compute Host identifier";
    tailf:info "Compute Host identifier";
    mandatory true;
    type string;
    //type leafref {
    // path "../..../devices/device/ports/port/servers/server/name";
    //}
  }
  leaf vpp-client-name {
    description "Optional client name for VPP";
    tailf:info "Optional client name for VPP";
    type vts-types:string128;
  }

  leaf device-group {
    description "Refers the device-group";
    tailf:info "Refers the device-group";
    type leafref {
      path "../..../device-groups/device-group/name";
    }
  } //device-group
  leaf subnet-mask {
    description "Subnet mask.";
    tailf:info "Subnet mask.";
    type inet:ip-address;
  }
}
```

```

leaf underlay-network {
  description "Name of underlay network portgroup/bridge on " +
    "binding-host which VTF is attached to.";
  tailf:info "Name of underlay network portgroup/bridge on " +
    "binding-host which VTF is attached to.";
  type string;
}
leaf tenant-network {
  description "Name of tenant network portgroup/bridge on " +
    "binding-host which VTF is attached to.";
  tailf:info "Name of tenant network portgroup/bridge on " +
    "binding-host which VTF is attached to.";
  type string;
}
leaf underlay-vlan-id {
  description "Vlan id that will be tagged on underlay network
portgroup/bridge on " +
    "binding-host which VTF is attached to.";
  tailf:info "Vlan id that will be tagged on underlay network
portgroup/bridge.";
  type vts-types:vlan-id;
}
leaf datastore {
  description "Name of datastore on binding-host.";
  tailf:info "Name of datastore on binding-host.";
  type string;
}
leaf mode {
  description "Deployment mode of VTF.";
  tailf:info "Deployment mode of VTF.";
  type identityref {
    base "vts-ids:vtf-mode";
  }
  default vts-ids:VM;
}
leaf max-hp-memory-perc {
  when "../mode = 'vts-ids:vhost'";
  description "Maximum huge pages memory perc 0-100";
  type uint16 {
    tailf:info "Maximum huge pages memory perc 0-100";
    range "0..100";
  }
}

leaf vtf-timestamp {
  type ietf-yang:date-and-time;
  description "The timestamp when the vtf was triggered";
  tailf:info "The timestamp when the vtf was triggered";
}

```

```

container vtf-vhost-interfaces {
  description "Set of VTF vhost interfaces.";
  tailf:info "Set of VTF vhost interfaces.";

  list vtf-vhost-interface {
    description "List of VTF vhost interfaces.";
    tailf:info "List of VTF vhost interfaces.";
    key name;
    max-elements 1;

    leaf name {
      description "Name of physical or bond interface on the compute host.";
      tailf:info "Name of physical or bond interface on the compute host.";
      type string;
      must "(../../mode='vts-ids:vhost')" {
        error-message "VTF vhost interface name is only applicable for vtf in
vhost mode.";
        tailf:dependency "../../mode";
      }
    }

    leaf pci-driver {
      description "Pci driver to use for this interface.";
      tailf:info "Pci driver to use for this interface.";
      type identityref {
        base "vts-ids:pci-driver-type";
      }
      default vts-ids:uio_pci_generic;
    }

    uses BONDED-INTERFACE {
      refine "bond" {
        must "(../../mode='vts-ids:vhost')" {
          error-message "VTF vhost bond interface is only applicable for vtf
in vhost mode.";
          tailf:dependency "../../mode";
        }
      }

      refine "bond/bond-interfaces/bond-interface/name" {
        must "current() != ../../../../name" {
          error-message "This interface cannot be added to the bond since it is
already added as VTF vhost interface.";
          tailf:dependency "../../../../name";
        }
      }
    } // uses BONDED-INTERFACE
  } // list vtf-vhost-interface
} // container vtf-vhost-interfaces
container reachable-subnets {

```



