



Reference Information

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Configuring Hierarchical Port Binding

This section describes configuring the Single Root I/O Virtualization (SR-IOV) and other VLAN-based m12 mechanism agents to work with OpFlex plug-in. This is accomplished by using Hierarchical Port Binding (HPB) and should work without any special modification to the configuration. Here are the basic steps needed to configure OpFlex with SR-IOV.

When using HPB, datapath connectivity in Cisco Application Centric Infrastructure (ACI) is accomplished by creating static VLAN bindings to the EPGs for networks created by OpenStack. There maybe other configuration required for datapath, for example, setting up VLAN on SR-IOV NIC or configuring OVS (or a load balancer in case of LBaaS). This is done by the third party agent or mechanism driver (for example, sriovnicswitch).

How to create these assets:

Before you begin

In order to configure the datapath using static VLAN bindings. The plug-in requires following assets:

- A physical domain (physdom) with the correct VLAN pool.
- Host-link information (which compute node fabric Ethernet interface is connected to which leaf switch port)
- Host-link-network-label information (describing which fabric Ethernet interface on compute node is used to serve which physnet)

This information is only needed if the deployment uses multiple physnets.

Procedure

- Step 1** Before deploying OpenStack Platform Overcloud, make sure you have one Physical Domain (physdom) created per each physnet required. Add pdom_prefix to the name of physical domain created. For example for physnet1 create pdom_physnet1, and attach the right VLAN pool.
- Step 2** The host-link information usually comes from LLDP auto discovery. It can also be provided statically using ACIHostLinks parameter in the Cisco ACI deployment template as shown in example below.

You also need to set NeutronNetworkVLANRanges and enable the third party mechanism drivers using ACIMechanismDrivers parameter, make sure that the apic_aim is the last mechanism in the list.

Example:

```
NeutronPhysicalDevMappings: physnet1:ens11,physnet2:ens7,physnet3:ens9
NeutronNetworkVLANRanges:physnet1:1200:1250,physnet2:1251:1300,physnet3:1301:1350
ACIMechanismDrivers: 'sriovnicswitch,apic_aim'
ACIHostLinks: '{"101": [{"host01|ens11": "1/14"}], "102": [{"host02|ens9": "1/14"}]}'
```

Parameters for the Cisco ACI Environment

The following table provides information about parameters that are required to configure the Cisco Application Centric Infrastructure (ACI) environment.

Parameter	Details
NeutronCorePlugin	<ul style="list-style-type: none"> • Value: 'ml2plus' • Default: None • Mandatory or Optional: Mandatory • Comments: None
NeutronServicePlugins	<ul style="list-style-type: none"> • Value: 'group_policy,ncp,apic_aim_l3' • Default: None • Mandatory or Optional: Mandatory • Comments: None
NeutronEnableIsolatedMetadata	<ul style="list-style-type: none"> • Value: true • Default: None • Mandatory or Optional: Mandatory • Comments: Must be set to true

Parameter	Details
NeutronEnableForceMetadata	<ul style="list-style-type: none"> • Value: true • Default: None • Mandatory or Optional: Mandatory • Comments: Must be set to true
ACIYumRepo	<ul style="list-style-type: none"> • Value:: <i>http://undercloud pxe network ipaddress</i> • Default: None • Mandatory or Optional: Mandatory • Comments: None
ACIApicHosts	<ul style="list-style-type: none"> • Value: Cisco APIC name and addresses • Default: None • Mandatory or Optional: Mandatory • Comments: None
ACIApicUsername	<ul style="list-style-type: none"> • Value: Username with administrative privileges • Default: admin • Mandatory or Optional: Optional • Comments: None
ACIApicPassword	<ul style="list-style-type: none"> • Value: Password • Default: None • Mandatory or Optional: Mandatory • Comments: None <p>Note Do not provide this parameter if certificate-based authentication is used.</p>
ACIMechanismDrivers	<ul style="list-style-type: none"> • Value: 'apic_aim' • Default: None • Mandatory or Optional: Mandatory • Comments: Add extra drivers—for example, for Open vSwitch when using neutron ovs agent or for sriovnicswitch when using sriov

