



Cisco Prime Network Services Controller 3.2 User Guide

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CHAPTER

1

Overview

This section contains the following topics:

- [Cisco Prime Network Services Controller Overview, page 1](#)
- [Topology Examples, page 4](#)
- [Features and Benefits, page 5](#)

Cisco Prime Network Services Controller Overview

The dynamic nature of cloud environments requires organizations to apply and enforce frequent changes to networks. These networks can consist of thousands of virtual services elements, such as firewalls, load balancers, routers, and switches. Cisco Prime Network Services Controller simplifies operations with centralized, automated multi-device and policy management for Cisco network virtual services. For the latest Prime Network Services Controller release updates and overview, see the corresponding Prime Network Services Controller [data sheet](#).

Cisco Prime Network Services Controller (Prime Network Services Controller) is the primary management element for Cisco Nexus 1000V (Nexus 1000V) Switches and Services that can enable a transparent, scalable, and automation-centric network management solution for virtualized data center and hybrid cloud environments. Nexus 1000V switches and services deliver a highly secure multitenant environment by adding virtualization intelligence to the data center network. These virtual switches are built to scale for cloud networks. Support for Virtual Extensible LAN (VXLAN) helps enable a highly scalable LAN segmentation and broader virtual machine (VM) mobility.

Prime Network Services Controller enables the centralized management of Cisco virtual services to be performed by an administrator, through its GUI, or programmatically through its XML API. Prime Network Services Controller is built on an information-model architecture in which each managed device is represented by its subcomponents (or objects), which are parametrically defined. This model-centric approach enables a flexible and simple mechanism for provisioning and securing virtualized infrastructure using Cisco VSG and Cisco Adaptive Security Appliance 1000V (ASA 1000V) Cloud Firewall virtual security services.

InterCloud

With Cisco Nexus 1000V InterCloud, the enterprise network can be securely extended to the cloud, with its enterprise network and security configurations such as VLANs and policies extended to the cloud. Using Prime Network Services Controller, workloads can be migrated from the enterprise data center to the public

cloud while retaining the same IP addresses and other networking parameters, thus avoiding the need to redesign the application.

Using Prime Network Services Controller, workloads in the public cloud can use the same security policies as their counterparts in the enterprise data center. System administrators get the policy consistency and network visibility that they require while retaining control of the cloud environment as a transparent extension of the enterprise data center.

With Prime Network Services Controller, customers have a unified view of the workloads across the enterprise data center (private cloud) and public cloud. They can select and migrate workloads from the enterprise data center to the public cloud.

Hypervisor Support

The Prime Network Services Controller platform supports multiple VM Managers through their APIs and through tight integration with Nexus 1000V Virtual Supervisor Modules (VSMs) and Virtual Ethernet Modules (VEMs).

Cisco Dynamic Fabric Automation Integration Support

Cisco Dynamic Fabric Automation (DFA) delivers fabric optimization, management, and automation capabilities under Cisco Unified Fabric. Prime Network Services Controller plays a critical role in the Cisco DFA solution with L4-7 services integration. Prime Network Services Controller integrates with Cisco Data Center Network Manager (DCNM) to support the managed resources and services in a VMware vSphere environment.

Consistent and Efficient Security Policies

Prime Network Services Controller uses security profiles for template-based configuration of security policies. A security profile is a collection of security policy sets and integrated policies and rules that can be predefined and applied on demand at the time of virtual machine instantiation. This profile-based approach significantly simplifies authoring, deployment, and management of security policies, including dense multi-tenant environments, while enhancing deployment agility and scaling. Security profiles also help reduce administrative errors and simplify audits.

The XML API for Prime Network Services Controller facilitates integration with northbound network provisioning tools for programmatic network and security provisioning and management of Cisco VSG (VSG) and ASA 1000V. The option of programmatic control of those virtual appliances can greatly simplify operational processes and reduce infrastructure management costs.

Nondisruptive Administration Model

By providing visual and programmatic controls, Prime Network Services Controller can enable the security operations team to author and manage security policies for virtualized infrastructure and enhance collaboration with the server and network operations teams. This nondisruptive administration model helps ensure administrative segregation of duties to reduce errors and simplify regulatory compliance and auditing:

- Security administrators can author and manage security profiles and manage VSG and ASA 1000V instances. Security profiles are referenced in Nexus 1000V port profiles.
- Network administrators can author and manage port profiles, and manage Nexus 1000V switches. Port profiles with referenced security profiles are available in VMware vCenter through the Nexus 1000V VSM programmatic interface with VMware vCenter.
- Server administrators can select an appropriate port profile in VMware vCenter when instantiating a virtual machine.

Efficient Management for Easier Scalability

Prime Network Services Controller implements an information-model architecture in which each managed device, such as VSG or Cisco ASA 1000V, is represented by the device's object-information model. This model-based architecture helps enable the use of:

- Stateless managed devices—Security policies (security templates) and object configurations are abstracted into a centralized repository and used as templates against any virtual device type.
- Dynamic device allocation—A centralized resource management function manages pools of devices that are commissioned (deployed) in service and a pool of devices that are available for commissioning. This approach simplifies large-scale deployments because managed devices can be preinstantiated and then configured on demand, and devices can be allocated and deallocated dynamically across commissioned and noncommissioned pools.
- Scalable management—A distributed management-plane function is implemented using an embedded agent on each managed device that helps enable greater scalability.

Topology Examples

The following figures show virtual data center and InterCloud topology examples.

Figure 1: Virtual Data Center Topology Example

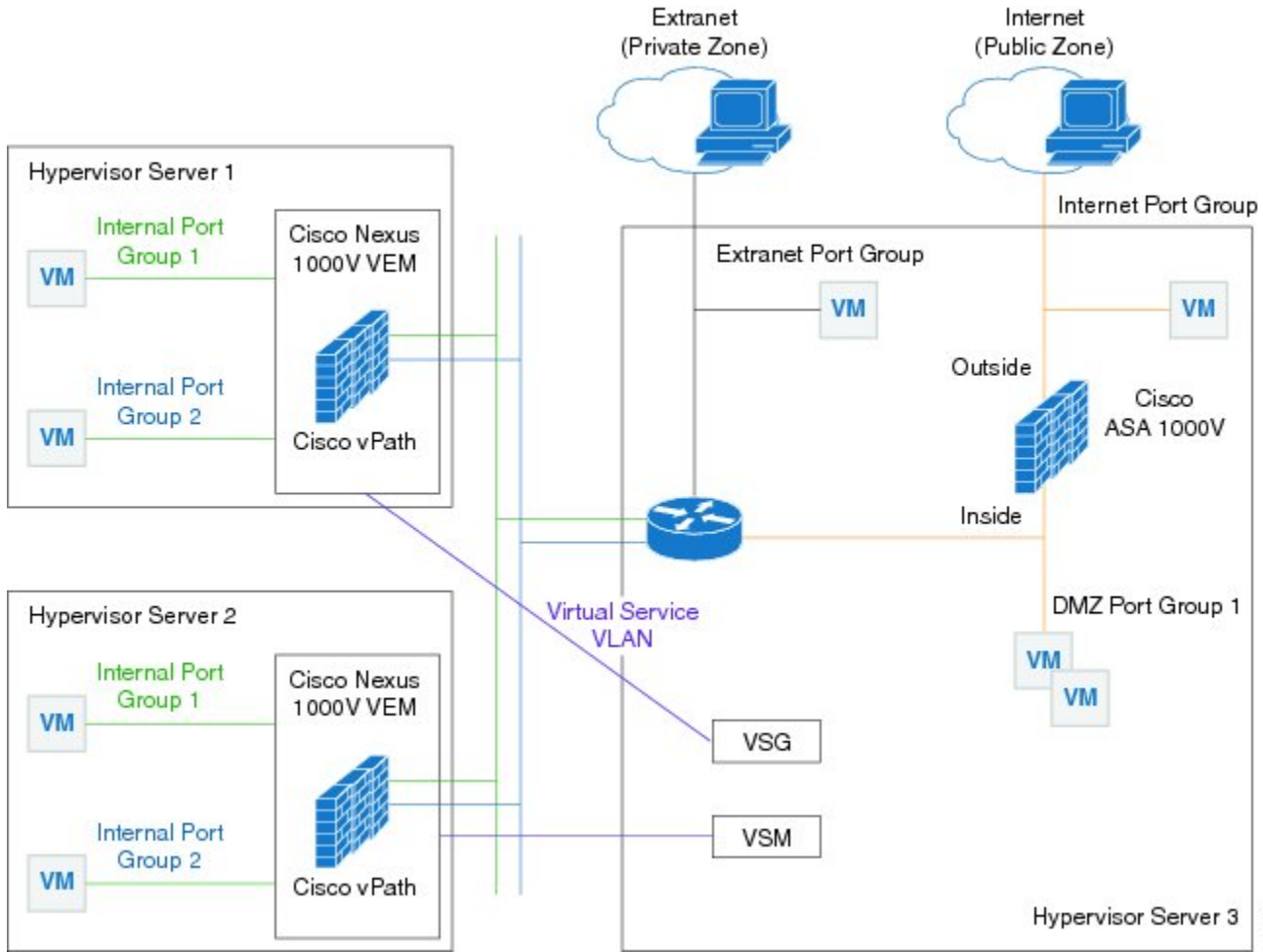
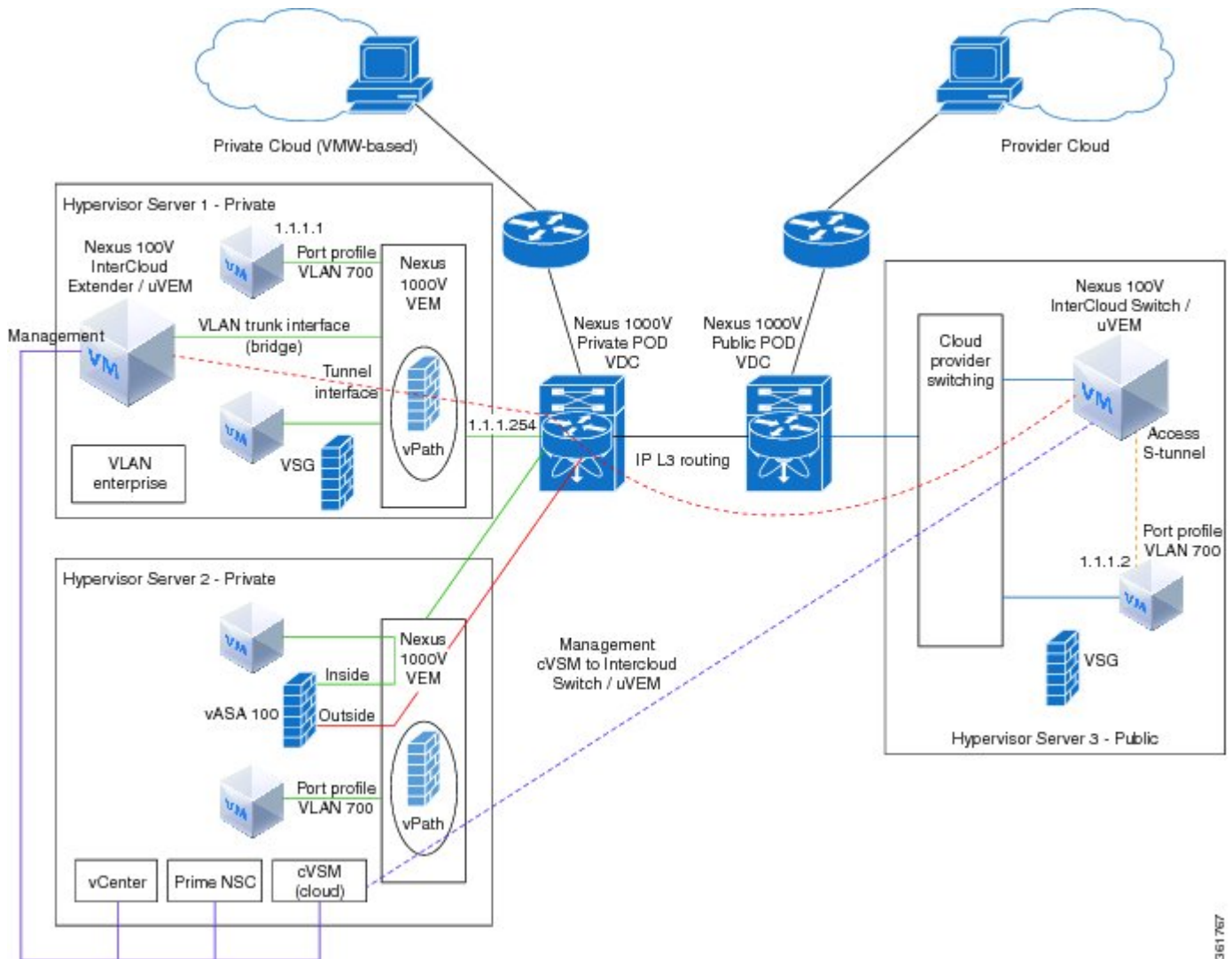


Figure 2: InterCloud Topology Example



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Features and Benefits

The following table lists the features and benefits of using Prime Network Services Controller. For the latest Prime Network Services Controller release description and overview, see the latest Prime Network Services Controller [data sheet](#) and [Release Notes](#).

Features	Description	Benefits
InterCloud Management	Prime Network Services Controller extends your enterprise data center into a public cloud through the configuration and management of InterCloud resources.	<ul style="list-style-type: none"> • Provides secure connections to the cloud via InterCloud links using VMware ESXi hypervisors. • Enables easy creation of templates and VMs on the cloud. • Supports high availability across the InterCloud link.
Multiple-Device Management	Prime Network Services Controller provides central management of VSG, CSR 1000V, ASA 1000V, Citrix NetScaler VPX and Nexus 1000V .	Simplifies provisioning and troubleshooting in a scaled-out data center.
Load Balancing Profiles	An application network profile represents load balancer server farms and related features and attributes.	Simplifies provisioning, reduces administrative errors during load balancing policy changes, reduces audit complexities, and helps enable a highly scale-out data center environment.
Routing Profiles	A network profile represents edge router routing policies and related features and attributes.	Simplifies provisioning, reduces administrative errors during routing policy changes, reduces audit complexities, and helps enable a highly scale-out data center environment.
Security Profiles	A security profile represents the VSG or ASA 1000V security policy configuration in a profile (template).	Simplifies provisioning, reduces administrative errors during security policy changes, reduces audit complexities, and helps enable a highly scaled-out data center environment.
Stateless Device Provisioning	The management agents in VSG and ASA 1000V are stateless, receiving information from Prime Network Services Controller.	<ul style="list-style-type: none"> • Enhances scalability. • Provides robust endpoint failure recovery without loss of configuration state.

Features	Description	Benefits
Security Policy Management	Security policies are authored, edited, and provisioned centrally.	<ul style="list-style-type: none"> • Simplifies operation and management of security policies. • Helps ensure that security intent is accurately represented in the associated security policies.
Context-Aware Security Policies	Prime Network Services Controller obtains virtual machine contexts from VMware vCenter.	Allows a security administrator to institute highly specific policy controls across the entire virtual infrastructure.
Support virtual services for DFA environments	Cisco Prime NSC obtains tenant information and allows virtual services to be added to DFA virtual overlay networks.	—
Dynamic Security Policy and Zone Provisioning	Prime Network Services Controller interacts with the Nexus 1000V VSM to bind the security profile to the corresponding Nexus 1000V port profile. When virtual machines are dynamically instantiated by server administrators and appropriate port profiles applied, their association with trust zones is also established.	Helps enable security profiles to stay aligned with rapid changes in the virtual data center.
Multi-Tenant (Scale-Out) Management	Prime Network Services Controller is designed to manage VSG and ASA 1000V security policies in a dense multi-tenant environment so that administrators can rapidly add and delete tenants and update tenant-specific configurations and security policies.	Reduces administrative errors, helps ensure segregation of duties in administrative teams, and simplifies audit procedures.
Role-Based Access Control (RBAC)	RBAC simplifies operational tasks across different types of administrators, while allowing subject-matter experts to continue with their normal procedures.	<ul style="list-style-type: none"> • Reduces administrative errors. • Enables detailed control of user privileges. • Simplifies auditing requirements.

Features	Description	Benefits
XML-Based API	Prime Network Services Controller XML API allows external system management and orchestration tools to programmatically provision VSG and ASA 1000V.	<ul style="list-style-type: none"><li>• Allows the use of the best-in-class management software.<li>• Offers transparent and scalable operation management.



Getting Started

This section contains the following topics:

- [Logging Into Prime Network Services Controller, page 9](#)
- [Prime Network Services Controller Configuration Workflow, page 9](#)
- [GUI Overview, page 10](#)

Logging Into Prime Network Services Controller

The default HTTPS URL for logging into the Prime Network Services Controller user interface is `https://server-ip-address`, where `server-ip-address` is the IP address assigned to the Prime Network Services Controller server. The IP address is the address for the management port.



Note

If you log in using HTTP, you are automatically redirected to the HTTPS link.

Prime Network Services Controller Configuration Workflow

The following table provides the most common initial and ongoing workflow tasks to configure Prime Network Services Controller.

Initial Configuration Tasks (Administrative)	Description
1. User Roles	Configure roles for user access.
2. Primary Authentication	Configure LDAP providers and select a primary authentication service.
3. Creating a Trusted Point	Configure trusted points for LDAP over SSL.
4. Configuring VM Managers	Configure access with hypervisors.

Initial Configuration Tasks (Administrative)	Description
5. Configuring Device Policies and Profiles	Configure the default Prime Network Services Controller system profile.
Ongoing Configuration Tasks	
6. Creating a Tenant	Add tenants for resource and service support.
7. Configuring Service Policies and Profiles	Configure access and security-related policies for access to resources.
8. Configuring Device Policies and Profiles	Configure device-specific policies and profiles.
9. Configuring Managed Resources, on page 177	Add and configure enterprise and cloud resources. Note To instantiate a cloud VM, use Cisco Intercloud Fabric to import the cloud template before instantiation in Cisco Prime Network Services Controller.

GUI Overview

Prime Network Services Controller provides a browser-based interface that enables you to configure managed endpoints, perform administrative operational tasks, and define and apply policies and profiles. You also use the GUI to manage and provision device resources.

User Interface Components

When you log into Prime Network Services Controller, the user interface is displayed.

The Prime Network Services Controller user interface contains the components described in the following table:

Table 1: Prime Network Services Controller User Interface Components

Component	Description
Title	Displays "Cisco Prime Network Services Controller."
Toolbar	Allows you to set inactivity timeout values, obtain product version information, access online help, provide product feedback, and log out.

Component	Description
Tabs	<p>Provide access to the primary Prime Network Services Controller components for managing your environment:</p> <ul style="list-style-type: none"> • Tenant Management • Resource Management • Policy Management • InterCloud Management • Administration
Navigation pane	<p>Provides navigation to all objects in the Prime Network Services Controller instance.</p> <p>The navigation pane is displayed on the left side of the screen below the tabs. The objects that are displayed in the navigation pane depend on the selected tab.</p>
Content pane	<p>Displays information and provides options for the object that is selected in the navigation pane. The Content pane often includes tables.</p>

The following table provides information about the tabs in the Prime Network Services Controller GUI:

Table 2: Tabs in the Prime Network Services Controller GUI

Tab	Description
Tenant Management	<p>Enables you to manage tenants in the current Prime Network Services Controller instance.</p> <p>A system or server administrator can use this tab to create organizational hierarchies and enable multi-tenant management domains. The organizational hierarchy levels are Tenant > Virtual Data Center > Application > Tier.</p>

Tab	Description
Resource Management	<p>Enables you to manage logical resources, such as VSGs, ASA 1000Vs, VSGs, and vCenters.</p> <p>Resource Management subtabs are:</p> <ul style="list-style-type: none"> • Managed Resources • Resources • VM Managers • Capabilities • Diagnostics
Policy Management	<p>Enables you to configure service and device policies and profiles, and to assign policies to profiles.</p> <p>Policy Management subtabs are:</p> <ul style="list-style-type: none"> • Service Profiles • Service Policies • Device Configurations • Capabilities • Diagnostics
<p>InterCloud Management</p> <p>Note This tab is not available in Hyper-V Hypervisor deployments.</p>	<p>Enables you to configure and monitor InterCloud resources.</p> <p>InterCloud Management subtabs are:</p> <ul style="list-style-type: none"> • Enterprise • Public Cloud • InterCloud Link • InterCloud Policies • Diagnostics
Administration	<p>Provides the tools needed for administering Prime Network Services Controller.</p> <p>Administration subtabs are:</p> <ul style="list-style-type: none"> • Access Control • System Profile • Diagnostics • Operations • Service Registry

Toolbar

The Prime Network Services Controller toolbar displays in the upper-right portion of the user interface. The following table describes the toolbar options:

Table 3: Toolbar Options

Option	Description
(username)	Username of the current Prime Network Services Controller session.
Preferences	Enables you to specify the amount of time that the Prime Network Services Controller session can remain inactive before the session times out. The value that you specify applies to the system from which you logged into Prime Network Services Controller.
Log Out	Logs you out of the current session.
About	Provides Prime Network Services Controller version information.
Help	Launches online help for the currently displayed screen.
Feedback	Allows you to provide feedback on Prime Network Services Controller.

Tables

The tables in the Prime Network Services Controller GUI contain the following features:

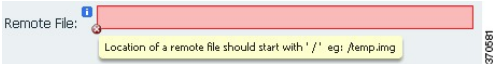

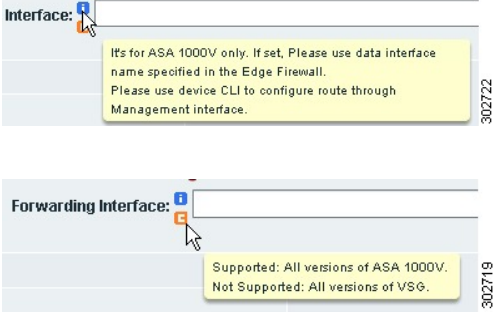
Feature	Description
Actions drop-down list	For tables that provide many actions, a drop-down list displays the options. The actions that are available for the selected item appear in normal font, whereas those actions that are not available for the selected item are dimmed.
Filter	You can filter the table contents by a value that you enter.
Record count	The number of entries in the table.

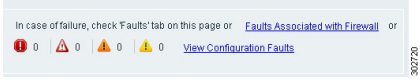

Feature	Description
Sort by column	You can sort all table entries by clicking on a column heading.
Table-specific toolbars	Toolbars are available for most tables, with options that are appropriate for the specific table.

Field Aids

Prime Network Services Controller includes the following aids to assist you in your tasks, whether configuring policies and profiles, troubleshooting faults, or looking for additional information for a particular window or dialog box.

Table 4: Prime Network Services Controller Field Aids

Feature	Description	Example
Tooltips	Pause your cursor over a field to view additional information about the field.	
Red field or box	Indicates that information is required. If you have entered information and the field remains red, the entry contains an error (such as an incomplete IP address). You can pause your mouse over the field to obtain information about the error.	
Field icons	<p>Two field icons (i and c) provide additional information for the field:</p> <ul style="list-style-type: none"> • The "i" icon provides additional information for the field. • The "c" icon identifies the feature support for the field. For example, a feature might be supported on ASA 1000Vs but not on VSGs. <p>Pause your cursor over the icon to view the information.</p>	

Feature	Description	Example
Fault links	<p>Fault information and links to fault information are available for each edge and compute firewall in Resource Management.</p> <p>Navigate to a specific compute or edge firewall to view the object state, number of faults, and severity of faults. The same pane provides links to the relevant fault page.</p>	
Online help	<p>Context-sensitive online help is available for each Prime Network Services Controller pane and dialog box.</p> <p>To access help, click Help in the active pane or ? in the active dialog box.</p>	

Firewall Access

If the Prime Network Services Controller server is protected by a firewall, the following ports must be enabled:

- 22—TCP
- 80—HTTP
- 443—HTTPS
- 843—Adobe Flash
- 6644—TCP, UDP

Idle Timeout Period

The Preferences dialog box allows you to specify the length of time, from 5 to 60 minutes, that a Prime Network Services Controller session on your current machine can remain idle before the session is closed. The value that you enter applies to the system that you used to log into Prime Network Services Controller.

Search

The Search tab enables you to search for instances of organizations in Prime Network Services Controller. From the search result, you can expand an organization's hierarchy and launch devices and policies in that organization.



Note

Searching for organization names does not work if the organization names contain special characters.

Procedure

Step 1 Do any of the following to launch the Search tab:

- Choose **Policy Management > Service Policies > root > Search**.
- Choose **Policy Management > Service Profiles > root > Search**.
- Choose **Policy Management > Device Configurations > root > Search**.
- Choose **Tenant Management > root > Search**.
- Choose **Resource Management > Managed Resources > root > Search**.

Note You can perform the Search operation at any level in the organizational hierarchy.

Step 2 Enter organization names as a *pattern or a regular expression. The Search feature is case-sensitive. When you enter a name as a regular expression, it can contain regex wildcards such as *, +, ? and so on. For example, "*" will match the previous character zero or more times. Searching myVdc* will return all names that contain "myVd" and "myVDC".

Use the following the guidelines when you enter a pattern:

- To fetch organization names starting with "ABC", enter "ABC*".
- To fetch organization names ending with "ABC", enter "*ABC".
- To fetch organizations names starting with "A" and ending with "BC" but with other characters in between, enter "A*BC".

Step 3 Click **Search**.
The search results are displayed in the table.

Clone

You can create a clone for an organization, policy, policy set, or profile at a destination of your choice. The hierarchy of an organization's clone or the names of the elements in it cannot be changed. After a clone is created, it cannot be renamed or moved to another location.

Procedure

Step 1 Based on the element you want to clone, do one of the following:

- To clone an organization, choose **Tenant Management > root > tenant > organization**.

- To clone a policy, policy set, or profile, choose **Policy Management > Service Polices > root > tenant > Policies > *policy*** or **Policy Management > Service Profiles > root > tenant > Profiles > *profile***.

Step 2 Right-click the element to be cloned and choose **Clone**.

Step 3 In the Clone dialog box that appears:

- a) Enter the name and destination of the clone.
- b) Click **OK**.

The clone appears in the destination you chose.



Configuring RBAC

This section contains the following topics:

- [RBAC, page 19](#)
- [User Accounts, page 19](#)
- [User Roles, page 21](#)
- [Privileges, page 23](#)
- [User Locales, page 24](#)
- [Configuring User Roles, page 25](#)
- [Configuring User Locales, page 26](#)
- [Configuring Locally Authenticated User Accounts, page 29](#)
- [Monitoring User Sessions, page 32](#)

RBAC

Role-Based Access Control (RBAC) is a method of restricting or authorizing system access for users based on user roles and locales. A role defines the privileges of a user in the system and the locale defines the organizations (domains) that a user would be able to access. Because users are not directly assigned privileges, management of individual user privileges is simply a matter of assigning the appropriate roles and locales.

A user is granted write access to desired system resources only if the assigned role grants the access privileges and the assigned locale allows access. For example, a user with the Server Administrator role in the Engineering organization would be able to update server configurations in the Engineering organization but could not update server configurations in the Finance organization unless the locales assigned to the user include the Finance organization.

User Accounts

User accounts are used to access the system. Up to 260 local user accounts can be configured in each Prime Network Services Controller instance. Each user account must have a unique username.

A local user can be authenticated using a password or an SSH public key. The public key can be set in either of the two formats: OpenSSH or SECSH.

Default User Account

Each Prime Network Services Controller instance has a default user account, admin, which cannot be modified or deleted. This account is the system administrator or superuser account and has full privileges. There is no default password assigned to the admin account; you must choose the password during the initial system setup.

Expiration of User Accounts

User accounts can be configured to expire at a predefined time. When the expiration time is reached, the user account is disabled.

By default, user accounts do not expire.

Username Guidelines

The username is used as the login ID for Prime Network Services Controller. When you assign usernames to Prime Network Services Controller user accounts, consider the following guidelines and restrictions:

- The login ID can contain from 1 to 32 characters, including the following:
 - Any alphanumeric character
 - Period (.)
 - Underscore (_)
 - Dash (-)
 - At symbol (@)
- Neither the unique username nor a local user's username can consist solely of numbers.
- The unique username cannot start with a number.
- If an all-numeric username exists on a AAA server (LDAP) and is entered during login, Prime Network Services Controller cannot log in the user.

After you create a user account, you cannot change the username. You must delete the user account and create a new one.

**Note**

You can create up to 260 user accounts in a Prime Network Services Controller instance.

Password Guidelines

For authentication purposes, a password is required for each user account. To prevent users from choosing insecure passwords, each password must be strong. If the Password Strength Check option is enabled, Prime Network Services Controller rejects any password that does not meet the following requirements:

- Must contain a minimum of 8 characters.

- Must contain at least three of the following:
 - Lowercase letters
 - Uppercase letters
 - Digits
 - Special characters
- Must not contain a character that is repeated more than three times consecutively, such as aaabbb.
- Must not be identical to the username or the reverse of the username.
- Must pass a password dictionary check. For example, the password must not be based on a standard dictionary word.
- Must not contain the following symbols: dollar sign (\$), question mark (?), or equals sign (=).
- Should not be blank for local user and admin accounts.

**Note**

The Password Strength Check option is enabled by default. You can disable it from the Locally Authenticated Users pane (Administration > Access Control > Locally Authenticated Users).

**Note**

If Prime Network Services Controller is configured to use remote authentication with LDAP, passwords for those remote accounts can be blank. With this configuration, the remote credentials store is used for authentication only, not authorization. The definition of the local user role definition applies to the remotely authenticated user.

User Roles

A user role contains one or more privileges that define the operations allowed for the user who is assigned to that role. A user can be assigned one or more roles. A user assigned multiple roles has the combined privileges of all assigned roles. For example, if Role1 has policy-related privileges, and Role2 has tenant-related privileges, users who are assigned to both Role1 and Role2 have policy- and tenant-related privileges.

All roles include read access to all configuration settings in the Prime Network Services Controller instance. The difference between the read-only role and other roles is that a user who is assigned only the read-only role cannot modify the system state. A user assigned another role can modify the system state in that user's assigned area or areas.