```

description "Set of subnets reachable through gateway.";
tailf:info "Set of subnets reachable through gateway.";
list reachable-subnet {
    description "List of subnets reachable through gateway.";
    tailf:info "List of subnets reachable through gateway.";
    key subnet;

    leaf subnet {
        description "Subnetwork address.";
        tailf:info "Subnetwork address.";
        type tailf:ip-address-and-prefix-length;
    }
} // list reachable-subnet
} // container reachable-subnets

container multi-threading {
    description "Enable Multi-Threading.";
    tailf:info "Enable Multi-Threading.";
    presence "true";
    when "../mode = 'vts-ids:vhost'";
}
container jumbo-frames {
    presence "true";
    when "../mode = 'vts-ids:vhost'";
    leaf mtu-size {
        type uint16 {
            tailf:info "Jumbo MTU Size 1501-9000";
            range "1501..9000";
        }
    }
}
leaf vmm-id {
    description "VMM which manages the server.";
    tailf:info "VMM which manages the server.";
    type leafref {
        path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vmms/vmm/id";
    }
} // list vtf
} // container vtf

container xrvr-groups {
    list xrvr-group {
        description "List of XRVR device groups, consisting of XRVR's and the
VTF-VMs attached to them ";
        tailf:info "XRVR to VTF Mapping.";

        key group-name;

```

```

leaf group-name {
  description "Name of xrvr group that VTF's will belong to. Each VTF
will belong to all XRVR's in the group.";
  tailf:info "XRVR group name.";
  type vts-types:string128;
}

container xrvr-devices {
  list xrvr-device {
    description "List of XRVR devices";
    tailf:info "XRVR in Group";
    key name;
    leaf name {
      description "Name of switch that is part of VTS inventory.";
      tailf:info "Device (Switch) name.";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
    }
  } // list xrvr-device
} // container xrvr-devices

container vtfs {
  list vtf {
    description "List of VTF VMs managed by the XRVR group";
    tailf:info "VTF VMs that are managed by the XRVR group";
    ncs:servicepoint xrvr-to-vtf-map-servicepoint;
    uses ncs:service-data;
    key ip;

    leaf ip {
      description "IP address of the VTF instance";
      tailf:info "IP address of the VTF instance";
      type inet:ip-address;
    }

    leaf vtf-creation-timestamp {
      type ietf-yang:date-and-time;
      description "The timestamp when the vtf was triggered";
      tailf:info "The timestamp when the vtf was triggered";
    }
  } // list vtf
} // container vtfs
} // list xrvr-group
} // container xrvr-devices

} // grouping VTS-INVENTORY

grouping VTS-NETWORK-TO-PORTS-MAPPING {
  container network-mapping {

```

```
description "This container hosts all mapping tables used by different
services.";
tailf:info "This container hosts all mapping tables used by different
services.";
list network {
  description "Identifier of the network.";
  tailf:info "ID of the network.";
  key id;
  leaf id {
    description "Identifier of the shared network.";
    tailf:info "ID of the shared network.";
    type vts-types:uuid;
  } //leaf id

  leaf tenant-name {
    description "tenant name of the network";
    tailf:info "tenant name of the network";
    type vts-types:string64; // same type as tenant name
  } // leaf tenant-name

  leaf topology-id {
    description "topology id of the network";
    tailf:info "topology id of the network";
    type vts-types:string128;
  } // leaf topology-id

  container ports {
    list port {
      description "List of ports configured on this shared network";
      tailf:info "List of ports configured on this shared network";

      key id;
      leaf id {
        description "Port id";
        tailf:info "port id";
        type vts-types:uuid;
      } // leaf id

      leaf tenant-name {
        description "tenant name of the port";
        tailf:info "tenant name of the port";
        type vts-types:string64; // same type as tenant name
      } // leaf tenant-name

      leaf topology-id {
        description "topology id of the port";
        tailf:info "topology id of the port";
        type vts-types:string128;
      } // leaf topology-id
    } // list port
  } // container ports
}
```

