Cisco APIC OpenStack Plug-in Release Notes, Release 5.0(2)

This document describes the features, bugs, and limitations for the Cisco Application Policy Infrastructure Controller (APIC) OpenStack Plug-in.

Cisco APIC OpenStack Plug-in allows policy deployment automation across Cisco Application Centric Infrastructure (ACI) and OpenStack, enabling a complete undercloud and overcloud visibility on Cisco ACI. The Cisco APIC OpenStack Plug-in allows dynamic creation of networking constructs to be driven directly from OpenStack, while providing additional visibility and control from the Cisco APIC.

Release notes are sometimes updated with new information about restrictions and bugs. See the following website for the most recent version of this document:

https://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/tsd-products-support-series-home.html

The following table shows the online change history for this document.

Date	Description
2020-10-27	Added to Changes in Behavior section the lack of Cisco APIC support for use of forward slash in endpoint names.
2020-08-31	Release 5.0(2) became available.

Contents

This document includes the following sections:

Cisco ACI Virtualization Compatibility Matrix

For information about Cisco ACI and OpenStack, see the *Cisco Virtualization Compatibility Matrix* at the following URL:

- https://www.cisco.com/c/dam/en/us/td/docs/Website/datacenter/aci/virtualization/matrix/virtmatrix.html

New and Changed Information

This section lists the new and changed features in this release and includes the following topics:

New Software Features

Feature	Description	Guidelines and Restrictions
Endpoint Group Contract Masters	A new extension, apic:epg_contract_masters , has been added in the 5.0(2) release. The extension controls the configuration of the “EPG contract masters” configuration in the endpoint group that maps to the Neutron network. This means that the provided and consumed contracts are inherited from the master endpoint group, and therefore are applied to the network’s default endpoint group, in addition to any other contracts.	■ This extension is not supported on external or SVI networks. ■ At least one subnet on the network must be attached as a router interface for the inherited contracts to have any effect.
Pre-existing Bridge Domain	Users can now use pre-existing bridge domains in Cisco APIC when creating Neutron networks. This is specified using the apic:distinguished_names cisco_apic network extension. This property can only be used when creating a network in Neutron, and cannot be used to update existing networks. The plug-in ensures that the specified bridge domain exists, and then takes ownership over the bridge domain resource. The preexisting bridge domain is deleted when the Neutron network that it maps to is deleted.	This extension is not supported on external or SVI networks, and should be considered a tech preview, as it may be removed or changed in the future.

Changes in Behavior

Cisco APIC Does Not Support Forward Slash in Endpoint Names

OpenStack allows users to give instance names with forward-slash characters ("/"). However, Cisco APIC does not support the use of forward-slash characters for endpoints. As a result, any forward-slash characters used in instance names are replaced with pipe characters ("|") by the integration when they are communicated to Cisco APIC. For example, if an instance was given the name "trees/fruit/apple", it would show up as an endpoint in Cisco ACI with the name "trees|fruit|apple".

New Behaviors in Previous Releases

The following are behaviors that were new in previous releases and may remain relevant:

- Starting with the 4.2(1) release, Debian packages are split into distribution-specific tarballs. Packages for the Xenial release are included in tarballs that have `-xenial` in the name, while packages for the Bionic release are included in tarballs that have `-bionic` in the name.
- Before the 4.2(1) release, the Neutron router resource's `apic:distinguished_names` extension reported the Distinguished Names (DNs) and CIDRs for the subnets attached to the router, as well as the DNs of the associated Contract and ContractSubject in Cisco ACI. Starting with the 4.2(1) release, this extension only reports the Contract and ContractSubject DNs.
- Before the 4.2(1) release, it was possible to attach unscoped Neutron subnets to routers such that Cisco ACI subnets referencing the same VRF would be created. These would result in Cisco ACI faults and loss of connectivity for the affected subnets.

