Cisco Intercloud Fabric Provider Platform Installation Guide, Release 2.2.1

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CHAPTER 1

Overview

New and Changed Information

The following table describes information that has been added or changed since the initial release of this document.

Date	Revision	Location
May 15, 2015	Added port requirements for inbound and outbound network traffic.	Port Requirements, on page 8
April 20, 2015	Initial version.	—

Cisco Intercloud Fabric Provider Platform

Cisco Intercloud Fabric Provider Platform (ICFPP) simplifies the complexity involved in working with a variety of public cloud APIs, and enables cloud API support for service providers who currently do not have API support. Cisco ICFPP provides an extensible adapter framework that allows integration with a variety of provider cloud infrastructure management platforms, such as OpenStack, CloudStack, VMware vCloud Director, and any other API that can be integrated through a software development kit (SDK) provided by Cisco.

Currently, service providers have their own proprietary cloud APIs—such as Amazon EC2 and Windows Azure—that give customers limited choices and provide no easy method for moving from one provider to another. Cisco ICFPP abstracts this complexity and translates Cisco Intercloud Fabric cloud API calls to cloud platform APIs of different provider infrastructure platforms, giving customers the option of moving their workloads regardless of the cloud API exposed by the service provider.

Many service providers do not provide cloud APIs that Cisco Intercloud Fabric can use to deploy customers' workloads. One option for these providers is to provide direct access to their virtual machine manager's SDK or API, such as vCenter or System Center, which exposes the provider environment and is not a preferred option for service providers due to security concerns. Cisco ICFPP, as the first point of authentication for the customer cloud when requesting cloud resources, enforces highly secure access to the provider environment. In addition, Cisco ICFPP provides the cloud APIs that are required for service providers to be part of the provider ecosystem for Cisco Intercloud Fabric.

As the interface between the Cisco Intercloud Fabric from customer cloud environments and provider clouds (public and virtual private clouds), Cisco ICFPP provides the following benefits:

- Standardizes and brings uniformity to cloud APIs, making it easier for Cisco Intercloud Fabric to consume cloud services from service providers that are part of the Cisco Intercloud Fabric ecosystem.
- Helps secure access to a service provider's underlying cloud platform.
- Limits the utilization rate per customer or tenant environment.
- Provides northbound APIs for service providers for integration with existing management platforms.
- Supports multitenancy.
- Monitors resource usage per tenant.
- Meters resource usage per tenant.

Cisco ICFPP Documentation

This guide describes Cisco ICFPP deployment options, installation requirements, installing Cisco ICFPP in VMware and OpenStack environments, and configuring Cisco ICFPP for multiple-node clusters.

For additional information, see the following documents on Cisco.com:

- *Cisco Intercloud Fabric Provider Platform Release Notes*
- *Cisco Intercloud Fabric Provider Platform Administrator Guide*
- *Cisco Intercloud Fabric Provider Platform Troubleshooting Guide*

CHAPTER 2

Cisco ICFPP Deployment Options

Deployment Options

You can deploy Cisco ICFPP in the service provider data center in the following configurations:

- Standalone—Deployment on a single node.
- Multiple-node cluster—Deployment on multiple nodes including a high-availability (HA) pair and additional service nodes.

Cluster deployments are most effective when they are configured behind a load balancer. After these configurations are deployed, a provider-supplied load balancer is expected to manage cookie-based sessions and direct requests and responses appropriately.

For more information, see the following topics:

- Standalone Configuration, on page 3
- Cluster Configuration, on page 4

Standalone Configuration

In a standalone configuration, Cisco ICFPP is deployed as a single virtual appliance that provides services and acts independently of other Cisco ICFPP nodes. A standalone configuration is appropriate for environments in which redundancy is not a concern.

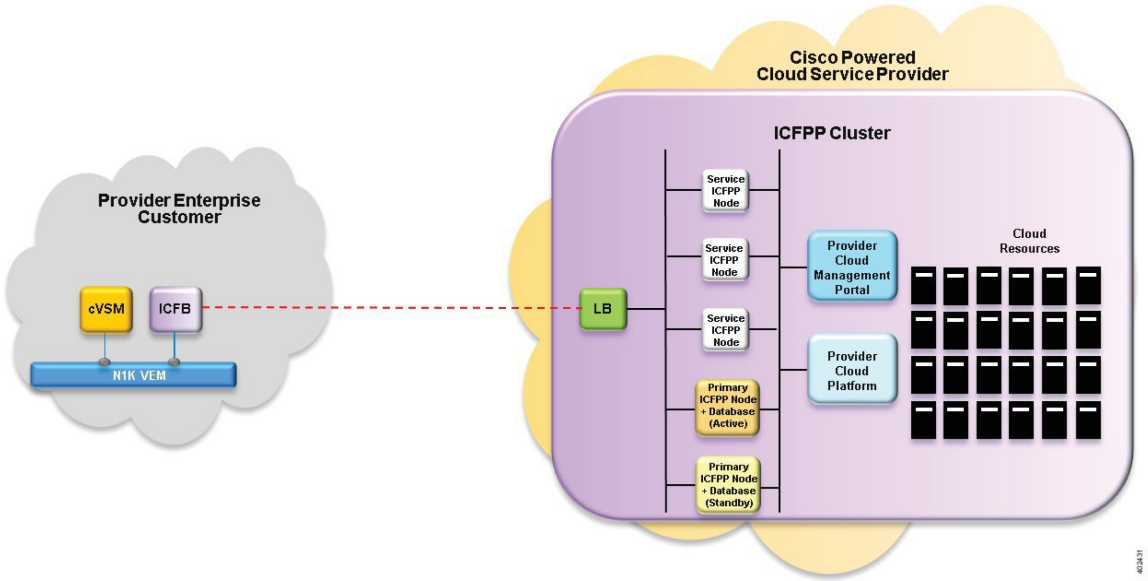
Cisco ICFPP is installed in OpenStack environments using the Standalone role only. After installation, you can configure the Cisco ICFPP virtual appliance as a primary node or service node as appropriate for your environment.

Cluster Configuration

In a cluster configuration, Cisco ICFPP supports large-scale operations in provider environments by deploying multiple Cisco ICFPP nodes. A provider-supplied load balancer distributes the load across the service nodes.

In a cluster configuration, Cisco ICFPP is deployed on multiple virtual appliances using the Primary Node and Service Node roles, as shown in the following figure.

Figure 1: Cisco ICFPP in a Multiple-Node Cluster Configuration


Provider Enterprise Customer
cVSM
ICFB
N1K VEM
Cisco Powered Cloud Service Provider
ICFPP Cluster
LB
Service ICFPP Node
Service ICFPP Node
Service ICFPP Node
Primary ICFPP Node + Database (Active)
Primary ICFPP Node + Database (Standby)
Provider Cloud Management Portal
Provider Cloud Platform
Cloud Resources
402431

A multiple-node cluster contains the following components:

- Two Cisco ICFPP virtual appliances with the Primary Node role that are deployed in an HA configuration.
- Two or more Cisco ICFPP virtual appliances that are deployed as service nodes.
- A load balancer that forwards incoming traffic to the service nodes only.

HA Configuration in a Cluster

In an HA configuration, Cisco ICFPP is deployed on two virtual appliances, both using the Primary Node role. Each virtual appliance in an HA pair includes a database for replication purposes. After both Cisco ICFPP appliances are deployed, you specify which node is active and which is standby.

The following concepts apply when Cisco ICFPP is deployed in an HA configuration:

- The Cisco ICFPP appliances in an HA pair have different management IP addresses.
- A single virtual IP address (VIP) is assigned to the active node.
- If the active node fails, the VIP is transferred to the standby node.
- When the original active node recovers, the VIP remains with the original standby node until that node fails.

Database replication works as follows:

- The active and standby nodes replicate each other's databases.
- At any time, only the database on the node with the VIP is used.
- When the database is updated on one node, the changes are replicated on the other node.