```
} // container ports

container port-macs {
  list port-mac {
    key mac-address;

    leaf mac-address {
      description "Port MAC address.";
      tailf:info "MAC address.";
      type vts-types:string128;
    }

    leaf port-id {
      description "Port id";
      tailf:info "port id";
      type vts-types:uuid;
    } // leaf id
  }
} // container port-macs

container subnetworks {
  list subnetwork {
    description "List of subnets added on this shared network";
    tailf:info "List of subnets added on this shared network";

    key id;
    leaf id {
      description "subnet id";
      tailf:info "subnet id";
      type vts-types:uuid;
    } // leaf id

    container router {
      description "Router that subnet is attached to";
      tailf:info "Router that subnet is attached to";

      leaf id {
        description "Router id that subnet is attached to";
        tailf:info "Router id";
        type vts-types:uuid;
      } // leaf id

      leaf tenant-name {
        description "tenant name of the router";
        tailf:info "tenant name of the router";
        type vts-types:string64;
      } // leaf tenant-name

      leaf topology-id {
        description "topology id of the router";
```

```

        tailf:info "topology id of the router";
        type vts-types:string128;
    } // leaf topology-id

    leaf vrf {
        description "VRF";
        tailf:info "VRF";
        type string;
    } // leaf vrf

    leaf provider-router {
        description "Provider router.";
        tailf:info "Provider router.";
        type boolean;
        default false;
    }

    } // container router
    } // list subnetwork
    } // container subnetworks
    } // list network
    } // container network-mapping
} // grouping VTS-NETWORK-TO-PORTS-MAPPING

```

```

grouping VTS-DEVICE-GROUP {
    container device-groups {
        description "List of device groups";
        tailf:info "List of device groups";

        list device-group {
            description "Set of devices";
            tailf:info "Set of devices";
            key name;

            leaf name {
                description "Name of the device-group";
                tailf:info "Name of the device-group";
                type vts-types:string128;
                must "0 = count(/ncs:devices/ncs:device[ncs:name = current()/../name])"
            {
                error-message "Device Group name could not be the same as the device
name";
                tailf:dependency "/ncs:devices/ncs:device/ncs:name";
            }
        }
    }

    leaf type {
        description "Type of device group";
        tailf:info "Type of device group";
    }
}

```

```

    type identityref {
      base "vts-ids:device-group-type";
    }
  }

  leaf vmmid {
    description "ID of VMM for device group";
    tailf:info "ID of VMM for device group";
    type vts-types:string128;
  }

  container devices {
    description "List of device in the device group";
    tailf:info "List of device in the device group";

    list device {
      description "device in the device group";
      tailf:info "device in the device group";
      key name;
      ncs:servicepoint vts-device-group-servicepoint;
      uses ncs:service-data;

      leaf name {
        description "Name of the device";
        tailf:info "Name of the device";
        type vts-types:string128;
        must "/ncs:devices/ncs:device[ncs:name = current()] or " +
          "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vts:vtfs/vts:vtf[ip = current()]" {
          error-message "deleting a device or vtf is not allowed when it is
present in a device group OR
adding a device or vtf in a device group is allowed only
when it is present in the inventory";
          tailf:dependency "/ncs:devices/ncs:device/ncs:name";
          tailf:dependency "/vts-service:vts-service/vts-service:sites/vts-
service:site/vts:cisco-vts/vts:vtfs/vts:vtf/vts:ip";
          tailf:dependency ".";
        }
      }

      leaf type {
        description "Type of device";
        tailf:info "Type of device";
        type identityref {
          base "vts-ids:device-group-device-type";
        }
      }

      leaf devicegroup-device-creation-timestamp {

```

```

        type ietf-yang:date-and-time;
        description "The timestamp when the device group device creation was
triggered";
        tailf:info "The timestamp when the device group device creation was
triggered";
    }

    leaf disable-validations {
        type empty;
        description "Disable ports and admin domain validations.";
        tailf:info "Disable ports and admin domain validations.";
    }