  Starting with the 4.2(1) release, if adding or removing an unscoped Neutron subnet to or from a router would result in overlapping Cisco ACI subnets, the operation is rejected with a SubnetOverlapInRoutedVRF exception. The gbp-validate tool also now reports any existing overlapping Subnets within a VRF as unrepairable errors.

  For existing deployments, run gbp-validate immediately after upgrading to the release, and remove router interfaces needed to eliminate any overlap that is reported. If attempting to remove such interfaces results in SubnetOverlapInRoutedVRF exceptions, then temporarily set the `allow_routed_vrf_subnet_overlap config` variable to True until the overlap has been cleaned up and validation passes.
- Beginning in Cisco APIC OpenStack Plug-in Release 4.1(1), using VXLAN on blade server systems is supported. See the Known Limitations section for more information.
- For OpenStack Director installs, the value for ACIOpflexUplinkInterface parameter needs to be an actual interface name. This is required to support both nested virtualization and non-nested configurations. Refer to the appropriate OpenStack Director documentation for additional information on how to configure this for your environment.
- For OpenStack Director 13 installs, enabling or disabling of LLDP is controlled by resource declaration. If you have the following in your yaml file:

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

  Then LLDP will be enabled. If you do not want to use LLDP, then you must put the following in your yaml file:
  `OS::TripleO::Services::CiscoAciLldp: OS::Heat::None`

  The use of ACIUseLldp to control this behavior was removed beginning with OpenStack Director 13.

- For installations currently running release 3.2(2.20180710), 4.0(1.20181001), or 4.0(2.20181221), run the `db_check` script before upgrading to ensure that the OpenStack ACI Integration Module (AIM) database migration script completed successfully. The script is in `support-tools-1.0.0.tar.gz` in the tarball for the release on Cisco.com.

  Contact the Cisco Technical Assistance Center (TAC) if the script indicates that there could be a potential problem.

- Cisco ACI software version 3.2(4e) or higher is recommended for this plug-in. You cannot use Cisco ACI software version 4.0(2c) for OpenStack as it has the following issues with floating IP usage: CSCvn77231.

- Starting in 4.01, agent-ovs was renamed opflex-agent. Operators must account for the change when stopping or starting the agent. Users who create their own installers also need to incorporate packaging changes for the agent.

  In addition, the default values for two sockets used by the agent have changed:

  Old: `/var/run/opflex-agent-ovs-inspect.sock`

  New: `/var/run/opflex-agent-inspect.sock`

  Old: `/var/run/opflex-agent-ovs-notif.sock`

  New: `/var/run/opflex-agent-notif.sock`

  The neutron-opflex-agent shares the notify socket with the opflex-agent, so its default value also changed to be consistent. All socket filenames can also be configured explicitly.

- If you are going to upgrade, you must upgrade the Cisco ACI fabric first before upgrading the Cisco APIC OpenStack plug-ins. The only exception is for the Cisco ACI fabric releases that have been explicitly validated for this specific plug-in version in the Cisco ACI Virtualization Compatibility Matrix.

- Multiple OpenStack instances can share the same Cisco ACI fabric. Earlier versions of unified plug-in would attach all OpenStack virtual machine manager (VMM) domains to every OpenStack cloud. This release allows cleaner separation by using this procedure:

  You must provision the VMM domains owned by each OpenStack cloud using the new host-domain-mapping CLI command:

  ```
  # aimctl manager host-domain-mapping-v2-create [options] <host name> <domain name> <domain type>
  ```

  The host name can be a wildcard, which is indicated using an asterisk surrounded by double quotes (`"*"`). A wildcard means that the mapping should be used for all hosts. When more than one OpenStack instance shares the fabric, an entry must be created in this table for each VMM domain in use by that OpenStack instance. As an example, if one OpenStack instance is using VMM Domains `"ostack1"` and `"ostack2"`, the following commands would be run on that OpenStack controller to put entries to this table:

  ```
  # aimctl manager host-domain-mapping-v2-create "*" ostack1 OpenStack
  # aimctl manager host-domain-mapping-v2-create "*" ostack2 OpenStack
  ```

  If the second OpenStack instance is using VMM Domain `"ostack3"`, the following command would be run on that OpenStack controller to add an entry to its table:

  ```
  # aimctl manager host-domain-mapping-v2-create "*" ostack3 OpenStack
  ```

- Earlier versions only supported one logical uplink for hierarchical port binding or non-opflex VLAN network binding. In this release, you can have multiple links for those use-cases when using unified plug-in.