Communications in a Cluster

In a cluster configuration, Cisco ICFPP manages communications as follows:

- Each service node establishes a connection with the database on the active node in the HA pair by using the virtual IP address for the HA pair.
- The load balancer accepts requests from Cisco Intercloud Fabric Director.
- The load balancer distributes the requests to the service nodes using a round-robin algorithm.
- Each new user session is directed to a different service node.
- Subsequent requests from the same session are sent to the same service node.
- The service node responds via the load balancer.

Session Persistence

Session persistence is managed by means of a PERSISTICFPP cookie that Cisco ICFPP issues. The cookie is generated when a user logs in and ensures that all requests from that user session are directed to the same node. If a service node fails, the load balancer forwards requests for that service node to a different service node. The new receiving node requires Cisco Intercloud Fabric Director to log in and then accepts new requests.

Note The service provider load balancer must be configured to persist sessions based on the PERSISTICFPP cookie.

Deployment Workflows

The deployment workflow that you use depends on whether Cisco ICFPP is deployed on VMware or OpenStack.

The following table describes the high-level tasks required to deploy Cisco ICFPP in a multiple-node cluster in a VMware environment.

Table 1: Configuration Workflow for a Multiple-Node Cluster on VMware

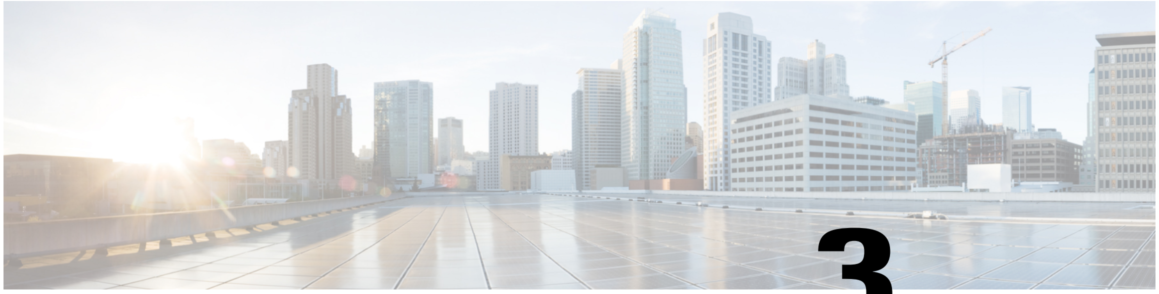
Step	Task	Related Information
1.	Install two Cisco ICFPP virtual appliances using the Primary Node role.	Installing Cisco ICFPP on VMware, on page 14
2.	Install two or more Cisco ICFPP virtual appliances using the Service Node role.	Installing Cisco ICFPP on VMware, on page 14

Step	Task	Related Information
3.	Configure HA on the appliances with the Primary Node role.	Configuring HA, on page 30
4.	Configure a load balancer for all service nodes in the cluster. **Note** The load balancer must be configured to persist sessions based on the PERSISTICFPP cookie that Cisco ICFPP issues.	Your load balancer documentation
5.	Configure communications for the cluster with Cisco Intercloud Fabric Director.	*Cisco Intercloud Fabric Getting Started Guide*

The following table describes the high-level tasks required to deploy Cisco ICFPP in a multiple-node cluster in an OpenStack environment.

Table 2: Configuration Workflow for a Multiple-Node Cluster on OpenStack

Step	Task	Related Information
1.	Install four or more Cisco ICFPP virtual appliances using the Standalone Node role.	Installing Cisco ICFPP on OpenStack, on page 21
2.	Configure two appliances with the Primary Node role.	Configuring a Primary Node, on page 27
3.	Configure the remaining appliances with the Service Node role.	Configuring a Service Node, on page 28
4.	Configure HA on the appliances with the Primary Node role.	Configuring HA, on page 30
5.	Configure the HA nodes to permit network traffic via the VIP address.	Configuring VIP Access for HA Nodes in OpenStack, on page 32
6.	Configure a load balancer for the service nodes in the cluster. **Note** The load balancer must be configured to persist sessions based on the PERSISTICFPP cookie that Cisco ICFPP issues.	Your load balancer documentation
7.	Configure communications for the cluster with Cisco Intercloud Fabric Director.	*Cisco Intercloud Fabric Getting Started Guide*



CHAPTER 3

Installation Requirements

System Requirements

You can deploy a Cisco ICFPP virtual appliance on a system that meets the following requirements:

Requirement	Description
Four Virtual CPUs	1.8 GHz
Memory	8 GB RAM
Disk Space	Disk space on shared NFS that is configured as follows: • Disk 1—100 GB for Cisco ICFPP. • Disk 2—As much memory as required to support concurrent virtual machines being moved to the provider cloud. **Note** If NFS is not configured, Cisco ICFPP stores VM images uploaded from Cisco Intercloud Fabric Director on the local disk.
One vNIC	Management network interface

Hypervisor Requirements

Cisco ICFPP is a virtual appliance that can be deployed on VMware vSphere Client or OpenStack KVM Hypervisor.

Hypervisor	Version
VMware	
VMware vSphere Client	5.1 (including update 1) and 5.5
OpenStack	
Red Hat Enterprise Linux OpenStack Platform	Icehouse

Port Requirements

Ports must be configured as described in the following tables to ensure that Cisco ICFPP can communicate effectively on the internal private network and the public network (Internet).

Table 3: Public Internet Inbound

Protocol	Port	Allow / Deny	Description
TCP	443	ALLOW	Allows inbound HTTPS traffic from the Internet so that Cisco Intercloud Fabric for Business can reach Cisco ICFPP.

Table 4: Public Internet Outbound

Protocol	Port	Allow / Deny	Description
All	All	DENY	Cisco ICFPP does not need to send outbound traffic to the Internet.

Table 5: Internal Network Inbound

Protocol	Port	Allow / Deny	Description
TCP	443	ALLOW	Allows inbound HTTPS traffic from the internal network, so that the Cisco ICFPP web-based GUI can be accessed.
TCP	22	ALLOW	Allows inbound SSH traffic from the internal network for Cisco ICFPP administration.
TCP	3306	ALLOW	Allows inbound MySQL traffic from the internal network. Required if Cisco ICFPP is configured in a multiple-node cluster.

Protocol	Port	Allow / Deny	Description
TCP	8080	ALLOW	Allows inbound HTTP traffic for template uploads to CloudStack. Required if using the CloudStack adapter.

Note The ports in the following table must be open on any firewalls on the internal network between Cisco ICFPP and destination systems to ensure that the destination systems receive communications from Cisco ICFPP.

Table 6: Internal Network Outbound

Protocol	Firewall Port	Allow / Deny	Description
TCP	443	ALLOW	Allows HTTPS traffic to the internal network. Required to reach the cloud provider API/SDK gateway if it is running on HTTPS.
TCP	80	ALLOW	Allows HTTP traffic to the internal network. Required to reach the cloud provider API/SDK gateway if it is running on HTTP.
TCP	3306	ALLOW	Allows outbound MySQL traffic to other Cisco ICFPP nodes on the internal network. Required if Cisco ICFPP is configured in a multiple-node cluster.
TCP/UDP	514	ALLOW	Allows syslog traffic from Cisco ICFPP to the syslog server.

Information Required for Configuration and Installation

Before installation, collect the following information:

Required Information	Mandatory / Optional	Your Information / Notes
For Preinstallation Configuration		
Cisco ICFPP image location	Mandatory	
Cisco ICFPP OVA or QCOW2 image name	Mandatory	
VM name	Mandatory	

Required Information	Mandatory / Optional	Your Information / Notes
VMware datastore location	Mandatory for VMware	
Network / Port Profile for VM management	Mandatory	
KVM flavor name	Mandatory for OpenStack	
KVM Instance Security Group	Mandatory for OpenStack	
For Cisco ICFPP Installation		
Installation type: Standalone, Primary, or Service Node For OpenStack environments, you can install in Standalone mode only.	Mandatory	
Hostname	Mandatory	
Admin / root / ShellAdmin account password	Mandatory	
Static IP address For OpenStack environments, this must be a public IP address.	Mandatory	
Subnet mask	Mandatory	
Gateway IP address	Mandatory	
Primary node IP address	Mandatory for service node installations only.	
NFS server IP address	Optional[1]	
NFS directory to mount	Optional	
Domain name.	Optional	
DNS server IP address	Mandatory	
NTP server IP address or fully qualified domain name (FQDN)	Mandatory	

[1] If you do not configure NFS in a cluster deployment, template creation and VM migration can fail if a service node fails.