    } //list device
    } // container devices
    } // list device-group
    } // container device-groups
} // grouping VTS-DEVICE-GROUP

grouping VTS-DEVICE-INTERFACE-GROUP {
    container device-interface-groups {
        description "List of device Interface groups";
        tailf:info "List of device Interface groups";

        list device-interface-group {
            description "Set of device interfaces";
            tailf:info "Set of device interfaces";
            key name;
            ncs:servicepoint vts-device-interface-group-servicepoint;
            uses ncs:service-data;

            leaf name {
                description "Name of the device-interface-group";
                tailf:info "Name of the device-interface-group";
                type vts-types:string128;
            }

            leaf type {
                description "Type of device group";
                tailf:info "Type of device group";
                type identityref {
                    base "vts-ids:device-group-type";
                }
                default vts-ids:device-interface-group;
            }

            leaf is-user-defined-group {
                description "Flag to determine if it is user defined interface group";
                tailf:info "Flag to determine if it is user defined interface group";
                type boolean;
                default "false";
            }
        }
    }
}

```

```

    }
    leaf interface-pool-change-timestamp {
        type ietf-yang:date-and-time;
        description "The timestamp when poolname change was retriggered";
        tailf:info "The timestamp when poolname changes was retriggered";
    }
    container device-interfaces {
        description "List of device interfaces in the device interface group";
        tailf:info "List of device interfaces in the device interface group";

        list device-interface {
            description "device in the device interface group";
            tailf:info "device in the device interface group";
            key "name device-name";

            leaf name {
                description "Name of the device interface";
                tailf:info "Name of the device interface";
                type vts-types:string128;
            }

            leaf device-name {
                description "Name of the device interface is associated to";
                tailf:info "Name of the device interface is associated to";
                type vts-types:string128;
            }

            leaf pool-name {
                description "Device Interface Pool Name.";
                tailf:info "Device Interface Pool Name.";
                type vts-types:string128;
            }

            leaf service-instance-id {
                description "Service Instance Id";
                tailf:info "Service Instance Id.";
                type vts-types:instance-id;
                default 0;
            }
        } //list device-interface
    } // container device-interfaces
} // list device-interface-group
} // container device-interface-groups
} // grouping VTS-DEVICE-INTERFACE-GROUP

grouping BONDED-INTERFACE {
    container bond {
        description "VTF vhost bonded interface.";
        tailf:info "VTF vhost bonded interface.";
        presence "interface is a bond";

        leaf bond-mode {

```



```

description "NIC bond mode.";
tailf:info "NIC bond mode.";
type identityref {
  base "vts-ids:nic-bond-mode";
}
default vts-ids:balance-xor-l34;
}
container bond-interfaces {
  description "Set of interfaces that forms this bond.";
  tailf:info "Set of interfaces that forms this bond.";

  list bond-interface {
    description "List of interfaces that forms this bond.";
    tailf:info "List of interfaces that forms this bond.";
    key name;
    min-elements 1;

    leaf name {
      description "Name of interface on the compute host.";
      tailf:info "Name of interface on the compute host.";
      type string;
    }
  } // list bond-interface
} // container bond-interfaces
} // container bond
} // grouping BONDED-INTERFACE

grouping VTS-HOSTS {
  container hosts {
    description "Hosts that VTS manages as part of the inventory.";
    tailf:info "VTS host inventory.";
    list host {
      description "List of hosts";
      tailf:info "List of hosts";
      //ncs:servicepoint host-servicepoint;
      uses ncs:service-data;
      key "name vmm-id";

      leaf name {
        description "Name of the server (Hostname typically).";
        tailf:info "Server name.";
        type vts-types:string128;
      }
    }

    uses VTS-HOST-INTERFACES;

    leaf type {
      description "Type of server.";
      tailf:info "Type of server.";
    }
  }
}

```