  To use this feature, the AIM CLI must be used to provide the mapping of physnets in OpenStack and an interface on a specific host. The following aimctl CLI command is used to configure this mapping:

  ```
  # aimctl manager host-link-network-label-create <host_name> <network_label> <interface_name>
  ```

  As an example, host h1.example.com is provisioned to map its eth1 interface to physnet1:

  ```
  # aimctl manager host-link-network-label-create h1.example.com physnet1 eth1
  ```

- Previously it was not possible for a single L3 Out to be shared across multiple OpenStack instances when using AIM, because both OpenStack instances would attempt to use an External Network Endpoint Group of the same name. This release adds scoping of the Application Profile for the External Network Endpoint Group using the apic_system_id, which is configured in the `[DEFAULT]` section of the aimctl.conf file.

- In earlier versions, the AIM plug-in would take ownership of pre-existing L3 Outs when NAT was not being used, which led to scenarios where the AIM plug-in would delete the pre-existing L3 Out in some corner cases. With this release, the AIM plug-in will not take ownership of any pre-existing L3 Outs.

- Legacy plug-in is not supported with the Ocata Plug-ins and will not be supported on future versions of OpenStack. The legacy plug-in for Newton is supported. All customers are recommended to use unified mode for both Newton and Ocata.

- The OpFlex agent does not support client authentication. This means that the SSL certificate check must be disabled in Cisco APIC GUI.

  1. In the Cisco APIC GUI, on the menu bar, choose System > System Settings > Fabric Wide Setting.
  2. Ensure that the OpFlex Client Authentication check box is not checked.

- Before the 5.0(1) release, the OpenStack plug-in marked resources it created in Cisco ACI using tags, which are child objects of every resource in Cisco ACI. The tags contain the value of the system ID configured in Cisco AIM. Starting with the 5.0(1) release, the OpenStack plug-in uses annotations to mark resources that it creates in Cisco ACI instead of using tags. This change is an optimization that allows for better scaling of resources created in Cisco ACI.

  If you upgrade from an older release, the resources that have already been created in Cisco ACI will not be automatically converted from tags to annotations. As a result, new Cisco AIM CLI commands have been added to find and delete resources with tags, which converts the tagged resources to annotations:

  ```
  # aimctl infra tag-list -t <AIM system ID, which is used for the tag>

  # aimctl manager tag-delete --dn <DN of the tag to delete>
  ```

- Nested Virtualization was added in the 4.0(1) plugin release. Neutron security groups weren't applied to ports used for nested virtualization. Starting with the 5.0(1) release, Neutron security groups are applied to these ports. If the previous behavior is needed, a flag can be set in the neutron-opflex-agent configuration to change to the old behavior:

  ```
  [OPFLEX]

  disable_security_group_for_nested_mode=True
  ```

- To enable drop logging, run the following command on the host:

sudo docker exec ciscoaci_opflex_agent /bin/sh -c "echo '{\"drop-log-enable\" : true}' > /var/lib/opflex-agent-ovs/droplog/a.droplogcfg"

The traffic must also be permitted to pass iptables. Enable this using the following command on the host:

```
# sudo iptables -t nat -A OUTPUT -p udp --dport 6081 -j DNAT --to 127.0.0.1:50000
```