CHAPTER 4

Installing Cisco ICFPP on VMware

Cisco ICFPP Software

The Cisco ICFPP software is available for download from Cisco.com. For assistance, contact your Cisco representative.

The Cisco ICFPP software package (`ICFP-dk9-2.2.1-pkg.zip`), contains the following files:

File	Description
`icfpp-2.2.1.ova`	Cisco ICFPP OVA file. Use this file to install Cisco ICFPP in VMware environments. See Workflow for VMware Environments, on page 14.
`icfpp-2.2.1.qcow2`	Cisco ICFPP QCOW2 file. Use this file to install Cisco ICFPP in OpenStack environments. See Workflow for OpenStack Environments, on page 21.
`README`	README file. This file contains information about installing and using Cisco ICFPP.

The Cisco ICFPP software includes an evaluation license with support for 20 VMs. To view the license details in the GUI after you install Cisco ICFPP, choose **Administration** > **License**, and expand the entry in the **License Keys** table.

Workflow for VMware Environments

Cisco ICFPP should be implemented by all service providers that interface with Cisco Secure Cloud Extension. The only exceptions to this are Amazon EC2 and Windows Azure, which are available to Cisco Intercloud Fabric through their native public cloud APIs.

The high-level tasks involved in deploying Cisco ICFPP in a VMware environment are:

1. Confirm that you have met the installation requirements—See Installation Requirements, on page 7.
2. Gather the required information—See Information Required for Configuration and Installation, on page 9.
3. Install Cisco ICFPP—See Installing Cisco ICFPP on VMware, on page 14.
4. Perform post-installation tasks—See Post-Installation Task for VMware Environments, on page 17.
5. (Optional) Configure Cisco ICFPP virtual appliances for a multiple-node cluster—See Configuring Multiple-Node Clusters, on page 27.
6. Configure communications with Cisco Intercloud Fabric Director—See the *Cisco Intercloud Fabric Getting Started Guide*.

Installing Cisco ICFPP on VMware

This procedure describes how to install Cisco ICFPP in a VMware environment.

We recommend that you configure an NFS server for all Cisco ICFPP nodes. If NFS is not configured, all VM images that are uploaded from Cisco Intercloud Fabric Director are stored on the local disk. If NFS is not configured and a node fails, any images stored on that node will not be available and could cause template creation and VM migration to fail if the node is part of a cluster.

Before You Begin

- Set your keyboard to United States English.
- Unzip the Cisco ICFPP software package to obtain the OVA file and the README file.
- Copy the Cisco ICFPP OVA image to a location that is available from the VMware vSphere Client.
- Make sure that all requirements are met as specified in System Requirements, on page 7.
- Collect the information required for the installation. See Information Required for Configuration and Installation, on page 9.
- Review the README file for information related to Cisco ICFPP installation and operation.

Procedure

Step 1 Using the **VMware vSphere Client**, log in to the vCenter server.

Step 2 Choose the host on which to deploy the Cisco ICFPP virtual appliance.

Step 3 Choose **File** > **Deploy OVF Template**.

Step 4 In the wizard, provide the information as described in the following table:

Screen	Action
Source	Choose the Cisco ICFPP OVA using one of the following methods: • Browse to the location, choose the file, and click **Open**. • Deploy from a URL on your local area network. Replace *FQDN* with the IP address or the fully qualified domain name, and click **Next**.
OVF Template Details	Verify the details.
End User License Agreement	Read the agreement and click **Accept**.
Name and Location	**1** Enter a name for the virtual appliance. **2** Choose the VMware data center or host where Cisco ICFPP will reside.
Deployment Configuration	Choose the type of deployment: • **Standalone—**Used for single-node deployments. • **Primary Node—**Used for HA deployment in a multiple-node cluster. • **Service Node—**Used in cluster deployments for handling requests.
Storage	Choose the location in which to store the Cisco ICFPP files.
Disk Format	Choose the required format for the virtual appliance disks: • **Thick Provision Lazy Zeroed—**Allocates storage immediately in thick format. • **Thick Provision Eager Zeroed—**Allocates storage in thick format. Creating disks might take longer using this option. • **Thin Provision—**Allocates storage on demand as data is written to disk.
Network Mapping	Choose the required network.

Screen	Action
Properties Address any errors that are indicated in red-colored text below a selection box.	
Node Mode	Choose the type of deployment for this node: Standalone, Primary Node, or Service Node. The mode you choose should match the deployment type in the Deployment Configuration screen.
ICFPP Hostname	Enter the hostname for the Cisco ICFPP node.
ICFPP Password	Enter and confirm the password to use for the admin, root, and ShellAdmin account access.
Static IP Address	Enter the static IP address to use for the Cisco ICFPP node.
Static IP Subnet Mask	Enter the subnet mask to apply to the node IP address.
IP Gateway	Enter the gateway IP address.
Primary Node IP Address for Service Node	For service nodes only, enter the IP address of the primary node or the virtual IP address (VIP) of the HA pair for database access.
NFS Server IP Address	Enter the IP address for an NFS server. **Note** If you do not configure NFS in a multiple-node cluster deployment, template creation and VM migration can fail if a service node fails.
NFS Server Directory to Mount	NFS server directory to be mounted.
Domain Name	Enter the domain name for the node, such as cisco.com.
DNS Server IP Address	Enter the DNS server IP address.
NTP Server IP (FQDN or IP Address)	Enter the NTP server IP address or fully qualified domain name.
Ready to Complete	Review the deployment settings for accuracy.

Step 5 Click **Finish**. A progress indicator displays the task status until Cisco ICFPP is deployed. For additional information, right-click the VM in the VMware vSphere Client and choose **Open Console**.

Step 6 After Cisco ICFPP is successfully deployed, power on the virtual appliance.

What to Do Next

Continue with Post-Installation Task for VMware Environments, on page 17.

Post-Installation Task for VMware Environments

After installing Cisco ICFPP in a VMware environment, you might need to configure the Cisco ICFPP IP address for network access. For more information, see Configuring the IP Address for Network Access, on page 17.

Configuring the IP Address for Network Access

The Cisco ICFPP IP address is configured during installation by using Open Virtualization Format (OVF) parameters. However, if the IP address is not configured correctly, you must configure the static IP address by using the ShellAdmin console options as described in this procedure.

Procedure

Step 1 Using SSH, connect to the Cisco ICFPP ShellAdmin console by using the following information:

- Cisco ICFPP IP address
- Username—shelladmin
- Password—The password that you set when you installed Cisco ICFPP.

Step 2 At the ShellAdmin prompt, choose the **Configure Network Interface** option to configure the static IP address.

Step 3 Enter **S** to configure a static IP address.

Step 4 Enter the Ethernet interface that you want to configure, such as eth0 or eth1.

Step 5 When prompted for the IP version, choose **IPv4**.

Step 6 Enter the static IP address, netmask, and gateway IP address.

Step 7 Enter **Y** to confirm the information.
The Cisco ICFPP virtual appliance reboots and displays a screen with the URL for accessing Cisco ICFPP.

Step 8 (Optional) To verify that the change has been applied, log in to the ShellAdmin console and choose the **Display Network Details** option.

Upgrading Cisco ICFPP

Cisco ICFPP enables you to upgrade standalone appliances and multiple-node clusters for bug fixes and updated adapters. For more information, see the following topics:

- Upgrading a Standalone Node, on page 18
- Upgrading a Multiple-Node Cluster, on page 18

Upgrading a Standalone Node

Use this procedure to upgrade a standalone node for bug fixes and updated adapters. To upgrade a multiple-node cluster, see Upgrading a Multiple-Node Cluster, on page 18.

Before You Begin

- Obtain the Cisco ICFPP upgrade file (`icfpp-upgrade-2.2.1.tar.gz`) from cisco.com. For assistance, contact your Cisco representative.
- Confirm that the upgrade file is accessible from the Cisco ICFPP virtual appliance.

