Hewlett Packard Enterprise

TITANIUM SERVER

SOFTWARE DEFINED NETWORKING

16.10

Titanium Server
Cloud Administration, 16.10

Contents

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Planning

Titanium Server and SDN

Titanium Server is interoperable with OpenFlow 1.3 for integration in data centers that use software defined networking (SDN) as the networking backbone.

Titanium Server can be configured to use SDN as an alternate backend for Neutron networking. An SDN-specific Neutron plugin uses SDN contoller northbound APIs to send Neutron tenant networking configurations to an OpenStack / Neutron integration application running on a remote SDN controller. The SDN controller implements the tenant networking by using OSVDB and OpenFlow interfaces to send switch configuration and flow rules to the accelerated vSwitches (AVS) on Titanium Server compute nodes.

When enabled, the SDN controller manages Neutron L2 services and optionally L3 services. If the option for the SDN controller to manage L3 services is not enabled, then L3 services are managed locally.

This feature is provided for demonstration purposes. For more about Titanium Server and SDN, refer to the *Titanium Server Release Notes*.

NOTE: SDN interoperability is configurable during system installation only. It cannot be added or removed after installation.

SDN Architecture for Titanium Server

Titanium Server uses the OAM network to connect to both the northbound and southbound APIs of the SDN controllers.

For northbound APIs, Titanium Server includes Neutron plugins for supported SDN controllers. These plugins typically use SDN controller-specific REST APIs to pass Neutron configuration data to the SDN controller. For supported SDN controllers, see the *Titanium Server Release Notes*.

For southbound APIs, Titanium Server's accelerated vSwitch (AVS) supports both the OVSDB and OpenFlow protocols. This allows SDN controllers to configure both vSwitch interfaces and vSwitch flow rules to realize the required Neutron configuration.

Restrictions for Systems Using SDN

The use of software-defined networking for Layer 3 adds some restrictions for Titanium Server host and network configurations.

You can optionally enable Layer 3 management when you configure an SDN controller. On systems where Layer 3 management is enabled, some restrictions apply.

Restrictions for Provider Network Configuration

- Provider networks used to implement the external tenant network must be of type **flat**.

- Provider networks used to implement internal tenant networks must be of type **vxlan**.

- Only IPv4 backed VxLAN networks are supported. The system must not be configured with IPv6 addressing when SDN networking is enabled.

- Additional VxLAN attributes such as TTL, multicast group-address, and port-number are ignored when SDN networking is enabled.

Restrictions for Host Configuration

- Each compute host must be configured with exactly one interface with a network type of data-external.

  The data-external interface can be configured against an Ethernet, AE or VLAN interface.

  The data-external interface must be configured with a flat provider network.

- Interfaces with a network type of data can only be assigned a single IP address for the purpose of VxLAN termination.

- The data and data-external interfaces cannot be combined with any other interface network type.

Restrictions for Network Configuration

- DVR routers are not supported. This capability is inherent in the SDN layer 3 distributed deployment model.

- The metadata service is not accessible using the metadata HTTP proxy. To obtain metadata, guests must be launched with the config-drive option.

- VLAN transparent networks are not supported.

- IPv6 is not supported.

- For north-south routing, VMs must use floating IP addresses

- For north-south routing, SNAT is not supported

- Physical devices attached to a tenant network are accessible only if they are managed by OpenStack or the SDN controller.

- The following Titanium Server network extensions are not supported, since they are not recognized by the OpenDaylight SDN controller:

  - QoS network policies

  - DNAT

  - Guest VLAN subnets

  - CPU scaling (due to a dependency on the metadata service)

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SDN Controller Configuration

Configuring SDN Controller Connection Parameters

To use an SDN controller, you must configure basic service parameters for the connection.

A configured SDN controller is required before you can unlock compute nodes.

NOTE: You must use the CLI to configure the service parameters.

Procedure

1. Log in to the active controller as the Keystone **admin** user.

2. Configure the Neutron ml2 driver.

   For OpenDaylight, use the following command:

   ```
   ~(keystone_admin)$ system service-parameter-add network ml2 \
   mechanism_drivers="vswitch,sriovnicswitch,opendaylight"
   +----------+------------------------------------+
   | Property | Value                              |
   +----------+------------------------------------+
   | uuid     | 2e92b41d-82ff-423c-ae7d-b62a8a9d06dc |
   | service  | network                            |
   | section  | ml2                                |
   | name     | mechanism_drivers                  |
   | value    | vswitch,sriovnicswitch,opendaylight |
   +----------+------------------------------------+
   ```

3. Configure the ml2 plugin with the URL of the SDN controller.

For OpenDaylight, use a command of the following form:

```
~(keystone_admin)$ system service-parameter-add network ml2_odl url=http://
odl-controller-host:8181/controller/nb/v2/neutron
```

where *odl-controller-host* is the URL of the SDN controller.