Drop log events are recorded in the opflex-agent logs. The following is an example of an event:

```
[2020-Jan-03 11:57:54.416092] [info] [ovs/PacketLogHandler.cpp:196:parseLog] : Int-PORT_SECURITY_TABLE MAC=0a:ff:ae:02:97:80:ee:42:6b:1a:3c:d6:IPv4 SRC=101.0.0.3 DST=101.0.0.5 LEN=84 DSCP=0 TTL=64 ID=52995 FLAGS=2 FRAG=0 PROTO=ICMP TYPE=8 CODE=0 ID=16920 SEQ=3
```

Drop logs can be disabled by running the following command:

```
# sudo docker exec ciscoaci_opflex_agent /bin/sh -c "echo '{\"drop-log-enable\" : false}' > /var/lib/opflex-agent-ovs/droplog/a.droplogcfg"
```

Supported Scale

For the verified scalability limits (except the CLI limits), see the *Verified Scalability Guide* for this release. For the OpenStack Platform Scale Limits, see the following table.

Note: The scalability information in the following table applies to the sum of OpenStack and OpenShift or Kubernetes resources integrated with OpFlex into the Cisco ACI fabric. It does not apply to Microsoft SCVMM hosts of Cisco ACI Virtual Edge instances.

Limit Type	Maximum Supported
Number of OpFlex hosts per leaf	120
Number of OpFlex hosts per port	20
Number of vPC links per leaf	40
Number of endpoints per leaf	10,000
Number of endpoints per host	400
Number of virtual endpoints per leaf	40,000

Notes:

1. An endpoint is defined as one of the following:
    - A virtual machine (VM) interface (also known as vnic),
    - A DHCP agent's port in OpenStack (if in DHCP namespace on the network controller), or
    - A floating IP address
2. Total virtual endpoints on a leaf can be calculated as:

    Virtual Endpoints / leaf = VPCs x endpoint groups (EPGs)

    Where:

    VPCs is the number of VPC links on the switch in the Attachment Profile used by the OpenStack VMM.

EPGs is the number of EPGs provisioned for the OpenStack VMM

For the CLI verified scalability limits, see the *Cisco NX-OS Style Command-Line Interface Configuration Guide* for this release.

Known Limitations

This section lists the known limitations.

- Cisco ACI Unified Plug-in for OpenStack does not support the following features:
  - ESX hypervisor support
  - ASR1K edgeNAT support
  - GBP/NFP Service chaining
  - ML2 Network constraints
- Cisco ACI Unified Plug-in for OpenStack supports OpenStack address scopes and dual stack IPv4 and IPv6 deployments.
- Dual-stack operation requires that all IPv4 and IPv6 subnets - both for internal and external networks - use the same VRF in Cisco ACI. The one exception to this is when separate external networks are used for IPv4 and IPv6 traffic. In that workflow, the IPv4 and IPv6 subnets used for internal networks plus the IPv6 subnets used for external networks all belong to one VRF, while the subnets for the IPv4 external network belong to a different VRF. IPv4 NAT can then be used for external networking.
- For installations with B-series that use VXLAN encapsulation, Layer 2 Policies (for example, bridge domains) should each contain only one Policy Target Group (that is, Endpoint Group) to ensure a functional data plane.
- The Cisco ACI OpenStack Plug-in is not integrated with the Multi-Site Orchestrator. When deploying to a Multi-Site deployment, the Cisco ACI configurations implemented by the plug-in must not be affected by the Multi-Site Orchestrator.
- NFV features, including SVI networks, trunk ports, and Service Function Chaining plug-in and workflow, are supported starting with the Ocata release of the plug-in.
- When you delete the Overcloud Heat stack, the Overcloud nodes are freed but the virtual machine manager (VMM) domain remains present in Cisco APIC. The VMM appears in Cisco APIC as a stale VMM domain along with the tenant unless you delete the VMM domain manually. Before you delete the VMM domain, verify that the stack has been deleted from the undercloud, and check that any hypervisors appearing under the VMM domain are no longer in the connected state. Once both of these conditions are met, you can safely delete the VMM domain Cisco APIC.
- Due to a bug in upstream Neutron, subport bindings are not cleaned up in trunk workflows. This has existed in earlier releases and is equally applicable to usage with Open vSwitch (OVS) reference implementation agents as well as OpFlex agents. For more information about the Neutron bug, see bug 1639111 on the Launchpad.net website.