The system contains the following default user roles:

aaa

Users have read and write access to users, roles, and AAA configuration, and read access to the rest of the system.

admin

Users have read and write access to the entire system and has most privileges. However, users cannot create or delete files, or perform system upgrades. These functions can be done only through the default admin account. The default admin account is assigned this role by default, and it cannot be changed.

intercloud-infra

Users have read and write access for InterCloud operations, including creating InterCloud links, creating provider accounts, managing InterCloud Extender and Switch images, and importing InterCloud Agent images. Users with this role are limited to InterCloud functionality.

intercloud-server

Users have read and write access for cloud VMs. User can create or move VMs from the enterprise to the cloud. Users can monitor cloud VMs for multiple tenants. Users with this role are limited to InterCloud functionality.

network

Users can create organizations, security policies, and device profiles.

operations

Users can acknowledge faults and perform some basic operations, such as logging configuration.

read-only

Users have read-only access to system configuration and operational status with no privileges to perform any operations.

tenant-admin

Users can configure tenant-related policies and resources for their associated tenants. However, users can view only those objects related to their associated tenants as defined by their assigned locales and organizations. They cannot see information about tenants that do not belong to their assigned locales and organizations.

Roles can be created, modified to add or remove existing privileges, or deleted. When a role is modified, the new privileges are applied to all users assigned to that role. Privilege assignment is not restricted to the privileges defined for the default roles. That is, you can use a custom set of privileges to create a unique role. For example, the default Network and Operations roles have different sets of privileges, but a new Network and Operations role can be created that combines the privileges of both roles.

If a role is deleted after it has been assigned to users, it is also deleted from those user accounts.

The role and locale assignments for a local user can be changed on Prime Network Services Controller. The role and locale for a remote user can be changed on LDAP. If any of the following information assigned to a user is modified, the administrator must delete all existing sessions of that user so that the new privileges take effect:

- Role
- Privilege for a role
- Locale
- Organization in a locale

Privileges

User Privileges

Privileges give users assigned to user roles access to specific system resources and permission to perform specific tasks. The following table lists each privilege and its description.

Privilege Name	Description
AAA	System security and AAA.
Admin	System administration.
InterCloud-Infrastructure	InterCloud infrastructure management.
InterCloud-Server	InterCloud VM management.
read-only	Read-only access. Read-only cannot be selected as a privilege; it is assigned to every user role.
Resource Configuration	Service device configuration.
Policy Management	Service device policies.
Fault Management	Alarms and alarm policies.
Operations	Logs, core file management, and show tech-support command.
Tenant Management	Create, delete, and modify tenants and organization containers.

Privileges and Role Assignments

The following table lists the out-of-box roles and the associated privileges.

Role	Associated Privileges
aaa	aaa
admin	admin
intercloud-infra	InterCloud-Infrastructure
intercloud-server	InterCloud-Server
network	policy, res-config, tenant

Role	Associated Privileges
operations	fault, operations
read-only	read-only
tenant-admin	policy, res-config, tenant

User Locales

A user can be assigned one or more locales. Each locale specifies one or more organizations or domains to which the user is allowed access. In addition, the user has read-only access privileges outside their assigned locale and going up the organization tree. This enables the user to use these organizations when creating policies. One exception to this rule is a locale with root as the associated organization, which gives unrestricted access to system resources in all organizations. Only the objects under organizations are controlled by locales. Access to other objects such as users, roles, and resources that are not present in the organization tree are not affected by locales.

At least one locale is required when adding a user account with either the network or tenant-admin role. If all the locales associated with a tenant-admin or network user are deleted, the tenant-admin or network user will not have access to the system. A user with the admin role needs to manually delete the user.



Note

Users not assigned to a locale have access to all resources in all organizations. For users assigned to a locale, access is restricted to the objects that reside under the organizations that belong to that locale.

Users with AAA privileges (AAA role) can assign organizations to the locale of other users. The assignment of organizations is restricted to only those in the locale of the user assigning the organizations. For example, if a locale contains only the Engineering organization, then a user assigned to that locale can assign only the Engineering organization to other users.



Note

AAA privileges must be carefully assigned because they allow a user to manage other users' privileges and role assignments.

You can hierarchically manage organizations. A user who is assigned to a top-level organization has automatic access to all organizations under it. For example, an Engineering organization can contain a Software Engineering organization and a Hardware Engineering organization. A locale containing only the Software Engineering organization has access to resources only within that organization; however, a locale that contains the Engineering organization has access to the resources for both the Software Engineering and Hardware Engineering organizations.

The role and locale assignments for a local user can be changed on Prime Network Services Controller. The role and locale for a remote user can be changed on LDAP. If any of the following information assigned to a user is modified, the administrator must delete all existing sessions of that user so that the new privileges take effect:

- Role

- Privilege for a role
- Locale
- Organization in a locale

Configuring User Roles

Creating a User Role

Procedure

- Step 1** Choose **Administration > Access Control > Roles**.
- Step 2** Click **Create Role**.
- Step 3** In the Create Role dialog box, complete the following fields, then click **OK**:

Field	Description
Name	User role name.
Privileges	<p>Available privileges. To assign a privilege to the selected role, check one or more of the following check boxes:</p> <ul style="list-style-type: none"> • Admin • AAA • Fault Management • InterCloud-Infrastructure • InterCloud-Server • Operations • Policy Management • Resource Configuration • Tenant Management <p>Note You can assign the admin privilege, which includes all privileges, or you can assign privileges individually.</p>

Editing a User Role

Procedure

- Step 1** Choose **Administration > Access Control > Roles**.
 - Step 2** Select the role you want to edit, then click **Edit**.
 - Step 3** In the Edit dialog box, check or uncheck the boxes for the privileges you want to add to or remove from the role, then click **OK**.
-

Deleting a User Role

Except for the admin and read-only roles, you can delete user roles that are not appropriate for your environment.

Procedure

- Step 1** Choose **Administration > Access Control > Roles**.
 - Step 2** Select the user role you want to delete, then click **Delete**.
 - Note** You cannot delete the admin or read-only role.
 - Step 3** In the Confirm dialog box, click **Yes**.
-

Configuring User Locales

Creating a Locale

Before You Begin

Verify that one or more tenants exist; if none exist, create one. For information on creating tenants, see [Creating a Tenant](#), on page 69.

Procedure

- Step 1** Choose **Administration > Access Control > Locales**.
- Step 2** Click **Create Locale**.
- Step 3** In the Create Locale dialog box, complete the following fields, then click **OK**:

Field	Description
Name	Locale name, containing 2 to 255 characters. The name can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:). You cannot change this name after it is saved.
Description	Brief locale description, containing 1 to 256 characters. The description can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:).
Assigned Organizations	
Assign Organization	Click to assign organizations to locales.
Assigned Organization	List of organizations assigned to the locale.

What to Do Next

Add the locale to one or more user accounts. For more information, see [Changing the Locales or Roles Assigned to a Locally Authenticated User](#), on page 32.

Editing a Locale

Procedure

- Step 1** Choose **Administration > Access Control > Locales**.
- Step 2** In the list of locales, select the locale you want to edit, then click **Edit**.
- Step 3** In the Description field, change the description as appropriate.
- Step 4** Click **Assign Organization**.
- Step 5** In the Assign Organization dialog box:
 - a) Expand the root node to view the available organizations.
 - b) Check the check boxes of the organizations to assign to the locale.
- Step 6** Click **OK** in the open dialog boxes to save your changes.

Deleting a Locale

Before You Begin

**Caution**

If the locale you want to delete is assigned to any users, remove the locale from the user list of locales.

**Note**

If all the locales associated with a tenant-admin or network user are deleted, the tenant-admin or network user will not have access to the system. A user with the admin role needs to manually delete the user.

Procedure

- Step 1** Choose **Administration > Access Control > Locales**.
- Step 2** In the pane, click the locale you want to delete, and then click **Delete**.

Assigning an Organization to a Locale

Procedure

- Step 1** Choose **Administration > Access Control > Locales > locale**, then click **Assign Organization**.
- Step 2** In the Assign Organization dialog box:
 - a) Expand root to view the available organizations.
 - b) Check the check boxes for the organizations you want to add to the locale.
- Step 3** Click **OK** in the open dialog boxes, then click **Save** to save the locale.

Deleting an Organization from a Locale

Procedure

- Step 1** Choose **Administration > Access Control > Locales > locale**.
- Step 2** In the content pane, click the **General** tab.
- Step 3** In the Assigned Organizations area, select the organization you want to delete, then click **Delete Organization**.
- Step 4** When prompted, confirm the deletion, then click **Save**.

Configuring Locally Authenticated User Accounts

Creating a User Account

When you create a user account, you assign one or more roles to the account. If you assign either the network or tenant-admin role to a user, you must also assign a locale. For information on creating locales, see [Creating a Locale](#), on page 26.

Before You Begin

Configure locales for accounts that will require either the network or tenant-admin role.

Procedure

- Step 1** Choose **Administration > Access Control > Locally Authenticated Users**.
- Step 2** Click **Create Locally Authenticated Users**.
- Step 3** In the **Properties** area, complete the following fields:

Field	Description
Login ID	<p>Login name.</p> <p>This name must be unique and meet the following guidelines and restrictions for Prime Network Services Controller user accounts:</p> <ul style="list-style-type: none"> • The login ID can be between 1 and 32 characters, including the following: <ul style="list-style-type: none"> ◦ Any alphanumeric character ◦ Underscore (_) ◦ Dash (-) ◦ At symbol (@) • The user name for each user account cannot be all-numeric. • The user name cannot start with a number. <p>After you save the user name, it cannot be changed. You must delete the user account and create a new one.</p>
Description	User description.
First Name	User first name. This field can contain up to 32 characters.

Field	Description
Last Name	User last name. This field can contain up to 32 characters.
Email	User email address.
Phone	User telephone number.
Password	<p>Password associated with this account.</p> <p>For maximum security, each password must be strong. If the Password Strength Check check box is checked, the system rejects any password that does not meet the following requirements:</p> <ul style="list-style-type: none"> • Contains a minimum of eight characters • Contains at least three of the following: <ul style="list-style-type: none"> ◦ Lowercase letters ◦ Uppercase letters ◦ Digits ◦ Special characters • Does not contain a character that is repeated more than three times consecutively, such as aaabbb. • Is not the user name or the reverse of the user name. • Passes a password dictionary check. For example, the password must not be based on a standard dictionary word. • Does not contain the following symbols: dollar sign (\$), question mark (?), equals sign (=). • The password must not be blank for local user and admin accounts. <p>Note The password strength check box on the Locally Authenticated Users pane can be unchecked, indicating that the password is not required to be strong. It must, however, contain a minimum of eight characters. The password field is a required field, and a user cannot be created without providing a password.</p>
Confirm Password	Reenter the password for confirmation purposes.

Field	Description
Password Expires	Indicates whether or not password expiration is enabled. Check the check box to enable password expiration.
Expiration Date	Available if password expiration is enabled. Date that the password expires.

Step 4 In the **Roles/Locales** tab area, complete the following fields:

Field	Description
Assigned Roles	Check the applicable check boxes to assign one or more roles to the user: Note You must assign a locale to a user before you can assign the network or tenant-admin role. <ul style="list-style-type: none"> • aaa • admin • intercloud-infra • intercloud-server • network • operations • read-only • tenant-admin
Assigned Locale	Check the applicable check boxes to assign one or more locales to the user. Note You must assign a locale to a user before you can assign the network or tenant-admin role.

Step 5 In the **SSH** tab area, complete the following fields, and then click **OK**:

Field	Description
Key	SSH key. If you choose the Key radio button, the SSH Data field is displayed.
Password	SSH password.

Field	Description
SSH Data	Available if Key is selected. Enter the SSH public key.

Changing the Locales or Roles Assigned to a Locally Authenticated User

Procedure

-
- Step 1** Choose **Administration > Access Control > Locally Authenticated Users > user**.
- Step 2** In the General tab, click the **Roles/Locales** tab.
- Step 3** Check or uncheck the appropriate check boxes to assign or remove a locale or role then click **Save**.
-

Monitoring User Sessions

You can monitor sessions for both locally and remotely authenticated users.

Procedure

-
- Step 1** Choose **Administration > Access Control**, then choose one of the following:
- **Locally Authenticated Users > user**.
 - **Remotely Authenticated Users > user**.
- Step 2** Click the **Sessions** tab to view the user session.

Field	Description
Host	IP address from which the user logged in.
Login Time	Date and time that the user logged in.
UI	User interface for this session: <ul style="list-style-type: none"> • web—GUI login • shell—CLI login • ep—End point

Field	Description
Terminal Type	Kind of terminal through which the user is logged in.



Configuring Primary Authentication

This section includes the following topics:

- [Primary Authentication, page 35](#)
- [Remote Authentication Providers, page 36](#)
- [Creating an LDAP Provider, page 36](#)
- [Editing an LDAP Provider, page 38](#)
- [Deleting an LDAP Provider, page 39](#)
- [Selecting a Primary Authentication Service, page 39](#)

Primary Authentication

Prime Network Services Controller supports two methods to authenticate user logins:

- Local to Prime Network Services Controller
- Remote through LDAP

The role and locale assignments for a local user can be changed on Prime Network Services Controller. The role and locale for a remote user can be changed on LDAP. If any of the following information assigned to a user is modified, the administrator must delete all existing sessions of that user so that the new privileges take effect:

- Role
- Privilege for a role
- Locale
- Organization in a locale

Remote Authentication Providers

If a system is configured for a supported remote authentication service, you must create a provider for that service to ensure that Prime Network Services Controller and the system configured with the service can communicate.

User Accounts in Remote Authentication Services

You can create user accounts in Prime Network Services Controller or in the remote authentication server.

The temporary sessions for users who log in through remote authentication services can be viewed through the Prime Network Services Controller GUI.

User Roles and Locales in Remote Authentication Services

If you create user accounts in the remote authentication server, you must ensure that the accounts include the roles and locales those users require for working in Prime Network Services Controller and that the names of those roles and locales match the names used in Prime Network Services Controller. If an account does not have the required roles and locales, the user is granted only read-only privileges.

LDAP Attribute for User

In Prime Network Services Controller, the LDAP attribute that holds the LDAP user roles and locales is preset. This attribute is always a name-value pair. For example, by default CiscoAvPair specifies the role and locale information for the user, and if the filter is specified, the LDAP search is restricted to those values that match the defined filter. By default, the filter is sAMAccountName=\$userid. The user can change these values to match the setting on the LDAP server. When a user logs in, Prime Network Services Controller checks for the value of the attribute when it queries the remote authentication service and validates the user. The value should be identical to the username.

An example of LDAP property settings is as follows:

- Timeout—30
- Retries—1
- Attribute—CiscoAvPair
- Filter—sAMAccountName=\$userid
- Base DN—DC=cisco, DC=com (The specific location in the LDAP hierarchy where Prime Network Services Controller starts the query for the LDAP user.)

Creating an LDAP Provider

Before You Begin

Configure users with the attribute that holds the user role and locale information for Prime Network Services Controller. You can use an existing LDAP attribute that is mapped to the Prime Network Services Controller user roles and locales, or you can create a custom attribute, such as the CiscoAVPair attribute, which has an attribute ID of 1.3.6.1.4.1.9.287247.1. When you add the LDAP user to the LDAP server, specify the role and locale in the attribute (for example, shell:roles=network,aaa shell:locale=sanjose,dallas).

Procedure

Step 1 Choose **Administration > Access Control > LDAP**.

Step 2 In the content pane, click **Create LDAP Provider**.

Step 3 In the Create LDAP Provider dialog box, provide the following information: then click **OK** and **Save**.

Field	Description
Hostname/IP Address	<p>Hostname or IP address of the LDAP provider.</p> <p>If SSL is enabled, this field must match a Common Name (CN) in the security certificate of the LDAP database.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server in the Prime Network Services Controller server.</p>
Key	<p>Password for the LDAP database account specified in the Root DN field.</p> <p>The maximum is 32 characters.</p>
Root DN	<p>Distinguished Name (DN) for an LDAP database account that has read and search permissions for all objects under the base DN.</p> <p>The maximum supported string length is 127 characters.</p>
Port	<p>Port through which Prime Network Services Controller communicates with the LDAP database.</p> <p>The default port number is 389.</p>
Enable SSL	Check to enable SSL.

Following is an example of creating an LDAP provider:

- **Hostname/IP Address**—Provider-blr-sam-aaa-10.cisco.com
- **Key**—xxxxxx (The password of the LDAP database account specified in the **Root DN** field.)
- **Root DN**— CN=bob,DC=cisco,DC=com (The value of CN is the name of a user with query privileges. DC refers to the location in the LDAP directory where a user is created.)
- **Port**—389
- **Enable SSL**—check box

What to Do Next

Select LDAP as the primary authentication service. For more information, see [Selecting a Primary Authentication Service](#), on page 39.

Editing an LDAP Provider

Procedure

Step 1 Choose **Administration > Access Control > LDAP > ldap-adapter**, then click **Edit**.

Step 2 In the Edit dialog box, modify the settings as as described in the following table, then click **OK** and **Save**.

Field	Description
Name	<p>Hostname or IP address of the LDAP provider (read-only).</p> <p>If SSL is enabled, this field must match a Common Name (CN) in the security certificate of the LDAP database.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server in the Prime Network Services Controller server.</p>
Key	<p>Password for the LDAP database account specified in the Root DN field.</p> <p>The maximum is 32 characters.</p>
Set	<p>Whether or not the preshared key has been set and is properly configured (read-only).</p> <p>If the Set value is Yes, and the Key field is empty, it indicates that a key was provided previously.</p>
Root DN	<p>Distinguished Name (DN) for an LDAP database account that has read and search permissions for all objects under the base DN.</p> <p>The maximum supported string length is 127 characters.</p>
Port	<p>Port through which Prime Network Services Controller communicates with the LDAP database.</p> <p>The default port number is 389.</p>
Enable SSL	<p>Check to enable SSL.</p>

Deleting an LDAP Provider

Procedure

- Step 1** Choose **Administration > Access Control > LDAP > ldap-provider**, then click **Delete**.
- Step 2** Confirm the deletion, then click **Save**.

Selecting a Primary Authentication Service



Note If the default authentication is set to LDAP, and the LDAP servers are not operating or are unreachable, the local admin user can log in at any time and make changes to the authentication, authorization, and accounting (AAA) system.

Procedure

- Step 1** Choose **Administration > Access Control > Authentication**.
- Step 2** In the Properties tab, specify the information as described in the following table, then click **OK**.

Field	Description
Default Authentication	Default method by which a user is authenticated during remote login: <ul style="list-style-type: none"> • LDAP—The user must be defined on the LDAP server specified for this Prime Network Services Controller instance. • Local—The user must be defined locally in this Prime Network Services Controller instance. • None—A password is not required when the user logs in remotely.
Role Policy to Remote Users	Action taken when a user attempts to log in and the LDAP server does not supply a user role with the authentication information: <ul style="list-style-type: none"> • assign-default-role—The user can log in with a read-only user role. • no-login—The user cannot log into the system, even if the user name and password are correct.



Configuring Trusted Points

This section includes the following topics:

- [Trusted Points, page 41](#)
- [Configuring Trusted Points, page 41](#)

Trusted Points

When setting up LDAP over Secure Sockets Layer (SSL) protocol for Prime Network Services Controller user authentication, you need to create a trusted point for each LDAP server. The certificate in the trusted point can be any one of the following:

- The certificate of the certificate authority (CA) that issued the LDAP server certificate.
- If the CAs are organized in a hierarchy, the certificate of any of the CAs in the hierarchy.
- The certificate of the LDAP server.

Configuring Trusted Points

Creating a Trusted Point

Procedure

Step 1 Choose **Administration > Access Control > Trusted Point**, then click **Create Trusted Point**.

Step 2 In the Create Trusted Point dialog box, complete the following fields, then click **OK**.

Field	Description
Name	Trusted point name.
Certificate Chain	Certificate information for this trusted point.

Editing a Trusted Point

Procedure

- Step 1** Choose **Administration > Access Control > Trusted Point**, then click **Edit**.
- Step 2** In the Edit dialog box, modify the certificate chain as appropriate, then click **OK**.
The Name and Fingerprint fields cannot be modified.
-

Deleting a Trusted Point

Procedure

- Step 1** Choose **Administration > Access Control > Trusted Point > *trusted-point***, then click **Delete**.
- Step 2** When prompted, confirm the deletion.
-



Configuring VM Managers

This section includes the following topics:

- [VM Manager Overview, page 43](#)
- [Hypervisor and VMM Support, page 44](#)
- [Configuring Connectivity with VMware vCenter, page 45](#)
- [Configuring Connectivity with Microsoft SCVMM, page 47](#)
- [Editing a VM Manager, page 48](#)
- [Deleting a VM Manager, page 50](#)

VM Manager Overview

After you install Prime Network Services Controller on a hypervisor, you must configure Prime Network Services Controller so that it can communicate with the Virtual Machine Manager (VMM) for that hypervisor and the VMs that Prime Network Services Controller manages.

Prime Network Services Controller communicates with the VMM to perform the following actions on the VMs that Prime Network Services Controller manages:

- Obtain the VM attributes that Prime Network Services Controller uses to define security or service policies for Nexus 1000V switches, VSG compute firewalls, and CSR 1000V edge routers.
- Instantiate, start, stop, restart, or delete VMs.
- Map VM network interfaces.
- Instantiate and configure services on service VMs.

For information on configuring VMM connectivity, see the following topics:

- [Configuring Connectivity with VMware vCenter, on page 45](#)
- [Configuring Connectivity with Microsoft SCVMM, on page 47](#)

**Note**

You must reestablish connectivity with the VMM if you change the Prime Network Services Controller server hostname or fully qualified domain name (FQDN).

Hypervisor and VMM Support

Prime Network Services Controller supports hypervisors and their VMMs as follows:

- VMware ESX with vCenter—All functionality described in [VM Manager Overview](#), on page 43.
- Microsoft Hyper-V with SCVMM—Only read attributes and configure VSG compute firewalls.

**Note**

No other VMMs are supported for managing VMs hosted by VMware ESX or Hyper-V Hypervisor. Although SCVMM can communicate with VMs configured on a VMware ESX hypervisor, Prime Network Services Controller support is restricted to homogeneous environments. That is, you can use SCVMM only with Hyper-V Hypervisor and vCenter only with VMware ESX.

The following table identifies the differences between the supported hypervisors with regard to Prime Network Services Controller features and devices. Other features and devices that Prime Network Services Controller supports but that are not listed in the table are expected to perform consistently on both hypervisors with their respective VMMs.

Table 5: Hypervisors and Prime Network Services Controller Feature Support

Feature	VMware ESX with vCenter	Microsoft Hyper-V Hypervisor with SCVMM
Network attributes	All	All
VM attribute support	Supported: <ul style="list-style-type: none"> • Cluster name • Guest OS full name • Hypervisor name • Parent application name • Port profile name • Resource pool • VM DNS name • VM name 	Supported: <ul style="list-style-type: none"> • Guest OS full name • Port profile name • VM DNS name • VM name
VM Refresh button	Not supported	Supported
Device and Feature Support		

Feature	VMware ESX with vCenter	Microsoft Hyper-V Hypervisor with SCVMM
ASA 1000V	Supported	Not supported
Citrix NetScaler load balancer	Supported (ESXi)	Not supported
CSR 1000V	Supported	Not supported
Integration with DCNM	Supported (ESXi)	Not supported
InterCloud functionality	Supported	Not supported
VSG	Supported	Supported

Configuring Connectivity with VMware vCenter

Establish connectivity between Prime Network Services Controller and VMware vCenter by performing the following tasks:

- 1 [Exporting the vCenter Extension File, on page 45](#)
- 2 [Registering the vCenter Extension Plug-in in vCenter, on page 46](#)
- 3 [Configuring Connectivity with vCenter, on page 46](#)

Exporting the vCenter Extension File

The first step in configuring connectivity with VMware vCenter is to export the vCenter extension file.

Before You Begin

If you use Internet Explorer, do one of the following to ensure that you can download the extension file:

- Open Internet Explorer in Administrator mode.
- After starting Internet Explorer, choose **Tools > Internet Options > Security**, and uncheck the **Enable Protected Mode** check box.

Procedure

- Step 1** In Prime Network Services Controller, choose **Resource Management > VM Managers > VM Managers**.
 - Step 2** In the VM Managers pane, click **Export vCenter Extension**.
 - Step 3** Save the vCenter extension file in a directory that the vSphere Client can access because you will need to register the vCenter extension plug-in from within the vSphere Client (see [Registering the vCenter Extension Plug-in in vCenter](#), on page 46).
 - Step 4** Open the XML extension file to confirm that the content is available.
-

Registering the vCenter Extension Plug-in in vCenter

Registering the vCenter extension plug-in enables you to create a VM Manager in Prime Network Services Controller and communicate with the vCenter VMM and the VMs that Prime Network Services Controller manages.

Procedure

- Step 1** From the VMware vSphere Client, log in to the vCenter server that you want to manage by using Prime Network Services Controller.
 - Step 2** In the vSphere Client, choose **Plug-ins > Manage Plug-ins**.
 - Step 3** Right-click the window background and choose **New Plug-in**.
Tip Scroll down and right-click near the bottom of the window to view the New Plug-in option.
 - Step 4** Browse to the Prime Network Services Controller vCenter extension file that you previously exported and click **Register Plug-in**.
The vCenter Register Plug-in window appears, displaying a security warning.
 - Step 5** In the security warning message box, click **Ignore**.
Note If desired, you can install this certificate for further integration with Public Key Infrastructure (PKI) and Kerberos facilities.
A progress indicator shows the task status.
 - Step 6** When the success message is displayed, click **OK**, and then click **Close**.
-

Configuring Connectivity with vCenter

After you register the vCenter extension plug-in in vCenter, you can configure connectivity with vCenter in Prime Network Services Controller.

Procedure

Step 1 Choose **Resource Management > VM Managers > VM Managers**, and then click **Add VM Manager**.

Step 2 In the Add VM Manager dialog box, enter the following information and then click **OK**:

- Name—VMM name.
- Description—VMM description.
- Hostname / IP Address—Hostname or IP address of the VMM.
- Port Number—Port number to use for communications.

A successfully added VMM is displayed with the following information:

- Admin State of *enable*.
- Operational State of *up*.
- VMware vCenter version.

Configuring Connectivity with Microsoft SCVMM

Use this procedure to configure Prime Network Services Controller connectivity with Microsoft SCVMM (SCVMM).

Before You Begin

- Confirm that you have the username and password for SCVMM access.
- Install Microsoft Service Provider Framework (SPF) so that Prime Network Services Controller can communicate with SCVMM. For more information, see <http://technet.microsoft.com/en-us/library/jj642895.aspx>.
- Confirm that SPF is installed correctly and functional in SCVMM by connecting to https://spf_host_ip:8090/SC2012R2/VMM/Microsoft.Management.Odata.Svc.

Procedure

Step 1 Choose **Resource Management > VM Managers**, and then click **Add VM Manager**.

Step 2 In the Add VM Manager dialog box, provide the information described in the following table, and then click **OK**:

Field	Description
Name	VMM name.
Description	VMM description.

Field	Description
Hostname / IP Address	Hostname or IP address of the VMM.
Domain Name / Username	Domain or username for SCVMM access.
Password	Password for SCVMM access.
Port Number	Port to use for communications.

A successfully added VMM is displayed with the following information:

- Admin State of *enable*.
- Operational State of *up*.
- SCVMM version.

Editing a VM Manager

After a VM Manager is added, you can modify its properties as follows:

- Admin State—For vCenter and SCVMM.
- Description—For vCenter and SCVMM.
- Domain Name / Username—SCVMM only.
- Password—SCVMM only.

All other fields are read-only.

Changing the administrative state depends on the current operational state:

- To change the administrative state to enabled, the operational state must be down.
- To change the administrative state to disabled, the operational state must be up.

If your request to change the administrative state fails, resubmit the request when the system has the correct operational state.

Procedure

Step 1 Choose one of the following:

- **Resource Management > VM Managers**

• **InterCloud Management > Enterprise > VM Managers**

Step 2 In the VM Managers tab, select the VM Manager you want to edit, and then click **Edit**.

Step 3 In the Edit VM Manager dialog box, edit the information as required, and then click **OK**.

Field	Description
Name	VM Manager name (read-only).
Description	Description of the VM Manager.
Hostname / IP Address	Hostname or IP address of the VMM (read-only).
Domain Name / Username	(SCVMM only) Domain or username for SCVMM access.
Password	(SCVMM only) Password for SCVMM access.
Port Number	Port to use for communications (read-only).
Admin State	<p>One of the following administrative states for the VM Manager:</p> <ul style="list-style-type: none"> • enable—When a VM Manager is added to Prime Network Services Controller with the administrative state of enable, the system fetches all VM inventory from the VM Manager. Any changes that occur to the VM on the VM Manager are also fetched. • disable—When a VM Manager is added to Prime Network Services Controller with the administrative state of disable, the system displays all discovered VMs from the VM Manager. Any changes that occur to the VMs on the VM Manager are not fetched. The changes will be fetched by Prime Network Services Controller when the admin state is changed to enable.
Type	VMM vendor (read-only).
Version	VMM version (read-only).

Field	Description
Operational State	One of the following operational states (read-only): <ul style="list-style-type: none"> • up • unreachable • bad-credentials • comm-err • admin-down • unknown
Operational State Reason	Reason for the operational state (read-only).

Deleting a VM Manager

You cannot delete a VM Manager if a service VM is deployed on the associated VMM.

Procedure

-
- Step 1** Choose one of the following:
- **Resource Management > VM Managers**
 - **InterCloud Management > Enterprise > VM Managers**
- Step 2** Choose the VM Manager that you want to delete, and then click **Delete**.
- Step 3** When prompted, confirm the deletion.
-



Configuring System Profiles

This section includes the following topics:

- [System Profile Overview, page 51](#)
- [Policies in System Profiles, page 51](#)
- [Configuring Policies, page 52](#)
- [Modifying the Default System Profile, page 62](#)
- [Editing a DNS Domain, page 64](#)
- [Adding an NTP Server, page 65](#)

System Profile Overview

Prime Network Services Controller provides one default System profile. The System profile includes time zone, DNS domain, DNS Server and NTP Server IP address information that is automatically generated using the data taken from initial Prime Network Services Controller installation. The System profile also contains the following policies: log file, fault, syslog, and core file. You can add and modify DNS server, NTP server, and policy information associated to the default system profile. However, you cannot create a new DNS domain or delete the default System profile.