For example, for OpenDaylight:

```
~(keystone_admin)$ system service-parameter-add network ml2_odl url=http://
192.168.12.30:8181/controller/nb/v2/neutron
+----------+----------------------------------------------------+
| Property | Value                                              |
+----------+----------------------------------------------------+
| uuid     | 89376838-4218-4425-8e78-bd0cc033483f               |
| service  | network                                            |
| section  | ml2_odl                                            |
| name     | url                                                |
| value    | http://192.168.12.30:8181/controller/nb/v2/neutron |
+----------+----------------------------------------------------+
```

4. Configure the credentials for ml2 access to the SDN controller.

For example, for OpenDaylight:

```
~(keystone_admin)$ system service-parameter-add network ml2_odl username=username
+----------+----------------------------------------------------+
| Property | Value                                              |
+----------+----------------------------------------------------+
| uuid     | 478dd1ce-b1c6-4179-9ea3-e99fc4548eaf               |
| service  | network                                            |
| section  | ml2_odl                                            |
| name     | username                                           |
| value    | ml2_user                                           |
+----------+----------------------------------------------------+
system service-parameter-add network ml2_odl password=password
+----------+----------------------------------------------------+
| Property | Value                                              |
+----------+----------------------------------------------------+
| uuid     | ffe32e64-163e-4ec2-8a22e-aba823d2467a              |
| service  | network                                            |
| section  | ml2_odl                                            |
| name     | password                                           |
| value    | t#raCt66fR                                         |
+----------+----------------------------------------------------+
```

5. Optional: Enable support for Layer 3 network management.

You can optionally enable SDN for L3 network services. Otherwise the L3 services are managed by Titanium Server.

> **NOTE:** For SDN L3 management, each compute node must be connected to an external network.

For eexample, to enable L3 management by the SDN controller for OpenDaylight, use the following command:

```
~(keystone_admin)$ system service-parameter-add \
network default service_plugins=networking_odl.l3.l3_odl.OpenDaylightL3RouterPlugin
+----------+----------------------------------------------------+
| Property | Value                                              |
+----------+----------------------------------------------------+
| uuid     | 936c5180-65b5-4af1-96e2-6bb3de85963d               |
| service  | network                                            |
| section  | default                                            |
| name     | service_plugins                                    |
```

```
| value    | networking_odl.l3.l3_odl.OpenDaylightL3RouterPlugin |
+----------+-----------------------------------------------------+
```

6. Apply the service parameters.

You must apply the basic service parameters before configuring any additional parameters, including the list of SDN controllers.

```
~(keystone_admin)$ system service-parameter-apply network

Applying network service parameters
```

Wait until any system configuration alarms are cleared and the configuration is fully applied.

A connection from Titanium Server is configured.

NOTE: Connection to the specified URL is not attempted at this time.

Postrequisites

The SDN controller must also be included in the list of known SDN controllers. See <u>Adding an SDN Controller</u> on page 7.

Adding an SDN Controller

On a system configured for software-defined networking (SDN), you can add SDN controllers from the web administration interface.

At least one configured SDN controller is required before you can unlock compute nodes.

Prerequisites

This feature is available only if SDN support is configured at installation using the Configuration Controller Script.
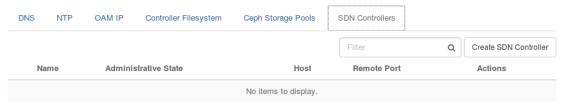
Procedure

1. On the System Configuration page, select the System Controllers tab.

NOTE: This tab is shown only on systems configured for SDN.

The System Configuration pane is available from **Admin** > **Platform** > **System Configuration** in the left-hand pane.

2. Click **Create SDN Controller**.

   The Create an SDN Controller dialog box appears.

3. Specify basic information for this SDN controller.

SDN Controller Host

   the IP address of the SDN controller

SDN Controller Port #

   the port to use for SDN control communications

SDN Control channel transport mode

   the transport type to use for communications (**TCP**, **UDP**, or **TLS**)

   NOTE: TLS is not currently supported.

SDN Controller administrative state

   the availability of the SDN controller for administrative control from Titanium Server
   (enabled or disabled)

4. Click **Create Controller**.

The SDN controller is added to the list of SDN controllers available to Titanium Server.

Postrequisites

   You must configure a connection to the SDN controller separately. See Configuring SDN
   Controller Connection Parameters on page 5.

Adding an SDN Controller Using the CLI

If you prefer, you can use the CLI to add an SDN Controller.

The following CLI commands are available for managing SDN controllers:

- **system sdn-controller-add**
- **system sdn-controller-modify**
- **system sdn-controller-list**
- **system sdn-controller-delete**

Prerequisites

You can add SDN controllers only if SDN support is configured at installation using the Configuration Controller Script.

Procedure

1. Log in to the active controller as the Keystone **admin** user.

2. Use the **system sdn-controller-add** command to add a controller.

    ```
     ~(keystone_admin)$ system sdn-controller-add -a sdn-controller-url \
     -p sdn-controller-port -t transport-protocol[ --state admin-state]
    ```

    where

    sdn-controller-url

    is the management IP address or FQDN of the SDN controller

    sdn-controller-port

    is the listening port for he SDN controller for southbound OVSDB protocol (for example, **6640** for OpenDaylight)

    transport-protocol

    is the transport protocol for the OVSDB connection

    - **TCP** (recommended for OpenDaylight)

    - **UDP**

    - **TLS** (not currently supported)

    admin-state

    is the administrative control state (**enable** or **disable**). The default is **enable**.

    ```
    +---------------------+------------------------------------+
    | Property            | Value                              |
    +---------------------+------------------------------------+
    | uuid                | 380fec8c-3768-4d41-8ac0-8c059245dcb0 |
    | administrative state | enabled                           |
    | ip address          | 192.168.12.30                      |
    | remote port         | 6640                               |
    | transport mode      | TCP                                |
    +---------------------+------------------------------------+
    ```

Postrequisites

You must configure a connection to the SDN controller separately. See [Configuring SDN Controller Connection Parameters](#) on page 5.