Parameter	Details
ACIApicEntityProfile	<ul style="list-style-type: none"> • Value: The Cisco ACI entity profile that has been preprovisioned on Cisco ACI • Default: None • Mandatory or Optional: Mandatory • Comments: None
ACIApicInfraVlan	<ul style="list-style-type: none"> • Value: The Cisco ACI fabric infra VLAN • Default: 4093 • Mandatory or Optional: Optional • Comments: Contact the Cisco ACI administrator for the correct value
ACIApicInfraSubnetGateway	<ul style="list-style-type: none"> • Value: The Cisco ACI infra subnet gateway • Default: 10.0.0.30 • Mandatory or Optional: Optional • Comments: Contact the Cisco ACI administrator for the correct value
ACIApicInfraAnycastAddr	<ul style="list-style-type: none"> • Value: The Cisco ACI anycast address • Default: 10.0.0.32 • Mandatory or Optional: Optional • Comments: Contact the Cisco ACI administrator for the correct value
ACIUseLldp	<ul style="list-style-type: none"> • Value: true or false • Default: true • Mandatory or Optional: Optional • Comments: If set to false, set CiscoAciLldp service to OS::Hat:None
ACIOpflexUplinkInterface	<ul style="list-style-type: none"> • Value: Interface name that is connected to the Cisco ACI leaf switch • Default: None • Mandatory or Optional: Mandatory • Comments: Actual interface name—for example, enp8s0

Parameter	Details
ACIOpflexEncapMode	<ul style="list-style-type: none"> • Value: vxlan or vlan • Default: vxlan • Mandatory or Optional: Optional • Comments: None
ACIOpflexVlanRange	<ul style="list-style-type: none"> • Value: <i>starting_vlan:ending_vlan</i> • Default: None • Mandatory or Optional: Mandatory if ACIOpflexEncapMode is set to vlan • Comments: None
ACIOpflexInterfaceType	<ul style="list-style-type: none"> • Value: linux or ovs • Default: linux • Mandatory or Optional: Optional • Comments: Set this value to 'ovs' when planning to deploy an "OpenShift on OpenStack" nested installation. The setting causes the OpFlex interface to be created on the ovs switch.
ACIOpflexInterfaceMTU	<ul style="list-style-type: none"> • Value: Intended MTU size • Default: 1500 • Mandatory or Optional: Optional • Comments: Use this parameter to set the MTU for the OpFlex interface. This must be set to 8000 for installing OpenShift on OpenStack.
NeutronPluginMl2PuppetTags	<ul style="list-style-type: none"> • Value: 'neutron_plugin_ml2,neutron_plugin_cisco_aci,neutron_sfc_service_config' • Default: None • Mandatory or Optional: Mandatory • Comments: None
NeutronNetworkVLANRanges	<ul style="list-style-type: none"> • Value: <i>physnet:starting_vlan:ending_vlan</i> (For example, physnet1:1100:1150,physnet2:1201:1211) • Default: None • Mandatory or Optional: Mandatory when using neutron ovs agent • Comments: None

Parameter	Details
NeutronBridgeMappings	<ul style="list-style-type: none"> • Value: For example: 'physnet1:br-ex,physnet2:br-ex' • Default: None • Mandatory or Optional: Mandatory when using neutron ovs agent • Comments: Physnets should match as provided in NeutronBridgeMappings
AciTenantNetworkType	<ul style="list-style-type: none"> • Value: vlan • Default: None • Mandatory or Optional: Mandatory when using neutron ovs agent • Comments: None
AcisOpenvswitch	<ul style="list-style-type: none"> • Value: true or false • Default: false • Mandatory or Optional: Set to true when using neutron ovs agent • Comments: None
NeutronOVSFirewallDriver	<ul style="list-style-type: none"> • Value: 'neutron.agent.linux.iptables_firewall.OVSHybridIptablesFirewallDriver' • Default: None • Mandatory or Optional: Mandatory • Comments: Set to the value shown when using neutron ovs agent
ACIHostLinks	<ul style="list-style-type: none"> • Value: For example: '{"101":{"ha.dom":"1/1", "hb.dom":"1/2"}, "102":{"hc.dom":"1/1"} }' • Default: None • Mandatory or Optional: Mandatory when using neutron ovs agent and not using lldp agent • Comments: Describes the host connections to switches in JSON format. In the example, The ha.dom host is connected to port 1/1 of switch ID 101, the hb.dom host is connected to port 1/2 of switch ID 101, and the hc.dom is connected to port 1/1 of switch ID 102.
NeutronPhysicalDevMappings	<ul style="list-style-type: none"> • Value: • Default: None • Mandatory or Optional: Optional • Comments:

Parameter	Details
NeutronPhysicalDevMappings	<ul style="list-style-type: none"> • Value: For example: physnet1:eth1,physnet2:eth2 • Default: None • Mandatory or Optional: Optional • Comments: You must set this parameter when you want to map a particular interface to a specific physnet
ACIApicCertName	<ul style="list-style-type: none"> • Value: Name of the Cisco APIC cert User (used for certificate-based authentication) • Type: String • Default: None • Mandatory or Optional: Optional
ACIApicPrivateKey	<ul style="list-style-type: none"> • Value: Private key for the cert User • Type: String • Default: None • Mandatory or Optional: Optional
ACIEnableBondWatchService	<ul style="list-style-type: none"> • Value: True or False • Type: Boolean • Default: False • Comment: Set this parameter to True if you use Cisco Unified Computing System (UCS) blade servers for OpenStack nodes.
AciKeystoneNotificationPurge	<ul style="list-style-type: none"> • Value: True or False • Type: Boolean • Default: False • Comment: Enables the automatic purge of Cisco APIC tenants when the project is deleted in OpenStack.
NeutronPluginExtensions	<ul style="list-style-type: none"> • Value: Comma-separated list of enabled extension plugins. • Default: apic_aim,port_security • Mandatory or Optional: Optional • Comment:Recommended values when parameter is explicitly configured are - apic_aim, port_security, qos.

Example of Resources Declaration

The following is a full example of the Cisco Application Centric Infrastructure (ACI) resources declaration (`ciscoaci-env.yaml`):

You declare resources for Cisco ACI environment when you install OpenStack. See the procedure [Installing OpenStack](#) in this guide.