```
    type identityref {
      base "vts-ids:server-type";
    }
  }

  leaf role {
    description "Role of server.";
    tailf:info "Role of server.";
    type identityref {
      base "vts-ids:server-role";
    }
    default "vts-ids:managed-server";
  }

  leaf vmm-id {
    description "VMM which manages the server.";
    tailf:info "VMM which manages the server.";
    type leafref {
      path "/vts-service:vts-service/vts-service:sites/vts-service:site/vts:cisco-
vts/vmms/vmm/id";
    }
  }

  leaf username {
    description "Username of server.";
    tailf:info "Username of server.";
    type string;
  }

  leaf password {
    description "Password of server.";
    tailf:info "Password of server.";
    type string;
  }

  leaf inventory-trigger-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when inventory is triggered";
    tailf:info "The timestamp when inventory is triggered";
  }

  leaf ip {
    description "Management IP address of the server ";
    tailf:info "Management IP address of the server ";
    type inet:ip-address;
  }

  leaf install-status {
    description "Status of installation.";
    tailf:info "Status of installation.";
    type identityref {
```

```

        base "vts-ids:install-status";
    }
    must "(./type='vts-ids:virtual-server')" {
        error-message "Install-status is applicable only for virtual servers.";
    }
}
leaf install-status-message {
    description "Detailed message describing " +
        "status of installation.";
    tailf:info "Detailed message describing " +
        "status of installation.";
    type vts-types:string255;
    must "(./type='vts-ids:virtual-server')" {
        error-message "Install-status-message is applicable only for virtual
servers.";
    }
}
}
}
}

grouping VTS-HOST-INTERFACES {
    container host-interfaces {
        description "Host Interfaces that VTS manages as part of the inventory.";
        tailf:info "VTS host interfaces inventory.";
        list host-interface {
            description "List of host interfaces";
            tailf:info "List of host interfaces";
            ncs:servicepoint host-interface-servicepoint;
            uses ncs:service-data;
            key "device-name device-port-name";

            uses COMMON-HOST-INTERFACE;

            leaf device-name {
                tailf:info "Device name";
                type leafref {
                    path "/ncs:devices/ncs:device/ncs:name";
                }
            }

            leaf device-port-name {
                tailf:info "Port name";
                type vts-types:string512;
            }

            leaf connid {
                tailf:info "Unique ID for host interface mapping";
                type vts-types:uuid;
            }
        }
    }
}

```

```

    }

    leaf group-name {
      description "Group Name.";
      tailf:info "Group Name.";
      type vts-types:string128;
    }

    leaf vtf_ip {
      tailf:info "VTF VM IP address";
      type inet:ip-address;
    }

    leaf inventory-trigger-timestamp {
      type ietf-yang:date-and-time;
      description "The timestamp when inventory is triggered";
      tailf:info "The timestamp when inventory is triggered";
    }

  }
}
}
grouping MULTI-HOMING {

  container multi-homing {
    container vpc {
      list vpc {
        key vpc-id;

        leaf vpc-id {
          tailf:info "<-1000 - 4096> Domain id.";
          type vts-types:vpc-id;
        }
        container vpc-peer {
          leaf vpc-peer-ip {
            tailf:info "Specify destination ip address of peer switch.";
            type inet:ip-address;
          }
          leaf vpc-peer-name {
            tailf:info "Specify peer switch name.";
            type vts-types:string128;
          }
        }
        leaf vpc-peer-link {
          description "Peer link of the virtual port channel.";
          tailf:info "<1-4096>;;Port Channel number.";
          type uint16 {
            range "1..4096";
          }
        }
      }
    }
  }
}

```

```

    }
    list connid {
      key id;
      leaf id {
        type vts-types:uuid;
      }
    }
  }
}

container ethernet-segments {
  description "Ethernet segments.";
  tailf:info "Ethernet segments.";
  list ethernet-segment {
    description "Ethernet segment.";
    tailf:info "Ethernet segment.";

    key "es-id system-mac";

    uses vts:COMMON-ESI-GROUPING;

    container ethernet-segment-peers {
      description "Ethernet segment peers.";
      tailf:info "Ethernet segment peers.";

      list ethernet-segment-peer {
        description "Ethernet segment peer.";
        tailf:info "Ethernet segment peer.";

        key name;

        leaf name {
          description "Ethernet segment peer device name.";
          tailf:info "Ethernet segment peer device name.";
          type leafref {
            path "/ncs:devices/ncs:device/ncs:name";
          }
        }
      } // list ethernet-segment-peer
    } // container ethernet-segment-peers

    list connid {
      key id;
      leaf id {
        type vts-types:uuid;
      }
    }
  } // list ethernet-segment
} // container ethernet-segments

```