Note

- Access to a DNS server and an NTP server is required for Prime Network Services Controller to communicate with the Amazon Cloud Provider.
- If you change the fully qualified domain name (FQDN), you must reconfigure Prime Network Services Controller connectivity with the hypervisor.

Policies in System Profiles

You can create multiple policies and assign them to the System profile. To manage policies for the default System profile, choose **Administration > System Profile**.

**Note**

The system profile uses name resolution to resolve policy assignments. For details, see [Name Resolution in a Multi-Tenant Environment](#), on page 68.

The following policies, which are created under root, are visible in the System profile.:

- Core file
- Fault
- Log file
- Syslog

Policies created under root are visible to both the System profile and the Device profile.

**Note**

You cannot delete existing default policies.

Configuring Policies

Configuring a Core File Policy Profile

You can create and modify the core file policy attributes. For more information on core file policy attributes, see the [Core File Attributes Table](#).

To add, modify, or delete a core file policy:

Procedure

Step 1 Choose **Administration > System Profile > root > Policies > Core File**.

Step 2 In the General tab, do one of the following:

- To add a core file policy, click **Add Core File Policy**. Enter the appropriate information and click **OK**.
 - To edit a core file policy, select the policy, and then click **Edit**. Edit the appropriate fields and click **OK**.
 - To delete a core file policy, select the policy, and then click **Delete**.
-

Core File Attributes Table

Field	Description
Name	Core file policy name, containing 1 to 32 characters. You can use alphanumeric characters, hyphen (-), underscore (_), and period (.). You cannot change the name after the policy has been saved.
Description	Brief policy description, containing 1 to 256 characters. You can use alphanumeric characters, hyphen (-), underscore (_), and period (.).
Admin State	Indicate whether the administrative state of the policy is to be enabled or disabled.
Hostname/IP Address	Hostname or IP address to use for this policy. If you use a hostname rather than an IP address, you must configure a DNS server in Prime Network Services Controller.
Port	Port number for sending the core dump file. This field is read-only for InterCloud policies.
Protocol	Protocol for exporting the core dump file (tftp only).
Path	Path to use when storing the core dump file on a remote system. The default path is /tftpboot; for example, /tftpboot/test, where <i>test</i> is the subfolder.

Configuring a Fault Policy

When the system boots up, a default fault policy is created. You can add additional fault policies or modify existing ones. However, you cannot delete the default fault policy. For more information on fault policy attributes, see the [Fault Policy Attributes Table](#).

To add, modify, or delete a fault policy:

Procedure

Step 1 Choose **Administration > System Profile > root > Policies > Fault**.

Step 2 In the General tab, do one of the following:

- To add a fault file policy, click **Add Fault File Policy**. Enter the appropriate information and click **OK**.
- To edit a fault file policy, select the policy, and then click **Edit**. Edit the appropriate fields and click **OK**.

- To delete a fault file policy, select the policy, and then click **Delete**.

Fault Policy Attributes Table

Field	Description
Name	<p>Fault policy name.</p> <p>This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.</p>
Description	Brief policy description.
Flapping Interval	<p>Length of time (in hours, minutes, and seconds) that must elapse before the system allows a fault to change its state.</p> <p>Flapping occurs when a fault is raised and cleared several times in rapid succession. To prevent this, the system does not allow a fault to change its state until this amount of time has elapsed since the last state change.</p> <p>If the condition reoccurs during the flapping interval, the fault returns to the active state. If the condition does not reoccur during the flapping interval, the fault is cleared. What happens at that point depends on the setting in the Clear Faults Retention Action field.</p> <p>The default flapping interval is ten seconds.</p>
Clear Faults Retention Action	<p>Action to be taken when faults are cleared:</p> <ul style="list-style-type: none"> • retain—Retain the cleared faults. • delete—Delete fault messages as soon as they are marked as cleared.

Field	Description
Clear Faults Retention Interval	<p>How long the system is to retain cleared fault messages:</p> <ul style="list-style-type: none"> • Forever—The system retains all cleared fault messages regardless of their age. • Other—The system retains cleared fault message for a specified the length of time. In the spinbox that is displayed when you select this option, enter the length of time (in days, hours, minutes, and seconds) that the system is to retain cleared fault messages.

Configuring a Logging Policy

When the system boots up, a default logging policy is created. You can add additional log policies or modify existing ones. However, you cannot delete the default log policy. For more information on logging policy attributes, see the [Logging Policy Attributes Tables](#).

Procedure

Step 1 Choose **Administration > System Profile > root > Policies > Log File**.

Step 2 In the General tab, do one of the following:

- To add a logging file policy, click **Add Logging File Policy**. Enter the appropriate information and click **OK**.
- To edit a logging file policy, select the policy, and then click **Edit**. Edit the appropriate fields and click **OK**.
- To delete a logging file policy, select the policy, and then click **Delete**.

Logging Policy Attributes Tables

Field	Description
Name	<p>Logging policy name.</p> <p>This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.</p>

Field	Description
Description	Brief policy description.
Log Level	<p>One of the following logging severity levels:</p> <ul style="list-style-type: none"> • debug0 • debug1 • debug2 • debug3 • debug4 • info • warning • minor • major • critical <p>The default log level is info.</p>
Backup Files Count	<p>Number of backup files that are filled before they are overwritten.</p> <p>The range is 1 to 9 files, with a default of 2 files.</p>
File Size (bytes)	<p>Backup file size.</p> <p>The range is 1 MB to 100 MB with a default of 5 MB.</p>

Configuring a Syslog Policy

When the system boots up, a default syslog policy is created. You can add additional syslog policies or modify existing ones. However, you cannot delete the default syslog policy. For more information on syslog policy attributes, see the [Syslog Policy Attributes Table](#).

The syslog message settings that you configure for the System profile apply to Prime Network Services Controller syslog messages only. These settings do not affect other, non-Prime Network Services Controller syslog messages.

To add, modify, or delete a syslog policy:

Procedure

Step 1 Choose **Administration > System Profile > root > Policies > Syslog**.

Step 2 In the General tab, do one of the following:

- To add a syslog policy, click **Add Syslog Policy**. Enter the appropriate information and click **OK**.
- To edit a syslog policy, select the policy, and then click **Edit**. Edit the appropriate fields and click **OK**.
- To delete a Syslog policy, select the policy, and then click **Delete**.

Syslog Policy Attributes Table

Field	Description
General Tab	
Name	Policy name.
Description	Brief policy description.
Use Emblem Format	Check the check box to use the EMBLEM format for syslog messages. This option appears only on supported devices.
Continue if Host is Down	Check the check box to continue logging if the syslog server is down. This option only appears on supported devices.
Servers Tab	
Add Syslog Server	Click to add a new syslog server.
Syslog Servers table	List of configured syslog servers.
Local Destinations Tab	
Console	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: alert, critical, or emergency. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p>

Field	Description
Monitor	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p>
File	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p> <ul style="list-style-type: none"> • File Name—Name of the file to which messages are logged. • Size (bytes)—Maximum size, in bytes, that the file can reach before the system begins to overwrite the messages.

Field	Description
Buffer	<p>Buffer options are not available for InterCloud policies.</p> <ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p> <ul style="list-style-type: none"> • Buffer Size (Bytes)—In bytes, the size of the buffer for syslog messages. • Wrap to Flash—Indicates whether or not the buffer contents are saved to flash memory when the buffer wraps (becomes full). Check the check box to save the contents to flash memory if the buffer wraps. • Max File Size in Flash (KB)—Maximum size, in kilobytes, that can be used by the syslog buffer. This option is enabled if the Wrap to Flash option is enabled. • Min Free Flash Size (KB)—Minimum size, in kilobytes, that is allocated for the syslog buffer. This option is enabled if the Wrap to Flash option is enabled.
Time Stamp	<p>Check the check box for each of the following options that you want to enable for timestamp display:</p> <ul style="list-style-type: none"> • Enable Timestamp • Include Year • Include Milliseconds • Show Time Zone • Use Local Time Zone

Adding a Syslog Server to a Syslog Policy

This procedure assumes that you have already created a syslog policy for a Prime Network Services Controller profile. For information on creating a syslog policy for a Prime Network Services Controller profile, see [Configuring a Syslog Policy, on page 56](#). For more information on syslog server attributes see the [Syslog Server Attributes Table](#).

Procedure

-
- Step 1** Choose **Administration > System Profile > root > Policies > Syslog > syslog-policy**.
- Step 2** In the Servers tab, click **Add Syslog Server**. Enter the appropriate information and click **OK**.
- Step 3** In the Servers tab, do one of the following:
- To add a syslog server, click **Add Syslog Server**. Enter the appropriate information and click **OK**
 - To edit a syslog server, select the server, and then click **Edit**. Edit the appropriate fields and click **OK**.
 - To delete a syslog server, select the server, and then click **Delete**.
-

Syslog Server Attributes Table

Field	Description
Server Type	One of the following server types: <ul style="list-style-type: none"> • primary • secondary • tertiary
Hostname/IP Address	Hostname or IP address where the syslog file resides. <p>Note If you use a hostname, you must configure a DNS server.</p>

Field	Description
Severity	One of the following severity levels: <ul style="list-style-type: none">• emergencies (0)• alerts (1)• critical (2)• errors (3)• warnings (4)• notifications (5)• information (6)• debugging (7)
Forwarding Facility	One of the following forwarding facilities: <ul style="list-style-type: none">• auth• authpriv• cron• daemon• ftp• kernel• local0• local1• local2• local3• local4• local5• local6• local7• lpr• mail• news• syslog• user• uucp

Field	Description
Admin State	Administrative state of the server: disabled or enabled.
Port	Port to use to send data to the syslog server. The default port selection is 514 for UDP. This option is not available for InterCloud policies.
Protocol	Protocol to use: TCP or UDP (default). This option is not available for InterCloud policies.
Use Transport Layer Security	Check the check box to use Transport Layer Security. This option is available only for TCP. This option is not available for InterCloud policies.
Server Interface	Interface to use to access the syslog server.

Modifying the Default System Profile

You can add and modify DNS server, NTP server, and policy information associated to the default system profile. However, you cannot create a new DNS domain or delete the default System profile.

Procedure

Step 1 Choose **Administration > System Profile > root > Profile > default**.

Step 2 In the General tab, update the information as required:

Field	Description
Name	Default profile name (read-only).
Description	Brief profile description.
Time Zone	Available time zones. The default time zone is UTC.

Step 3 In the Policy tab, update the information as required:

Field	Description
DNS Servers	
Add DNS Server	Click to add a new DNS server.
Delete	Deletes the DNS server selected in the DNS Servers table.
Up and down arrows	Changes the priority of the selected DNS server. Prime Network Services Controller uses the DNS servers in the order in which they appear in the table.
DNS Servers table	Identifies the DNS servers configured in the system.
NTP Servers	
Add NTP Server	Click to add a new NTP server.
Delete	Deletes the NTP server selected in the NTP Servers table.
Up and down arrows	Changes the priority of the selected NTP server. Prime Network Services Controller uses the NTP servers in the order in which they appear in the table.
NTP Servers table	Identifies the NTP servers configured in the system.
DNS Domains	
Edit	Edits the DNS domain selected in the DNS Domains table. The default DNS domain cannot be deleted. Caution Changing the DNS domain will cause a loss of connectivity that results in an error message, your session closing, and then the display of a new Prime Network Services Controller certificate. This situation occurs when the Prime Network Services Controller hostname, Prime Network Services Controller domain name, or both have changed. If this occurs, reconfigure connectivity with your hypervisor. For more information, see Configuring VM Managers, on page 43 .
DNS Domains	Identifies the default DNS domain name and domain configured in the system.
Other Options	

Field	Description
Syslog	The syslog policies associated with this profile can be selected, added, or edited. Click the Resolved Policy field to review or modify the specified policy.
Fault	The fault policies associated with this profile can be selected, added, or edited. Click the Resolved Policy field to review or modify the specified policy.
Core File	The core file policies associated with this profile can be selected, added, or edited. Click the Resolved Policy field to review or modify the specified policy.
Log File	The log file policies associated with this profile can be selected, added, or edited. Click the Resolved Policy field to review or modify the specified policy.

Step 4 Click **Save**.

Editing a DNS Domain



Caution

Changing the DNS domain will cause a loss of connectivity that results in an error message, your session closing, and then the display of a new Prime Network Services Controller certificate. This situation occurs when the Prime Network Services Controller hostname, domain name, or both have changed. If this occurs, reconfigure connectivity with the hypervisor. For more information, see [Configuring VM Managers](#), on page 43.

Procedure

- Step 1** Choose **Administration > System Profile > root > Profile > default**.
 - Step 2** Click the **Policy** tab.
 - Step 3** In the DNS Domains table, select the domain that you want to edit, then click **Edit**.
 - Step 4** In the Edit DNS Domains dialog box, edit the Domain Name field as required, then click **OK**.
 - Step 5** Click **Save**.
-

Adding an NTP Server

You can specify a maximum of four NTP servers for the System profile. Use the up and down arrows to arrange the servers from highest to lowest priority, with the highest priority server at the top of the list.

Procedure

Step 1 Choose **Administration > System Profile > root > Profile > default**.

Step 2 In the Policy tab, do one of the following:

- To add an NTP server, click **Add NTP Server**. Enter the appropriate information, click **OK**, and then click **Save**.
 - To delete an NTP server, select the server, and then click **Delete**.
-



Configuring Tenants

This section includes the following topics:

- [Tenant Management, page 67](#)
- [Configuring Tenants, page 69](#)
- [Configuring Virtual Data Centers, page 70](#)
- [Configuring Applications, page 71](#)
- [Configuring Tiers, page 72](#)

Tenant Management

The topics in this section describe how to manage tenants when Prime Network Services Controller is installed in Standalone mode. For information on managing tenants when Prime Network Services Controller is installed in Orchestrator mode, see [Integrating with DCNM, on page 209](#).

Tenant Management and Multi-Tenant Environments

Prime Network Services Controller provides the ability to support multi-tenant environments. A multi-tenant environment enables the division of large physical infrastructures into logical entities called organizations. As a result, you can achieve logical isolation between organizations without providing a dedicated physical infrastructure for each organization.

The administrator can assign unique resources to each tenant through the related organization in the multi-tenant environment. These resources can include policies, pools, device profiles, service devices, and so on. The administrator can use locales to assign or restrict user privileges and roles by organization if access to certain organizations needs to be restricted.

Users with the tenant-admin role can see only those objects and resources that are related to their associated tenants as defined by the locales and organizations assigned to them. They cannot see the policies or resources of other tenants. Tenant-admin users can view faults only for the resources (such as firewalls or load balancers) that they manage. They cannot see diagnostic information or configure administrative options.

Users with the admin role add a user with the tenant-admin role by associating the user with a locale and organization. For more information about creating user accounts and assigning locales and organizations, see the following topics:

- [Creating a User Account, on page 29](#)
- [Creating a Locale, on page 26](#)

The tenant-admin role has the following privileges:

- Policy management
- Resource configuration
- Tenant management

Prime Network Services Controller provides a strict organizational hierarchy as follows:

- 1 root
- 2 Tenant
- 3 Virtual Data Center
- 4 Application
- 5 Tier

The root can have multiple tenants. Each tenant can have multiple data centers. Each data center can have multiple applications, and each application can have multiple tiers.

The policies and pools created at the root level are systemwide and are available to all organizations in the system. However, any policies and pools created in an organization below the root level are available only to those resources that are below that organization in the same hierarchy.

For example, if a system has tenants named Company A and Company B, Company A cannot use any policies created in the Company B organization. Company B cannot access any policies created in the Company A organization. However, both Company A and Company B can use policies and pools in the root organization.

Name Resolution in a Multi-Tenant Environment

In a multi-tenant environment, Prime Network Services Controller uses the hierarchy of an organization to resolve the names of policies and resource pools. The steps that Prime Network Services Controller takes to resolve the names of policies and resource pools are as follows:

- 1 Prime Network Services Controller checks the policies and pools for the specified name within an organization assigned to the device profile or security policy.
- 2 If the policy or pool is found, Prime Network Services Controller uses that policy or pool.
- 3 If the policy or pool does not contain available resources at the local level, Prime Network Services Controller moves up the hierarchy to the parent organization and checks for a policy with the specified name. Prime Network Services Controller repeats this step until the search reaches the root organization.

**Note**

The object name reference resolution takes an object name and resolves an object from an organization container to the object with the same name that is closest in the tree as it searches upward toward root. If an object with the specified name is not found, Prime Network Services Controller uses a corresponding default object. For example, assume that there is an SNMP policy under a data center named MySNMP and an SNMP policy in the tenant in the same tree that is also named MySNMP. In this case, the user cannot explicitly select the MySNMP policy under the tenant. If the user wants to select the SNMP policy under the tenant, they must provide a unique name for the object in the given tree.

- 4 If the search reaches the root organization and an assigned policy or pool is not found, Prime Network Services Controller looks for a default policy or pool starting at the current level and going up the chain to the root level. If a default policy or pool is found, Prime Network Services Controller uses it. If a policy is not available, a fault is generated.

Configuring Tenants

Creating a Tenant

Procedure

- Step 1** Choose **Tenant Management > root > Create Tenant**.
- Step 2** In the Create Tenant dialog box, enter a name and description for the tenant, and then click **OK**.

Editing a Tenant

Procedure

- Step 1** Choose **Tenant Management > root > *tenant*** where *tenant* is the tenant that you want to edit.
- Step 2** In the General tab, modify the description as required, and then click **Save**.

Deleting a Tenant



Note When you delete an organization (such as a tenant, virtual data center, application, or tier), all data contained under the organization is deleted, including subordinate organizations, service devices, resource pools, and policies.

Procedure

- Step 1** Choose **Tenant Management > root**.
 - Step 2** Right-click the tenant that you want to delete, and choose **Delete Tenant**.
 - Step 3** When prompted, confirm the deletion.
-

Configuring Virtual Data Centers

Creating a Virtual Data Center

Procedure

- Step 1** Choose **Tenant Management > root > tenant**, where *tenant* is the location for the new virtual data center.
 - Step 2** Click **Create Virtual Data Center**.
 - Step 3** In the Create Virtual Data Center dialog box, enter a name and description for the virtual data center, and then click **OK**.
-

Editing a Virtual Data Center

Procedure

- Step 1** Choose **Tenant Management > root > tenant > vdc** where *vdc* is the virtual data center that you want to edit.
 - Step 2** In the General tab, modify the description as required and click **Save**.
-

Deleting a Virtual Data Center



Note When you delete a virtual data center, all data contained under the virtual data center is deleted, including subordinate organizations, service devices, resource pools, and policies.

Procedure

- Step 1** Choose **Tenant Management > root > tenant** where *tenant* is the tenant with the virtual data center that you want to delete.
 - Step 2** Right-click the virtual data center that you want to delete and choose **Delete Virtual Data Center**.
 - Step 3** When prompted, confirm the deletion.
-

Configuring Applications

Creating an Application

Procedure

- Step 1** Choose **Tenant Management > root > tenant > vdc** where *vdc* is the location for the new application.
 - Step 2** Click **Create Application**.
 - Step 3** In the Create Application dialog box, enter a name and description for the application, and then click **OK**.
-

Editing an Application

Procedure

- Step 1** Choose **Tenant Management > root > tenant > vdc > application**, where *application* is the application that you want to edit.
 - Step 2** In the General tab, modify the description as required, and then click **Save**.
-

Deleting an Application



Note When you delete an application, all data contained under the application is deleted, including subordinate organizations, service devices, resource pools, and policies.

Procedure

- Step 1** Choose **Tenant Management** > **root** > *tenant* > *vdc* where *vdc* is the virtual data center with the application that you want to delete.
 - Step 2** Right-click the application that you want to delete, and choose **Delete Application**.
 - Step 3** When prompted, confirm the deletion.
-

Configuring Tiers

Creating a Tier

Procedure

- Step 1** Choose **Tenant Management** > **root** > *tenant* > *vdc* > *application*, where *application* is the location for the new tier.
 - Step 2** Click **Create Tier**.
 - Step 3** In the Create Tier dialog box, enter a name and description for the tier, and then click **OK**
-

Editing a Tier

Procedure

- Step 1** Choose **Tenant Management** > **root** > *tenant* > *vdc* > *application* > *tier* where *tier* is the tier you want to edit.
 - Step 2** In the General tab, modify the description as required, and then click **Save**.
-

Deleting a Tier



Note When you delete a tier, all data contained under it is also deleted, including service devices, resource pools, and policies.

Procedure

-
- Step 1** Choose **Tenant Management** > **root** > *tenant* > *vdc* > *application* where *application* contains the tier that you want to delete.
- Step 2** Right-click the tier that you want to delete and choose **Delete Tier**.
- Step 3** When prompted, confirm the deletion.
-



CHAPTER 9

Configuring Service Policies and Profiles

This section includes the following topics:

- [Service Path Configuration Workflow, page 75](#)
- [Configuring Service Policies, page 81](#)
- [Working with Profiles, page 116](#)
- [Configuring Security Profiles, page 123](#)
- [Configuring Security Policy Attributes, page 128](#)

Service Path Configuration Workflow

Service paths enable you to apply multiple services to VM traffic by binding a sequence of services to a specific port profile.

The following table identifies the tasks required to configure a service path, related topics, and the minimum role required for each task:

Task	Related Topic	Role Required
1. Confirm that the prerequisites are met.	See Prerequisites for Configuring Service Paths, on page 76 .	admin
2. Create the tenant and, if needed, the subordinate organization in which the service path will reside.	See Creating a Tenant, on page 69 .	admin
3. Add a port profile to a Nexus 1000V VSM. Note You can perform this step at any time before Step 6.	See Adding a Port Profile to a VSM, on page 77 .	admin

Task	Related Topic	Role Required
4. Create service nodes for inclusion in the service path.	See Creating a Service Node, on page 78 .	tenant-admin
5. Create a service path with service entries.	See Creating a Service Path, on page 79 .	tenant-admin
6. Bind the service path to the VSM port profile.	See Binding a Service Path to a Port Profile, on page 80 .	tenant-admin

Prerequisites for Configuring Service Paths

The following table describes the prerequisites for configuring service paths:

Item	Requirement
Tenant	Has at least one of the following assigned: <ul style="list-style-type: none"> • Compute firewall • Edge firewall • vPath-enabled load balancer using Citrix NetScaler 1000V
Compute firewall	<ul style="list-style-type: none"> • Has a security policy assigned. • Has a policy set with policies and rules for the compute firewall. • The policy set is bound to the compute firewall security policy. • A VLAN is provided if the firewall is to be used as a Layer 2 adjacent service node. • The VLAN exists on the VSM.

Item	Requirement
Edge firewall	<ul style="list-style-type: none"> • Has an edge device profile defined. • Has an edge security profile defined. • Has a policy set with policies and rules for the edge firewall. • An inbound security profile is attached to the outside interface of the edge firewall. • A VLAN is provided on the data interface because the edge firewall can be used only as a Layer 2 adjacent service node. • The VLAN exists on the VSM.
Load Balancer	Has vPath enabled.
Nexus 1000V	<ul style="list-style-type: none"> • Is deployed. • Is registered with Prime Network Services Controller.
Services	<p>The following services are deployed:</p> <ul style="list-style-type: none"> • VSG • ASA 1000V • Citrix NetScaler 1000V

Adding a Port Profile to a VSM

Prime Network Services Controller enables you to add a port profile to an enterprise VSM. You cannot add a port profile to a cloud VSM.

If an enterprise VSM has preconfigured port profiles or virtual service configurations that were created outside of Prime Network Services Controller, these configurations will not be displayed in the Prime Network Services Controller GUI.

If you create a port profile in Prime Network Services Controller and specify a VLAN, you must create the VLAN itself on the VSM and then add it to the necessary system and uplink port profiles. The same steps apply for VLANs that you specify while creating service devices, such as edge or compute firewalls: you must create the VLANs on the devices, and then add them to the appropriate system and uplink port profiles.

Before You Begin

Confirm the following:

- An enterprise VSM is registered and in the *applied* state in Prime Network Services Controller by choosing **Resource Management > Resources > VSMs**.
- You have admin privileges.

Procedure

- Step 1** Choose **Resource Management > Resources > VSMs > vsm**, then click **Edit**.
- Step 2** Above the Port Profile table, click **Add**.
- Step 3** In the Add Port Profile dialog box, enter the required information as follows, then click **OK**:
- 1 In the General tab, provide the following information:
 - Name
 - Description
 - State: Enabled or Disabled.
 - Type of Binding: Dynamic, Ephemeral, or Static.
 - Binding Option: Auto, AutoExpand, or None.
 - Maximum and minimum number of ports.
 - Tenant or subordinate organization in which to create the port profile.
 - 2 In the L2 Network Membership tab, provide the following information:
 - Capability: Bridge Domain or VLAN.
 - Mode: Access or Trunk
 - VLAN number (Access mode) or VLAN range (Trunk mode).
-

The NICs table is populated automatically after you bind a service path to the port profile and the service path is used the first time. For more information about configuring a service path and binding it to a port profile, see [Service Path Configuration Workflow](#), on page 75.

Creating a Service Node

A service node identifies a virtual service device that can be used in a service path and provides basic configuration for that device.

The following restrictions apply when creating a service node:

- If you create multiple service nodes for a specific logical service device, the adjacencies must be different.
- You cannot create service nodes under different tenants with the same data IP address, VLAN, and adjacency, even if the logical service devices are different.

If either of these situations occurs, an error message will be generated when you attempt to bind the service path to the VSM port profile.

Before You Begin

Confirm the following:

- A logical device (compute firewall, edge firewall, or load balancer) exists.
- You have Tenant Management privileges.

Procedure

Step 1 Choose **Policy Management > Service Policies > root > tenant > Policy Helpers > Service Node**, and then click **Add Service Node**.

Step 2 In the Add Service Node dialog box, provide the following information, and then click **OK**:

- Name
 - Service Type: Compute Firewall, Edge Firewall, or Load Balancer.
 - Network Service: Name of the logical service device.
 - Fail Mode: Action to take if the service node loses connectivity:
 - Close—Drop the packets.
 - Open—Forward the packets.
 - Adjacency Type: Layer 2 or Layer 3.
-

Creating a Service Path

After you create service nodes, you can create a service path that uses the nodes. Traffic using the service path moves from one service node to another in the sequence that you specify.



Note

You cannot use a service node more than once in a service path.

Before You Begin

Confirm that you have Tenant Management privileges.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > tenant > Policies > Service Path**, and then click **Add Service Path**.
- Step 2** In the Add Service Path dialog box, enter a name and description for the service path, and then click **Add Service Entry**.
- Step 3** In the Add Service Entry dialog box, provide the following information, and then click **OK**:
- Service type
 - Service node
 - Service profile

The service profile identifies the policies that apply to the traffic using the service path.

- Step 4** Add additional service entries as needed for the service path and click **OK**.
-

What to Do Next

You must bind the service path to a port profile so that the service path can be created on the Nexus 1000V VSM. After the service path is bound to a port profile, the traffic using that port profile follows the service entries in the sequence indicated in the table.

Binding a Service Path to a Port Profile

Binding a service path to a port profile ensures that all traffic using that port profile will follow the configured service path. When you bind a service path to a port profile, the NICs table that is displayed in the Edit Port Profile dialog box remains empty until the service path is used for the first time. When the service path is used, the NICs table is populated automatically.

Before You Begin

Confirm the following:

- A service path exists.
- You have Tenant Management privileges.

Procedure

- Step 1** Choose one of the following:
- **Resource Management > Managed Resources > root > tenant > Port Profiles Tab**
 - **Resource Management > Resources > VSMs > vsm > Edit**.

- Step 2** In the Port Profiles table, select the port profile you want to bind a service path to, then click **Edit**.
- Step 3** In the Service Path field, click **Select**.
- Step 4** In the Select Service Path dialog box, select the required service path, then click **OK**.
- Step 5** In the Edit Port Profile dialog Box, click **Apply** and then **OK** to apply and save the change.
-

Configuring Service Policies

This procedure describes the general steps for configuring service policies for managed resources.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > *policy-type***.
- Step 2** In the General tab, click **Add *policy-type***.
- Step 3** In the dialog boxes that follow, enter the required information. For more information on each dialog box, click the online-help.

The following topics provide specific details on various policies:

- [Configuring ACL Policies and Policy Sets, on page 81](#)
 - [Configuring Connection Timeout Policies, on page 88](#)
 - [Configuring DHCP Policies, on page 89](#)
 - [Configuring IP Audit and IP Audit Signature Policies, on page 93](#)
 - [Configuring NAT/PAT Policies and Policy Sets, on page 95](#)
 - [Configuring Packet Inspection Policies, on page 100](#)
 - [Configuring Routing Policies, on page 101](#)
 - [Configuring TCP Intercept Policies, on page 102](#)
 - [Configuring Site-to-Site IPsec VPN Policies, on page 103](#)
-

Configuring ACL Policies and Policy Sets

The following topics describe how to configure ACL policies and policy sets:

- [Adding an ACL Policy, on page 82](#)
- [Time Ranges in ACL Policy Rules, on page 86](#)
- [Adding an ACL Policy Set, on page 87](#)

Adding an ACL Policy

Prime Network Services Controller enables you to implement access control lists based on the time of day and frequency, or inclusion in a defined group. Benefits of this feature include:

- Providing closer control of access to network resources throughout the day or week.
- Enhancing policy-based routing and queuing functions.
- Automatically rerouting traffic at specific times of the day to ensure cost-effectiveness.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > ACL > ACL Policies**.
- Step 2** In the General tab, click **Add ACL Policy**.
- Step 3** In the Add ACL Policy dialog box, enter a name and brief description for the policy, then click **Add Rule**.
- Step 4** In the Add Rule dialog box, specify the required information as described in [Add ACL Policy Rule Dialog Box](#), on page 82, then click **OK**.