Procedure

Step 1 In the Cisco ICFPP GUI, choose **Install** > **Adapters**, and click **Install**.

Step 2 In the **Install Adapter** dialog box, enter the following information:

Field	Description
Adapter Type	Choose **Cisco**.
Adapter Name	This field displays CAPI by default. No input is required.
Adapter Description	Enter the desired description.
Adapter File	Browse to the Cisco ICFPP upgrade file and click **Open**.

Step 3 Click **Upload**.

Step 4 After the unload is complete, click **Submit**.

Step 5 Using SSH, log in to the ShellAdmin console for the virtual appliance.

Step 6 Choose the **Stop Services** option.

Step 7 Choose the **Start Services** option.
Cisco ICFPP is upgraded to the new version, and updated version information is displayed in the GUI in the **Adapters** tab.

Upgrading a Multiple-Node Cluster

Use this procedure to upgrade a multiple-node cluster for bug fixes and updated adapters. To upgrade a standalone (single-node) Cisco ICFPP virtual appliance, see Upgrading a Standalone Node, on page 18.

The high-level tasks involved in upgrading a cluster are:

1. Upgrading the HA active node.
2. Stopping the virtual IP services on the upgraded HA active node.

3 Monitoring status while services fail over to the HA standby node.

4 Upgrading the HA standby node.

5 Stopping the virtual IP services on the upgraded HA standby node.

6 Starting the virtual IP services on the HA active node.

7 Starting the virtual IP services on the HA standby node.

8 Upgrading and restarting Infra services for each service node.

The following procedure describes how to perform these tasks.

Before You Begin

- Obtain the Cisco ICFPP upgrade file (`icfpp-upgrade-2.2.1.tar.gz`) from cisco.com. For assistance, contact your Cisco representative.
- Ensure that the upgrade file is accessible from the Cisco ICFPP virtual appliance.
- Confirm that HA has been configured on two Cisco ICFPP virtual appliances that are configured with the primary node role.

Procedure

Step 1 Using the node management IP address instead of the virtual IP address for the HA pair, log in to the Cisco ICFPP GUI for the active node in the HA pair.

Step 2 Upgrade the HA active node as follows:

a) Choose **Install** > **Adapters** > **Install**.
b) In the Install Adapter dialog box, provide the required information.
For more information about the fields in this dialog box, see Upgrading a Standalone Node, on page 18.
c) Click **Upload**.
d) After the upload is complete, click **Submit**.

Note Do NOT restart Infra services after upgrading the HA active node.

Step 3 Log in to the ShellAdmin console for the HA active node that was upgraded in Step 2.

Step 4 Stop the Virtual IP service on the active node as follows:

a) Choose the **Setup HA** option.
b) When asked if you want to reconfigure HA, enter **Y**.
c) Enter **C** to stop the VIP service.
d) Enter **Y** to confirm the action.
e) Press **Enter** to return to the ShellAdmin menu.

Step 5 Log in to the ShellAdmin console for the standby node for the HA pair.

Step 6 In the ShellAdmin console for the HA standby node, choose **Display Services Status** to monitor the following events as they occur:

- HA services fail over to the standby node in the HA pair.
- Infra services start running on the standby node.

- The GUI for the standby node becomes available for logging in.
  It can take a few minutes for the services to start and for the GUI of the standby node to be accessible from the browser.

The node that was originally the HA standby node becomes the HA active node.

Step 7 Using the node management IP address instead of the virtual IP address for the HA pair, log in to the Cisco ICFPP GUI for the node that is now the active node in the HA pair.

Step 8 Upgrade the HA newly active node (the original standby node) by uploading and submitting the upgrade package as described in Step 2 of this procedure.

Note Do NOT restart Infra services after upgrading this node.

Step 9 In the ShellAdmin console for the node that was upgraded in Step 8, stop the Virtual IP service as described in Step 4.

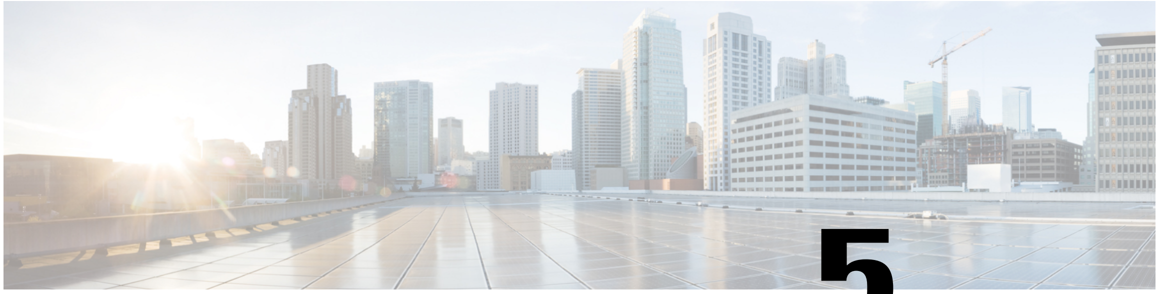
Step 10 In the ShellAdmin console for the original active node that was upgraded in Step 2, start the Virtual IP service as follows:

a) Choose the **Setup HA** option.
b) When asked if you want to reconfigure HA, enter **Y**.
c) Enter **D** to start the VIP service.
d) Press **Enter** to return to the ShellAdmin menu.

Step 11 In the ShellAdmin console for the HA standby node that was upgraded in Step 8, start the Virtual IP service as described in Step 10.

Step 12 For each service node in the cluster:

a) Log in to the Cisco ICFPP GUI for the service node.
b) Upgrade the service node by uploading and submitting the upgrade package as described in Step 2.
c) Using the ShellAdmin console, restart Infra services by first choosing the **Stop Services** option and then choosing the **Start Services** option.



CHAPTER 5

Installing Cisco ICFPP on OpenStack

Workflow for OpenStack Environments

Cisco ICFPP should be implemented by all service providers that interface with Cisco Secure Cloud Extension. The only exceptions to this are Amazon EC2 and Windows Azure, which are available to Cisco Intercloud Fabric through their native public cloud APIs.

The high-level tasks involved in installing and configuring Cisco ICFPP in an OpenStack environment are:

1. Confirm that you have met the installation requirements—See Installation Requirements, on page 7.
2. Gather the required information—See Information Required for Configuration and Installation, on page 9.
3. Configure OpenStack for Cisco ICFPP and launch a Cisco ICFPP instance—See Installing Cisco ICFPP on OpenStack, on page 21.
4. Configure Cisco ICFPP for use with Cisco Intercloud Fabric Director—See Configuring Cisco ICFPP for Cisco Intercloud Fabric Director, on page 23.
5. (Optional) Configure Cisco ICFPP virtual appliances for a multiple-node cluster—See Configuring Multiple-Node Clusters, on page 27.
6. Configure Cisco Intercloud Fabric Director for use with Cisco ICFPP—See the *Cisco Intercloud Fabric Getting Started Guide*.

Installing Cisco ICFPP on OpenStack

To install Cisco ICFPP on OpenStack, you must import an image, create a flavor, and launch an instance. This procedure describes how to complete these tasks.

This procedure can take up to two hours to complete, depending on the amount of time it takes to upload the image and convert it from QCOW2 format to RAW.

Before You Begin

- Download the Cisco ICFPP software package from cisco.com. For assistance, contact your Cisco representative.
- Unzip the downloaded file to obtain the QCOW2 file and the README file. For more information, see Cisco ICFPP Software, on page 13.
- Review the README file for information related to installing and using Cisco ICFPP with OpenStack.
- Confirm that you have met the requirements in System Requirements, on page 7.
- Gather the information identified in Information Required for Configuration and Installation, on page 9.
- In OpenStack:
  - Confirm that you have admin privileges.
  - Create an OpenSource RC file (`name-openrc.sh`) in which you define your environmental variables and login credentials.
  - Create a project on which to install Cisco ICFPP.
  - Confirm that the Cinder service is up and running.
  - Configure a security group that allows traffic on ports 22, 80, 443, and 3306.

For more information about performing these operations in OpenStack, see docs.openstack.org.