```
container smh {
  list multi-homing {
    description "List of multi-homing connections";
    tailf:info "List of multi-homing connections";
    key id;

    leaf id {
      type uint32;
    }

    list connid {
      key id;
      leaf id {
        type vts-types:uuid;
      }
    }
  }
}
}
```

6.10 System Config

```
submodule cisco-vts-system-config {

  belongs-to cisco-vts {
    prefix vts;
  }

  import ietf-inet-types {
    prefix inet;
  }
  import ietf-yang-types {
    prefix ietf-yang;
  }

  import tailf-common {
    prefix tailf;
  }

  import tailf-ncs {
    prefix ncs;
  }

  import cisco-vts-types {
    prefix vts-types;
  }
}
```

```
}  
import cisco-vts-identities {  
  prefix vts-ids;  
}
```

```
organization "Cisco Systems, Inc.";
```

```
contact
```

```
"Cisco Systems, Inc.  
Customer Service
```

```
Postal: 170 West Tasman Drive  
San Jose, CA 95134
```

```
Tel: +1 800 533-NETS";
```

```
description
```

```
"This module contains a collection of YANG definitions  
for Cisco's VTS's management. Specifically, for the  
management of system level configurations.
```

```
Copyright (c) 2015 by Cisco Systems, Inc.  
All rights reserved.";
```

```
revision "2017-12-15" {
```

```
  description
```

```
    "VTS 2.6.1
```

```
    Enhancements:
```

- Add container to store vault keys and root token

```
  ";
```

```
}
```

```
revision "2017-05-30" {
```

```
  description
```

```
    "VTS 2.5.1
```

```
    Enhancements:
```

```
    Added vtf-mode-config container to determine VTF usage.
```

```
  ";
```

```
}
```

```
revision "2016-11-15" {
```

```
  description
```

```
    "VTS 2.4
```

```
    Enhancements:
```

```
    Corrections:
```

- The ip address of DHCP servers can also be an IPv6 address
- Added constraints so that only one v4 and one v6 DHCP server are allowed.
- Added a default for the DHCP server vrf-name, which is always required.

```

";
}

revision "2016-08-30" {
  description
  "VTS 2.3.1
  Enhancements:
    - Added leaf domain-id to identify this domains routes
  - Added leaf gwgroup-change-timestamp to track RR gateway group changes
  Corrections:
  ";
}

revision "2016-07-15" {
  description
  "VTS 2.3.0
  Enhancements:
    - Added multicast-config leaf to control the number of
      networks per multicast group ip allocation
  Corrections:
  ";
}

revision "2015-06-15" {
  description
  "Initial revision.";
}

grouping SYSTEM-CONFIG {
  container global-settings {
    description "Container for system level configurations";

    leaf ovs-vtc-interface-type {
      description "Determines the OVS-VTC interface type -- management (default) or
underlay.";
      tailf:info "OVS-VTC interface type.";
      type identityref {
        base "vts-ids:vtc-interface-type";
      }
      default "vts-ids:management";
    }

    leaf vtf-vtc-interface-type {
      description "Determines the VTF-VTC interface type -- underlay (default) or
management.";
      tailf:info "VTF-VTC interface type.";
      type identityref {

```