Note All Network Port conditions in a single ACL rule must have the same value selected in the Attribute Value field. For example, you would choose FTP from the Attribute Value drop-down list for all rule conditions that specify the Attribute Name of Network Port.

The Add Rule dialog box contains settings for time rules for ACL policies. For more information about using time ranges with ACL policies, see [Time Ranges in ACL Policy Rules](#), on page 86.

Add ACL Policy Rule Dialog Box

Field	Description
Name	Rule name, containing 2 to 32 characters. The name can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:). You cannot change the name after it is saved.
Description	Brief rule description, containing 1 to 256 characters. The name can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:).
Action to Take	<ol style="list-style-type: none"> 1 Click the action to take if the rule conditions are met: <ul style="list-style-type: none"> • Drop—Drops traffic or denies access. • Permit—Forwards traffic or allows access. • Reset—Resets the connection. 2 Check the Log check box to enable logging.

Field	Description
Condition Match Criteria	Do one of the following: <ul style="list-style-type: none"> • Click match-all for the ACL Policy Rule to match all the conditions (AND). • Click match-any for the ACL Policy Rule to match any one condition (OR).
Src-Dest-Service Tab A rule can have a service condition or a protocol condition, but not both.	
Source Conditions	<ol style="list-style-type: none"> 1 Click Add. 2 Enter the required values for following: <ul style="list-style-type: none"> • Attribute Type • Attribute Name • Operator • Attribute Value 3 Click OK.
Destination Conditions	<ol style="list-style-type: none"> 1 Click Add. 2 Enter the required values for following: <ul style="list-style-type: none"> • Attribute Type • Attribute Name • Operator • Attribute Value 3 Click OK.
Service	<ol style="list-style-type: none"> 1 Click Add. 2 Enter the required values for following: <ul style="list-style-type: none"> • Operator • Protocol • Port 3 Click OK.

Field	Description
Protocol Tab	Specify the protocols to which the rule applies: <ul style="list-style-type: none"> • To apply the rule to any protocol, check the Any check box. • To apply the rule to specific protocols: <ol style="list-style-type: none"> 1 Uncheck the Any check box. 2 From the Operator drop-down list, choose a qualifier: Equal, Not Equal, Member, Not Member, In range, or Not in range. 3 In the Value fields, specify the protocol, object group, or range.
Ether Type Tab	Specify the encapsulated protocols to be examined for this rule: <ol style="list-style-type: none"> 1 From the Operator drop-down list, choose a qualifier: Equal, Not equal, Greater than, Less than, Member, Not Member, In range, or Not in range. 2 In the Value fields, specify the hexadecimal value, object group, or hexadecimal range.
Time Range Tab	
To apply the rule all the time	Check the Always check box.
To apply the rule for a specific time range	<ol style="list-style-type: none"> 1 Uncheck the Always check box. 2 Check the Range check box. 3 In the Absolute Start Time fields, provide the start date and time. 4 In the Absolute End Time fields, provide the end date and time.

Field	Description
To apply the rule based on membership in an object group	<ol style="list-style-type: none"> 1 Uncheck the Always check box. 2 Check the Pattern check box. 3 From the Operator drop-down list, choose member (Member of). 4 Do any of the following : <ul style="list-style-type: none"> • From the Select Object Group drop-down list, choose an existing object group. • Click Add Object Group to create a new object group. • Click the Resolved Object Group link to review or modify the specified object group.
To apply the rule on a periodic basis, with the frequency you specify	<ol style="list-style-type: none"> 1 Uncheck the Always check box. 2 Check the Pattern check box. 3 From the Operator drop-down list, choose range (In range). 4 In the Begin fields: <ol style="list-style-type: none"> 1 From the Begin drop-down list, choose the beginning day of the week or the frequency of the time range. 2 Choose the beginning hour and minute, and AM or PM. 5 In the End fields: <ol style="list-style-type: none"> 1 From the End drop-down list, choose the ending day of the week or frequency. 2 Choose the ending hour and minute, and AM or PM. <p>Note If you choose a frequency from the Begin drop-down list, choose the same frequency from the End drop-down list. For example, choose Weekdays from both the Begin and End drop-down lists.</p>

Field	Description
Advanced Tab	Specify any source port attributes that must be matched for the current policy to apply: <ol style="list-style-type: none"> 1 Click Add. 2 Provide the required information in the following fields, and then click OK: <ul style="list-style-type: none"> • Attribute Name • Operator • Attribute Value

Time Ranges in ACL Policy Rules

Prime Network Services Controller enables you to configure time ranges for ACL policy rules in either of the following ways:

- By specifying a time range for the ACL policy rule.
- By associating an ACL object group with the ACL policy rule.

Prime Network Services Controller supports the following types of time ranges:

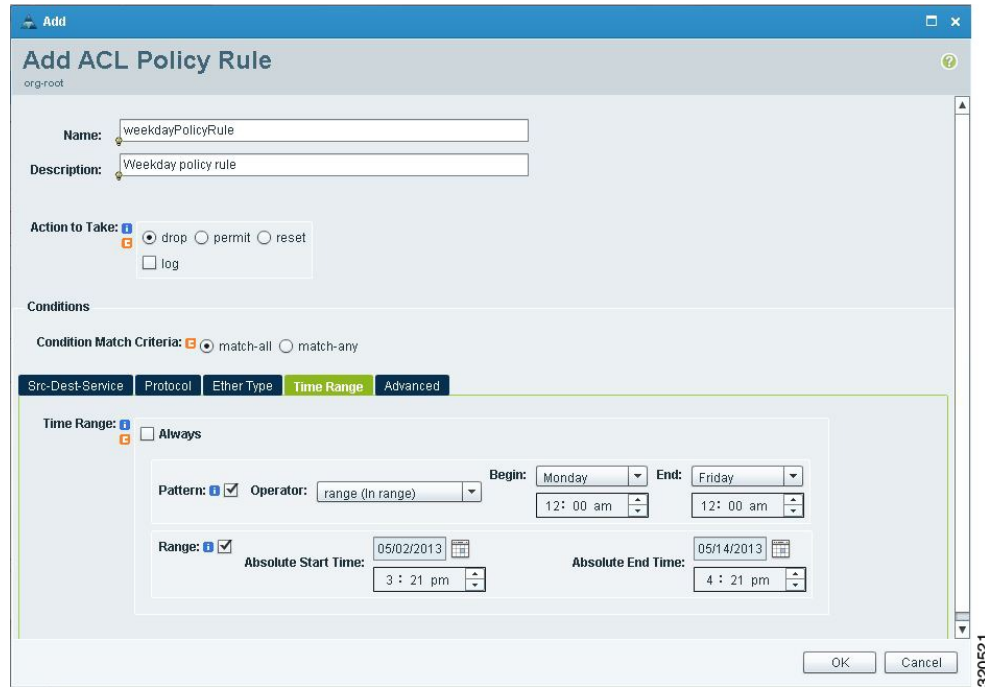
- **Periodic**—Specified by day-of-week start and end times (such as Sunday to Sunday), or a frequency (such as Daily, Weekdays, or Weekends). Periodic range start and end times also include options for hours and minutes.
- **Absolute**—Specified by a calendar date and time for start and end times, such as 01 Sep 2013 12:00 AM to 31 Dec 2013 12:00 AM.

For each ACL policy rule, you can have:

- One absolute time range.
- Any number of periodic time ranges, or none.
 - To specify a single periodic time range, add it to an ACL policy rule.
 - To specify multiple periodic time ranges, use an ACL policy object group.

The following figure shows the Time Range fields for an ACL policy rule.

Figure 3: Time Range Fields in an ACL Policy Rule



Adding an ACL Policy Set

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > ACL > ACL Policy Sets**.
- Step 2** In the General tab, click **Add ACL Policy Set**.
- Step 3** In the Add ACL Policy Set dialog box, enter the required information as described in the following table, then click **OK**:

Field	Description
Name	Policy set name, containing 2 to 32 characters. The name can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:). You cannot change the name after it is saved.
Description	Policy set description, containing 1 to 256 characters. The name can contain alphanumeric characters, hyphen (-), underscore (_), period (.), and colon (:).

Field	Description
Admin State	Administrative state of the policy: enabled or disabled. This field is not available for all policy sets.
Policies	
Add Policy	Click to add a new policy.
Available	Policies that can be assigned to the policy set. Use the arrows between the columns to move policies between columns.
Assigned	Policies assigned to the policy set.
Up and down arrows	Changes the priority of the selected policies. Arrange the policies from highest to lowest priority, with the highest priority policy at the top of the list.

Configuring Connection Timeout Policies

Prime Network Services Controller enables you to configure connection timeout policies so that you can establish timeout limits for different traffic types.

After you create a connection timeout policy, you can associate it with an edge security profile. For more information, see [Configuring Edge Security Profiles](#), on page 120.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > Connection Timeout**.
- Step 2** In the General tab, click **Add Connection Timeout Policy**.
- Step 3** In the Add Connection Timeout Policy dialog box:
 - a) Enter a policy name and description.
 - b) Choose whether the administrative status of the policy is to be enabled or disabled.
- Step 4** To add a rule to the policy, click **Add Rule**.
- Step 5** In the Add Connection Timeout Policy Rule dialog box, provide the information as described in [Add Connection Timeout Policy Rule Dialog Box](#), on page 89.

Add Connection Timeout Policy Rule Dialog Box

Table 6: Add Connection Timeout Policy Rule Dialog Box

Field	Description
Name	Policy name.
Description	Brief policy description.
Action	
Idle TCP	Length of time (in days, hours, minutes, and seconds) a TCP connection can remain idle before it is closed.
Half-Closed	Length of time (in days, hours, minutes, and seconds) a half-closed TCP connection can remain idle before it is freed.
Send Reset To Idle Connection	Check the check box to send a reset to the TCP endpoints when a TCP connection times out.
Idle UDP	Length of time (in days, hours, minutes, and seconds) a UDP connection can remain idle before it closes. The duration must be at least one minute, and the default value is two minutes. Enter 00:00:00:00 to disable timeout.
ICMP	Length of time (in days, hours, minutes, and seconds) an ICMP state can remain idle before it is closed.
Protocol	Not available for configuration.
Source Conditions	
Destination Conditions	

Configuring DHCP Policies

Prime Network Services Controller enables you to create the following DHCP policies and apply them to edge firewalls:

- DHCP relay policy
- DHCP server policy

You can also configure DHCP relay servers for inclusion in DHCP relay policies.

The DHCP relay and DHCP server policies can be authored at the organization level and can be applied only to the inside interface of an edge firewall. When they are applied, DHCP policies allow the edge firewall to act either as a DHCP server or a DHCP relay for all VMs in the inside network.

You can apply only one DHCP server or relay profile at a time to the inside interface of the edge firewall.

For more information, see the following topics:

- [Adding a DHCP Relay Server, on page 90](#)
- [Configuring a DHCP Relay Policy, on page 90](#)
- [Configuring a DHCP Server Policy, on page 91](#)

Adding a DHCP Relay Server

DHCP relay servers are used to forward DHCP requests and replies between clients and servers when they are not on the same physical subnet. In contrast to IP router forwarding, where IP datagrams are switched between networks, DHCP relay servers receive DHCP messages and then generate a new message to send out on a different interface.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > DHCP > DHCP Relay Server**.
- Step 2** In the General tab, click **Add DHCP Relay Server**.
- Step 3** In the New DHCP Relay Server dialog box, provide the information described in the [Add DHCP Relay Server Dialog Box, on page 90](#), then click **OK**.
-

Add DHCP Relay Server Dialog Box

Field	Description
Name	Relay server name.
Description	Brief description of the relay server.
Relay Server IP	IP address of the relay server.
Interface Name	Interface to use to reach the relay server.

Configuring a DHCP Relay Policy

Prime Network Services Controller enables you to associate a DHCP relay server with a DHCP relay policy, as described in this procedure.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > DHCP > DHCP Relay**.
- Step 2** In the General tab, click **Add DHCP Relay Policy**.
- Step 3** In the New DHCP Relay Policy dialog box, provide the information described in [Add DHCP Relay Policy Dialog Box](#), on page 91, then click **OK**.
-

Add DHCP Relay Policy Dialog Box

Name	Description
Name	Policy name.
Description	Brief policy description.
DHCP Relay Server Assignment	<p>Assign a DHCP relay server in one of the following ways:</p> <ul style="list-style-type: none"> • Click Add DHCP Relay Server to add a new DHCP relay server. • In the Available Relay Servers list, select one of the available relay servers and move it to the Assigned Relay Servers list <p>You must assign at least one DHCP relay server to the policy.</p>

Configuring a DHCP Server Policy

A DHCP server policy enables you to define the characteristics of the policy, such as ping and lease timeouts, IP address range, and DNS and WINS settings.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > DHCP > DHCP Server**.
- Step 2** In the General tab, click **Add DHCP Server Policy**.
- Step 3** In the New DHCP Server Policy dialog box, provide the information as described in [Add DHCP Server Policy Dialog Box](#), on page 92, then click **OK**.
-

Add DHCP Server Policy Dialog Box

Field	Description
General Tab	
Name	Policy name.
Description	Brief policy description.
Ping Timeout (Milliseconds)	Amount of time (in milliseconds) that the DHCP server waits for a ping reply before it stops attempting to reach a pool address for client assignment. The valid range is 10 to 10000 milliseconds.
Lease Timeout	Amount of time (in days, hour, minutes, and seconds) that the DHCP server allocates an IP address to a DHCP client before reclaiming and then reallocating it to another client. The default value is 00:01:00:00 (one hour).
Edge Device Interface Using the DHCP Client for DHCP Server Auto Configuration	To enable DHCP server automatic configuration, enter the name of the edge device interface that uses the DHCP client. For ASA 1000V instances, this interface is always an outside interface. Leaving this field empty indicates that the automatic configuration feature is disabled.
DNS Settings	DNS settings used by the edge firewall when configuring DHCP clients. To add a new entry, click Add DNS Setting and add the required information.
WINS Servers	Windows Internet Naming Service (WINS) name servers that are available to DHCP clients. To add a new WINS server, click Add WINS Server and enter the WINS server IP address. WINS servers are listed in the order of preference, with the most preferred WINS server at the top. Select an entry in the table, and then use the arrows above the table to change server priority.

Field	Description
IP Address Range	Enter the following information for the DHCP address pool: <ul style="list-style-type: none"> • Start IP Address—Beginning IP address of the pool. • End IP Address—Ending IP address of the pool. • Subnet Mask—Subnet mask to apply to the address pool.

The Advance tab allows you to add Manual and Exclude addresses. You must know the applicable MAC and IP addresses.

Configuring IP Audit and IP Audit Signature Policies

The IP audit feature provides basic Intrusion Prevention System (IPS) support for ASA 1000V instances. Prime Network Services Controller supports a basic list of signatures, and enables you to configure policies that specify one or more actions to apply to traffic that matches a signature.

The following IP audit policies are available:

- Audit policies
- Signature policies

When you associate an IP audit policy with a device, the policy is applied to all traffic on the outside interface of the device.

The following topics describe how to configure these policies.

Configuring IP Audit Policies

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > IP Audit > Audit Policies**.
- Step 2** In the General tab, click **Add IP Audit Policy**.
- Step 3** In the Add IP Audit Policy dialog box provide the following information:
- Policy name
 - Policy description

- In the Admin State field, choose whether the administrative state of the policy is to be enabled or disabled.

Step 4 To add a rule to the policy, click **Add Rule** in the Rule Table toolbar.

Step 5 In the Add IP Audit Policy Rule dialog box, provide the information as described in [Add IP Audit Policy Rule Dialog Box](#), on page 94, then click **OK** in the open dialog boxes.

Add IP Audit Policy Rule Dialog Box

Table 7: IP Audit Policy Rule Dialog Box

Field	Description
Name	Rule name.
Description	Brief rule description.
Attack-Class Action	Check the check boxes of the actions to take for signature type Attack if the conditions of the rule are met: <ul style="list-style-type: none"> • Log—Send a message indicating that a packet matched the signature. • Drop—Drop the packet. • Reset Flow—Drop the packet and reset the connection.
Informational-Class Action	Check the check boxes of the actions to take for signature type Informational if the conditions of the rule are met: <ul style="list-style-type: none"> • Log—Send a message indicating that a packet matched the signature. • Drop—Drop the packet. • Reset Flow—Drop the packet and reset the connection.
Protocol	Not available for configuration.
Source Conditions	
Destination Conditions	

Configuring IP Audit Signature Policies

An IP audit signature policy identifies the signatures that are enabled and disabled. By default, all signatures are enabled. You can disable a signature when legitimate traffic matches the signature in most situations, resulting in false alarms. However, disabling the signature is performed at a global level, meaning that no traffic will trigger the signature (even bad traffic) when it is disabled.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > IP Audit > Signature Policies**.
 - Step 2** In the General tab, click **Add IP Audit Signature Policy**.
 - Step 3** In the Add IP Audit Signature Policy dialog box, enter a name and description for the policy.
 - Step 4** In the Signatures area, move signatures between the Enabled Signatures and Disabled Signatures lists as required.
Note We recommend that you do not disable signatures unless you are sure you understand the consequences of doing so.
You can view additional information about a signature by selecting the required signature and clicking **Properties**.
 - Step 5** After you have made all adjustments, click **OK**.
-

Configuring NAT/PAT Policies and Policy Sets

Prime Network Services Controller supports Network Address Translation (NAT) and Port Address Translation (PAT) policies for controlling address translation in the deployed network. These policies support both static and dynamic translation of IP addresses and ports.

Prime Network Services Controller enables you to configure the following policy items:

- NAT policy—Can contain multiple rules, which are evaluated sequentially until a match is found.



Note Edge routers support a limited set of NAT policy options.

- NAT policy set—Group of NAT policies that can be associated with an edge security profile. When the profile is applied, the NAT policies are applied only to ingress traffic.
- PAT policy—Supports source dynamic and destination static interface PAT on edge firewalls.

The following topics describe how to configure NAT and PAT policies, and NAT policy sets.

Configuring NAT/PAT Policies

This procedure describes how to configure NAT/PAT policies with Prime Network Services Controller.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > NAT > NAT Policies**.
- Step 2** In the General tab, click **Add NAT Policy**.
- Step 3** In the Add NAT Policy dialog box, enter a name and description for the policy.
- Step 4** In the Admin State field, indicate whether the administrative state of the policy is to be enabled or disabled.
- Step 5** To add a rule to the policy, click **Add Rule**.
- Step 6** In the Add NAT Policy Rule dialog box, provide the information as described in [Add NAT Policy Rule Dialog Box](#), on page 96, then click **OK** in the open dialog boxes.
-

Add NAT Policy Rule Dialog Box

Add NAT Policy Rule Dialog Box

Field	Description
Name	Rule name.
Description	Brief rule description.
Original Packet Match Conditions	
Source Match Conditions	Source attributes that must be matched for the current policy to apply. To add a new condition, click Add Rule Condition . Available source attributes are IP Address and Network Port.
Destination Match Conditions	Destination attributes that must be matched for the current policy to apply. To add a new condition, click Add Rule Condition . Available destination attributes are IP Address and Network Port.

Field	Description
Protocol	<p>Specify the protocols to which the rule applies:</p> <ul style="list-style-type: none"> • To apply the rule to any protocol, check the Any check box. • To apply the rule to specific protocols: <ol style="list-style-type: none"> 1 Uncheck the Any check box. 2 From the Operator drop-down list, choose a qualifier: Equal, Not equal, Member, Not Member, In range, or Not in range. 3 In the Value fields, specify the protocol, object group, or range.
NAT Action Table	
NAT Action	From the drop-down list, choose the required translation option: Static or Dynamic.
Translated Address	<p>Identify a translated address pool for each original packet match condition from the following options:</p> <ul style="list-style-type: none"> • Source IP Pool • Source Port Pool • Source IP PAT Pool • Destination IP Pool • Destination Port Pool <p>For example, if you specify a source IP address match condition, you must identify a Source IP Pool object group. Similarly, a destination network port match requires a Destination Port Pool object group.</p> <p>The Source IP PAT Pool option is available only if you choose dynamic translation.</p> <p>Click Add Object Group to add object groups for the translation actions.</p>

Field	Description
NAT Options	<p>Check and uncheck the check boxes as required:</p> <ul style="list-style-type: none"> • Enable Bidirectional—Check the check box for connections to be initiated bidirectionally; that is, both to and from the host. Available only for static address translation. • Enable DNS—Check the check box to enable DNS for NAT. • Enable Round Robin IP—Check the check box to allocate IP addresses on a round-robin basis. Available only for dynamic address translation. • Disable Proxy ARP—Check the check box to disable proxy ARP. Available only for static address translation.



Note Edge routers support a limited set of NAT policy options.

Configuring NAT Policy Sets

Policy sets enable you to group multiple policies of the same type (such as NAT, ACL, or Interface) for inclusion in a profile. NAT policy sets are groups of NAT policies that can be associated with an edge security profile.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > NAT > NAT Policy Sets**.
- Step 2** In the General tab, click **Add NAT Policy Set**.
- Step 3** In the Add NAT Policy Set dialog box, enter a name and description for the policy set.
- Step 4** In the Admin State field, indicate whether the administrative status of the policy is to be enabled or disabled.
- Step 5** In the Policies area, select the policies to include in this policy set:
 - a) In the Available list, select one or more policies and move them to the Assigned list.
 - b) Adjust the priority of the assigned policies by using the arrow keys above the list.
 - c) If required, click **Add NAT Policy** to add a new policy and include it in the Assigned list.
For information on configuring a NAT policy, see [Configuring NAT/PAT Policies, on page 95](#).
- Step 6** Click **OK**.

Configuring PAT for Edge Firewalls

Prime Network Services Controller enables you to configure source and destination interface PAT for edge firewalls, such as the ASA 1000V. For more information, see the following topics.

Configuring Source Dynamic Interface PAT

Prime Network Services Controller enables you to configure source dynamic interface PAT for edge firewalls, such as ASA 1000Vs.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > NAT > NAT Policies**.
 - Step 2** In the General tab, click **Add NAT Policy**.
 - Step 3** In the Add NAT Policy dialog box, enter a name and description for the policy.
 - Step 4** In the Admin State field, indicate whether the administrative state of the policy is to be enabled or disabled.
 - Step 5** Click **Add Rule** to add a rule to this policy.
 - Step 6** In the Add NAT Policy Rule dialog box, provide the information described in [Add NAT Policy Rule Dialog Box](#), on page 96 with the following specific settings, then click **OK**:
 - a) From the NAT Action drop-down list, choose **Dynamic**.
 - b) In the Translated Address area, add a Source IP Pool object group that contains the ASA 1000V outside interface IP address.
 - Step 7** Click **OK**.
-

Configuring Destination Static Interface PAT

Prime Network Services Controller enables you to configure destination static interface PAT for edge firewalls, such as ASA 1000Vs, as described in the following procedure.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > NAT > NAT Policies**.
- Step 2** In the General tab, click **Add NAT Policy**.
- Step 3** In the Add NAT Policy dialog box, enter a name and description for the policy.
- Step 4** In the Admin State field, indicate whether the administrative state of the policy is to be enabled or disabled.
- Step 5** Click **Add Rule** to add a rule to this policy.
- Step 6** In the Add NAT Policy Rule dialog box, enter the IP address of the ASA 1000V outside interface as a rule condition for Destination Match Conditions.
- Step 7** Configure other options in the Add NAT Policy Rule dialog box as described in [Add NAT Policy Rule Dialog Box](#), on page 96, then click **OK**.
 - Note** If any of the IP address fields includes a range that starts or ends with the IP address of the outside interface of the ASA 1000V, an error message will be displayed that identifies an overlap with the ASA 1000V interface IP address.

Step 8 Click **OK**.

Configuring Packet Inspection Policies

Prime Network Services Controller enables you to configure policies for application-layer protocol inspection. Inspection is required for services that embed IP addressing information in the user data packet, or that open secondary channels on dynamically assigned ports. When inspection is configured, the end device performs a deep packet inspection instead of quickly passing the packet on. As a result, inspection can affect overall device throughput.

[Protocols Supported for Packet Inspection Policies, on page 100](#) lists the application-layer protocols supported by Prime Network Services Controller.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > Packet Inspection**.
 - Step 2** In the General tab, click **Add Packet Inspection Policy**.
 - Step 3** In the Add Packet Inspection Policy dialog box, enter a name and description for the policy.
 - Step 4** In the Admin State field, indicate whether the administrative status of the policy is enabled or disabled.
 - Step 5** To add a rule to the policy, click **Add Rule**.
 - Step 6** In the Add Packet Inspection Policy Rule Dialog box, provide the information as described in [Add Packet Inspection Policy Rule Dialog Box, on page 101](#), then click **OK** in the open dialog boxes.
-

Protocols Supported for Packet Inspection Policies

CTIQBE	ICMP	PPTP	SQL *Net
DCE/RPC	ICMP Error	RSH	SunRPC
DNS	ILS	RSTP	TFTP
FTP	IP Options	SIP	WAAS
H323 H225	IPsec Pass-Through	Skinny	XDMCP
H323 RAS	MGCP	SMTP	
HTTP	NetBIOS	SNMP	

Add Packet Inspection Policy Rule Dialog Box

Field	Description
Name	Rule name.
Description	Brief rule description.
Action	Under Enable Inspections, check the check boxes of protocols to be inspected if the rule conditions are met.
Protocol	Not available for configuration.
Source Conditions	
Destination Conditions	

Configuring Routing Policies

Prime Network Services Controller enables you to use routing policies to configure static, OSPF, and BGP routes for managed resources.

**Note**

You can configure only inside and outside interfaces on edge firewalls by using Prime Network Services Controller. Use the CLI to configure routes on the edge firewall management interface.

After you configure a static route routing policy, you can implement the policy by:

- Including the routing policy in an edge device profile.
- Applying the edge device profile to an edge firewall that has managed endpoints.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > Routing**.
- Step 2** In the General tab, click **Add Routing Policy**.
- Step 3** In the Add Routing Policy dialog box, enter a name and brief description for the routing policy.
- Step 4** To add a new static route, click **Add Static Route**.
- Step 5** In the Add Static Route dialog box, enter the following information:
 - a) In the Destination Network fields, enter the IP route prefix and prefix mask for the destination.
 - b) In the Forwarding (Next Hop) fields, enter the IP address of the next hop that can be used to reach the destination network.

Note The Forwarding Interface field applies only to ASA 1000V data interfaces. Use the CLI to configure routes on the ASA 1000V management interface.

c) (Optional) In the Distance Metric field, enter the distance metric.

Step 6 Click **OK**.

Configuring TCP Intercept Policies

Prime Network Services Controller enables you to configure TCP intercept policies that you can then associate with an edge security profile. TCP intercept policies that you associate with a device via an edge security profile are applied to all traffic on the outside interface of the device.

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policies > TCP Intercept**.
- Step 2** In the General tab, click **Add TCP Intercept Policy**.
- Step 3** In the Add TCP Intercept Policy dialog box, enter a name and brief description for the policy.
- Step 4** In the Admin State field, indicate whether the administrative status of the policy is to be enabled or disabled.
- Step 5** To add a rule to the policy, click **Add Rule**.
- Step 6** In the Add TCP Intercept Policy Rule dialog box, provide the information as described in [Add TCP Intercept Policy Rule Dialog Box](#), on page 102.

Add TCP Intercept Policy Rule Dialog Box

Field	Description
Name	Rule name.
Description	Brief rule description.
Maximum Number of Embryonic TCP Connections (0-65535)	<p>Number of embryonic TCP connections allowed overall and per client:</p> <ol style="list-style-type: none"> 1 In the Total field, enter the maximum number of embryonic TCP connections allowed. 2 In the client field, enter the maximum number of embryonic TCP connections allowed per client. <p>The default value 0 (zero) indicates unlimited connections.</p>
Protocol	Not available for configuration.
Source Conditions	Not available for configuration.

Field	Description
Destination Conditions	Not available for configuration.

Configuring Site-to-Site IPsec VPN Policies

Prime Network Services Controller enables you to configure site-to-site IPsec VPNs. In addition, you can configure a crypto map policy and attach it to an edge profile. For ease of configuration and to keep logical IPsec entities separate, configuration is divided into the following sections:

- Configuring Crypto Map Policies
- Configuring IKE Policies
- Configuring Interface Policy Sets
- Configuring IPsec Policies
- Configuring Peer Authentication Policies
- Configuring VPN Device Policies

To access VPN policies, choose **Policy Management > Service Policies > root > Policies > VPN**.

Configuring Crypto Map Policies

Prime Network Services Controller enables you to create crypto map policies that include:

- Rules for source and destination conditions.
- IP Security (IPsec) options, including an IPsec policy.
- Internet Key Exchange (IKE) options, including a peer device.

Crypto map policies are applied to interfaces by means of their inclusion in interface policy sets and edge security policies.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > Crypto Map Policies**.
 - Step 2** In the General tab, click **Add Crypto Map Policy**.
 - Step 3** In the Add Crypto Map Policy dialog box, provide the information as described in [Add Crypto Map Policy Dialog Box](#), on page 104, then click **OK**.
 - Step 4** To add a policy rule, click **Add Rule** in the General tab and provide the required information as described in [Add Crypto Map Policy Rule Dialog Box](#), on page 106.
-

Add Crypto Map Policy Dialog Box

Field	Description
General Tab	
Name	Policy name.
Description	Brief policy description.
Admin State	Whether the administrative status of the policy is enabled or disabled.
Rule Table	
Add Rule	Click Add Rule to add a new rule to the current policy.
IPsec Settings Tab	
SA Lifetime	Length of time (in days, hours, minutes, and seconds) that a security association (SA) lives before expiring.
SA Lifetime Traffic (KB)	Volume of traffic, in kilobytes, that can pass between IPsec peers using a given SA before that association expires.
Enable Perfect Forwarding Secrecy	Whether or not Perfect Forward Secrecy (PFS) is enabled. PFS is a cryptographic characteristic associated with a derived shared secret value. With PFS, if one key is compromised, previous and subsequent keys are not compromised, because subsequent keys are not derived from previous keys.
Diffie-Hellman Group	Available if PFS is enabled. Choose the Diffie-Hellman (DH) group for this policy: <ul style="list-style-type: none"> • Group 1—The 768-bit DH group. • Group 2—The 1024-bit DH group. • Group 5—The 1536-bit DH group.
IPsec Policies	The IPsec policy that applies to the current policy. Select an existing IPsec policy or click Add IPsec Policy to create a new policy.