The following example is applicable for Cisco ACI Release 5.2(1) and later:

```
# A Heat environment file which can be used to enable a
# a Neutron Cisco Aci backend on the controller, configured via puppet
resource_registry:

    #controller
    OS::TripleO::ControllerExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates//nodepre.yaml

    OS::TripleO::Services::NeutronL3Agent: OS::Heat::None
    OS::TripleO::Services::NeutronOvsAgent:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_neutron_opflex.yaml
    OS::TripleO::Docker::NeutronMl2PluginBase:
/opt/ciscoaci-tripleo-heat-templates/puppet/services/ciscoaci-ml2.yaml
    OS::TripleO::Services::CiscoAciAIM:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_aciaim.yaml

    #compute
    OS::TripleO::ComputeExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates//nodepre.yaml
    OS::TripleO::Services::ComputeNeutronOvsAgent:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_neutron_opflex.yaml
    OS::TripleO::Services::ComputeNeutronCorePlugin:
/opt/ciscoaci-tripleo-heat-templates/puppet/services/ciscoaci_compute.yaml
    OS::TripleO::Services::ComputeNeutronMetadataAgent:
/opt/ciscoaci-tripleo-heat-templates/docker/services/compute-neutron-metadata.yaml

    OS::TripleO::Services::CiscoAciLldp:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_lldp.yaml
    OS::TripleO::Services::CiscoAciOpflexAgent:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_opflex.yaml

parameter_defaults:
    NeutronSfcDriver: 'aim'
    NeutronFcDriver: 'aim'
    AdminPassword: 'admin0123'
    EC2MetadataIp: 1.100.1.1
    ControlPlaneDefaultRoute: 1.100.1.1
    DockerInsecureRegistryAddress: 1.100.1.1:8787
    OpenStackControllerFlavor: control
    OpenStackComputeFlavor: compute
    ExternalNetworkVlanID: 1
    InternalApiNetworkVlanID: 301
    StorageNetworkVlanID: 302
    StorageMgmtNetworkVlanID: 303
    TenantNetworkVlanID: 304
    NeutronCorePlugin: 'ml2plus'
    NeutronPluginMl2PuppetTags: 'neutron_plugin_ml2,neutron_plugin_cisco_aci'
    NeutronServicePlugins: 'group_policy,ncp,apic_aim_l3'
    NeutronEnableIsolatedMetadata: true
    NeutronEnableForceMetadata: true
    EnablePackageInstall: true
```



```

ACIScopeNames: true
ACIYumRepo: http://1.100.1.1/acirepo
ACIApicHosts: 172.171.170.169
ACIApicUsername: admin
ACIApicPassword: mypass
ACIApicSystemId: osp13
ACIMechanismDrivers: 'apic_aim'
ACIApicEntityProfile: osp13-aep
ACIApicInfraVlan: 4093
ACIApicInfraSubnetGateway: 10.0.0.30
ACIApicInfraAnycastAddr: 10.0.0.32
ACIOpflexUplinkInterface: enp8s0
ACIOpflexEncapMode: vxlan
HeatEnginePluginDirs:
/usr/lib64/heat,/usr/lib/heat,/usr/local/lib/heat,/usr/local/lib64/heat,/usr/lib/python2.7/site-packages/gbpautomation/heat

NeutronGlobalPhysnetMtu: 8950
ACIOpflexInterfaceMTU: 9000
NtpServer: ['172.28.184.8']
NeutronPluginMl2PuppetTags:
'neutron_plugin_ml2,neutron_plugin_cisco_aci,neutron_sfc_service_config'

```



Note If you are deploying a release prior to Cisco ACI Release 5.2(1), you need to make the following changes in the above example:

- Remove the definition for the `OS::TripleO::Services::CiscoAciOpflexAgent` service.
- Change the `OS::TripleO::Services::NeutronOvsAgent` and `OS::TripleO::Services::ComputeNeutronOvsAgent` to reference the `/opt/ciscoaci-tripleo-heat-templates/deployment/opflex/copflex-agent-container-puppet.yaml` template.

Example of Resources Declaration When Using the Neutron OVS Agent

When you use the Neutron OVS agent, Cisco-specific containers for Horizon and Heat may be optional. If that is the case, remove them from the `ciscoaci_containers.yaml` file that was generated in step 5 in the section [Preparing Undercloud for Cisco ACI with OpFlex Orchestration](#) in this guide.

You can use the following commands to remove Horizon and Heat from the `ciscoaci_containers.yaml` file:

```

resource_registry:
#controller
  OS::TripleO::ControllerExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates//nodepre.yaml

  OS::TripleO::Services::NeutronL3Agent: OS::Heat::None
  OS::TripleO::Services::NeutronOvsAgent:
/usr/share/openstack-tripleo-heat-templates/docker/services/neutron-ovs-agent.yaml
  OS::TripleO::Docker::NeutronMl2PluginBase:
/opt/ciscoaci-tripleo-heat-templates/puppet/services/ciscoaci-ml2.yaml
  OS::TripleO::Services::CiscoAciAIM:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_aciaim.yaml
  OS::TripleO::Services::NeutronSfcApi:
/usr/share/openstack-tripleo-heat-templates/puppet/services/neutron-sfc-api.yaml