```

    base "vts-ids:vtc-interface-type";
  }
  default "vts-ids:underlay";
}

leaf vtf-sg-reflexive-acl-enabled {
  description "Enable Reflexive ACL functionality on VTFs";
  tailf:info "Enable Reflexive ACL functionality on VTFs";
  type boolean;
  default true;
}

leaf route-reflector-mode {
  //TODO: improve this description
  description "Determines how the route reflector operate.";
  tailf:info "Route reflector mode.";
  type identityref {
    base "vts-ids:route-reflector-mode";
  }
}

container global-route-reflectors {
  description "Set of global route reflectors.";
  tailf:info "Global route reflectors.";
  when "../route-reflector-mode = 'vts-ids:global-rr'";
  list global-route-reflector {
    uses ncs:service-data;
    ncs:servicepoint global-rr-servicepoint;
    description "List of global route reflectors.";
    tailf:info "Route reflector.";
    key name;
    leaf name {
      description "Name of the route reflector.";
      tailf:info "Name.";
      type leafref {
        path "/ncs:devices/ncs:device/ncs:name";
      }
    }
  }
  leaf gwgroup-change-timestamp {
    type ietf-yang:date-and-time;
    description "The timestamp when the gateway group change was triggered";
    tailf:info "The timestamp when the gateway group change was triggered";
  } // leaf gwgroup-change-timestamp
} // list route-reflector
} // container route-reflectors

container dhcp-servers {
  description "Set of DHCP servers.";
  tailf:info "DHCP servers.";
  list dhcp-server {
    uses ncs:service-data;
  }
}

```

```

description "List of DHCP servers.";
tailf:info "DHCP server.";
key ip-address;

/* TODO: enforce that only 1 v4 and 1 v6 can be taken
   the constraints below are not enforcing that.
   Revisit this ASAP

must "count(contains(..dhcp-server/ip-address, '.')) <= 1" {
    error-message "No more than one DHCP server with an IPv6 address can be
provided.";
    tailf:dependency ".";
}

must "count(contains(..dhcp-server/ip-address, '.')) <= 1" {
    error-message "No more than one DHCP server with an IPv4 address can be
provided.";
    tailf:dependency ".";
}
*/

leaf ip-address {
    description "IP address of the DHCP server";
    tailf:info "IP address.";
    type inet:ip-address;
}

leaf vrf-name {
    description "VRF name of the DHCP server";
    tailf:info "VRF name.";
    type vts-types:string128;
    default "default";
}

} // list dhcp-server
} // container dhcp-servers

container anycast-gateway {
    description "Common anycast configuration for all gateways.";
    tailf:info "Common anycast gateway.";
    presence "Existence of anycast-gateway configuration";
    uses ncs:service-data;
    ncs:servicepoint vts-anycast-gateway-servicepoint;
    leaf anycast-gw-address {
        description "Common anycast MAC address for all gateways.";
        tailf:info "Common anycast MAC address.";
        type string {
            pattern '[0-9a-fA-F][02468aceACE](:[0-9a-fA-F]{2}){5}' {
                error-message "The anycast gateway mac address must be a unicast

```

```

address.";
    }
  }
} // container anycast-gateway

leaf metadata-server {
  type string;
  tailf:info "Metadata Server IP Address. VTS installs white-list security group
rule for this ip so VMs on VTFs upon startup can access this server.";
  default "169.254.169.254/32";
}

leaf domain-id {
  type string;
  tailf:info "Id/Tag to identify this domains routes";
}

container service-policy-config{
  description "Service Policy Configuration";
  tailf:info "Service Policy Configuration";
  leaf policy-mode {
    description "Specify service policy mode";
    tailf:info "Specify service policy mode";
    default "vts-ids:security-group-to-epg-mode";
    type identityref {
      base "vts-ids:service-policy-mode";
    }
  }
} //container service-policy-config

container multicast-config {
  description "Multicast config";
  tailf:info "Multicast config";
  leaf allocation-reuse-count {
    description "Number of networks per multicast group ip allocation. A value of
zero indicates that all networks in the system use the same multicast group";
    tailf:info "Number of networks per multicast group ip allocation. A value of
zero indicates that all networks in the system use the same multicast group";
    type vts-types:multicast-reuse-count;
    //type uint32;
    default 1;
  }
} // container multicast-config

container resource-allocator-config {
  description "Resource Allocator config";
  tailf:info "Resource Allocator config";
  leaf allocate-outside-range {
    description "Allow allocations to occur outside of any range?";
  }
}

```