Usage Guidelines

- We recommended that service VMs used in service function chaining (SFC) workflows use static IP addressing and not rely on DHCP. When the service VM becomes part of a service chain in OpenStack and correspondingly

a service graph on Cisco ACI, the associated EPG is removed. Thus, services such as DHCP are not available for the endpoint. This is applicable with OVS reference implementation agents as well as OpFlex agents.

- When you run the host report ansible-playbook (`/opt/ciscoaci-tripleo-heat-templates/tools/report.yml`), the step to copy files from a running container may return an error, causing the host report to fail. If this happens, rerun the playbook until it succeeds. The failure is due to a known issue in Red Hat OpenStack Platform (OSP) 13 Director.

  For more information, see the Red Hat Bugzilla bug 1767289. You can find the related product note in the Red Hat Customer portal knowledge base article “docker cp command sometimes failed with invalid argument.”

- If you are using Cisco ACI Virtual Edge with OpenStack or Kubernetes OpFlex on the same leaf, do not use Cisco APIC version 4.2(3), or you will encounter the bug CSCvs49419. if you have that configuration and need features from the Cisco APIC 4.2(x) release train, use the 4.2(2) or 4.2(4) version.

- JuJu charms users must first update the Charms before installing the updated plug-in.

- Newer RHEL installations limit the maximum number of multicast group subscriptions to 20. This is configured with the net.ipv4.igmp_max_memberships sysctl variable. Installations using VXLAN encapsulation for OpenStack VMM domains should set this value higher than the total number of endpoint groups (EPGs) that might appear on the node (one for each Neutron network with Neutron workflow, or one for each Policy Target Group with Group Based Policy workflow).

  Note: Controller hosts running DHCP agents that are connected to OpFlex networks have an EPG for each network.

- When using the allowed address pair feature with the Cisco ACI plug-in, be aware of the following differences from upstream implementation:

  — As OpenStack allows the same allowed_address_pair to be configured on multiple interfaces for HA, the OpFlex agent requires that the specific VNIC that currently owns a specific allowed_address_pair to assert that address ownership using Gratuitous ARP.

  — When using the promiscuous mode, the vSwitch stops enforcing the port security check. To get reverse traffic for a different IP or MAC address, you still need to use the allowed-address-pair feature. If you are running tempest, you will see test_port_security_macspoofing_port fail in scenario testing, as that test does not use the allowed-address-pair feature.

- Before performing an upgrade from 3.1(1) using OpenStack Director or attempting a Cisco APIC ID recovery procedure, all AIM processes on all controllers need to be shut down. To shut down all the AIM processes on all controllers, run the following command on the undercloud:

```
for IP in $(nova list | grep ACTIVE | sed 's/.*ctlplane=//' | sed 's/ |//') ; do

ssh -o UserKnownHostsFile=/dev/null -o StrictHostKeyChecking=no heat-admin@$IP \

"sudo systemctl stop aim-event-service-rpc; sudo systemctl stop aim-aid; sudo systemctl stop
aim-event-service-polling" ;

done
```

  If upgrading, you do not need to explicitly restart the AIM processes as the upgrade will automatically restart them.

  If attempting a Cisco APIC ID recovery, you must restart the AIM processes on all the controllers manually after ID Recovery is complete.