Field	Description
Peer Device	<p>Peer device.</p> <p>Choose an existing peer or click Add Peer Device to add a new peer.</p> <p>In the Add Peer Device dialog box, enter the peer device IP address or hostname.</p>
Other Settings Tab	
Enable NAT Traversal	Whether or not IPsec peers can establish a connection through a NAT device.
Enable Reverse Route Injection	Whether or not static routes are automatically added to the routing table and then announced to neighbors on the private network.
Connection Type	<p>Connection type for this policy:</p> <ul style="list-style-type: none"> • Answer-Only—Responds only to inbound IKE connections during the initial proprietary exchange to determine the appropriate peer to which to connect. • Bidirectional—Accepts and originates connections based on this policy. • Originate-Only—Initiates the first proprietary exchange to determine the appropriate peer to which to connect.
Negotiation Mode	<p>Mode to use for exchanging key information and setting up SAs:</p> <ul style="list-style-type: none"> • Aggressive Mode—Faster mode, using fewer packets and exchanges, but does not protect the identity of the communicating parties. • Main Mode—Slower mode, using more packets and exchanges, but protects the identities of the communicating parties.
DH Group for Aggressive Mode	DH group to use when in aggressive mode: Group 1, Group 2, or Group 5.

Add Crypto Map Policy Rule Dialog Box

Field	Description
Name	Rule name.
Description	Brief rule description.
VPN Action	Action to take based on this rule: Permit or Deny.
Protocol	<p>Protocols to examine for this rule:</p> <ul style="list-style-type: none"> • To examine all protocols, check the Any check box. • To examine specific protocols: <ol style="list-style-type: none"> 1 Uncheck the Any check box. 2 From the Operator drop-down list, choose a qualifier: Equal, Not equal, Member, Not Member, In range, or Not in range. 3 In the Value fields, specify the protocol, object group, or range.
Source Conditions	<p>Source attributes that must be matched for the rule to apply.</p> <p>To add a new condition, click Add Rule Condition.</p> <p>Available source attributes are IP Address and Network Port.</p>
Destination Conditions	<p>Destination attributes that must be matched for the rule to apply.</p> <p>To add a new condition, click Add Rule Condition.</p> <p>Available destination attributes are IP Address and Network Port.</p>

Configuring IKE Policies

The Internet Key Exchange (IKE) protocol is a hybrid protocol that implements Oakley and SKEME key exchanges inside the Internet Security Association and Key Management Protocol (ISAKMP) framework. The initial IKE implementation used the IPsec protocol, but IKE can be used with other protocols. IKE provides authentication of the IPsec peers, negotiates IPsec keys, and negotiates the IPsec Security Associations (SAs).

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > IKE Policies**.
- Step 2** In the General tab, click **Add IKE Policy**.
- Step 3** In the Add IKE Policy dialog box, enter a name and description for the policy.
- Step 4** Configure either an IKE V1 or IKE V2 policy:
- IKE V1 Policy
 - 1 Click **Add IKE V1 Policy**.
 - 2 In the Add IKE V1 Policy dialog box, provide the information described in [IKE V1 Policy Dialog Box, on page 107](#), then click **OK**.
 - IKE V2 Policy
 - 1 Click **Add IKE V2 Policy**.
 - 2 In the Add IKE V2 Policy dialog box, provide the information described in [IKE V2 Policy Dialog Box, on page 107](#), then click **OK**.
- Step 5** Click **OK**.
-

IKE V1 Policy Dialog Box

Field	Description
DH Group	Diffie-Hellman group: Group 1, Group 2, or Group 5.
Encryption	Encryption method: 3DES, AES, AES-192, AES-256, or DES.
Hash	Hash algorithm: MD5 or SHA.
Authentication	Authentication method is Preshared key.
SA Lifetime	Length of time (in days, hours, minutes, and seconds) that an SA lives before expiring.

IKE V2 Policy Dialog Box

Field	Description
DH Group	Diffie-Hellman group: Group 1, Group 2, Group 5, or Group 14.

Field	Description
Encryption	Encryption method: 3DES, AES, AES-192, AES-256, or DES.
Hash	Hash integrity algorithm: MD5, SHA, SHA256, SHA384, or SHA512.
Pseudo Random Function Hash	Pseudo-random function (PRF) has algorithm: MD5, SHA, SHA256, SHA384, or SHA512.
SA Lifetime	Length of time (in days, hours, minutes, and seconds) that an SA lives before expiring.

Configuring Interface Policy Sets

Interface policy sets enable you to group multiple policies for inclusion in an edge security profile.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > Interface Policy Sets**.
 - Step 2** In the General tab, click **Add Interface Policy Set**.
 - Step 3** In the Add Interface Policy Set dialog box, provide the information as described in [Add Interface Policy Set Dialog Box](#), on page 108, then click **OK**.
-

Add Interface Policy Set Dialog Box

General Tab

Field	Description
Name	Policy set name.
Description	Brief description of the policy set.
Admin State	Administrative state of the policy set: enabled or disabled.
Policies Area	
Add Crypto Map Policy	Click to add a new policy.

Field	Description
Available	Policies that can be assigned to the policy set. Use the arrows between the columns to move policies between columns.
Assigned	Policies assigned to the policy set.
Up and down arrows	Changes the priority of the selected policies. Arrange the policies from highest to lowest priority, with the highest priority policy at the top of the list.

Domain Settings Tab

Field	Description
Enable IKE (Must check at least one)	Check the appropriate check box to specify IKE V1 or IKE V2.
Enable IPsec Pre-fragmentation	Check the check box to fragment packets before encryption. Pre-fragmentation minimizes post-fragmentation (fragmentation after encryption) and the resulting reassembly before decryption, thereby improving performance.
Do Not Fragment	Available only if the Enable IPsec Pre-fragmentation check box is checked. From the drop-down list, choose the action to take with the Don't Fragment (DF) bit in the encapsulated header: <ul style="list-style-type: none"> • Clear • Copy • Set

Configuring IPsec Policies

IPsec policies define the IPsec policy objects used to create a secure IPsec tunnel for a VPN.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > IPsec Policies**.
- Step 2** In the General tab, click **Add IPsec Policy**.
- Step 3** In the Add IPsec Policy dialog box, enter a name and description for the policy.

You must configure either an IKE V1 or IKE V2 proposal for an IPsec policy.

Step 4 To configure an IKE V1 proposal:

- a) In the IKE v1 Proposal Table area, click **Add IPsec IKEv1 Proposal**.
- b) In the IPsec IKEv1 Proposal dialog box, provide the information described in [IPsec IKEv1 Proposal Dialog Box, on page 110](#), then click **OK**.

Step 5 To configure an IKE V2 proposal:

- a) In the IKE v2 Proposal Table area, click **Add IPsec IKE v2 Proposal**.
- b) In the IPsec IKEv2 Proposal dialog box, provide the information described in [IPsec IKEv2 Proposal Dialog Box, on page 111](#), then click **OK**.

Step 6 Click **OK** to save the policy.

IPsec IKEv1 Proposal Dialog Box

Field	Description
Mode	Mode in which the IPsec tunnel operates. In Tunnel mode, the IPsec tunnel encapsulates the entire IP packet.
ESP Encryption	Encapsulating Security Protocol (ESP) encryption method: <ul style="list-style-type: none"> • 3DES—Encrypts three times according to the Data Encryption Standard (DES) using 56-bit keys. • AES—Encrypts according to the Advanced Encryption Standard (AES) using 128-bit keys. • AES-192—Encrypts according to the AES using 192-bit keys. • AES-256—Encrypts according to the AES using 256-bit keys. • DES—Encrypts according to the DES using 56-bit keys. • Null—Null encryption algorithm. Transform sets defined with ESP-Null provide authentication without encryption; this method is typically used for testing purposes only.

Field	Description
ESP Authentication	<p>Hash authentication algorithm:</p> <ul style="list-style-type: none"> • MD5—Produces a 128-bit digest. • Null—Does not perform authentication. • SHA—Produces a 160-bit digest.

IPsec IKEv2 Proposal Dialog Box

Field	Description
ESP Encryption Algorithm Table	<p>To add an ESP encryption method:</p> <ol style="list-style-type: none"> 1 Click Add ESP Encryption Algorithm. 2 From the ESP Encryption drop-down list, choose the encryption method: <ul style="list-style-type: none"> • 3DES—Encrypts three times according to the Data Encryption Standard (DES) using 56-bit keys. • AES—Encrypts according to the Advanced Encryption Standard (AES) using 128-bit keys. • AES-192—Encrypts according to the AES using 192-bit keys. • AES-256—Encrypts according to the AES using 256-bit keys. • DES—Encrypts according to the DES using 56-bit keys. • Null—Null encryption algorithm. Transform sets defined with ESP-Null provide authentication without encryption; this method is typically used for testing purposes only.

Field	Description
Integrity Algorithm Table	<p>To add an integrity algorithm:</p> <ol style="list-style-type: none"> 1 Click Add Integrity Algorithm. 2 From the Integrity Algorithm drop-down list, choose the authentication algorithm: <ul style="list-style-type: none"> • MD5—Produces a 128-bit digest. • Null—Does not perform authentication. • SHA—Produces a 160-bit digest.

Configuring Peer Authentication Policies

Use a peer authentication policy to define the method used to authenticate a peer.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > Peer Authentication Policies**.
 - Step 2** In the General tab, click **Add Peer Authentication Policy**.
 - Step 3** In the Add Peer Authentication Policy dialog box, enter a name and description for the policy.
 - Step 4** Click **Add Policy to Authenticate Peer**.
 - Step 5** In the Add Policy to Authenticate Peer dialog box, provide the information described in [Add Policy to Authenticate Peer Dialog Box](#), on page 112, then click **OK**.
 - Step 6** Click **OK** to save the policy.
-

Add Policy to Authenticate Peer Dialog Box

Field	Description
Peer Device (Unique)	Unique IP address or hostname of the peer.
IKEv1 Area	
Local	Preshared key.
Confirm	Preshared key for confirmation.
Set	Whether or not the preshared key has been set and is properly configured (read-only).
IKEv2 Area	

Field	Description
Local	Local preshared key.
Confirm	Local preshared key for confirmation.
Set	Whether or not the local preshared key has been set and is properly configured (read-only).
Remote	Remote preshared key.
Confirm	Remote preshared key for confirmation.
Set	Whether or not the remote preshared key has been set and is properly configured (read-only).

Configuring VPN Device Policies

A VPN device policy enables you to specify VPN global settings, such as:

- IKE policy
- IKE global settings
- IPsec global settings
- Peer authentication policy

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policies > VPN > VPN Device Policies**.
- Step 2** In the General tab, click **Add VPN Device Policy**.
- Step 3** In the Add VPN Device Policy dialog box, provide the information as described in [Add VPN Device Policy Dialog Box](#), on page 114.
- Step 4** As needed, provide the information described in the following tables:
- [Configuring IKE Policies](#), on page 106
 - [Configuring Peer Authentication Policies](#), on page 112
- Step 5** Click **OK** to create the policy.
-

Add VPN Device Policy Dialog Box

General Tab


Note

A VPN device policy requires both an IKE policy and a peer authentication policy.

Field	Description
Name	Policy name.
Description	Brief policy description.
IKE Policy	Choose an existing policy from the drop-down list, or click Add IKE Policy to add a new policy.
Peer Authentication Policy	Choose an existing policy from the drop-down list, or click Add Peer Authentication Policy to add a new policy.

IKE Settings Tab

Field	Description
Enable IPsec over TCP	Whether or not IPsec traffic is allowed over TCP. If IPsec over TCP is enabled, this method takes precedence over all other connection methods.
Send Disconnect Notification	Whether or not clients are notified that sessions will be disconnected.
Allow Inbound Aggressive Mode	Whether or not inbound aggressive mode is permitted.
Wait for Termination before Rebooting	Whether or not a reboot can occur only when all active sessions have terminated voluntarily.
Threshold for Cookie Challenge (0-100 Percent)	Percentage of the maximum number of allowed Security Associations (SAs) that can be in-negotiation (open) before cookie challenges are issued for future SA negotiations.
Negotiation Threshold for Maximum SAs (0-100 Percent)	Percentage of the maximum number of allowed SAs that can be in-negotiation before additional connections are denied. The default value is 100 percent.

Field	Description
IKE Identity	Phase 2 identification method: <ul style="list-style-type: none"> • Automatic—Determines ISAKMP negotiation by connection type: <ul style="list-style-type: none"> ◦ IP address for a preshared key. ◦ Cert DN for certificate authentication. • IP Address—IP address of the host exchanging ISAKMP identity information. • Hostname—Fully qualified domain name of the host exchanging ISAKMP identity information. • Key ID—String used by the remote peer to look up the preshared key.
Key for IKE Identity	The key to use for IKE identify if the IKE identification method is Key ID.
NAT Traversal	Whether or not IPsec peers can establish a connection through a NAT device.
Keep-Alive Time for NAT Traversal	Length of time (in hours, minutes, and seconds) that a tunnel can exist with no activity before the device sends keepalive messages to the peer. Values range from 10 to 3600 seconds, with a default of 20 seconds.
IKEv2 IPsec Maximum Security Associations	Whether or not the total number of IKE V2 SAs on the node can be set.
Maximum Number of SA	Maximum number of SA connections allowed.
IKEv1 over TCP Port Table	<ol style="list-style-type: none"> 1 Click Add IKE V1 Over TCP Port to add a new port. 2 In the Port field, enter the TCP port to use for IKE V1.

IPsec Settings Tab

Field	Description
Anti Replay	Whether or not SA anti-replay is enabled.

Field	Description
Anti Replay Window Size	Window size to use to track and prevent duplication of packets. Using a larger window size allows the decryptor to track more packets.
SA Lifetime	Length of time (in days, hours, minutes, and seconds) that an SA can live before expiring.
SA Lifetime Volume (KB)	Volume of traffic, in kilobytes, that can pass between IPsec peers using a given SA before the association expires.

Configuring Zone-Based Firewall Policies

A zone policy defines the traffic that you want to allow or deny between zones. A zone-pair policy allows you to specify a unidirectional firewall policy between two zones. The direction is defined by specifying a source and destination zone.

A firewall zone is a group of interfaces to which a policy can be applied. By default, traffic can flow freely within that zone but all traffic to and from that zone is dropped. To allow traffic to pass between zones, you must explicitly declare it by creating a zone-pair and a policy for that zone.

This workflow is part of the [Edge Router Configuration Workflow](#), on page 191.

For more information on Zone Based Firewall policies and options, see http://www.cisco.com/en/US/partner/products/sw/secursw/ps1018/products_tech_note09186a00808bc994.shtml.

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > tenant > Policies** and select **Zone Based Firewall**.
 - Step 2** Choose **Zone Pair Policies** and add a zone pair policy. In this step you designate a source and destination zone and apply a policy map. If you have not configured a policy map, you can create one now and also configure associated class maps and rules.
 - Step 3** Choose **Policy Sets** and create a policy set by identifying zone pair policies.
-

Working with Profiles

A profile is a collection of policies. By creating a profile with policies that you select, and then applying that profile to multiple objects, such as edge firewalls, you can ensure that those objects have consistent policies.

A device must be registered to Prime Network Services Controller before you can apply a profile to it.

Prime Network Services Controller enables you to create and apply the following types of profiles:

- Compute security profiles—Compute firewall profiles that include ACL policies and user-defined attributes.

- Edge device profiles—Edge firewall profiles that include routing, VPN, DHCP, and IP Audit policies.
- Edge security profiles—Edge firewall profiles that include access and threat mitigation policies.

The following topics describe how to configure and apply profiles.

Configuring Compute Security Profiles

Prime Network Services Controller enables you to create compute security profiles at the root or tenant level. Creating a compute security profile at the root level enables you to apply the same profile to multiple tenants.

Procedure

-
- Step 1** Choose **Policy Management > Service Profiles > root > Compute Firewall > Compute Security Profiles**.
- Step 2** In the General tab, click **Add Compute Security Profile**.
- Step 3** In the Add Compute Security Profile dialog box, provide the information as described in [Add Compute Security Profile Dialog Box](#), on page 117, then click **OK**.
-

Add Compute Security Profile Dialog Box

General Tab

Field	Description
Name	Profile name. This name can be between 2 and 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is saved.
Description	Brief profile description. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Policy Set	Drop-down list of policy sets.
Add ACL Policy Set	Click the link to add an ACL policy set.
Resolved Policy Set	Click the link to edit the resolved policy set.
Resolved Policies Area	
(Un)assign Policy	Click the link to assign or unassign a policy.
Name	Rule name.

Field	Description
Source Condition	Source condition for the rule.
Destination Condition	Destination condition for the rule.
Service/Protocol	Service or protocol to which the rule applies.
EtherType	Encapsulated protocol to which the rule applies.
Action	Action to take if the rule conditions are met.
Description	Rule description.

Attributes Tab

Field	Description
Add User Defined Attribute	Opens a dialog box for adding an attribute.
Name	Attribute name.
Value	Attribute value.

Verifying Compute Firewall Policies

Use this procedure to verify active policies and optionally modify policy objects for compute firewalls.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Compute Firewalls > compute-firewall**.
 - Step 2** In the Compute Security Profiles tab, select the required policy, then click **Show Resolved Policies**.
 - Step 3** In the Edit dialog box, click the required policy in the Resolved Policies table to view the policy details, such as source and destination conditions.
 - Step 4** To modify a policy, in the Policy Set area, either choose a different policy from the drop-down list, or click **Add ACL Policy Set** to configure a new policy.
 - Step 5** Click **Apply** to accept any changes or **OK** when you have finished reviewing the policies.
-

Configuring Edge Device Profiles

Edge device profiles contain the following policies in addition to a timeout value for address translation:

- DHCP
- IP audit signature
- Routing
- VPN device

You can create an edge device profile at any level of the organization hierarchy (root, tenant, virtual data center (VDC), app, or tier). Creating an edge device profile at the root level enables you to apply it to multiple edge firewalls for different tenants.

Procedure

-
- Step 1** Choose **Policy Management > Service Profiles > root > Edge Firewall > Edge Device Profiles**.
- Step 2** In the General tab, click **Add Edge Device Profile**.
- Step 3** In the Add Edge Device Profile dialog box, enter the information as described in [Edge Device Profile Dialog Box](#), on page 119, then click **OK**.
-

Edge Device Profile Dialog Box

Field	Description
General Tab	
Name	Profile name.
Description	Brief profile description.
Policies Tab	
Routing Policy	Choose an existing policy or click Add Routing Policy to add a new policy. Click the Resolved Policy link to review or modify the assigned policy.
IP Audit Signature Policy	Choose an existing policy or click Add IP Audit Signature Policy to add a new policy. Click the Resolved Policy link to review or modify the assigned policy.
VPN Device Policy	Choose an existing policy or click Add VPN Device Policy to add a new policy. Click the Resolved Policy link to review or modify the assigned policy.

Field	Description
Address Translations Timeout	Length of time (in days, hours, minutes, and seconds) that a translation can remain unused before it expires.
DHCP Policy	
Edge DHCP Policy	Adds a DHCP policy.
Type	Type of DHCP service: relay or server.
Interface Name	Interface to which the DHCP policy is applied.
Server/Relay Policy	DHCP policy name.

Configuring Edge Security Profiles

Edge security profiles can include any of the following:

- ACL policy sets (ingress and egress)
- Connection timeout policies
- IP audit policies
- NAT policy sets
- Packet inspection policies
- TCP intercept policies
- VPN interface policy sets

You can create an edge security profile at any level of the organizational hierarchy (root, tenant, VDC, app, or tier). Creating an edge security profile at the root level enables you to apply it to multiple edge firewalls for different tenants.

Procedure

-
- Step 1** Choose **Policy Management > Service Profiles > Edge Firewall > Edge Security Profiles**.
- Step 2** In the General tab, click **Add Edge Security Profile**.
- Step 3** In the Add Edge Security Profile dialog box provide the information as described in [Add Edge Security Profile Dialog Box](#), on page 121.
-

Add Edge Security Profile Dialog Box

Field	Description
General Tab	
Name	Profile name.
Description	Brief profile description.
Ingress Tab	
Policy Set	Choose an existing policy set or click Add ACL Policy Set to add a new policy set. Click the Resolved Ingress Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
Egress Tab	
Policy Set	Choose an existing policy set or click Add ACL Policy Set to add a new policy set. Click the Resolved Egress Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
NAT Tab	
Policy Set	Choose an existing policy set or click Add NAT Policy Set to add a new policy set. Click the Resolved NAT Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
VPN Tab	
Policy Set	Choose an existing policy set or click Add Interface Policy Set to add a new policy set. Click the Resolved VPN Interface Policy Set link to modify the assigned policy set.
Advanced Tab	

Field	Description
Packet Inspection Policy	Choose an existing policy or click Add Packet Inspection Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
Connection Timeout Policy	Choose an existing policy or click Add Connection Timeout Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
TCP Intercept Policy	Choose an existing policy or click Add TCP Intercept Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
IP Audit Policy	Choose an existing policy or click Add IP Audit Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.

Applying an Edge Device Profile

After you have created an edge device profile, you can apply the profile to multiple edge firewalls to ensure consistent policies across the firewalls.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Edge Firewalls > edge-firewall**.
 - Step 2** In the General tab, click **Select** in the Edge Device Profile field.
 - Step 3** In the Select Edge Device Profile dialog box, select the required profile, then click **OK**.
 - Step 4** Click **Save**.
-

Applying an Edge Security Profile

After you have created an edge security profile, you can apply it to edge firewall instances to ensure consistent policies on the interfaces.



Note Edge security profiles can be applied only on outside interfaces of edge firewalls.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Edge Firewalls > edge-firewall**.
 - Step 2** In the Interfaces table, select the required outside interface, then click **Edit**.
 - Step 3** In the Edit dialog box, click **Select** in the Edge Security Profile field.
 - Step 4** In the Select Edge Security Profile dialog box, select the required profile, then click **OK**.
 - Step 5** Click **OK** in the open dialog boxes, then click **Save**.
-

Verifying Edge Firewall Policies

Use this procedure to verify active policies and optionally modify policy objects for edge firewalls.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Edge Firewalls > edge-firewall**.
 - Step 2** In the Edge Security Profiles tab, select the required policy, then click **Show Resolved Policies**.
 - Step 3** To view policy or policy set details, use the tabs in the Edit dialog box to navigate to the required policy or policy set, then click the required policy or policy set in Resolved field
 - Step 4** To use a different policy or policy set, navigate to the required policy or policy set, then either choose a different policy or policy set from the drop-down list, or add a new policy or policy set.
 - Step 5** Click **Apply** to accept any changes or **OK** when you have finished reviewing the policies.
-

Configuring Security Profiles

Editing a Security Profile for a Compute Firewall

Procedure

- Step 1** Choose **Policy Management > Service Profiles > root > Compute Firewalls > Compute Security Profiles**.
- Step 2** In the General tab, select the profile you want to edit, then click **Edit**.
- Step 3** In the Edit Compute Security Profile dialog box, edit the fields as required by using the information in the following tables, then click **OK**.

Field	Description
Name	Profile name.
Description	Brief policy description.
Policy Set	List of available policy sets.
Add ACL Policy Set	Click to add a new ACL policy set.
Resolved Policy Set	Click the link to view and optionally edit the resolved policy set.
Resolved Policies	
(Un)assigned Policy	Click to assign or unassign policies.
Name	Policy name.
Source Condition	Source condition for the policy.
Destination Condition	Destination condition for the policy.
Service/Protocol	Protocol specify by the policy.
EtherType	EtherType specified by the policy.
Action	Action to take if the specified condition is met.
Description	Brief policy description.

Field	Description
Add User Defined Attribute	Click to add a custom attribute.
Name	Attribute name.
Value	Attribute value.

Editing a Security Profile for an Edge Firewall

This procedure enables you to edit a security profile associated with an edge firewall.

Procedure

- Step 1** Choose **Policy Management > Service Profiles > root > Edge Firewall > Edge Security Profiles**.
- Step 2** In the General tab, select the edge security profile that you want to edit, then click **Edit**.
- Step 3** In the Edit Edge Security Profile dialog box, edit the entries as required by using the information in the following table, then click **OK**.

Field	Description
General Tab	
Name	Profile name (read-only).
Description	Brief profile description.
ID	Unique profile identifier (read-only).
Ingress Tab	
Policy Set	Choose an existing policy set or click Add ACL Policy Set to add a new policy set. Click the Resolved Ingress Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
Egress Tab	
Policy Set	Choose an existing policy set or click Add ACL Policy Set to add a new policy set. Click the Resolved Egress Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
NAT Tab	
Policy Set	Choose an existing policy set or click Add NAT Policy Set to add a new policy set. Click the Resolved NAT Policy Set link to modify the assigned policy set.
Resolved Policies	Click (Un)assign Policy to assign or remove a policy for the current policy set.
VPN Tab	

Field	Description
Policy Set	Choose an existing policy set or click Add Interface Policy Set to add a new policy set. Click the Resolved VPN Interface Policy Set link to modify the assigned policy set.
Advanced Tab	
Packet Inspection Policy	Choose an existing policy or click Add Packet Inspection Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
Connection Timeout Policy	Choose an existing policy or click Add Connection Timeout Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
Threat Migration	Choose an existing policy or click Add TCP Intercept Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.
IP Audit Policy	Choose an existing policy or click Add IP Audit Policy to add a new policy. Click the Resolved Policy link to modify the assigned policy.

Deleting a Security Profile

Procedure

-
- Step 1** In the **Navigation** pane, choose **Policy Management > Security Policies > root > Security Profiles**.
- Step 2** In the **Work** pane, click the security profile you want to delete.
- Step 3** Click **Delete**.
- Step 4** In the Confirm dialog box, click **OK**.
-

Deleting a Security Profile Attribute

Procedure

- Step 1** In the **Navigation** pane, choose **Policy Management > Security Profiles > root > Security Profiles > security profile**. The security profile is the profile that contains the attribute you want to delete.
 - Step 2** In the **Work** pane, click the **Attributes** tab.
 - Step 3** Click the attribute you want to delete.
 - Step 4** Click **Delete**.
 - Step 5** In the Confirm dialog box, click **OK**.
-

Assigning a Policy

Procedure

- Step 1** In the **Navigation** pane, expand **Policy Management > Security Profiles > root > Security Profiles**.
 - Step 2** Click the profile where you want to assign the policy.
 - Step 3** In the **Work** pane, click the **(Un)assign Policy** link.
 - Step 4** In the **(Un)assign Policy** dialog box, move the policy you want assigned to the **Assigned** list.
 - Step 5** Click **OK**.
-

Unassigning a Policy

Procedure

- Step 1** In the **Navigation** pane, expand **Policy Management > Security Profiles > root > Security Profiles**.
 - Step 2** Click the profile where you want to unassign the policy.
 - Step 3** In the **Work** pane, click the **(Un)assign Policy** link.
 - Step 4** In the **(Un)assign Policy** dialog box, move the policy you want unassigned to the **Available** list.
 - Step 5** Click **OK**.
-

Configuring Security Policy Attributes

Configuring Object Groups

An object group defines a collection of condition expressions on a system-defined or user-defined attribute. An object group can be referred to in a policy rule condition when the member or not-member operator is selected. A rule condition that refers to an object group resolves to true if any of the expressions in the object group are true.

Object groups can be created at any level in the organizational hierarchy.

Adding an Object Group

Procedure

Step 1 Choose **Policy Management > Service Policies > root > tenant > Policy Helpers > Object Groups**.

Step 2 In the General tab, click **Add Object Group**.

Step 3 In the Add Object Group dialog box, complete the following fields, then click **OK**:

Note You must specify an attribute type and name before adding an object group expression. If VNMC was installed on Hyper-V hypervisor: the attribute type VM is not supported and if you choose the attribute type Network, attribute name Service is not supported.

Field	Description
Name	Object group name. This name can be between 2 and 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is saved.
Description	Brief description of the object group. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Attribute Type	Available attribute types: Network, VM, User Defined, vZone, and Time Range. You must configure an attribute type and name to add an object group expression.
Attribute Name	Available attribute names for the selected attribute type.
Expression Table	
Add Object Group Expression	Click to add an object group expression.

Field	Description
Operator	Operator for the selected expression.
Value	Value for the selected expression.

Adding an Object Group Expression

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Object Groups**.
- Step 2** In the General tab, select the object group you want to add an object group expression to, then click **Edit**.
Note For new object groups, you must specify the attribute type and name before adding an object group expression.
- Step 3** In the Edit Object Group dialog box, click **Add Object Group Expression**.
- Step 4** In the Add Object Group Expression dialog box, specify the object group expression by using the information in the following table, then click **OK** in the open dialog boxes.

Field	Description
Attribute Name	Attribute (read-only).
Operator	Available operators for this attribute.
Attribute Value	Attribute value for this expression.

Editing an Object Group

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > tenant > Policy Helpers > Object Groups**.
- Step 2** In the General tab, select the object group you want to edit, then click **Edit**.
- Step 3** In the Edit Object Group dialog box, update the fields as follows, then click **OK** in the open dialog boxes:

Field	Description
Name	Object group name (read-only).

Field	Description
Description	Object group description. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Attribute Type	Specified attribute type (read-only).
Attribute Name	Specified attribute name (read-only).
Expression Table	
Add Object Group Expression	Click to add a new object group expression.
Edit	Enables you to edit the selected object group expression.
Delete	Deletes the selected object group expression.
Operator	Expression operator.
Value	Expression attribute value.

Editing an Object Group Expression

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Object Groups**.
- Step 2** In the General tab, select the object group with the expression you want to edit, then click **Edit**.
- Step 3** In the Expression table in the Edit Object Group dialog box, select the expression you want to edit, then click **Edit**.
- Step 4** In the Edit Object Group Expression dialog box, edit the fields as required, then click **OK** in the open dialog boxes.