Procedure

Step 1 In the shell from which you want to enter **glance** commands, enter the following command:

```
source name-openrc.sh
```

Step 2 Using the **glance** CLI, upload an image to the OpenStack server by entering the following command:

```
glance image-create --name icfpp-n.n.n --disk-format qcow2 --container-format bare --file
./icfpp-n.n.n.qcow2
```

where *icfpp-n.n.n* is the name of the Cisco ICFPP image, such as icfpp-2.2.1.

After the image has been uploaded, it appears in the OpenStack Dashboard Images table at **Admin** > **Images** or **Project** > *project* > **Manage Compute** > **Images & Snapshots**.

Step 3 In the OpenStack Dashboard, choose **Admin** > **Flavors**, and click **Create Flavor**.

Step 4 In the **Create Flavor** dialog box, enter the following information, and click **Create Flavor**:

- Name—Enter a flavor name.
- vCPUs—Enter **4**.
- RAM MB—Enter **8192**.

- Root Disk—Enter **100 GB**.
- Ephemeral Disk—Enter **0**.
- Swap Disk—Enter **0**.

Step 5 Choose **Project** > *project* > **Manage Compute** > **Volumes**, and click **Create Volume**.

Step 6 In the **Create Volume** dialog box, add a volume with the size 100 GB, and click **Create Volume**.

Step 7 In OpenStack, obtain the following information:

- Flavor ID
- Image ID
- Network ID

Step 8 At the command line, enter the following command to launch Cisco ICFPP:

```
nova boot --image image-id --flavor flavor-id
--nic net-id=network-id --block-device-mapping vdb=volume-id
icfpp-instance-name
```

A Cisco ICFPP instance is launched.

Configuring Cisco ICFPP for Cisco Intercloud Fabric Director

After you have installed Cisco ICFPP on an OpenStack server and launched a Cisco ICFPP instance, you can configure Cisco ICFPP for use with Cisco Intercloud Fabric Director.

Before You Begin

Confirm the following:

- Cisco ICFPP has been installed on an OpenStack server and an instance has been launched.
- You know the Cisco ICFPP public IP address.

Procedure

Step 1 In a browser, enter the public IP address assigned to the Cisco ICFPP instance and log in to the Cisco ICFPP GUI. The default credentials are:

- Username: admin
- Password: admin

Step 2 In the OpenStack dashboard, choose **Project** > ***project*** > **Access & Security**, and click the **API Access** tab.

Step 3 In the **API Endpoints** table, locate and make a note of the service endpoint Uniform Resource Identifier (URI) for the **Identity** service.

Step 4 In the Cisco ICFPP GUI, choose **Cloud Instances** and click **Add**.

Step 5 In the **Add Cloud Instance** dialog box, provide the following information, and click **Add**:

Field	Description
Cloud Instance Name	The name of the cloud instance.
Type	The cloud instance type: Cisco or Custom.
Module Name	For a **CISCO** cloud instance type, choose the module name, such as OSP for OpenStack. For a **CUSTOM** cloud instance type, enter the custom module name.
Image Conversion Support on Cloud	Displayed for OSP modules only. Indicate whether or not image conversion on the cloud is required.
FTP Server Name	For Dimension Data (DiData) modules only, the name of the FTP server.
Endpoint URI	The endpoint URI for the cloud instance.

Step 6 In the Cisco ICFPP GUI, choose **Tenants** > **All Tenants**, and click the **Accounts** tab.

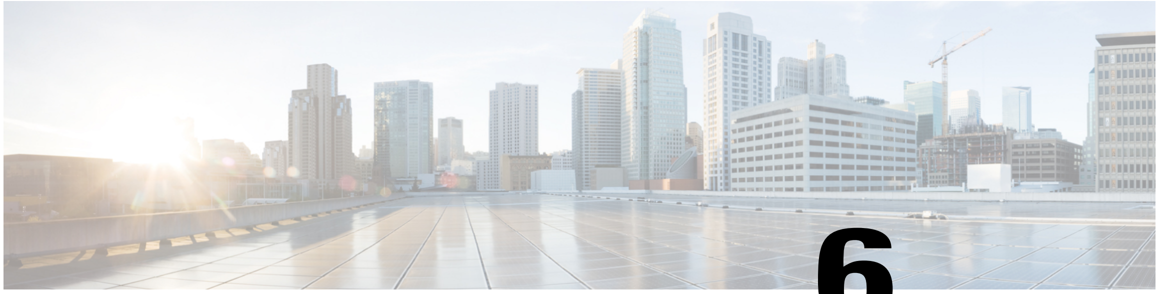
Step 7 Click **Add**.

Step 8 In the **Add Tenant** dialog box, provide the following information, and click **Add**:

Field	Description
Tenant Name	Enter the tenant name. You cannot change the name after adding the tenant.
Cloud Instance Name	Choose the name of the cloud instance. You cannot change this entry after adding the tenant.
Enable Tenant Account	
Enabled	(Read-only) Indicates whether or not the tenant account is enabled. The account is enabled by default.
Org Name	For VMware vCloud Director clouds only, enter the name of the organization to which the tenant belongs.
Resource Limits	

Field	Description
Max Servers	Enter the maximum number of servers provisioned for the tenant, including stopped VMs.
User Account	
Username	Enter the account username.
Email	Enter the account email address.
API Key	For CloudStack clouds only, enter the API key for the tenant.
Secret Key	For CloudStack clouds only, enter the Secret key for the tenant.

For information about configuring Cisco ICFPP for a multiple-node cluster, see Configuring Multiple-Node Clusters, on page 27.



CHAPTER 6

Configuring Cisco ICFPP for Clusters

Configuring Multiple-Node Clusters

The topics in this section describe how to use the ShellAdmin console to configure Cisco ICFPP nodes for multiple-node clusters.

Configuring a Primary Node

To configure a Cisco ICFPP virtual appliance that has been installed using the Standalone Mode role for a multiple-node cluster, you must first configure it as a primary node or service node by using the ShellAdmin console. This procedure describes how to configure a standalone node as a primary node. To configure a standalone node as a service node, see Configuring a Service Node, on page 28.

Before You Begin

Install a Cisco ICFPP virtual appliance using the Standalone Mode role.

Procedure

Step 1 Using SSH, log in to the ShellAdmin console of the node that will be the active node for the HA pair.

Step 2 At the ShellAdmin prompt, choose the **Change Node Role** option.

Step 3 When prompted, enter **Y** to change the node role.

Step 4 Enter **A** to configure the node as a primary node.

Step 5 Enter **Y** to confirm that you want to configure the node as a primary node.
Information similar to the following is displayed:

```
user selected 'y'
 Checking DB Status
   2399 ?       00:00:00 mysqld_safe
   2820 ?       00:04:21 mysqld
Configuring as Primary Node...
Stopping services before changing node role
Stopping the services...
Setting up current node as Primary node...
Enabling Remote Database access to ICFPP Service nodes
Checking the MySQL to be ready before enabling remote access to DB...
Waiting a maximum of 900 seconds for MySQL to be up on localhost

Trying a maximum of 900 seconds for enabling remote access to DB
Successfully enabled remote access for database

SUCCESS: Successfully changed node role to Primary Node

Stopping Database and restarting it for changes to take effect
Stopping database...
Database stopped...
Starting services that were previously stopped.
Starting the Database...
Starting the services...
In order for changes to take effect logout and log back in
Do you want to logout [y/n]?
```

Step 6 Enter **Y** when prompted to log out.
You are logged out of the ShellAdmin console. When you log in again, the menu will include options for configuring HA and viewing HA status.

Configuring a Service Node

To configure a Cisco ICFPP virtual appliance that has been installed using the Standalone Mode role for a multiple-node cluster, you must first configure it as a primary node or as a service node by using the ShellAdmin console. This procedure describes how to configure a standalone node as a service node. To configure a standalone node as a primary node, see Configuring a Primary Node, on page 27.

Before You Begin

- Install a Cisco ICFPP virtual appliance using the Standalone role.
- Obtain the IP address of a primary node in the cluster or the virtual IP address (VIP) of an HA pair in the cluster.
- Back up any data in the virtual appliance database that you want to keep. When the virtual appliance is reconfigured as a service node, the existing data will be deleted.