- Keystone configuration update

  When the OpenStack plug-in is installed in the unified mode, the Cisco installer adds the required configuration for keystone integration with AIM. When not using unified mode, or when using your own installer, the configuration section must be provisioned manually:

  ```
  [apic_aim_auth]
  auth_plugin=v3password
  auth_url=http://<IP Address of controller>:35357/v3
  username=admin
  password=<admin_password>
  user_domain_name=default
  project_domain_name=default
  project_name=admin
  ```

- When using optimized DHCP, the DHCP lease times are set by the configuration variable apic_optimized_dhcp_lease_time under the `[ml2_apic_aim]` section.

  — This requires a restart of neutron-server to take effect

  — If this value is updated, existing instances will continue using the old lease time, provided their neutron port is not changed (e.g. rebooting the instance would trigger a port change, and cause it to get the updated lease time). New instances will however use the updated lease time.

- In upstream Neutron, the "advertise_mtu" option has been removed.

  Since the aim_mapping driver still uses this configuration, the original configuration which appeared in the default section should be moved to the aim_mapping section. For example:

  ```
  [aim_mapping]
  advertise_mtu = True
  ```

  It is set to True by default in the code (if not explicitly specified in the config file).

- The Unified Plug-in allows coexistence of GBP and ML2 networking models on a single OpenStack Cloud installation. However, they must operate on different VRFs. We recommend using a single model per OpenStack Project.

- If a default VRF is implicitly created for a tenant in ML2, it is not implicitly deleted until the tenant is deleted (even if it not being used anymore).

- Unified model impact of the transaction Model Updates in Newton.

  When GBP and ML2 co-exist, GBP implicitly created some neutron resources. In Newton, the neutron transaction model has been updated and has added various checks. Some of those checks spuriously see this nested transaction usage as an error and log and raise an exception. The exception is handled correctly by GBP and there is no functional impact but unfortunately the neutron code also logs some exceptions in neutron log file – leading to the impression that the action had failed.

  While most such exceptions are logged at the DEBUG level, occasionally you might see some exceptions being logged at the ERROR level. If such an exception log is followed by a log message which indicates that the operation is being retried, the exception is being handled correctly. One such example is the following:

  Delete of policy-target on a policy-target-group associated to a network-service-policy could raise this exception:

  ```
  2017-03-18 12:52:34.421 27767 ERROR neutron.api.v2.resource […] delete failed
  ```

```
2017-03-18 12:52:34.421 27767 ERROR neutron.api.v2.resource Traceback …:

2017-03-18 12:52:34.421 27767 ERROR neutron.api.v2.resource   File "/usr/lib/python2.7/site-
packages/neutron/api/v2/resource.py", line 84, …

...

2017-03-18 12:52:34.421 27767 ERROR neutron.api.v2.resource     raise …

2017-03-18 12:52:34.421 27767 ERROR neutron.api.v2.resource ResourceClosedError: This
transaction is closed
```

Note: Cisco is working with the upstream community for further support on Error level logs.

- When a Layer 2 policy is deleted in GBP, some implicit artifacts related to it may not be deleted (resulting in unused BDs/subnets on Cisco APIC). If you hit that situation, the workaround is to create a new empty Layer 2 policy in the same context and delete it.
- If you use tempest to validate OpenStack, the following tests are expected to fail and can be ignored:

  ```
  tempest.scenario.test_network_basic_ops.TestNetworkBasicOps.test_update_router_admin_state
  ```

- Neutron-server logs may show the following message when DEBUG level is enabled:

  ```
  Timed out waiting for RPC response: Timeout while waiting on RPC response - topic:
  "<unknown>", RPC method: "<unknown>" info: "<unknown>"
  ```

  This message can be ignored.

- High Availability LBaaSv2 is not supported.
- OpenStack Newton is the last version to support non-unified plug-in. OpenStack Ocata and future releases will only be supported with the unified plug-in.
- For deployments running Cisco ACI version 4.1(2g) and using the Group Based Policy workflow and associated APIs, contract filters set to an EtherType of ARP can result in the filter being incorrectly set as “Unspecified” on the leaf. If an EtherType of ARP is required, then you must use a Cisco ACI release other than 4.1(2g).
- Some deployments require installation of an “allow” entry in IP Tables for IGMP. This must be added to all hosts running an OpFlex agent and using VXLAN encapsulation to the leaf. The rule must be added using the following command:

  ```
  # iptables -A INPUT -p igmp -j ACCEPT
  ```

  In order to make this change persistent across reboots, add the command either to `/etc/rc.d/rc.local` or to a cron job that runs after reboot.