Field	Description
Attribute Name	Attribute name (read-only).
Operator	Available operators for this expression.
Attribute Value	Attribute value for this expression.

Deleting an Object Group

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Object Groups**.
 - Step 2** In the General tab, select the Object Group you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Deleting an Object Group Expression

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Object Groups**.
 - Step 2** In the General tab, select the object group that contains the expression you want to delete, then click **Edit**.
 - Step 3** In the Edit Object Group dialog box, select the expression that you want to delete In the Expression table, then click **Delete**.
 - Step 4** When prompted confirm the deletion.
 - Step 5** Click **OK** in the open dialog box to save the change.
-

Configuring Security Profile Dictionary

Adding a Security Profile Dictionary

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > tenant > Policy Helpers > Security Profile Dictionary**.
 - Note** You can have one security profile dictionary at the root level and one for each tenant.
- Step 2** In the General tab, click **Add Security Profile Dictionary**.
- Step 3** In the Add Security Profile Dictionary dialog box, complete the following fields as appropriate, then click **OK**:

Field	Description
Name	Name of the security profile dictionary. This name can contain 1 to 16 alphanumeric characters. You cannot use spaces or any special characters, and you cannot change this name after the object has been saved. Note You can have one security profile dictionary at the root level and one for each tenant.
Description	A description of the security profile dictionary. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Attributes Table	
Add Security Profile Custom Attribute	Click to add a new attribute.
Name	Custom attribute name.
Description	Custom attribute description.

Adding a Security Profile Dictionary Attribute

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > tenant > Policy Helpers > Security Profile Dictionary**.
- Step 2** In the General tab, select the security profile dictionary that you want to add an attribute to, then click **Edit**.
- Step 3** In the Edit Security Profile Dictionary dialog box, click **Add Security Profile Custom Attribute**.
- Step 4** In the Add Security Profile Custom Attribute dialog box, complete the following fields, then click **OK**:

Field	Description
Name	Attribute name. This name can be between 1 and 16 alphanumeric characters. You cannot use spaces or any special characters, and you cannot change this name after the object has been saved.

Field	Description
Description	Attribute description. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.

Editing a Security Profile Dictionary

Procedure

Step 1 Choose **Policy Management > Service Policies > root > Policy Helpers > Security Profile Dictionary**.

Step 2 In the General tab, select the security profile dictionary you want to edit, then click **Edit**.

Step 3 In the Edit Security Profile Dictionary dialog box, modify the fields as appropriate, then click **OK**:

Field	Description
Name	Name of the security profile dictionary (read-only).
Description	Description of the security profile dictionary.
Attributes	
Add Security Profile Custom Attribute	Click to add a custom attribute.
Name	Attribute name.
Description	Attribute description.

Editing a Security Profile Dictionary Attribute

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Security Profile Dictionary**.
 - Step 2** In the General tab, select the security profile dictionary that contains the attribute you want to edit, then click **Edit**.
 - Step 3** In the Edit Security Profile Dictionary dialog box, select the attribute you want to edit, then click **Edit**.
 - Step 4** In the Edit Security Custom Attribute dialog box, edit the Description field as required, then click **OK** in the open dialog boxes to save the change.
-

Deleting a Security Profile Dictionary

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Security Profile Dictionary**.
 - Step 2** In the General tab, select the security profile dictionary you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Deleting a Security Profile Dictionary Attribute

Procedure

-
- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > Security Profile Dictionary**. In the General tab, select the dictionary that contains the attribute you want to delete, then click **Edit**.
 - Step 2** In the Edit Security Profile Dictionary dialog box, in Attributes table, select the attribute you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Working with vZones

A virtual zone (vZone) is a logical grouping of VMs or hosts. vZones facilitate working with policies and profiles because vZones enable you to write policies based on vZone attributes by using vZone names.

The high level flow for working with vZones in Prime Network Services Controller is as follows:

1. Define a vZone, each with one or more conditions for inclusion in the vZone.

2. Define a service policy with the rules based on zone or network conditions.
 3. Create a policy set that includes the service policy defined in Step 2.
 4. Create a security profile that includes the policy set created in Step 3.
 5. Bind the security profile to the ASA 1000V or VSG port profile.
 6. Assign the security profile to the ASA 1000V or VSG in Prime Network Services Controller.
- See the following topics for more information about working with vZones.

Adding a vZone

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > vZones**.
- Step 2** In the General tab, click **Add vZone**.
- Step 3** In the Add vZone dialog box provide the required information as described in the following table, then click **OK**:

Field	Description
Name	vZone name. The name can be between 2 and 32 characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change the name after it is saved.
Description	vZone description. The description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Condition Match Criteria	Condition match options: <ul style="list-style-type: none"> • Choose match-all for the zone to match all the conditions (AND). • Choose match-any for the zone to match any one condition (OR).
vZone Condition	
Attribute Type	Condition type.
Attribute Name	Condition attribute name. Note vZone conditions cannot be created using the service attribute.
Operator	Condition operator.
Attribute Value	Condition attribute value.

Editing a vZone

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > vZones**.
- Step 2** In the General tab, select the vZone that you want to edit, then click **Edit**.
- Step 3** In the Edit vZone dialog box in the General tab, right-click the attribute that you want to edit, and choose **Edit**.
- Step 4** In the Edit Zone Condition dialog box, edit the fields as required, then click **OK** in the open dialog boxes.

Field	Description
Name	vZone name (read-only).
Description	Brief vZone description.
Condition Match Criteria	Choose the required match option: <ul style="list-style-type: none"> • Match-all—Match all of the criteria (AND). • Match-any—Match any one of the criteria (OR).
vZone Condition	
Toolbar	
Add Zone Condition	Adds a zone condition.
Edit	Enables you to edit the selected condition.
Delete	Deletes the selected condition.
Filter	Filters the contents by the string or value that you enter.
Table	
Attribute Name	Zone condition attribute name.
Operator	Zone condition operator.
Attribute Value	Value for the zone condition.

Deleting a vZone Condition

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > vZones**.
 - Step 2** In the General tab, select the vZone with the condition that you want to delete, then click **Edit**.
 - Step 3** In the Edit vZone dialog box, select the condition in the vZone Condition table that you want to delete, then click **Delete**.
 - Step 4** Confirm the deletion.
 - Step 5** In the Edit vZone dialog box, click **OK** or **Apply**.
-

Deleting a vZone

Procedure

- Step 1** Choose **Policy Management > Service Policies > root > Policy Helpers > vZones**.
 - Step 2** In the General tab, select the vZones that you want to delete, then click **Delete**.
 - Step 3** Confirm the deletion.
-



Configuring Device Policies and Profiles

This section includes the following topics:

- [Device Policies and Profiles, page 139](#)
- [Device Configuration, page 140](#)
- [Device Policies, page 141](#)
- [Configuring Device Policies, page 141](#)
- [Configuring Device Profiles, page 168](#)
- [Configuring NTP, page 173](#)
- [Associating Device Policies with Profiles, page 175](#)

Device Policies and Profiles

Prime Network Services Controller enables you to create device profiles and policies at any organizational level.

Device Profiles

A Prime Network Services Controller device profile is a set of custom security attributes and device policies. For Nexus 1000V VSMs, the device profile is added to the port profile. The port profile is assigned to the Nexus 1000V VSM vNIC, making the device profile part of the virtual machine (VM). Adding a device profile to the VM allows the addition of custom attributes to the VM. Firewall rules can be written using custom attributes such that traffic between VMs can be allowed to pass or be dropped.

You apply device profiles to compute and edge firewalls by choosing Resource Management > Managed Resources and then navigating to the required compute or edge firewall at the root or tenant level. The Firewall Settings area of the firewall pane includes the Device Profile option.

Prime Network Services Controller includes a default device profile at root level. The default device profile can be edited but cannot be deleted.

Policies

Prime Network Services Controller supports the following objects related to policies:

- **Policy set**—Contains policies. After a policy set is created, it can be assigned to a profile. An existing default policy set is automatically assigned at system boot up.
- **Policy**—Contains rules that can be ordered. An existing default policy is automatically assigned at system boot up. The default policy contains a rule with an action of **drop**.
- **Rule**—Contains conditions for regulating traffic. The default policy contains a rule with an action of **drop**. Conditions for a rule can be set using the network, custom, and virtual machine attributes.
- **Object group**—Can be created under an organization node. An object group defines a collection of condition expressions on a system-defined or user-defined attribute. An object group can be referred to in a policy rule condition when the member or not-member operator is selected. A rule condition that refers to an object group resolves to true if any of the expressions in the object group are true.
- **Security Profile Dictionary**—Logical collection of security attributes. You define dictionary attributes for use in a security profile. A security profile dictionary is created at the root or tenant node. You can create only one dictionary for a tenant and one for root. The security profile dictionary allows the user to define names of custom attributes. Custom attribute values are specified on security profile objects. Custom attributes can be used to define policy rule conditions. Attributes configured in a root level dictionary can be used by any tenant. You cannot create a dictionary below the tenant level.
- **Zone**—Set of VMs based on conditions. The zone name is used in the authoring rules.

Security policies are created and then pushed to the Cisco VSG or ASA 1000V.

Device Configuration

Prime Network Services Controller enables you to configure devices by adding policies to a device profile and then applying that profile to a device. To create a root device profile, choose **Policy Management > Device Configurations > root** and click **Add Device Profile**. Device profiles contain options for the following policies and settings:

- DNS server and domain
- NTP server
- SNMP policy
- Syslog policy
- Fault policy
- Core policy
- Log file policy
- Policy engine logging
- Authentication policy

Device Policies

Prime Network Services Controller enables you to create the following policies and assign them to device profiles for application to service devices:

- AAA policy
- Core file policy
- Fault policy
- Logging policy
- SNMP policy
- Syslog policy

Prime Network Services Controller provides default policies for fault, logging, SNMP, and syslog. The default policies cannot be deleted but can be modified. A device profile uses name resolution to resolve policy assignments. For details, see [Name Resolution in a Multi-Tenant Environment](#), on page 68.

Policies created under root are visible to both the Prime Network Services Controller profile and the Device profile.

Configuring Device Policies

Prime Network Services Controller enables you to configure and manage the following types of device policies:

- AAA
- Core File
- Fault
- Log File
- SNMP
- Syslog

Configuring AAA Policies

Authentication, authorization, and accounting (AAA) policies verify users before they are allowed access to a network and network services. By creating AAA policies in Prime Network Services Controller and associating the policies with objects through device profiles, you can ensure that only authenticated users can access the objects.

Prime Network Services Controller supports authentication and authorization for edge firewalls and server groups using the following protocols:

- Kerberos
- Lightweight Directory Access Protocol (LDAP)
- Windows NT

- RADIUS
- RSA SecurID (SDI)
- TACACS+

You can use Prime Network Services Controller to configure an AAA policy on ASA 1000V. Prime Network Services Controller does not support AAA policies on VSG, VPX, or CSR 1000V.

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Policies > AAA > Auth Policies**.

Step 2 In the General tab, click **Add Auth Policy**.

Step 3 In the Add Auth Policy dialog box, enter the information as described in [Add Auth Policy Dialog Box](#), on page 142, then click **OK**.

Note If you add a remote server group with a new server group with a new server host, the information that you must provide for the host depends on the protocol used. For example, the information required for a RADIUS server host is different from the information required for an LDAP server host. See the online help for the information required for the selected protocol.

Field Descriptions

Add Auth Policy Dialog Box

Field	Description
Name	Policy name.
Description	Brief policy description.
Authorization	Check the Enable check box to enable authorization via server authentication.
Remote Access Methods	
Add Remote Access Method	Adds a remote access method to the policy. For more information, see Remote Access Method Dialog Box , on page 143.
Access Method	One of the following access methods: <ul style="list-style-type: none"> • Enable Mode • HTTP • Serial • SSH • Telnet

Field	Description
Admin State	Whether the administrative state of the policy is enabled or disabled.
Remote Server Group	Remote server group name.
Local Auth	This column is not used.

Remote Access Method Dialog Box

Field	Description
Access Method	One of the following access methods: <ul style="list-style-type: none"> • Enable Mode • HTTP • Serial • SSH • Telnet
Admin State	Whether the administrative state of the access method is enabled or disabled.
Server Group	Indicate the server group to use: <ol style="list-style-type: none"> 1 In the Protocol for Creation field, choose the required protocol. 2 In the Server Group fields, do one of the following: <ul style="list-style-type: none"> • From the drop-down list, choose an available remote server group. • Click Add Remote Server Group - <i>protocol</i> to add a new remote server group. <p>Note If you add a new remote server group, the information that you must provide for the server group and host depends on the protocol used. For example, the information required for a RADIUS server group and host is different from the information required for an LDAP server group and host.</p>

Configuring Core File Policies

Adding a Core File Policy for a Device

You can add a core file policy at any organizational level.

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Core File**.
- Step 2** In the General tab, click **Add Core File Policy**.
- Step 3** In the Add Core File Policy dialog box, add the information as described in the following table, then click **OK**:

Field	Description
Name	Core file policy name, containing 1 to 32 characters. You can use alphanumeric characters, hyphen (-), underscore (_), and period (.). You cannot change the name after the policy has been saved.
Description	Brief policy description, containing 1 to 256 characters. You can use alphanumeric characters, hyphen (-), underscore (_), and period (.).
Admin State	Indicate whether the administrative state of the policy is to be enabled or disabled.
Hostname/IP Address	Hostname or IP address to use for this policy. If you use a hostname rather than an IP address, you must configure a DNS server in Prime Network Services Controller.
Port	Port number for sending the core dump file. This field is read-only for InterCloud policies.
Protocol	Protocol for exporting the core dump file (tftp only).
Path	Path to use when storing the core dump file on a remote system. The default path is /tftpboot; for example, /tftpboot/test, where <i>test</i> is the subfolder.

Editing a Core File Policy for a Device Profile

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Core File**.
- Step 2** In the General tab, select the core file policy you want to edit, then click **Edit**.
- Step 3** In the Edit Core File Policy dialog box, edit the fields as required, using the information in the following table, then click **OK**.

Field	Description
Name	Name of the core file policy (read-only).
Description	Brief policy description.
Admin State	Administrative status of the policy: enabled or disabled.
Hostname	Hostname or IP address. Note If you use a hostname, you must configure a DNS server.
Port	Port number to use when exporting the core dump file. This field is read-only for InterCloud policies.
Protocol	Protocol used to export the core dump file (tftp only).
Path	Path to use when storing the core dump file on the remote system. The default path is /tftpboot. To specify a subfolder under tftpboot, use the format /tftpboot/ <i>folder</i> where <i>folder</i> is the subfolder.

Deleting a Core File Policy from a Device Profile

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Core File**.
- Step 2** In the General tab, select the core file policy you want to delete, then click **Delete**.
- Step 3** When prompted, confirm the deletion.

Configuring Fault Policies

Adding a Fault Policy for a Device Profile

You can add a fault policy at any organizational level.

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Policies > Fault**.

Step 2 In the General tab, click **Add Fault Policy**.

Step 3 In the Add Fault Policy dialog box, enter the information as described in the following table, then click **OK**.

Field	Description
Name	Fault policy name. This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.
Description	Brief policy description.
Flapping Interval	Length of time (in hours, minutes, and seconds) that must elapse before the system allows a fault to change its state. Flapping occurs when a fault is raised and cleared several times in rapid succession. To prevent this, the system does not allow a fault to change its state until this amount of time has elapsed since the last state change. If the condition reoccurs during the flapping interval, the fault returns to the active state. If the condition does not reoccur during the flapping interval, the fault is cleared. What happens at that point depends on the setting in the Clear Faults Retention Action field. The default flapping interval is ten seconds.
Clear Faults Retention Action	Action to be taken when faults are cleared: <ul style="list-style-type: none"> • retain—Retain the cleared faults. • delete—Delete fault messages as soon as they are marked as cleared.

Field	Description
Clear Faults Retention Interval	<p>How long the system is to retain cleared fault messages:</p> <ul style="list-style-type: none"> • Forever—The system retains all cleared fault messages regardless of their age. • Other—The system retains cleared fault message for a specified the length of time. In the spinbox that is displayed when you select this option, enter the length of time (in days, hours, minutes, and seconds) that the system is to retain cleared fault messages.

Editing a Fault Policy for a Device Profile



Note When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Fault**.
- Step 2** In the General tab, select the fault policy you want to edit, then click **Edit**.
- Step 3** In the Edit Fault Policy dialog box, modify the following fields as required, then click **OK**.

Field	Description
Name	Policy name (read-only).
Description	Brief policy description.

Field	Description
Flapping Interval	<p>Length of time (in hours, minutes, and seconds) that must elapse before the system allows a fault to change its state.</p> <p>Flapping occurs when a fault is raised and cleared several times in rapid succession. To prevent this, the system does not allow a fault to change its state until this amount of time has elapsed since the last state change.</p> <p>If the condition recurs during the flapping interval, the fault returns to the active state. If the condition does not recur during the flapping interval, the fault is cleared. The next action depends on the setting in the Clear Faults Retention Action field.</p> <p>The default flapping interval is ten seconds.</p>
Clear Faults Retention Action	<p>Available fault retention actions:</p> <ul style="list-style-type: none"> • retain—The system retains fault messages. • delete—The system deletes fault messages when they are marked as cleared.
Clear Faults Retention Interval	<p>How long the system is to retain cleared fault messages:</p> <ul style="list-style-type: none"> • Forever—The system retains all cleared fault messages regardless of their age. • Other—The system retains cleared fault message for a specified the length of time. In the spinbox that is displayed when you select this option, enter the length of time (in days, hours, minutes, and seconds) that the system is to retain cleared fault messages.

Deleting a Fault Policy for a Device Profile



Note

When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Fault**.
 - Step 2** In the General tab, select the fault policy that you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Configuring Log File Policies

Adding a Logging Policy for a Device Profile

You can add a logging policy for a device at any organizational level.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Log File**.
- Step 2** In the General tab, click **Add Logging Policy**.
- Step 3** In the Add Logging Policy dialog box, complete the following fields, then click **OK**.

Field	Description
Name	Logging policy name. This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.
Description	Brief policy description.

Field	Description
Log Level	<p>One of the following logging severity levels:</p> <ul style="list-style-type: none"> • debug0 • debug1 • debug2 • debug3 • debug4 • info • warning • minor • major • critical <p>The default log level is info.</p>
Backup Files Count	<p>Number of backup files that are filled before they are overwritten.</p> <p>The range is 1 to 9 files, with a default of 2 files.</p>
File Size (bytes)	<p>Backup file size.</p> <p>The range is 1 MB to 100 MB with a default of 5 MB.</p>

Editing a Logging Policy for a Device Profile



Note When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Log File**.
- Step 2** In the General tab, select the log file policy that you want to edit, then click **Edit**.
- Step 3** In the Edit Log File Policy dialog box, edit the fields as required by using the information in the following table, then click **OK**.

Field	Description
Name	Logging policy name (read-only).
Description	Brief policy description.
Log Level	<p>One of the following logging levels:</p> <ul style="list-style-type: none"> • debug0 • debug1 • debug2 • debug3 • debug4 • info • warning • minor • major • critical <p>The default log level is info.</p>
Backup Files Count	<p>Number of backup files that are filled before they are overwritten.</p> <p>The range is 1 to 9 files, with a default of 2 files.</p>
File Size (bytes)	<p>Backup file size.</p> <p>The range is 1 MB to 100 MB with a default of 5 MB.</p>

Deleting a Logging Policy for a Device Profile



Note

When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Log File**.
 - Step 2** In the General tab, select the logging policy you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Configuring SNMP Policies

Adding an SNMP Policy

You can add an SNMP policy at any organizational level.

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > SNMP**.
 - Step 2** In the General tab, click **Add SNMP Policy**.
 - Step 3** In the Add SNMP dialog box, complete the following fields as appropriate:

Table 8: General Tab

Field	Description
Name	SNMP policy name. This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.
Description	SNMP policy description. This description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphens, underscore, dot, and colon.
Admin State	Indicate whether the administrative status of the policy is enabled or disabled.
Location	Physical location of the device.
Contact	Contact person for the device.
SNMP Port	Port that the SNMP agent listens to for requests. You cannot edit this field.

Step 4 Click the **Communities** tab, then complete the following steps:

- a) Click **Add SNMP Community**.
- b) In the Add SNMP Community dialog box, complete the following fields as appropriate, then click **OK**:

Name	Description
Community	SNMP community name.
Role	Role associated with the community string. You cannot edit this field.

Step 5 In the Add SNMP dialog box, click **OK**.

Editing an SNMP Policy



Note When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Policies > SNMP**.

Step 2 In the General tab, select the SNMP policy that you want to edit, then click **Edit**.

Step 3 In the Edit SNMP Policy dialog box, edit the information in the General tab as required, using the information in the following table:

Field	Description
Name	SNMP policy name (read-only).
Description	Brief policy description.
Admin State	Administrative state of the policy: enabled (default) or disabled.
Location	Physical location of the device.
Contact	Contact person for the device.
SNMP Port	Port that the SNMP agent listens to for requests (read-only).

Step 4 In the Communities tab, edit the information as required:

Field	Description
Add SNMP Community	Adds an SNMP community.
Delete	Deletes the selected SNMP community.
Filter	Enter the string or value that you want to filter the table contents by.
Community	SNMP community name.
Role	Role associated with the SNMP community.

Step 5 In the Traps tab, edit the information as required:

Field	Description
Add SNMP Trap	Adds an SNMP trap.
Edit	Enables you to edit the selected SNMP trap.
Delete	Deletes the selected SNMP trap.
Filter	Enter the string or value that you want to filter the table contents by.
Hostname/IP Address	IP address of the SNMP host.
Port	Port where the SNMP agents listens for requests.
Community	SNMP community name.

Step 6 Click OK.

Deleting an SNMP Policy



Note

When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > SNMP**.
 - Step 2** In the General tab, select the SNMP policy that you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Adding an SNMP Trap Receiver

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > SNMP**.
 - Step 2** In the General tab, click **Add SNMP Policy > Traps > Add SNMP Trap**.
 - Step 3** In the Add SNMP Trap dialog box, enter the following information, then click **OK**:

Field	Description
Hostname/ IP Address	Hostname or IP address of the SNMP host.
Port	Port that the SNMP agent listens to for requests. The default port is 162.
Community	SNMP community name.

Editing an SNMP Trap Receiver

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Policies > SNMP**.
 - Step 2** In the General tab, select the SNMP policy with the SNMP trap that you want to edit, then click **Edit**.
 - Step 3** In the Edit SNMP Policy dialog box, click the **Traps** tab.
 - Step 4** In the Traps tab, select the entry that you want to edit, then click **Edit**.
 - Step 5** In the Edit SNMP Trap dialog box, edit the information in the General tab as required, using the following information:

Field	Description
Hostname/IP Address	Hostname or IP address of the SNMP host (read-only).

Field	Description
Port	Port that the SNMP agent listens to for requests.
Community	SNMP community name.

Step 6 Click **OK** in the open dialog boxes.

Deleting an SNMP Trap Receiver

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > SNMP**.
 - Step 2** In the General tab, select the SNMP policy with the SNMP trap that you want to delete, then click **Edit**.
 - Step 3** In the Edit SNMP Policy dialog box, click the **Traps** tab.
 - Step 4** In the Traps tab, select the entry that you want to delete, then click **Delete**.
 - Step 5** When prompted, confirm the deletion.
-

Configuring Syslog Policies

Adding a Syslog Policy for a Device

Prime Network Services Controller enables you to configure syslog policies for syslog messages and then attach a created syslog policy to a device profile for implementation on all devices using that profile.

You can create syslog policies for logging syslog messages to a remote syslog server or to a local buffer for later review.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Syslog**.
 - Step 2** In the General tab, click **Add Syslog Policy**.
 - Step 3** In the Add Syslog dialog box, provide the information as described in [Add Syslog Policy Dialog Box, on page 157](#), then click **OK**.
-

Field Descriptions

Add Syslog Policy Dialog Box

Field	Description
General Tab	
Name	Policy name.
Description	Brief policy description.
Use Emblem Format	Check the check box to use the EMBLEM format for syslog messages. This option appears only on supported devices.
Continue if Host is Down	Check the check box to continue logging if the syslog server is down. This option only appears on supported devices.
Servers Tab	
Add Syslog Server	Click to add a new syslog server.
Syslog Servers table	List of configured syslog servers.
Local Destinations Tab	
Console	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: alert, critical, or emergency. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p>

Field	Description
Monitor	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p>
File	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency.</p> <ul style="list-style-type: none"> • File Name—Name of the file to which messages are logged. • Size (bytes)—Maximum size, in bytes, that the file can reach before the system begins to overwrite the messages.

Field	Description
Buffer	<p>Buffer options are not available for InterCloud policies.</p> <ul style="list-style-type: none"> • Admin State—Administrative state of the policy: disabled or enabled. • Level—Message level: emergency, alert, critical, error, warning, notification, information, or debugging. If the Admin State is enabled, select the message level that you want displayed. The system displays that level and above on the console. For example, if you choose critical, the system also displays messages with the severities alert and emergency. • Buffer Size (Bytes)—In bytes, the size of the buffer for syslog messages. • Wrap to Flash—Indicates whether or not the buffer contents are saved to flash memory when the buffer wraps (becomes full). Check the check box to save the contents to flash memory if the buffer wraps. • Max File Size in Flash (KB)—Maximum size, in kilobytes, that can be used by the syslog buffer. This option is enabled if the Wrap to Flash option is enabled. • Min Free Flash Size (KB)—Minimum size, in kilobytes, that is allocated for the syslog buffer. This option is enabled if the Wrap to Flash option is enabled.
Time Stamp	<p>Check the check box for each of the following options that you want to enable for timestamp display:</p> <ul style="list-style-type: none"> • Enable Timestamp • Include Year • Include Milliseconds • Show Time Zone • Use Local Time Zone

Editing a Syslog Policy for a Device Profile

Prime Network Services Controller enables you to edit existing syslog policies as described in this procedure.

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Policies > Syslog**.

Step 2 In the General tab, select the policy you want to edit, then click **Edit**.

Step 3 In the Edit Syslog Policy dialog box, in the General tab, edit the information as required, using the following information:

Field	Description
Name	Policy name (read-only).
Description	Brief policy description.
Use Emblem Format	Check the check box to use the EMBLEM format for syslog messages. This option is supported for ASA 1000Vs. It is not supported for VSGs.
Continue if Host is Down	Check the check box to continue logging if the syslog server is down. This option is supported for ASA 1000Vs. It is not supported for VSGs.

Step 4 In the Servers tab, click **Add Syslog Server** to add a new syslog server, or select an existing server and click **Edit** to edit it.

Step 5 In the Local Destinations tab, edit the information as required, using the following information:

Field	Description
Console	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: enabled or disabled. • Level—Message level: alerts, critical, or emergencies. <p>If the Admin State is enabled, select the lowest message level that you want displayed. The system displays that level and above on the console.</p>

Field	Description
Monitor	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: enabled or disabled. • Level—Message level: alert, critical, emergency, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the lowest message level that you want displayed. The system displays that level and above on the console.</p>
File	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: enabled or disabled. • Level—Message level: alert, critical, emergency, error, warning, notification, information, or debugging. <p>If the Admin State is enabled, select the lowest message level that you want displayed. The system displays that level and above on the console.</p> <ul style="list-style-type: none"> • File Name—Name of the file to which messages are logged. • Size (bytes)—Maximum size, in bytes, that the file can reach before the system begins to overwrite the messages.

Field	Description
Buffer	<ul style="list-style-type: none"> • Admin State—Administrative state of the policy: enabled or disabled. • Level—Message level: alert, critical, emergency, error, warning, notification, information, or debugging. If the Admin State is enabled, select the lowest message level that you want displayed. The system displays that level and above on the console. • Buffer Size (Bytes)—In bytes, the size of the buffer for syslog messages. • Wrap to Flash—Indicates whether or not the buffer contents are saved to flash memory with the buffer wraps (becomes full). Check the check box to save the contents to flash memory if the buffer wraps. • Max File Size in Flash (KB)—Maximum size, in kilobytes, that can be used by the syslog buffer. This option is enabled if the Wrap to Flash option is enabled. • Min Free Flash Size (KB)—Minimum size, in kilobytes, that is allocated for the syslog buffer. This option is enabled if the Wrap to Flash option is enabled.
Time Stamp	<p>Check the check box for each of the following options that you want to enable for displaying timestamps:</p> <ul style="list-style-type: none"> • Enable Timestamp • Include Year • Include Milliseconds • Show Time Zone • Use Local Time Zone

Step 6 Click **OK**.

Deleting a Syslog Policy for a Device Profile



Note When the system boots up, a default policy already exists. You can modify the default policy, but you cannot delete it.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Syslog**.
- Step 2** In the General tab, select the syslog policy that you want to delete, then click **Delete**.
- Step 3** When prompted, confirm the deletion.

Adding a Syslog Server for a Device Profile

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Syslog**.
- Step 2** In the General tab, click **Add Syslog Policy**.
- Step 3** In the Add Syslog Policy dialog box, click the **Servers** tab, then click **Add Syslog Server**.
- Step 4** In the Add Syslog Server dialog box, provide the information as described in [Add Syslog Server Dialog Box, on page 163](#), then click **OK** in the open dialog boxes.

Field Descriptions

Add Syslog Server Dialog Box

Field	Description
Server Type	One of the following server types: <ul style="list-style-type: none"> • primary • secondary • tertiary
Hostname/IP Address	Hostname or IP address where the syslog file resides. <p>Note If you use a hostname, you must configure a DNS server.</p>

Field	Description
Severity	One of the following severity levels: <ul style="list-style-type: none">• emergencies (0)• alerts (1)• critical (2)• errors (3)• warnings (4)• notifications (5)• information (6)• debugging (7)
Forwarding Facility	One of the following forwarding facilities: <ul style="list-style-type: none">• auth• authpriv• cron• daemon• ftp• kernel• local0• local1• local2• local3• local4• local5• local6• local7• lpr• mail• news• syslog• user• uucp

Field	Description
Admin State	Administrative state of the server: disabled or enabled.
Port	Port to use to send data to the syslog server. The default port selection is 514 for UDP. This option is not available for InterCloud policies.
Protocol	Protocol to use: TCP or UDP (default). This option is not available for InterCloud policies.
Use Transport Layer Security	Check the check box to use Transport Layer Security. This option is available only for TCP. This option is not available for InterCloud policies.
Server Interface	Interface to use to access the syslog server.