Procedure

Step 1 Using SSH, log in to the ShellAdmin console of the standalone node that you want to configure as a service node.

Step 2 At the ShellAdmin prompt, choose the **Change Node Role** option.

Step 3 When prompted, enter **Y** to change the node role.

Step 4 Enter **B** to configure the node as a service node.

Step 5 Enter **Y** to confirm that you want to configure the node as a service node.

Step 6 When asked if you want to continue, do one of the following:

- Enter **N** to stop the configuration so that you can back up the database.
- Enter **Y** to confirm that you want to continue.

If you choose to continue, Cisco ICFPP confirms your choice.

Step 7 When prompted, enter the IP address of the primary node or the VIP of the HA pair that the service node is to use.
Information similar to the following is displayed:

```
Configuring as Service Node...
Stopping services before changing node role
Stopping the services...
Setting up current node as ICFPP service node...with remote DB IP 123.45.1.60
Disabling Database service at startup

SUCCESS: Successfully changed node role to Service Node

Starting services that were previously stopped...
Starting the services...
In order for the changes to take effect, log out and log in again
Do you want to log out [y/n]?
```

Step 8 Enter **Y** to log out.
The next time that you log in, the menu will include the options available for a service node.

Configuring NFS

If you did not configure an NFS server for a Cisco ICFPP virtual appliance when you installed it, you can configure the appliance for NFS by using the ShellAdmin console.

We recommend that you configure an NFS server for all Cisco ICFPP nodes. If NFS is not configured, all VM images that are uploaded from Cisco Intercloud Fabric Director are stored on the local disk. If NFS is not configured and a node fails, any images stored on that node will not be available and could cause template creation and VM migration to fail if the node is part of a cluster.

Before You Begin

- Upload all images on the Cisco ICFPP virtual appliance to the cloud. If the images are not uploaded to the cloud, they will be deleted when NFS is configured.
- Identify the NFS server IP address and the directory in which the files are to be stored.

Procedure

Step 1 Using SSH, log in to the ShellAdmin console for the Cisco ICFPP virtual appliance that you want to configure for NFS.

Step 2 Choose the **NFS Configuration** option.
Cisco ICFPP displays a menu with options for configuring, removing, and viewing an NFS configuration.

Step 3 At the prompt, enter **A**.
Cisco ICFPP determines whether or not an NFS directory is mounted and displays the results:

```
Checking for mounted NFS directory...
NFS directory is not mounted
Note: Configuring NFS will delete any images that are not uploaded to the cloud! Proceed
[y/n]?
```

Step 4 Enter **Y** to continue.
Cisco ICFPP determines whether or not an NFS IP address or NFS directory has been configured and then prompts you for input.

Step 5 When prompted, enter the NFS server IP address and the NFS directory path.
Information similar to the following is displayed while NFS is configured:

```
Configuring NFS with : NFS Server IP=123.15.1.1, remote directory=/nfs/dir local mounting
point=/mnt/icfpp-images
Creating /mnt/icfpp-images directory.
Starting portmap and nfs services...
Starting portmap:                                          [  OK  ]
mount -t nfs 123.15.1.1:/icfpp-images /mnt/icfpp-images
May wait for mount up to 12-0 seconds..., please be patient...
Successfully mounted 123.15.1.1:/icfpp-images  at /mnt/icfpp-images
Saving NFS Configuration
NFS IP address: 123.15.1.1
NFS Directory Path: /icfpp_images
Saved NFS Configuration
Setting up images directory to use NFS
Image directory setup to NFS done
Press Return to continue
```

Step 6 Press **Enter** to return to the ShellAdmin menu.
To view or remove the NFS configuration, choose the **NFS Configuration** option in the ShellAdmin menu and choose the appropriate option from the NFS menu.

Configuring HA

After you deploy Cisco ICFPP virtual appliances, you can configure them for high availability (HA) by using the ShellAdmin console.

When configuring HA:

- Configure the active node and standby node concurrently as described in this procedure.
- The database on the standby node is deleted when the HA pair is configured.

Before You Begin

- Deploy or configure two Cisco ICFPP virtual appliances as primary nodes.
- Identify a virtual IP (VIP) address for the HA pair.
- Determine which node will be the active node and which will be the standby node.
- On the node that will be the standby node, move any existing data that you want to save to another location.

Procedure

Step 1 Using SSH, log in to the ShellAdmin console of the node that will be the active node for the HA pair.

Step 2 At the ShellAdmin prompt, choose the **Setup HA** option and press **Enter**.
A warning is displayed stating that the contents of the database on the standby node will be deleted.

Step 3 When prompted, enter **Y** to configure the node for HA.

Step 4 Enter **A** to configure the node as the active node.

Step 5 When prompted, enter **Y** to configure the node as the active node.
Cisco ICFPP detects and displays the IP address of the current node.

Step 6 Enter **Y** to confirm the node IP address.

Step 7 Enter the standby node IP address.

Step 8 Enter the VIP to use for the IP pair.
Information similar to the following is displayed:

```
--------------------------------------------
HA Configuration Information:
--------------------------------------------
This node will be configured as active node
Active Node IP address:   123.45.1.61
Standby Node IP address:  123.45.1.62
Virtual IP address:       123.45.1.60
--------------------------------------------
Proceed with setting up HA with above configuration [y/n]:
```

Step 9 Enter **Y** to confirm the configuration and proceed or **N** to change the values. If you choose to proceed, Cisco ICFPP displays progress messages while it configures the active node for HA.

Step 10 While Cisco ICFPP is configuring the active node for HA, log in to the ShellAdmin console of the node that will be the standby node for the HA pair.

Step 11 At the ShellAdmin prompt, choose the **Setup HA** option and press **Enter**.

Step 12 Enter **Y** to configure the node for HA.

Step 13 Enter **B** to configure the node as the standby node.

Step 14 When prompted, enter **Y** to configure the node as the standby node.
Cisco ICFPP detects and displays the IP address of the current node.

Step 15 Enter **Y** to confirm the node IP address.

Step 16 Enter the active node IP address.

Step 17 Enter the VIP to use for the HA pair.
Information similar to the following is displayed:

```
--------------------------------------------
HA Configuration Information:
```

```
--------------------------------------------
This node will be configured as standby node
Active Node IP address:   123.45.1.61
Standby Node IP address:  123.45.1.62
Virtual IP address:       123.45.1.60
--------------------------------------------
Proceed with setting up HA with above configuration [y/n]:
```

Step 18 Enter **Y** to confirm the configuration.
Cisco ICFPP displays progress messages while it configures the standby node for HA and synchronizes the database information on both nodes.

Step 19 When prompted, press **Enter** to return to the ShellAdmin menu.

What to Do Next

For OpenStack environments, continue with Configuring VIP Access for HA Nodes in OpenStack, on page 32.

Configuring VIP Access for HA Nodes in OpenStack

After Cisco ICFPP primary nodes are configured for HA, the virtual IP address (VIP) is used in the event of failover. However, OpenStack Neutron does not allow a host to accept packets with an IP address in the packet header that does not match the destination host IP address. As a result, packets sent to the VIP do not reach the node to which the VIP is assigned. To allow the packets to reach HA pair, the VIP must be added as an allowed address for both nodes (active and standby) in the HA pair.

This procedure describes how to configure VIP access on the nodes in the HA pair by using the OpenStack **neutron port-update** command. For more information, see the OpenStack documentation at docs.openstack.org.

Before You Begin

- Confirm that HA has been configured on two Cisco ICFPP primary nodes in an OpenStack environment.
- Confirm that you have access to the OpenStack Neutron command line tool.