```

```

#compute
OS::TripleO::ComputeExtraConfigPre: /opt/ciscoaci-tripleo-heat-templates//nodepre.yaml
OS::TripleO::Services::ComputeNeutronOvsAgent:
/usr/share/openstack-tripleo-heat-templates/docker/services/neutron-ovs-agent.yaml
OS::TripleO::Services::ComputeNeutronCorePlugin:
/opt/ciscoaci-tripleo-heat-templates/puppet/services/ciscoaci_compute.yaml
OS::TripleO::Services::ComputeNeutronMetadataAgent:
/opt/ciscoaci-tripleo-heat-templates/docker/services/compute-neutron-metadata.yaml

#if using LLDP, else set it to OS::Heat::None
OS::TripleO::Services::CiscoAciLldp:
/opt/ciscoaci-tripleo-heat-templates/docker/services/cisco_lldp.yaml

parameter_defaults:
  NeutronSfcDriver: 'aim'
  NeutronFcDriver: 'aim'
  AdminPassword: 'myPass123'
  EC2MetadataIp: 10.10.253.10
  ControlPlaneDefaultRoute: 10.10.253.10
  DockerInsecureRegistryAddress: 10.10.253.10:8787
  OvercloudControllerFlavor: control
  OvercloudComputeFlavor: compute
  NeutronCorePlugin: 'ml2plus'
  NeutronPluginMl2PuppetTags: 'neutron_plugin_ml2,neutron_plugin_cisco_aci'
  NeutronServicePlugins: 'group_policy,ncp,apic_aim_l3,flow_classifier,sfc,trunk'
  NeutronEnableIsolatedMetadata: true
  NeutronEnableForceMetadata: true
  EnablePackageInstall: true
  ACIScopeNames: true
  ACIYumRepo: http://10.10.253.10/acirepo
  ACIApicHosts: 171.36.17.106
  ACIApicUsername: admin
  ACIApicPassword: apicPass123
  ACIApicSystemId: osp13-ovs
  ACIApicEntityProfile: OSP-AEP
  ACIApicInfraVlan: 4093
  ACIApicInfraSubnetGateway: 10.0.0.30
  ACIApicInfraAnycastAddr: 10.0.0.32
  ACIOpflexUplinkInterface: ens9
  HeatEnginePluginDirs:
  /usr/lib64/heat,/usr/lib/heat,/usr/local/lib/heat,/usr/local/lib64/heat,/usr/lib/python2.7/site-packages/gcpautomation/heat

  NeutronGlobalPhysnetMtu: 8950
  NtpServer: ['172.28.184.8']
  NeutronPluginMl2PuppetTags:
'neutron_plugin_ml2,neutron_plugin_cisco_aci,neutron_sfc_service_config'
  AciExternalRoutedDomain: 'myERD'
  ACIMechanismDrivers: openvswitch,apic_aim
  NeutronNetworkVLANRanges: physnet1:1200:1250
  AciOpenvswitch: true
  NeutronBridgeMappings: 'physnet1:br-ex'
  NeutronTunnelTypes: ''
  NeutronOVSHybridIptablesDriver:
'neutron.agent.linux.iptables_firewall.OVSHybridIptablesFirewallDriver'
  NeutronEnableDVR: false

```

Examples of Creating Host Reports

During troubleshooting, you might need to collect host reports from the OpenStack cluster. You do it using provided playbook `/opt/ciscoaci-tripleo-heat-templates/tools/report.yaml`. This section provides example of using the host report playbook.

- `ansible-playbook /opt/ciscoaci-tripleo-heat-templates/tools/report.yaml`

This example collects data from all nodes and creates the file `/home/stack/overcloud_aci_report.tgz`.

- `ansible-playbook /opt/ciscoaci-tripleo-heat-templates/tools/report.yaml -e '{"limit_flavors":['control'], "dest_file":"/tmp/abc}'`

This example limits the report to controllers and changes the default output file.

- `ansible-playbook /opt/ciscoaci-tripleo-heat-templates/tools/report.yaml -e '{"limit_hosts":[overcloud-controller-0, overcloud-controller-2]}'`

This example limits the report collection to the hosts specified. You can club `"limit_flavors"` and `"limit_hosts"` to further filter the nodes from which to collect data.

Deploying with TLS

Deploying Red Hat OpenStack 13 with Transport Layer Security (TLS) is a supported configuration. To enable TLS on OpenStack endpoints, follow the instructions in *Advanced Overcloud Customization* on the Red Hat website.

To enable TLS between AIM and Cisco Application Policy Infrastructure Controller (APIC), follow the certificate authentication procedure described in step 4 of [Installing Overcloud](#) in this guide.