Editing a Syslog Server for a Device Profile

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Syslog**.
- Step 2** In the General tab, select the required syslog policy, then choose **Edit**.
- Step 3** In the Edit Syslog Policy dialog box, from the **Servers** tab, select the syslog server you want to edit, then click **Edit**.
- Step 4** In the Edit Syslog Server dialog box, edit the fields as required, using the information in the following table.

Field	Description
Server Type	One of the following server types: primary, secondary, or tertiary (read-only).
Hostname/IP Address	Hostname or IP address where the syslog file resides.

Field	Description
Severity	One of the following severity levels: <ul style="list-style-type: none">• emergencies (0)• alerts (1)• critical (2)• errors (3)• warnings (4)• notifications (5)• information (6)• debugging (7)
Forwarding Facility	One of the following forwarding facilities: <ul style="list-style-type: none">• auth• authpriv• cron• daemon• ftp• kernel• local0• local1• local2• local3• local4• local5• local6• local7• lpr• mail• news• syslog• user• uucp

Field	Description
Admin State	Administrative state of the policy: enabled or disabled.
Port	Port to use to send data to the syslog server. Valid port values are 1025 through 65535 for both TCP and UDP. The default TCP port is 1470. The default UDP port is 514.
Protocol	Protocol to use: TCP or UDP.
Use Transport Layer Security	Check the check box to use Transport Layer Security. This option is available only for TCP.
Server Interface	Interface to use to access the syslog server. This option applies to ASA 1000V only. Enter the data interface name specify in the edge firewall. Use the device CLI to configure a route through the management interface.

Step 5 Click **OK** in the open dialog boxes to save your changes.

Deleting a Syslog Server for a Device Profile

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Policies > Syslog**.
 - Step 2** In the General tab, select the syslog policy with the server you want to delete, then click **Edit**.
 - Step 3** In the Edit Syslog Policy dialog box, click the **Servers** tab.
 - Step 4** In the Servers tab, select the syslog server that you want to delete, then click **Delete**.
 - Step 5** When prompted, confirm the deletion.
 - Step 6** Click **OK** to save the policy.
-

Configuring Device Profiles

Adding a Firewall Device Profile

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Device Profiles**.

Step 2 In the General tab, click **Add Device Profile**.

Step 3 In the New Device Profile dialog box, enter the required information in the General and Policies tabs, then click **OK**:

Field	Description
DNS Servers	You can: <ul style="list-style-type: none"> • Add a new server. • Select an existing server and edit or delete it. • Use the arrows to change priority.
DNS Domains	You can: <ul style="list-style-type: none"> • Add a new domain. • Select an existing domain and edit or delete it.
NTP Servers	You can: <ul style="list-style-type: none"> • Add a new server. • Select an existing server and edit or delete it. • Use the arrows to change priority.
SNMP	You can: <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned. <p>This option is not available for InterCloud Management device profiles.</p>

Field	Description
Syslog	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.
Fault	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned. <p>This option is not available for InterCloud Management device profiles.</p>
Core File	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.
Policy Agent Log File	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.
Policy Engine Logging	<p>Select the appropriate radio button to enable or disable logging.</p> <p>This option is not available for InterCloud Management device profiles.</p>

Field	Description
Auth Policy	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned. <p>This option is not available for InterCloud Management device profiles.</p>

Editing a Firewall Device Profile

After you create a firewall device profile, you can edit it as needed.

Procedure

Step 1 Choose **Policy Management > Device Configurations > root > Device Profiles**.

Step 2 In the Device Profiles pane, select the profile you want to edit, then click **Edit**.

Step 3 In the Edit Firewall Device Policy dialog box, update the information in the General tab as described in the following table:

Field	Description
Name	<p>Profile name.</p> <p>This name can be between 1 and 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is saved.</p>
Description	<p>Brief profile description.</p> <p>The description can be between 1 and 256 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon.</p>
Time Zone	<p>Select the required time zone from the drop-down list.</p>

Step 4 In the Policies tab, update the information as described in the following table, then click **OK**:

Field	Description
DNS Servers	
Add DNS Server	Adds a DNS server.
Edit	Enables you to edit the selected DNS server.
Delete	Deletes the selected DNS server.
Up and down arrows	Change the priority of the selected DNS server. Prime Network Services Controller uses the DNS servers in the order in which they appear in the table.
<i>DNS Servers Table</i>	
IP Address	IP addresses for the DNS servers configured in the system.
Server Interface	Interface to use to access the DNS server.
NTP Servers	
Add NTP Server	Click to add an NTP server.
Edit	Enables you to edit the selected NTP server.
Delete	Deletes the selected NTP server.
Up and down arrows	Change the priority of the selected NTP Server hostname. Prime Network Services Controller uses the NTP servers in the order in which they appear in the table.
<i>NTP Servers Table</i>	
Hostname / IP Address	Hostnames or IP addresses for NTP servers configured in the system.
Interface Name	Interface to use to access the NTP server.
DNS Domains	
Add	Click to add a DNS domain name.
Edit	Click to edit the DNS domain name selected in the DNS Domains table. The default DNS name cannot be edited.

Field	Description
Delete	Click to delete the DNS domain name selected in the DNS Domains table.
DNS Domains table	Default DNS domain name and domain in the system.
Other Options	
SNMP	Select, add, or edit SNMP policies as needed.
Syslog	Select, add, or edit syslog policies as needed.
Fault	Select, add, or edit fault policies as needed.
Core File	Select, add, or edit core file policies as needed.
Policy Agent Log File	Select, add, or edit the policy agent log file policies as needed.
Policy Engine Logging	Select the appropriate radio button to enable or disable logging.
Auth Policy	Select an available authentication policy, or click Add Auth Policy to add a new authentication policy.

Deleting a Firewall Device Profile

Procedure

-
- Step 1** Choose **Policy Management > Device Configurations > root > Device Profiles**.
 - Step 2** In the **Work** pane, click the device profile you want to delete.
 - Step 3** Click **Delete**.
 - Step 4** In the Confirm dialog box, click **OK**.
-

Configuring NTP

Network Time Protocol (NTP) is a networking protocol used to synchronize the time on a network of machines. An NTP network usually gets its time from an authoritative time source, such as a radio clock or an atomic clock attached to a time server.

Prime Network Services Controller enables you to configure NTP for compute firewalls, edge firewalls, and Prime Network Services Controller itself.

Configuring NTP for a compute or edge firewall requires the following steps:

- 1 Configuring a device profile with NTP.
- 2 Applying the device profile to a compute or edge firewall

The following topics describe how to perform these steps.

For information on configuring NTP on Prime Network Services Controller, see [Adding an NTP Server](#), on page 65.

Creating a Device Profile with NTP

This procedure describes how to create a device profile with NTP that you can apply to an edge or compute firewall.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Device Profiles**.
 - Step 2** In the General tab, click **Add Device Profile**.
 - Step 3** In the New Device Profile dialog box, provide the following information:
 - Name—Profile name.
 - Description—Brief profile description.
 - Time Zone—From the drop-down list, choose the time zone.
 - Step 4** Click the **Policies** tab.
 - Step 5** In the NTP servers area, click **Add NTP Server**.
 - Step 6** In the Add NTP Server dialog box, enter the information as described in [Add NTP Server Dialog Box](#), on page 174, then click **OK**.
 - Step 7** Click **OK**.
-

What to Do Next

After you have configured the device profile, you can apply it to a firewall as described in the following topics:

- [Applying Device Profiles to Edge Firewalls](#), on page 174
- [Applying Device Profiles to Compute Firewalls](#), on page 174

Field Descriptions

Add NTP Server Dialog Box

Add NTP Server Dialog Box

Field	Description
Hostname/IP Address	NTP server name or IP address. For Prime Network Services Controller and VSGs, you can enter either a hostname or IP address. For ASA 1000Vs, you must enter an IP address.
Interface Name	(Policy Management Device Profiles only) Device interface to reach the NTP server. Only ASA 1000Vs support interface names. <ul style="list-style-type: none"> • If you specify an interface, use the interface name specified by the edge firewall. • To use the management interface, you must configure the route by using the CLI.
Authentication Key	(Policy Management Device Profiles only) Authentication key to access the NTP server. Only ASA 1000Vs support authentication keys.

Applying Device Profiles to Compute Firewalls

After you have created a device profile, you can apply the profile to a compute firewall.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Compute Firewalls > compute-firewall**.
 - Step 2** In the General tab, click **Select** in the Device Profile field.
 - Step 3** In the Select Device Profile dialog box, select the desired profile, then click **OK**.
 - Step 4** Click **Save**.
-

Applying Device Profiles to Edge Firewalls

After you have created a device profile, you can apply the profile to an edge firewall.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant > Edge Firewalls > edge-firewall**.
 - Step 2** In the General tab, click **Select** in the Device Profile field.
 - Step 3** In the Select Device Profile dialog box, select the desired profile, then click **OK**.
 - Step 4** Click **Save**.
-

Associating Device Policies with Profiles

After you create a device policy, you can associate it with a device profile. By doing so, you can ensure that all devices associated with the device profile use the same policy.

Procedure

- Step 1** Choose **Policy Management > Device Configurations > root > Device Profiles > profile** where *profile* is the device profile that you want to add the device policy to.
 - Step 2** Click the **Policies** tab.
 - Step 3** In the Policies tab, locate the drop-down list for the type of policy you want to associate, such as Syslog or Auth Policy.
 - Step 4** From the drop-down list, choose the policy to add to the profile, then click **Save**. The policy is automatically applied to all devices using the selected profile.
-



CHAPTER 11

Configuring Managed Resources

This section contains the following topics:

- [Resource Management, page 177](#)
- [Registering Third-Party VMs, page 178](#)
- [Verifying VM Registration, page 182](#)
- [Importing Service Images, page 182](#)
- [Compute Firewalls, page 183](#)
- [Edge Firewalls, page 189](#)
- [Edge Routers, page 191](#)
- [Load Balancers, page 196](#)
- [Adding a Port Profile to a VSM, page 203](#)
- [Updating Discovered VSM Port Profiles, page 204](#)
- [Troubleshooting Devices and Services, page 204](#)
- [Launching ASDM, page 205](#)
- [Managing VSG Pools, page 206](#)

Resource Management

Prime Network Services Controller enables you to manage the following resources:

- **Compute firewalls**—A virtual firewall that delivers security and compliance for a virtual computing environment at the VM level. Context-based and VLAN-independent policies can be applied to VM zones, thereby providing topology-invariant, policy-based security controls. In addition, traffic from external sources to VMs, and from VM to VM can be protected.
- **Edge firewalls**—A virtual appliance that secures the tenant edge in a multitenant environment. An example of an edge firewall is a Cisco Adaptive Security Appliance 1000V (ASA 1000V). An edge firewall:

- Supports site-to-site VPN, NAT, and DHCP.
 - Acts as a default gateway.
 - Secures the VMs within a tenant against network-based attacks.
- Edge routers—A virtual edge router that serves as a single-tenant WAN gateway in a multitenant cloud. It allows enterprises to extend their WANs into external provider-hosted clouds.
 - Load balancers—A virtual appliance that distributes network and application traffic across multiple servers. It improves application performance and prevents server failures by alleviating loads on servers.
 - Virtual Security Gateways (VSGs)—VSGs evaluate policies based on network traffic. The main functions of a VSG are as follows:
 - Receive traffic from Virtual Network Service Data Path (vPath).
For every new flow, the vPath component encapsulates the first packet and sends it to a VSG as specified in the Nexus 1000V port profiles. It assumes that the VSG is Layer 2 adjacent to vPath. The mechanism used for communication between vPath and the VSG is similar to VEM and Nexus 1000V communication on a packet VLAN.
 - Perform application fix-up processing such as FTP, TFTP, and RSH.
 - Evaluate policies by inspecting the packets sent by vPath using network, VM, and custom attributes.
 - Transmit the policy evaluation results to vPath.



Note Each vPath component maintains a flow table for caching VSG policy evaluation results.

- Virtual Supervisor Modules (VSMs)—A virtual appliance that runs on a Nexus 1000V switch and that manages, monitors, and configures multiple Virtual Ethernet Modules (VEMs). VEMs run as part of a hypervisor where they act as virtual switches. VSMs are tightly integrated with hypervisors, so that configurations made on a VSM are automatically propagated to the VEMs. As a result, instead of configuring soft switches inside the hypervisor on a host-by-host basis, you can define configurations for immediate use on all VEMs that are managed by the VSM from a single interface.

You manage resources by placing them in service. The general workflow for placing devices in service is as follows:

- 1 Create tenants and subordinate organizations.
- 2 Configure device policies.
- 3 Register or instantiate service devices from service images.

Registering Third-Party VMs

Registering third-party VMs in Prime Network Services Controller is a two-step process, as described in the following topics:

- 1 [Installing the Prime Network Services Controller Device Adapter](#), on page 180
- 2 [Deploying and Registering Third-Party VMs](#), on page 179

Deploying and Registering Third-Party VMs

This procedure describes how to deploy third-party VMs (such as Citrix NetScaler 1000V and Citrix NetScaler VPX) and register them with Prime Network Services Controller.

Before You Begin

Confirm the following:

- Prime Network Services Controller Device Adapter is successfully registered with Prime Network Services Controller by choosing **Administration > Service Registry > Providers**. The Providers table should include managed-endpoint and mgmt-controller entries for the Prime Network Services Controller Device Adapter VM.
- The third-party OVA is available from the VMware vSphere Client.



Note

If you are prompted with a third-party login screen requesting information (for example, management IP information or upload feature licenses), you can do either of the following:

- Use the existing configuration and ignore this screen.
- Refer to the following URL for additional Citrix licensing features: <http://support.citrix.com/proddocs/topic/netscaler-getting-started-map-10-1/ns-initial-config-using-ftu-wizard-tsk.html>

Procedure

Step 1 In VMware, choose the host on which to deploy the third-party VM.

Step 2 Choose **File > Deploy OVF Template**.

Step 3 In the wizard, provide the information as described in the following table.

Note The same information is required for both Citrix NetScaler 1000V and Citrix NetScaler VPX VMs.

Screen	Action
Source	Choose the OVA that you want to deploy.
OVF Template Details	Review the details.
Name and Location	Enter a name and choose a location for the VM.
Storage	Choose the location for the VM files.
Disk Format	Choose the format in which to store the virtual disks.
Network Mapping	Choose the destination networks for the VM.

- Step 4** In the Ready to Complete screen, review the deployment settings for accuracy, and then click **Finish**.
- Step 5** Open the VM console so that you can monitor the deployment status.
- Step 6** When prompted in the console, enter the following information for the VM:
- IP address
 - Subnet mask
 - Gateway IP address
- Step 7** When the information is correct, enter **4** and press **Return**.
You can continue to monitor the progress in the console.
- Step 8** Confirm that the VM is registered in Prime Network Services Controller by choosing **Resource Management > Resources > resource**. For example, for Citrix NetScaler load balancer VMs, you would choose **Resource Management > Resources > VPX**.
-

Installing the Prime Network Services Controller Device Adapter

The Prime Network Services Controller Device Adapter enables third-party VMs (such as Citrix NetScaler load balancers) to register with Prime Network Services Controller.



Note

- Prime Network Services Controller Device Adapter is required and must be installed before you deploy and register third-party service nodes, such as Citrix NetScaler 1000V and Citrix NetScaler VPX service nodes.
 - Adding or editing policies from the Prime Network Services Controller Device Adapter is not supported. All configuration must be performed using the Prime Network Services Controller GUI.
 - You need to install the Prime Network Services Controller Device Adapter only once for each Prime Network Services Controller instance.
-

Before You Begin

Make sure that a network path exists between the Prime Network Services Controller Device Adapter IP address and the Prime Network Services Controller management IP address.

Procedure

- Step 1** Use the VMware vSphere Client to log in to the vCenter server.
- Step 2** Choose the host on which to deploy the Prime Network Services Controller Device Adapter.
- Step 3** Choose **File > Deploy OVF Template**.
- Step 4** In the wizard, provide the required information as described in the following table:

Screen	Action
Source	Navigate to and choose the <code>nsc-device-adapter.3.2.nx.ova</code> file.
OVF Template Details	Review the details of the Prime Network Services Controller Device Adapter template.
End User License Agreement	Review the agreement and click Accept .
Name and Location	Specify a name and location for the VM. The name must begin with a letter.
Deployment Configuration	Choose Installer .
Storage	Choose the data store for the VM.
Disk Format	Choose the required format.
Network Mapping	Choose the management network port group for the VM.
Properties	Provide the required information with particular attention to the following fields: <ul style="list-style-type: none"> • NTP—Enter the IP address for an NTP server. • Prime Network Services Controller Device Adapter IP Address RegIP—Enter the IP address for the Prime Network Services Controller server.
Ready to Complete	Review the deployment settings for accuracy.

Step 5 Click **Finish**.

Step 6 After the deployment is complete, power up the VM.
You can monitor the progress of the deployment by opening the VM console.

Step 7 Confirm that the Prime Network Services Controller Device Adapter VM is successfully registered with Prime Network Services Controller by logging in to the Prime Network Services Controller server and choosing **Administration > Service Registry > Providers**.
The Providers table should include managed-endpoint and mgmt-controller entries for the Prime Network Services Controller Device Adapter VM that you deployed.

Verifying VM Registration

Use this procedure to verify that the following VMs are successfully registered in Prime Network Services Controller:

- ASA 1000V
- CSR 1000V
- InterCloud
- Citrix NetScaler load balancer
- VSG
- VSM

To confirm registration with Prime Network Services Controller, choose **Resource Management > Resources > resource**. In the content pane, the consolidated status for each resource is displayed in the Status column. This consolidated status is determined by assessing the following attributes in sequence:

- 1 Reachability
- 2 Association
- 3 Config State
- 4 Running

If any of these attributes fail, the failure of that attribute is displayed. For example, if the device cannot be reached, the status *unreachable* is displayed. Similarly, if the device is reachable and associated, but the configuration fails, the status *config failed* is displayed.

Importing Service Images

Prime Network Services Controller enables you to import service images that you can then use to instantiate a service device.

After you import an image, Prime Network Services Controller automatically places the file in the correct location and populates the Images table.

For information on instantiating a service VM from a service image, see the following topics:

- [Adding a Compute Firewall, on page 183](#)
- [Adding an Edge Firewall, on page 189](#)
- [Adding Edge Routers, on page 195](#)
- [Adding Load Balancers, on page 199](#)

Before You Begin

Confirm that the service images are available for importing into Prime Network Services Controller.

Procedure

- Step 1** Choose **Resource Management > Resources > Images**.
- Step 2** Click **Import Service Image**.
- Step 3** In the Importing Service Image Dialog box:
- Enter a name and description for the image you are importing.
 - In the Type field, choose the type of image to import.
 - In the Version field, enter a version number that you want to assign to the image.
 - In the Import area, provide the following information, and then click **OK**:
 - Protocol to use for the import operations: FTP, SCP, or SFTP.
 - Hostname or IP address of the remote host with the images.
 - Account username and password for the remote host.
 - Absolute image path and filename, starting with a slash (/).
-

Compute Firewalls

Adding a Compute Firewall

You can add a compute firewall and assign it to a VSG, thereby placing the VSG in service. A wizard walks you through the configuration process, which includes assigning profiles, assigning a VSG or instantiating a VSG service image, and configuring interfaces.

When you add a new compute firewall, the firewall data IP address can be the same as the data IP address of an existing compute firewall in Prime Network Services Controller as long as the firewalls have different organizational paths. That is, as long as the firewalls do not reside in the same organization, including parent and child organizations.

**Note**

We recommend that you add the compute firewall at the tenant level or below, and not at the root level.

Before You Begin

- You must have at least one of the following:
 - An available VSG that is registered in Prime Network Services Controller. For more information, see [Verifying VM Registration](#), on page 182.
 - A VSG pool with at least one available VSG.
 - An imported VSG service image.
- A VM Manager must be configured in Prime Network Services Controller.



Note For HA-specific configurations, refer to the appropriate [Cisco Adaptive Security Appliance 1000V \(ASA 1000V\)](#) configuration guide for additional information.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the Network Services tab, choose **Add Compute Firewall**.
- Step 3** In the Properties screen, provide the information as described in [Properties Screen, on page 185](#), and then click **Next**.
- Step 4** In the Service Device screen, select the required VSG service device, provide any required information as described in [Service Device Screen, on page 185](#), and then click **Next**.
- Step 5** (Instantiate option only) If you instantiate a VSG service device from an image, do one or both of the following in the Placement screen, and then click **Next**:
- Navigate to and choose the host or resource pool to use for the VSG instance.
 - If you enabled high availability, either check the **Same as Primary** check box, or navigate to and choose the host or resource pool to use for the secondary VSG instance.
- Step 6** In the Interfaces screen, configure interfaces as follows, and then click **Next**:
- If you assigned a VSG, enter the data IP address and subnet mask.
 - If you assigned a VSG pool, enter the data IP address and subnet mask.
 - If you instantiated a VSG service device without high availability, add management and data interfaces.
 - If you instantiated a VSG service device with high availability, add management, data, and HA interfaces.
- For field-level help when configuring the interfaces, see the online help.
- Step 7** In the Summary screen, confirm that the information is correct, and then click **Finish**.

Compute Firewall Deployment Options

VSG compute firewalls are available in the following deployment models based on the memory, CPU speed, and number of virtual CPUs. Choose the deployment size that is appropriate for your environment.

Deployment Size	Memory	CPU Speed	Number of Virtual CPUs
Small	2 GB	1.0 GHz	1
Medium	2 GB	1.5 GHz	1
Large	2 GB	1.5 GHz	2

Field Descriptions

Properties Screen

Field	Description
Name	<p>Compute firewall name.</p> <p>This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.</p>
Description	<p>Compute firewall description.</p>
Host Name	<p>Management hostname of the firewall.</p>
Device Profile	<p>Do either of the following:</p> <ul style="list-style-type: none"> • Click the profile name to view or optionally modify the currently assigned device configuration profile. • Click Select to choose a different device configuration profile.

Service Device Screen

Field	Description
Assign VSG	<p>Assign a VSG to the compute firewall.</p> <p>From the VSG Device drop-down list, choose the required service device.</p>
Assign VSG Pool	<p>Assign a VSG pool to the compute firewall.</p> <p>In the VSG Pool field, either choose the required pool from the drop-down list or click Add Pool to add a new pool.</p>

Field	Description
Instantiate	<p>Instantiate a VSG service device from an available image.</p> <ol style="list-style-type: none"> 1 In the list of available images, select the image to use to instantiate a new VSG service device. 2 In the High Availability field, check the Enable HA check box to enable high availability. 3 From the Deployment Size drop-down list, choose the size of the deployment. For more information, see Compute Firewall Deployment Options, on page 184. 4 In the VM Access password fields, enter the password for the admin user account.

Managing Compute Firewalls

You can edit and view fault information on existing compute firewalls as needed.

Procedure

Step 1 In the Resource Management tab, choose **Managed Resources > root > tenant**.

Step 2 In the Network Services tab, select the required compute firewall, and then click **Edit** or **Delete**.

Step 3 If you chose **Edit**, modify the fields as appropriate, using the information in the following tables, and then click **OK**.

Note To view additional information about an entry in the Faults tab, double-click the entry, or select the entry and then click **Properties**.

General Tab

Field	Description
Name	Compute firewall name.
Description	Compute firewall description.
Management IP Address	Management IP address for the compute firewall.
HA Role	High availability role of the compute firewall: standalone or active standby.
Deployment Size	Size of the deployment: Small, Medium, or Large.
Device Profile	Device profile associated with the compute firewall.
Status	

Field	Description
Deploy State	Deployment state of the firewall.
Power State	Whether the firewall is powered off or on.
Config Status	Configuration status of the compute firewall: applied, applying, failed-to-apply, or not-applied.
Association Status	Association state of the firewall: associated, associating, disassociating, failed, or unassociated.
Reachable	Whether or not the compute firewall is reachable.

Placement Tab

This tab is displayed only if the compute firewall is instantiated from a service image.

Field	Description
Image Table (read-only)	
Select	Radio-button indicating image selection.
Name	Service image name.
Version	Service image version.
VM Manager Details	
If high availability is enabled, the following fields are displayed for both the primary and secondary service devices.	
VM Manager	VM Manager for the service device.
Host	IP address of the VM host.
Instance Name	VM instance name.

Network Interfaces Tab—VSG Assigned

This tab is displayed only if a VSG was assigned to the compute firewall.

Field	Description
Management Hostname	Management hostname for the compute firewall.
Data IP Address	Compute firewall data IP address.
Data IP Subnet	Netmask for the data IP address.

Field	Description
VLAN	VLAN to use for service path configuration if the device is running in Layer 2 mode.

Network Interfaces Tab—VSG Instantiated

This tab is displayed only if the compute firewall was instantiated from a service image.

Field	Description
Toolbar	
Add Interface	Adds an interface.
Edit	Enables you to edit the selected interface.
Delete	Deletes the selected interface.
Filter	Filters the table contents by the string or value that you enter.
Table	
Type	Interface type: Data, HA, or Management.
IP Address	Interface IP address.
Port Group / Sub Network	Port group or subnetwork associated with the interface.

Unassigning a VSG

Use this procedure to remove a VSG from a compute firewall.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
 - Step 2** In the Network Services tab, choose the compute firewall with the VSG that you want to unassign.
 - Step 3** In the toolbar, choose **Actions > Unassign VSG**.
 - Step 4** When prompted, confirm the action.
-

Edge Firewalls

Adding an Edge Firewall

You can add an edge firewall and assign it to an ASA 1000V, thereby placing the ASA 1000V in service. A wizard walks you through the configuration process, which includes assigning configuration and service profiles, assigning an ASA 1000V or instantiating an ASA 1000V service image, and configuring interfaces.

Before You Begin

- At least one of the following must exist:
 - An ASA 1000V must be registered in Prime Network Services Controller and must be available for assignment.
 - An imported ASA 1000V service image.
- A VM Manager must be configured in Prime Network Services Controller. For more information about VM registration, see the [Cisco Prime Network Services Controller 3.2 Quick Start Guide](#).

**Note**

For HA-specific configurations, refer to the appropriate [Cisco Adaptive Security Appliance 1000V \(ASA 1000V\)](#) configuration guide for additional information.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the Network Services tab, choose **Add Edge Firewall**.
- Step 3** In the Properties screen, provide the information described in [Properties Screen, on page 190](#), and then click **Next**.
- Step 4** In the Service Device screen, do one of the following, and then click **Next**:
 - To assign an existing ASA 1000V service device:
 - 1 Click **Assign ASA 1000V**.
 - 2 From the **ASA 1000V Device** drop-down list, choose the required ASA 1000V.
 - To instantiate a new ASA 1000V:
 - 1 Click **Instantiate**.
 - 2 Choose the image to use to instantiate a new ASA 1000V service device.
 - 3 In the VM Access password fields, enter the password for the admin user account.
- Step 5** (Instantiate option only) If you instantiate a ASA 1000V service device from an image, do one or both of the following in the Placement screen, and then click **Next**:

- Navigate to and choose the host or resource pool to use for the ASA 1000V instance.
- If you enabled high availability, either check the **Same as Primary** check box, or navigate to and choose the host or resource pool to use for the secondary ASA 1000V instance.

Step 6 In the Interfaces screen, add the required interfaces as follows, and then click **Next**:

- If you assigned an ASA 1000V without high availability, configure one inside and one outside interface.
- If you assigned an ASA 1000V with high availability, configure one inside and one outside interface, each with a secondary IP address.
- If you instantiated an ASA 1000V without high availability, configure management, inside, and outside interfaces.
- If you instantiated an ASA 1000V with high availability, configure management, inside, outside, and HA interfaces.

Note The management and HA interfaces must use different port profiles.

Step 7 In the Summary screen, confirm that the information is accurate, and then click **Finish**.

Step 8 If you instantiated the ASA 1000V from a service image, you must do the following to ensure registration with Prime Network Services Controller:

- a) **Within 15 minutes of instantiation**, manually register the ASA 1000V to Prime Network Services Controller by using the ASA 1000V CLI.
- b) If you do not register the ASA 1000V within 15 minutes of instantiation, the instantiated ASA 1000V will enter a failed state, and you must delete it manually from Prime Network Services Controller and the hypervisor.

Field Descriptions

Properties Screen

Field	Description
Name	Edge firewall name. This name can contain 1 to 32 identifier characters. You can use alphanumeric characters including hyphen, underscore, dot, and colon. You cannot change this name after it is created.
Description	Edge firewall description.
Host Name	Management hostname of the firewall.
High Availability	Check the Enable HA check box to enable high availability.

Field	Description
Device Configuration Profile	Do either of the following: <ul style="list-style-type: none"> Click the profile name to view and optionally modify the currently assigned device configuration profile. Click Select to choose a different device configuration profile.
Device Service Profile	Do either of the following: <ul style="list-style-type: none"> Click the profile name to view and optionally modify the currently assigned device service profile. Click Select to choose a different device service profile.

Unassigning an ASA 1000V

If required, you can unassign an ASA 1000V from an edge firewall.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
 - Step 2** In the Network Services tab, choose the required edge firewall.
 - Step 3** In the toolbar, choose **Actions > Unassign ASA 1000V**.
 - Step 4** When prompted, confirm the action.
-

Edge Routers

Edge Router Configuration Workflow

This workflow describes how to create an edge router under a tenant.

Steps	Notes
1. Confirm that prerequisites are met.	See Prerequisites for Configuring Edge Routers , on page 192.