- For deployments that use B-series servers, an additional service must be started on the hosts to ensure that connectivity is maintained with the leaf at all times. Complete the following steps:

  1. Install the Cisco APIC API package (python-apicapi for Debian packaging, apicapi for RPM packaging) for any servers running an OpFlex agent.
  2. Add the OpFlex uplink bond name to `/etc/environments` (that is, opflex_bondif=bond1).

     This is needed if the interface is other than default (bond0).
  3. Enable the apic-bond-watch service using the following command:

```
sudo systemctl enable apic-bond-watch
```

4. Start the apic-bond-watch service using the following command:

```
sudo systemctl start apic-bond-watch
```

For OpenStack Director installations using VXLAN encapsulation for VMM domains, two additional configuration items may be needed to handle large installations. The number of multicast groups should be configured to match the maximum number of endpoint groups for the host, and the maximum auxiliary memory for sockets needs to be increased for IPC. These are configured using the `extra-config.yaml` file, with the following parameters:

```
ControllerParameters:

  ExtraSysctlSettings:
    net.ipv4.igmp_max_memberships:
      value: 4096
    net.core.optmem_max:
      value: 1310720
ComputeParameters:
  ExtraSysctlSettings:
    net.ipv4.igmp_max_memberships:
      value: 1024
```

The IGMP max memberships value should be greater than or equal to the number of Neutron networks that the host has Neutron ports on. For example, if a compute host has 100 instances, and each instance is on a different Neutron network, then this number must be set to at least 100. Controller hosts running the neutron-dhcp-agent will need set this value to match the number of Neutron networks managed by that agent, which means this number will probably need to be higher on controller hosts than compute hosts.

- For installations not using OpenStack Director, the maximum allowed packet size for the database must be configured to support database transactions for tenants in AIM with large configurations. The default value installed by OpenStack director in `/etc/my.cnf.d/galera.cnf` is sufficient for most installations:

```
[mysqld]
…
max_allowed_packet = 16M

[mysqldump]
max_allowed_packet = 16M”
```

- After deploying Queens with Juju charms (18 or 19), sometimes a VM spawn fails. The failure is due to a neutron-opflex-agent failing to start on the host that the VM was scheduled to. The host can be determined using the `neutron agent-list` command: The neutron-opflex-agent is missing for the effected compute node.

  Restart of neutron-opflex-agent on the affected node fixes the problem and can be used as a workaround after a fresh deployment.

- When you do an upgrade involving Red Hat OSP13, the installer doesn’t delete the `/var/www/html/acirpo` directory. This causes problems when building new containers. When performing an upgrade using OSP13, be sure to manually delete this directory before installing the new RPM.

Bugs

This section contains lists of open and resolved bugs and known behaviors.

- Resolved Bugs
- Known Behaviors

Resolved Bugs

The following table lists the resolved bugs for this release. Click the bug ID to access the Bug Search tool and see additional information about the bug.

Bug ID	Description
CSCvt68117	The DNS server IP addresses and static routes changes should be reflected automatically.

Related Documentation

The Cisco Application Policy Infrastructure Controller (APIC) documentation can be accessed from the following website:

https://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/tsd-products-support-series-home.html

The documentation includes installation, upgrade, configuration, programming, and troubleshooting guides, technical references, release notes, and knowledge base (KB) articles, as well as other documentation. KB articles provide information about a specific use case or a specific topic.

By using the "Choose a topic" and "Choose a document type" fields of the Cisco APIC documentation website, you can narrow down the displayed documentation list to make it easier to find the desired document.