```

    tailf:info "Allow allocations to occur outside of any range?";
    type boolean;
    default true;
  }
} // container resource-allocator-config

container delay-reading-applied-config {
  description "Time to wait to read the running configuration of devices after it is
applied.";
  tailf:info "Time to wait to read the running configuration of devices after it is
applied.";
  presence "Existence of delay-reading configuration";
  uses ncs:service-data;
  ncs:servicepoint vts-read-delay-servicepoint;
  leaf nxos-delay-reading-applied-config {
    description "Time to wait to read the running configuration after it is applied
for NX-OS devices.";
    tailf:info "Time to wait to read the running configuration after it is applied NX-
OS devices.";
    type uint16;
    units milliseconds;
    default 0;
  } // leaf nxos-delay-reading-applied-config
} // container delay-reading-applied-config

container vtf-mode-config {
  description "VTF Mode config";
  tailf:info "VTF Mode config";
  leaf vtf-mode {
    description "VTF mode indicates whether VTC considers VTFs as L2 or
VTEP.";
    tailf:info "VTF mode indicates whether VTC considers VTFs as L2 or VTEP.";
    type vts-types:vtf-mode-enum;
    default 12;
  }
}

container multiple-subnets-allowed {
  description "Flag to support multiple subnets";
  leaf multiple-subnets-allowed {
    description "Flag to support multiple subnets";
    tailf:info "Flag to support multiple subnets";
    type boolean;
    default "false";
  }
}

leaf remote-sg-behavior {
  description "True: VTS rejects SecurityGroup & Port Requests that deal with
Rules containing remote-sg. False: Violating Rules will be simply ignored and

```

```

dropped.";
    tailf:info "True: VTS rejects SecurityGroup & Port Requests that deal with
Rules containing remote-sg. False: Violating Rules will be simply ignored and
dropped.";
    type boolean;
    default "false";
}

container redeploy-options {
description "Redeploy options";
leaf redeploy-active {
description "A redeploy is underway";
tailf:info "A redeploy is underway";
type boolean;
default "false";
}
}

container vault {
description "Generated runtime configuration for vault";
tailf:info "Generated runtime configuration for vault";
list seal-keys {
key seal-key;
leaf seal-key {
description "Vault keys generated during initialization to unseal instance";
tailf:info "Vault keys generated during initialization to unseal instance";
type tailf:aes-cfb-128-encrypted-string;
} //leaf seal-key
} //list seal-keys

leaf root-token {
description "Vault root token generated during initialization";
tailf:info "Vault root token generated during initialization";
type tailf:aes-cfb-128-encrypted-string;
} //leaf root-token

leaf consul-encrypt-key {
description "base64 encoded Consul encryption key";
tailf:info "base64 encoded Consul encryption key";
type tailf:aes-cfb-128-encrypted-string;
} //leaf consul-encrypt-key
} //container vault

} // container system-config
} // grouping

grouping GLOBAL_SYSTEM_CONFIG {
container southbound-lock-config {
description "Southbound lock config";
tailf:info "Southbound lock config";

```

```
leaf device-monitoring {
  description "Southbounds locks a device if down and syncs missing data when it
comes up again";
  tailf:info "Southbounds locks a device if down and syncs missing data when it
comes up again";
  type boolean;
  default true;
}
} // container southbound-lock-config

container general-settings {
  description "general settings";
  tailf:info "general settings";
  leaf invoke-templates-redeploy {
    description "Flag to be set to false when you do not want template redeploy in
case of port redeploy ";
    tailf:info "Flag to be set to false when you do not want template redeploy in case
of port redeploy ";
    type boolean;
    default true;
  }
} // container general-settings
} //grouping GLOBAL_SYSTEM_CONFIG
} // module
```