Procedure

Step 1 Obtain a list of networks by entering the following command:

```
$ neutron net-list
```

Information similar to the following is displayed:

```
+------------------------------+-----------------+----------------------------------------+
| id                                   | name                  | subnets
                                    |
+------------------------------+-----------------+----------------------------------------+
| 2d84eaa4-8b81-4dc8-9897-dd8ef4719f8b | public-direct-600    |
3e0b77fe-fc66-4913-bc58-7f62d4ab247a 10.203.28.0/23 |
|                                      |                      |
5c2f73a9-4e2f-498c-8244-6aefe5129fdd 10.203.50.0/23 |
|                                      |                      |
ba29165f-c88a-496a-9adc-99ee90407ebe 10.203.24.0/23 |
|                                      |                      |
d5b69780-aefb-42a6-8ba5-aaf405fb36a0 10.203.30.0/24 |
| b5d8d461-74d7-45a4-a1f0-f7ac96586bd5 | Net1                 |
c0921b42-2896-4b32-b33e-f54db9e5a3d6 192.168.0.0/24 |
| ca80ff29-4f29-49a5-aa22-549f31b09268 | public-floating-601  |
0cfde3f1-e28b-4b87-8095-e0014b0ee573                 |
|                                      |                      |
348a808d-ce64-43bc-a9d9-c20e52d2ac06                 |
|                                      |                      |
3784170e-5d7f-48b4-b63d-aab4a0fef769                 |
| ff95095f-89f0-4005-b709-70a75212d73c | icfpp-ha-123-network |
1099b814-05d9-4da0-93d1-06167db4891f 192.168.1.0/24 |
+--------------------------------------+----------------------+--------------------------------------------------------+
```

Step 2 Obtain a list of ports on the network on which the active and standby nodes in the HA pair are deployed by entering the following command:

```
$ neutron port-list -- --network_id=net_id
```

where *net_id* is the identifier for the required network. In this example, the network name is icfpp-ha-123-network.

```
$ neutron port-list -- --network_id=ff95095f-89f0-4005-b709-70a75212d73c
```

Information similar to the following is displayed:

```
+----------------------------+----+------------+---------------------------------------------------------------+
| id                                   | name | mac_address       | fixed_ips
                                                                      |
+----------------------------+----+------------+---------------------------------------------------------------+
| 4a439cf1-b95e-49ba-a8d6-0b03a8142dd2 |      | fa:16:3e:f6:f8:a9 | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f", "ip_address": "192.168.1.12"} |
| 93d0a69a-7bb8-4719-9ed7-63c10accd78b |      | fa:16:3e:1f:7f:d2 | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f", "ip_address": "192.168.1.11"} |
| 9d626a64-ee7c-410b-ae00-661dd275de79 |      | fa:16:3e:61:81:4b | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f", "ip_address": "192.168.1.14"} |
| cf56fd7b-2896-4e06-b520-1d2258ad6158 |      | fa:16:3e:ab:27:ca | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f", "ip_address": "192.168.1.13"} |
| d7457d29-44ba-46ef-b47a-4b94c9199902 |      | fa:16:3e:ad:d0:e9 | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f", "ip_address": "192.168.1.15"} |
+----------------------------+----+------------+---------------------------------------------------------------+
```

Step 3 In the output of the previous step, locate the port ID for the active node.

Step 4 Update the port so that it accepts traffic from the VIP by entering the following command:

```
$ neutron port-update active-port-id --allowed_address_pairs list=true type=dict
ip_address=vip
```

where:

- *active-port-id* is the port ID of the active node.
- *vip* is the virtual IP address for the HA pair.

For example, if the IP address of the active node is 192.168.1.11 and the VIP is 192.168.1.10, the command would resemble the following:

```
$ neutron port-update 93d0a69a-7bb8-4719-9ed7-63c10accd78b --allowed_address_pairs list=true
 type=dict ip_address=192.168.1.10
```

Step 5 View the port details and confirm that the allowed_address_pairs field lists the VIP by entering the following command:

```
$ neutron port-show active-port-id
```

where *active-port-id* is the identifier for the port configured in the previous step.

Using the current example, the command and results would be:

```
$ neutron port-show 93d0a69a-7bb8-4719-9ed7-63c10accd78b

+----------------------+------------------------------------------------------------------------------------+
| Field                | Value
                     |
+----------------------+------------------------------------------------------------------------------------+
| admin_state_up       | True
                     |
| allowed_address_pairs | {"ip_address": "192.168.1.10", "mac_address": "fa:16:3e:1f:7f:d2"}
                   |
| device_id            | b7b8eeb5-70ad-49ac-a3b4-6d8a144293a2
                     |
| device_owner         | compute:alln01-1-csi
                     |
| extra_dhcp_opts      |
                     |
| fixed_ips          | {"subnet_id": "1099b814-05d9-4da0-93d1-06167db4891f","ip_address":
 "192.168.1.11"}  |
| id                   | 93d0a69a-7bb8-4719-9ed7-63c10accd78b
                     |
| mac_address          | fa:16:3e:1f:7f:d2
                     |
| name                 |
                     |
| network_id           | ff95095f-89f0-4005-b709-70a75212d73c
                     |
| security_groups      | f995d22f-edb8-47c0-9aff-6339a15fb5be
                     |
| status               | ACTIVE
                     |
| tenant_id            | b1436740f8db42e39904ee9779f67eb8
                     |
+----------------------+------------------------------------------------------------------------------------+
```

Step 6 Configure the standby node to accept VIP traffic by entering the following command:

```
$ neutron port-update standby-port-id --allowed_address_pairs list=true type=dict
ip_address=vip
```

where:

- *standby-port-id* is the port ID of the standby node.
- *vip* is the virtual IP address for the HA pair.

Step 7 View the port details for the standby node and confirm that the allowed_address_pairs field lists the VIP:

```
$ neutron port-show standby-port-id
```

Step 8 (Optional) Complete the following steps to configure the VIP so that it is accessible from an external network and so that it uses a floating IP address:

a) Configure a port corresponding to the VIP by entering the following command:

```
$ neutron port-create --fixed-ip ip_address=ip --security-group security-group network-name
```

where:

- *ip* is the fixed IP address for the port.
- *security-group* is the name of the security group to use for this port.
- *network-name* is the name of the network to which the port belongs.

Using our example, the command and results would be:

```
$ neutron port-create --fixed-ip ip_address=192.168.1.10 --security-group default
icfpp-ha-123-network

Created a new port:
+------------------+-------------------------------------------------------------------+
| Field                  | Value
                       |
+------------------+-------------------------------------------------------------------+
| admin_state_up         | True
                       |
| allowed_address_pairs |                |
| device_id              |
                       |
| device_owner           |                                      |
| fixed_ips              | {"subnet_id":
"1099b814-05d9-4da0-93d1-06167db4891f","ip_address": "192.168.1.10"}  |
| id                     | ea35e2a9-1b45-4b05-b345-f4758e490052
         |
| mac_address            | fa:16:3e:df:e9:69                                       |
| name                   |                 |
| network_id             | ff95095f-89f0-4005-b709-70a75212d73c            |
| security_groups        | f995d22f-edb8-47c0-9aff-6339a15fb5be
             |
| status                 | DOWN                 |
| tenant_id              | b1436740f8db42e39904ee9779f67eb8
         |
+------------------+-------------------------------------------------------------------+
```

b) In the OpenStack Horizon GUI, associate a floating IP address with the port to which the fixed IP address is assigned.

Moving from a Standalone Setup to a Cluster

Cisco ICFPP enables you to move from a standalone configuration to a cluster. Moving from a standalone configuration to a cluster involves moving the database contents from the existing standalone node to the active HA node in the cluster as described in this procedure.

After moving the database contents, you can configure and test the cluster setup without modifying or affecting the standalone setup. For more information about configuring a multiple-node cluster, see Deployment Workflows, on page 5.

Before You Begin

- Obtain the FTP server IP address and login credentials for backing up and restoring the database.
- Confirm that the standalone node and both nodes in the HA pair are running the same version of Cisco ICFPP.

Procedure

Step 1 In the ShellAdmin console for the standalone node, back up the existing database as follows:

a) Choose **Stop Services** to stop the Infrastructure Manager services.
b) Choose **Backup Database**.
c) Choose **Start Services**.

Step 2 Deploy or configure two primary nodes by using any of the following methods:

- For VMware environments, deploy two new Cisco ICFPP virtual appliances using the Primary Node role. For more information, see Installing Cisco ICFPP on VMware, on page 14.
- For OpenStack environments, deploy two new Cisco ICFPP virtual appliances using the Standalone Node role and then configure the appliances as primary nodes. For more information, see Installing Cisco ICFPP on OpenStack, on page 21.
- Configure existing Cisco ICFPP virtual appliances using the Standalone Node role as primary nodes. For more information, see Configuring a Primary Node, on page 27.

Step 3 Restore the backed-up database from Step 1 onto one of the primary nodes:

a) In the primary node ShellAdmin console, choose **Stop Services** to stop the Infrastructure Manager services.
b) Choose **Restore Database**.
c) Choose **Start Services**.

Step 4 In the ShellAdmin console, configure the two primary nodes as an HA pair.

Note You must configure the primary node on which the database was restored as the active node in the HA pair. If you configure it as the standby node, the database on that node will be deleted.

For more information, see Configuring HA, on page 30.

Step 5 Configure service nodes for the cluster. For more information, see Configuring a Service Node, on page 28.

Restoring a Database onto an Existing HA Pair

Cisco ICFPP enables you to configure an HA pair and then restore a database from an existing standalone node to the HA pair.

Note You must stop and start services in the sequence described in this procedure to successfully restore the database on the HA pair.

Before You Begin

- Back up the required database from a standalone node onto an FTP server.
- Identify the active node in the HA pair on which to restore the database.
- Confirm that the standalone node and both nodes in the HA pair are running the same version of Cisco ICFPP.

Procedure

Step 1 Stop the VIP service on the current standby node in the HA pair as follows:

a) Log in to the ShellAdmin console for the current standby node.
b) Choose the **Setup HA** option.
c) When asked if you want to reconfigure HA, enter **Y**.
d) Enter **C** to stop the VIP service.
e) Enter **Y** to confirm the action.
f) Press **Enter** to return to the ShellAdmin menu.

Step 2 Stop the VIP service on the current active node in the HA pair as follows:

a) Log in to the ShellAdmin console for the current active node.
b) Choose the **Setup HA** option.
c) When asked if you want to reconfigure HA, enter **Y**.
d) Enter **C** to stop the VIP service.
e) Enter **Y** to confirm the action.
f) Press **Enter** to return to the ShellAdmin menu.

Stopping the VIP service on the active node in an HA pair automatically stops the Infrastructure Manager services if they are running.

Step 3 On the active node in the HA pair, restore the database backup that was obtained from the standalone node as follows:

a) In the ShellAdmin console for the active node, choose **Restore Database**.
b) When prompted, enter the FTP server IP address and login credentials.
c) Enter the path and filename for the backed up database file on the FTP server.
d) Follow the onscreen prompts to complete the process.

Step 4 Restart the VIP service on the active node as follows:

a) In the ShellAdmin console for the active node, choose **Setup HA**.
b) When asked if you want to reconfigure HA, enter **Y**.
c) Enter **D** to start the VIP service.
d) Press **Enter** to return to the ShellAdmin menu.

Starting the VIP service on the active node in an HA pair automatically starts the Infrastructure Manager services on the active node.

Step 5 Restart the VIP service on the standby node in the HA pair as follows:

a) In the ShellAdmin console for the standby node, choose **Setup HA**.
b) When asked if you want to reconfigure HA, enter **Y**.
c) Enter **D** to start the VIP service.
d) Press **Enter** to return to the ShellAdmin menu.

Monitoring HA Status

After configuring Cisco ICFPP for HA, you can view the configuration details, check the status of the active and standby nodes, and view detailed replication status.

Procedure

Step 1 Log in to the ShellAdmin console for one of the nodes in the HA pair.

Step 2 At the menu prompt, choose **Display HA Status**.
Information similar to the following is displayed:

```
Configured HA role for this node is:  Active
Current HA role for this node is: Active
HA Configuration properties for this node are:
ACTIVE_IP_ADDRESS=123.16.1.30
STANDBY_IP_ADDRESS=123.16.1.3
VIRTUAL_IP_ADDRESS=123.16.1.25

IP address of this node is: 123.16.1.30
Checking if Virtual IP Address is reachable...OK
Virtual IP Address service status on this node...OK
Checking DB replication from 123.16.1.30 to 123.16.1.3...OK
Checking DB replication from 123.16.1.3 to 123.16.1.30...OK

Do you want to view detailed replication status ? [y/n]
```

Step 3 To view detailed information, enter **Y** and press **Enter**.
Information similar to the following is displayed:

```
                Slave_IO_State : Waiting for master to send event
                   Master_Host : 123.16.1.3
                   Master_User : replicator
                   Master_Port : 3306
                 Connect_Retry : 60
               Master_Log_File : mysql-bin.000002
           Read_Master_Log_Pos : 645644
                Relay_Log_File : mysqld-relay-bin.000004
                 Relay_Log_Pos : 361
         Relay_Master_Log_File : mysql-bin.000002
              Slave_IO_Running : Yes
             Slave_SQL_Running : Yes
               Replicate_Do_DB :
           Replicate_Ignore_DB :
…
```

Step 4 Use your arrow keys to scroll through the information, and enter **Q** to return to the menu.

Viewing HA Syslog Messages

After configuring Cisco ICFPP for HA, Cisco ICFPP checks HA status every five minutes. Any warning or failure messages that are issued are included in the log file for syslog messages. This log file commonly resides in `/var/log/` with the name `messages`. To view these messages, log in as root and use a text editor as described in this procedure.

Procedure

Step 1 In the ShellAdmin console, choose the **Log in as Root** option.

Step 2 Enter **Y** to confirm the login request, and enter the root account password at the prompt.

Step 3 Enter the following command to view the contents of the log file:

```
vi /directory-path/filename
```

where *directory-path* is location of the log file and *filename* is the name of the log file. For example, you might enter the following:

```
vi /var/log/messages
```

Step 4 To identify messages that pertain to HA, look for entries that contain the string `ICFPP HA` as shown in the following example:

```
Mar 13 03:27:13 localhost logger: ICFPP HA: MySQL replication from 123.45.67.8 to 123.45.67.9
 is in WARN state
Mar 13 03:27:13 localhost logger: ICFPP HA: Please use shelladmin to check HA status details
Mar 13 03:27:13 localhost logger: ICFPP HA: MySQL replication from 122.33.44.5 to 122.33.44.6
 is in WARN state
Mar 13 03:27:13 localhost logger: ICFPP HA: Please use shelladmin to check HA status details
```

Step 5 Address any HA-related messages as indicated.

CHAPTER 7

Additional Information

Related Documentation for Cisco Intercloud Fabric Provider Platform

The documentation listed below is available for Cisco Intercloud Fabric Provider Platform at the following URL:

http://www.cisco.com/c/en/us/support/cloud-systems-management/intercloud-fabric/tsd-products-support-series-home.html

General Information

Cisco Intercloud Fabric Provider Platform Release Notes

Install and Upgrade

Cisco Intercloud Fabric Provider Platform Installation Guide

Administration

Cisco Intercloud Fabric Provider Platform Administrator Guide

Troubleshooting and Alerts

Cisco Intercloud Fabric Provider Platform Troubleshooting Guide

Cisco Intercloud Fabric Documentation

The documentation listed below is available for Cisco Intercloud Fabric at the following URL:

http://www.cisco.com/c/en/us/support/cloud-systems-management/intercloud-fabric/tsd-products-support-series-home.html

Cisco Intercloud Fabric Release Notes

Cisco Intercloud Fabric Getting Started Guide

Cisco Intercloud Fabric Director REST API Guide

Cisco Intercloud Fabric Configuration Guide

Cisco Intercloud Fabric Firewall Configuration Guide

Cisco vPath and vServices Reference Guide for Intercloud Fabric

Cisco Intercloud Fabric User Guide

Cisco Intercloud Fabric Troubleshooting Guide

Cisco Nexus 1000V Documentation

Cisco Nexus 1000V for VMware vSphere

Cisco Nexus 1000V for KVM

Cisco Nexus 1000V for Microsoft Hyper-V

Cisco Virtual Security Gateway Documentation

Cisco Virtual Security Gateway

Cisco Cloud Services Router Documentation

Cisco Cloud Services Router 1000V

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation*, at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html.

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