Steps	Notes
2. (Optional) Configure Edge Router configuration and service profiles and policies. If needed, you can use the default profiles.	<ul style="list-style-type: none"> • Choose Policy Management > Service Profiles > <i>tenant</i> > Edge Router and select Device Service Profiles or Interface Service Profiles • Choose Policy Management > Service Policies > <i>tenant</i> and select Policies or Policy Helpers
3. Add an edge router under a tenant.	Choose Resource Management > Managed Resources > <i>tenant</i> and select Add Edge Router from the Network Services Actions drop-down list.
4. Enter the appropriate information in the Add Edge Router Wizard.	See Adding Edge Routers, on page 195 .
5. Verify that the edge router has been created.	Choose Resource Management > Resources and select the edge router device and view the device status in the table. Note It takes some time for the logical device to associate with the physical device.

Prerequisites for Configuring Edge Routers

The following table lists the information you should have on hand and any prerequisites for configuring edge routers. For information on adding and configuring edge routers, see [Edge Router Configuration Workflow, on page 191](#) and [Adding Edge Routers, on page 195](#).



Note

By default, CSR 1000V OVA images contain three vNICs and Prime Network Services Controller will instantiate CSR 1000V service images with only three interfaces. If you need more than three edge router interfaces, see <http://www.cisco.com/en/US/docs/routers/csr1000/software/configuration/vminterface.html> for information on how to configure additional interfaces.

Item	Notes
Decide whether you are assigning or instantiating an edge router.	<p>Note all the necessary edge router information needed for configuration.</p> <ul style="list-style-type: none"> • To assign an edge router to Prime Network Services Controller, an edge router VM must be installed. Use VM management software (such as VMware) to deploy a device image from an OVA template and register the device with Prime Network Services Controller. For Cisco Cloud Services Router 1000V, see the Cisco CSR 1000V Configuration Guide. • To instantiate an edge router, an edge router service image must be available. For more information, see Importing Service Images, on page 182.
At least one tenant is configured	See Creating a Tenant .
Determine the number of loopback interfaces required on the edge router.	Loopback interfaces cannot be added or deleted after an edge router is instantiated. Therefore, all required loopback interfaces must be configured before assignment or during instantiation.
Determine the number of data (Gigabit Ethernet) interfaces required on the edge router.	Data interfaces cannot be added or deleted after an edge router is instantiated. Therefore, all required data interfaces must be configured before assignment or during instantiation.
Decide whether to create a new edge router device profile	Prime Network Services Controller offers a default configuration profile that contains common policies for all devices managed in Prime Network Services Controller. You can use or edit the default profile, or customize a new profile. To create a new device configuration profile, choose Policy Management > Device Configurations > root (or tenant) > Device Profiles and click Add Device Profile .

Item	Notes
Decide whether to configure or use the default device service profiles.	<p>To create or edit a device service profile, note the following applicable router policy and interface information you need for configuration:</p> <p>Device Service Profile (Policies)</p> <ul style="list-style-type: none"> • Routing Policy <ul style="list-style-type: none"> ◦ Static ◦ BGP ◦ OSPF • NAT <p>Note Edge routers support a limited set of NAT policy options.</p> • Zone-Based Firewall <p>Note For more information on zone-based firewall configuration, see Configuring Zone-Based Firewall Policies, on page 116.</p> <p>Note A zone policy defines the traffic that you want to allow or deny between zones. A zone-pair policy allows you to specify a unidirectional firewall policy between two zones. The direction is defined by specifying a source and destination zone.</p> <p>Interface Service Profiles</p> <ul style="list-style-type: none"> • Ingress • Egress • NAT Membership • Firewall Zone Membership <p>Note A firewall zone is a group of interfaces to which a policy can be applied. By default, traffic can flow freely within that zone but all traffic to and from that zone is dropped. To allow traffic to pass between zones, you must explicitly declare it by creating a zone-pair and a policy for that zone.</p>

Adding Edge Routers

This procedure describes the steps in the Add Edge Router wizard. The Add Edge Router wizard is part of the [Edge Router Configuration Workflow](#), on page 191. Before using the Add Edge Router wizard, see [Prerequisites for Configuring Edge Routers](#), on page 192.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > tenant**, and then choose **Add Edge Router**.
 - Step 2** Enter edge router device information in the Properties window and click **Next**.
 - Step 3** If you are instantiating an edge router, do the following, and then click **Next**:
 - a) Select the image to use to instantiate the edge router.
 - b) In the Compute area, enter the number of virtual CPUs and amount of memory you need to meet the required throughput. For more information, see [Edge Router Deployment Options](#), on page 195.
 - c) In the VM Access area, enter the access credentials.
 - Step 4** In the Service Device screen, if you are assigning an edge router, choose the deployed edge router, configure the applicable interfaces and IP addresses, and then click **OK**.
 - Note**
 - You must configure at least two Gigabit interfaces.
 - The primary IP address and the sub management IP address must be in the same subnet.
 - Step 5** In the Placement screen, choose the location for the edge router.
 - Step 6** In the Interface screen, assign the IP address. Keep in mind that the the primary IP address and the sub management IP address must be in the same subnet.
 - Step 7** Click **Finish** if the summary details are correct.
-

Edge Router Deployment Options

Edge routers can support different amounts of throughput based on the number of virtual CPUs and amount of memory. Choose the number of virtual CPUs and amount of memory that are appropriate for your environment and for the desired throughput.

Throughput	Technology Package		
	Standard	Advanced	Premium
10 Mbps	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM
50 Mbps	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM
100 Mbps	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM	1 vCPU, 2.5 GB RAM
250 Mbps	4 vCPU, 4 GB RAM	4 vCPU, 4 GB RAM	4 vCPU, 4 GB RAM

Throughput	Technology Package		
500 Mbps	4 vCPU, 4 GB RAM	—	—
1 Gbps	4 vCPU, 4 GB RAM	—	—

Managing Edge Routers

You can do the following edge router management tasks:

- Edit information and network interfaces.
- Modify the device profile, device service profile, and the interface service profile.
- Delete an edge router.
- Monitor status and view fault information.
- You can start, stop, and reboot edge routers that have been instantiated.
- You can perform assign and unassign operations for edge routers that have been registered.

For information on initial edge router configuration, see [Edge Router Configuration Workflow](#), on page 191 and [Prerequisites for Configuring Edge Routers](#), on page 192.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the Network Services tab, choose the required edge router and then click **Edit** or **Delete**.
- Step 3** If you chose **Edit**, modify or view the appropriate tab information in the Edit dialog box, and then click **OK**.
- Note** To view additional information about an entry in the Faults tab, double-click the entry, or select the entry and then click **Properties**.
-

Load Balancers

Load Balancer Configuration Workflow

This workflow describes how to create a load balancer under a tenant. The workflow includes creating a virtual server profile and an associated service if one does not exist.

Steps	Notes
1. Confirm that the prerequisites are met.	See Prerequisites for Configuring Load Balancers, on page 197 . This topic also includes the following information: <ul style="list-style-type: none"> • Importing load balancer licenses. • Installing the device adapter.
2. Add a virtual server profile to a tenant.	Add a service and enter general and server farm information. See Load Balancing Service Dialog Boxes, on page 200 for server farm information.
3. Verify that the virtual server profile has been created.	Choose Policy Management > Service Profiles > tenant > Load Balancer and confirm that the virtual server has been created in the Virtual Server Profiles table.
4. Add a load balancer device under a tenant.	Choose Resource Management > Managed Resources > tenant and then choose Add Load Balancer from the Network Services Actions drop-down list.
5. Enter the appropriate information in the Add Load Balancer Wizard.	The wizard maps a logical load balancer and configures the virtual IP addresses to the selected virtual servers. For more information, see Adding Load Balancers, on page 199 .
6. Verify that the load balancer has been created.	Choose Resource Management > Resources > VPX > load-balancer and then view the device status in the table. It takes some time for the logical device to associate with the physical device.

After a load balancer is added and configured, you can view faults, edit, and monitor the load balancer. For more information, see [Managing Load Balancers, on page 202](#). Also, if you would like to edit services on a server profile (for example, add ping monitors), choose **Policy Management > Service Profiles > tenant > Load Balancer > Virtual Server Profiles > service** and click **Edit**.

Prerequisites for Configuring Load Balancers

The following table lists the information you should have on hand and any prerequisites for configuring load balancers:



Note

For load balancer configuration, see [Load Balancer Configuration Workflow, on page 196](#) and [Adding Load Balancers, on page 199](#).

Item	Notes
Tenant	At least one existing tenant configured.
Load Balancer Information	

Item	Notes
For Citrix NetScaler load balancers, the Prime Network Services Controller Device Adapter must be deployed	See Registering Third-Party VMs .
Decide whether you are assigning or instantiating a load balancer	<p>Note all the necessary load balancer information needed before configuration.</p> <p>To assign a load balancer, the load balancer OVA must first be deployed. For Citrix NetScaler load balancers, see Citrix Netscaler documentation and also Registering Third-Party VMs.</p> <p>To instantiate a load balancer, a load balancer service image must be available. See Importing Service Images for information on how to import a service image.</p>
Virtual Server Profile Information	
Determine the number of virtual servers required on the load balancer	Virtual servers cannot be added or deleted after a load balancer is instantiated. All required virtual servers must be configured before registration or during instantiation.
Service and server farm information	<ul style="list-style-type: none"> • Protocol • Port • Algorithm • Persistence • Real server • Host name or IP address <p>For more information, see Load Balancing Service Dialog Boxes, on page 200.</p>
Monitor information	<ul style="list-style-type: none"> • TCP • HTTP • Ping

Adding Load Balancers

This procedure describes the steps in the Add Load Balancer wizard. Before using the Add Load Balancer wizard, confirm that the prerequisites are met in [Prerequisites for Configuring Load Balancers](#), and see [Load Balancer Configuration Workflow](#).

Procedure

Step 1 Enter load balancer device information in the Properties window and click **Next**.

Note If you choose to enable vPath, only vPath-enabled devices (like Citrix Netscaler 1000V) will be available for selection in the instantiation image list.

Step 2 Choose whether you want to register or instantiate a load balancer in the Service Device window.

Step 3 Do one of the following:

1 If you are registering a load balancer:

- Enter all required information (device IP address, subnet mask and gateway information).
- Select the device type and version from the drop-down lists.
- Enter the device access credentials.
- Configure one data interface and one virtual IP interface in the Configure Interface window, then click **Next**. All interfaces must be in different subnetworks. The management interface is automatically taken from the device IP address that you entered above.

2 If you are instantiating a load balancer:

- Select the instantiation image and locate where the VM will be hosted.
- Enter the virtual machine access credentials and click **Next**.
- Navigate to VM placement.
- Configure one data interface and one management interface in the Configure Interface window, then click **Next**.

Step 4 Configure a virtual server by selecting an existing virtual server profile and assigning virtual IP addresses (VIPs) in the Configure Virtual Server window, then click **Next**.

Note

- VIPs are public IP addresses that clients connect to and where all traffic is directed to. Behind VIPs are real servers where load balancing occurs. Limit the number of VIPs to 64 VIPs per load balancer.

- The VIP IP address cannot be on the management network.

Step 5 Click **Finish** if the summary details are correct.

For troubleshooting information, view errors in the Faults tab (see [Managing Load Balancers](#)). If you would like to modify the virtual server profile services (for example, add monitors to your server farm) choose **Policy Management > Service Profiles > tenant > Load Balancer > Virtual Server Profiles > service** and click **Edit**. Navigate to the Server Farm tab to modify any information.

Load Balancing Service Dialog Boxes

Various Service dialog boxes appear when configuring a virtual server service for a load balancer profile. For more information on how to configure a load balancer profile, see the [Load Balancer Configuration Workflow](#) topic.

Server Farm Information



Note

- If you need to add a new server farm, you must enter information in the Real Server and Monitor tabs.
- To confirm that your configurations were applied, you can view the device's UI.

Field	Notes
Protocol	If you select SSL or SSL_TCP, a security policy must be configured. See the Security Policy Dialog Boxes topic which describes.
Algorithm	Select the scheduling algorithm for the server farm. <ul style="list-style-type: none"> • Least Connection—New connections are sent to the server with the fewest connections. • Destination IP Hash—Selects a server based on a hash of the source IP address of each packet. • Least Bandwidth—New connections are sent to the server with the least bandwidth. • Least Packets—New connections are sent to the server with the least packets. • Least Response Time—New connections are sent to the server with the least response time. • Round Robin—Each server is used in turn according to the weight assigned to it. • URL Hash—The left part of the URL (before the question mark) is hashed and divided by the total weight of the running servers. The result designates which server will receive the request. Applicable to only HTTP service load balancing.
Increment Interval	Interval at which the server is pinged.

Field	Notes
Persistence	<p>Select the persistence method that will define how the load balance service handles information. The following persistence restrictions exist:</p> <ul style="list-style-type: none"> • SSL—Applies only to SSL-based services. • Cookie Insert—Applies only to HTTP-based services. <p>Note If the service protocol and persistence is an invalid combination, a "failed-to-apply" status appears in the Network Services tab.</p>
Monitors	
HTTP	Monitors HTTP traffic.
Ping	Pings real servers to see if they are up and running.
TCP	Monitors TCP traffic.

Limitations

- 64 real servers per server farm
- 64 monitors per server farm
- 16 services per virtual server

Security Policy Dialog Boxes

Load Balancing Security Policy Information

For load balancing, if SSL and SSL-TCP protocols are selected, security policies must be configured. You can configure security policies so that cryptographic authentication is enabled using the SSL Params, Cipher Groups, Certificate, and Certificate Key File dialog boxes.



Note

SSL offload configuration requires a valid certificate and key file.

Dialog Box	Description
SSL Params	Allows you to customize the SSL configuration. From this dialog box you may choose to enable and configure the following: <ul style="list-style-type: none"> • Ephemeral RSA • Session reuse • Cipher redirect • SSL and SSLv2 redirect • Selection of TLSv1, SSLv3, and SSLv2 protocols • Close notifications • SSL redirect port rewrite
Cipher Group	Allows you to select or add cipher groups. A cipher group is a set of cipher suites that you attach to an SSL service.
Certificate and Certificate Key File	Allows you to configure or add certificates and certificate key files.

Managing Load Balancers

You can do the following load balancer management tasks:

- Edit information and network interfaces.



Note Management and data IP interfaces cannot be modified after creation.

- Delete a load balancer.
- Monitor status and view fault information.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the Network Services tab, choose the required load balancer, and then click **Edit** or **Delete**.
- Step 3** If you chose **Edit**, modify or view the appropriate tab information in the Edit dialog box, and then click **OK**.
- Note** To view additional information about an entry in the Faults tab, double-click the entry, or select the entry and then click **Properties**.

If you would like to modify the virtual server profile services (for example, add monitors to your server farm) choose **Policy Management > Service Profiles > tenant > Load Balancer > Virtual Server Profiles > service** and click **Edit**. Navigate to the Server Farm tab to modify any information.

Adding a Port Profile to a VSM

Prime Network Services Controller enables you to add a port profile to an enterprise VSM. You cannot add a port profile to a cloud VSM.

If an enterprise VSM has preconfigured port profiles or virtual service configurations that were created outside of Prime Network Services Controller, these configurations will not be displayed in the Prime Network Services Controller GUI.

If you create a port profile in Prime Network Services Controller and specify a VLAN, you must create the VLAN itself on the VSM and then add it to the necessary system and uplink port profiles. The same steps apply for VLANs that you specify while creating service devices, such as edge or compute firewalls: you must create the VLANs on the devices, and then add them to the appropriate system and uplink port profiles.

Before You Begin

Confirm the following:

- An enterprise VSM is registered and in the *applied* state in Prime Network Services Controller by choosing **Resource Management > Resources > VSMs**.
- You have admin privileges.

Procedure

- Step 1** Choose **Resource Management > Resources > VSMs > vsm**, then click **Edit**.
- Step 2** Above the Port Profile table, click **Add**.
- Step 3** In the Add Port Profile dialog box, enter the required information as follows, then click **OK**:
 - 1 In the General tab, provide the following information:
 - Name
 - Description
 - State: Enabled or Disabled.
 - Type of Binding: Dynamic, Ephemeral, or Static.
 - Binding Option: Auto, AutoExpand, or None.
 - Maximum and minimum number of ports.
 - Tenant or subordinate organization in which to create the port profile.
 - 2 In the L2 Network Membership tab, provide the following information:
 - Capability: Bridge Domain or VLAN.

- Mode: Access or Trunk
 - VLAN number (Access mode) or VLAN range (Trunk mode).
-

The NICs table is populated automatically after you bind a service path to the port profile and the service path is used the first time. For more information about configuring a service path and binding it to a port profile, see [Service Path Configuration Workflow](#), on page 75.

Updating Discovered VSM Port Profiles

When Prime Network Services Controller discovers a VSM port profile that was configured directly on the Nexus 1000V, only some of the configuration information is available to Prime Network Services Controller. As a result, you need to provide the missing information in Prime Network Services Controller.

This situation usually occurs under the following circumstances:

- A VSM port profile with an organization and virtual service have been configured on a Nexus 1000V.
- VMs with vNICs that use the port profile have also been configured on the device.

Procedure

- Step 1** Log in to the Prime Network Services Controller GUI and choose **Resource Management > Resources > VSM**.
 - Step 2** Choose the VSM with the port profile that was configured using the CLI, and then click **Edit**.
 - Step 3** In the Port Profiles table, choose the required port profile, and then click **Edit**.
 - Step 4** Update the port profile properties so that they are consistent with the configured port profile, and save your changes. You can then use the port profile as needed.
 - Step 5** If any port profile properties are modified via the CLI, update them in Prime Network Services Controller so that the configurations remain synchronized.
-

Troubleshooting Devices and Services

You can use Prime Network Services Controller to troubleshoot faults associated with managed devices and services.

Procedure

-
- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
 - Step 2** In the Network Services tab, choose the required service or device, and then click **Edit**.
 - Step 3** In the General tab, review the Status area for any issues or states affecting reachability, configuration, or association.
 - Step 4** In the Faults tab, review the displayed faults. To view additional information about a fault, double-click the entry, or choose the entry and then click **Properties**.
-

Launching ASDM

Prime Network Services Controller enables you to launch Cisco Adaptive Security Device Manager (ASDM) as a Web Start application on your desktop.

You can set up ASDM to be used by the ASA 1000V when it is configured for either Prime Network Services Controller management mode or ASDM management mode. When the ASA 1000V is configured to use Prime Network Services Controller management mode, you can use ASDM to monitor the status of the ASA 1000V, but you cannot use it to manage configurations.

Before You Begin

You must complete the following tasks before launching ASDM from Prime Network Services Controller:

1 Do one of the following:

- If you have not already deployed the ASA 1000V OVA, do so; during the deployment, provide the ASDM client IP address.
- If you have already deployed the ASA 1000V OVA, apply the following configuration by using the VM console in the vSphere client:

- Add a route on the management interface to the ASDM client subnet by issuing the following command:

```
ASA1000V(config)# route interface ip subnet next-hop-ip
```

where *interface* is the management interface to the ASDM client subnet, *ip* is the IP address of the host that accesses ASDM, *subnet* is the ASDM client subnet, and *next-hop-ip* is the IP address of the gateway.



Note Perform this step only if the next hop gateway IP address was not specified when deploying the ASA 1000V.

- Allow HTTP access via the management interface for the ASDM client subnet by entering the following command:

```
ASA1000V(config)# http ip subnet interface
```

where *ip* is the IP address of the host that accesses ASDM, and *interface* is the ASDM client interface.



Note Perform this step only if the ASDM client IP address was not specified when deploying the ASA 1000V.

- 2 Confirm the following:
 - The ASA 1000V is registered to Prime Network Services Controller.
 - A valid username and password exist for the ASA 1000V VM console.
- 3 Assign the edge firewall to an ASA 1000V instance. If the edge firewall is not assigned to an ASA 1000V instance, the ASDM options are not displayed in the UI.
- 4 Confirm that your system is configured to run downloaded Java Web Start applications.

For more information about configuring ASDM, see the *Cisco ASA 1000V Cloud Firewall Getting Started Guide*.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > tenant**.
 - Step 2** In the Network Services tab, choose the required edge firewall, and then click **Edit**.
 - Step 3** In the Edit dialog box, click **Launch ASDM**.
The ASDM Launch screen opens.
 - Step 4** In the ASDM Launch screen, click **Run ASDM**.
The ASDM Web Start application is automatically downloaded and runs. If prompted, accept the certificates.
- Note** If an ASDM login dialog box is displayed, you can click **OK** without entering login credentials.
-

Managing VSG Pools

Adding a VSG Pool

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the VSG Pools tab, click **Add Pool**.
- Step 3** In the Add Pool dialog box, enter a name and description for the pool.
- Step 4** To assign members to the pool:
 - a) Click **(Un)Assign**.

- b) In the Available list, choose the VSGs that you want to add to the pool, and then click the arrow to move them to the Assigned list.
- c) Click **OK**.

Step 5 Click **OK**.

Assigning a VSG Pool

You can assign a VSG pool to a compute firewall when you add a compute firewall to a tenant or other organization. For information on assigning a VSG to a compute firewall, see [Adding a Compute Firewall, on page 183](#).

Editing a VSG Pool

After you create a VSG pool, you can change its description and add or remove VSGs from the pool as required.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
 - Step 2** In the VSG Pools tab, choose the pool that you want to edit, and then click **Edit**.
 - Step 3** In the Edit Pool dialog box, modify the following information as required, and then click **OK**:
 - a) Edit the description.
 - b) To add or remove VSGs from the pool, click **(Un)Assign**.
 - c) To delete a VSG from the pool, choose the required VSG from the list of pool members, and then click **Delete**.
-

Unassigning a VSG Pool

If required, you can unassign a pool from a compute firewall.

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
 - Step 2** In the Network Services tab, select the required firewall, and then choose **Actions > Unassign VSG/Pool**.
 - Step 3** When prompted, confirm the action.
-

Deleting a VSG Pool

Procedure

- Step 1** Choose **Resource Management > Managed Resources > root > tenant**.
- Step 2** In the VSG Pools tab, choose the pool that you want to delete, and then click **Delete**.
- Step 3** When prompted, confirm the deletion.
-



Integrating with DCNM

This section includes the following topics:

- [DCNM Integration Overview, page 209](#)
- [Configuring Connectivity with DCNM, page 212](#)
- [Troubleshooting Integration Issues, page 214](#)

DCNM Integration Overview

Prime Network Services Controller supports integration with Cisco Data Center Network Manager (DCNM). As part of this integration, Prime Network Services Controller provides the automation of virtual network services in Cisco Dynamic Fabric Automation (DFA). In the Cisco DFA solution, services like firewalls and load balancers are deployed at leaf nodes within the spine-leaf topology and in border leaf nodes, in contrast to more traditional data centers where these services are deployed at the aggregation layer.

The following table describes the primary items in the Prime Network Services Controller integration with DCNM:

Item	Description
Prime Network Services Controller	Provides central management of network services in a multi-tenant environment.
DCNM	<ul style="list-style-type: none">• Provides the setup, visualization, management, and monitoring of the data center infrastructure.• Provides configuration and image management for the fabric.
Dynamic Fabric Automation (DFA) cluster	Provides a simplified spine-leaf architecture, enhanced forwarding, and distributed control plane.

Item	Description
Prime Network Services Controller Adaptor	<ul style="list-style-type: none"> • Links Prime Network Services Controller with DCNM. • Enables DCNM to interoperate with one or more instances of Prime Network Services Controller. • Maps the tenants and virtual data centers to the Prime Network Services Controller instances responsible for network services. • Listens to network database updates and communicates those updates to the appropriate Prime Network Services Controller instance. • Upon notification of a new network service in a tenant network, notifies DCNM of the change.

Prime Network Services Controller provides centralized management of network services by supporting the following actions:

- The creation, reading, updating, and deletion of vPath-based service chains.
- The creation, updating, and deletion of network services.
- Communicating changes about network services to the Prime Network Services Controller Adaptor.

The Prime Network Services Controller GUI reflects this support by displaying information for networks and subnetworks associated with a tenant, and network services in a tenant's network.

Terminology

The following table identifies the corresponding terms in Prime Network Services Controller and DCNM:

Prime Network Services Controller Name	DCNM Name	Description
Tenant	Organization	A collection of VDCs for tenant-level separation of resources and data.
Virtual Data Center (VDC)	Partition	An independent routing domain that includes a collection of subnetworks. A VDC can belong to only one tenant.
Subnetwork	Network	A unique Layer 2 network identified by a unique identifier. A subnetwork can belong to only one VDC.

Networks

After an admin user provisions one or more tenant networks in DCNM, DCNM sends the information about the tenant network to Prime Network Services Controller. A tenant-admin user in Prime Network Services Controller can then deploy network services such as firewalls, load balancers, and routers on those networks.

For each network, DCNM provides Prime Network Services Controller with a *handle* that uniquely identifies the network on a VM manager and the network's Layer 3 IP details, such as subnet prefix, mask, and default gateway.

To view these networks in Prime Network Services Controller, choose **Resource Management > Managed Resources > root > tenant (or other subordinate organization)**, and then click the **Subnetworks** tab.

You can place the interfaces of a network service that is deployed at a particular level (or *node*) in the tenant organizational hierarchy on available networks at the following locations:

- The organization node on which the service is being deployed.
- Organization nodes that are children of the organization node on which the service is being deployed.
- Organization nodes that are ancestors of the organization node on which the service is being deployed.

Network Roles

Networks are qualified by a role property which identifies their intended usage. The following table describes the various network roles.

Network Role	Description
Host	Tenant-specific network intended for tenant application VMs. Service nodes can also be connected to this network.
Service	Tenant network intended exclusively for service nodes.
External	Tenant network that provides external connectivity. Both tenant application VMs and service nodes can connect to this network.
Management	Shared infrastructure network used for communication between service nodes and Prime Network Services Controller. Service node management interfaces connect to this network.
HA	Shared infrastructure network intended for high availability communications between service nodes. Service node HA interfaces connect to this network.

In contrast with tenant networks, which are tenant-specific and provisioned on the data center fabric by DCNM, infrastructure networks are shared by all tenants and are provisioned on the data center fabric out of band.

Details about infrastructure networks need to be added to Prime Network Services Controller by the admin user. Because these networks are shared, they can be added only to root (**Tenant Management > root**).

To add details about infrastructure networks, choose **Resource Management > Managed Resources** and then click the **Subnetworks** tab.

Roles and Privileges

The following roles support Prime Network Services Controller integration with DCNM:

Role	Responsibility
admin	<ul style="list-style-type: none"> • Deploy Prime Network Services Controller if it is not already deployed. • Configure the Prime Network Services Controller instance and credentials on DCNM. • Confirm communication between Prime Network Services Controller and DCNM. • As needed, create tenant-admin user accounts. • Provide the tenant-admin user with the Prime Network Services Controller management IP address.
tenant-admin	<ul style="list-style-type: none"> • Add, modify, or delete network services in the scope of the tenant organizational hierarchy provided by DCNM. • As part of network service creation, connect the data interfaces on the subnetworks for that tenant.

Configuring Connectivity with DCNM

This procedure describes how to configure connectivity between Prime Network Services Controller and DCNM.

After you have successfully configured connectivity, the following aspects apply:

- When operating with DCNM, you cannot create, modify, or delete tenants or virtual data centers from the Prime Network Services Controller GUI.
- Prime Network Services Controller allows admin and tenant-admin users to create, modify, and delete Application and Tier organizational levels under a Virtual Data Center organization.
- The Prime Network Services Controller GUI does not allow admin or tenant-admin users to modify any information related to tenant-scoped network or subnetworks. This restriction does not apply to management or HA networks and subnetworks that are managed by Prime Network Services Controller admin users.
- If you create, update, or delete a network service in Prime Network Services Controller, it will be reflected in both DCNM and Prime Network Services Controller.

Before You Begin

Confirm the following:

- The DCNM system is running.
- Enhanced Fabric Network was enabled during DCNM deployment.
- You have network access to the DCNM system.
- You have the appropriate privileges for configuring DCNM.
- You have deployed Prime Network Services Controller in Orchestrator mode.
- You have created a user account with the admin role for use only by the Prime Network Services Controller Adaptor in DCNM.

For more information about these prerequisites, see the following links:

- Cisco Prime Data Center Network Manager—http://www.cisco.com/en/US/products/ps9369/tsd_products_support_series_home.html
- Prime Network Services Controller Quick Start Guide—http://www.cisco.com/en/US/products/ps13213/prod_installation_guides_list.html

Procedure

- Step 1** Log in to the DCNM VM console as root.
- Step 2** Navigate to the /opt/nscadapter/bin directory.
- Step 3** Start the Prime Network Services Controller adaptor by entering the following command: **nsc-adapter-mgr adapter start**
- Step 4** Using the **nsc-adapter-mgr nsc add** command, enter the following information to provide DCNM with access to Prime Network Services Controller:
- Prime Network Services Controller management IP address
 - Username for Prime Network Services Controller access
 - Password for Prime Network Services Controller access

The command format is **nsc-adapter-mgr nsc add** *ip-address username password*.

- Step 5** Log in to the Cisco DCNM GUI and do the following:
- a) Choose **Admin > Dynamic Fabric Automation > Settings**.
 - b) Choose **Config > Dynamic Fabric Automation (DFA) > Auto-Configuration**.
 - c) Click **Add Organization** and enter the information for the organization. An organization in DCNM corresponds to a tenant in Prime Network Services Controller.
 - d) As needed, add partitions to the organization. A partition in DCNM corresponds to virtual data center in Prime Network Services Controller.

e) Add a network to the partition.

Step 6 To confirm that connectivity is established between DCNM and Prime Network Services Controller, log in to Prime Network Services Controller and confirm that the organization is displayed in the Tenant Management tab.

Troubleshooting Integration Issues

If you encounter issues with the Prime Network Services Controller and DCNM integration, you can look for information in the following locations:

- On the DCNM server, review the log files in `/opt/nscadapter/var/log` for information.
- In the Prime Network Services Controller GUI:
 - Review faults for services by choosing **Resource Management > Managed Resources > root > tenant > Network Services > network-service > Edit > Faults tab**.
 - Review audit logs and faults by choosing **Resource Management > Diagnostics > Audit Logs** or **Faults**.

For either option, double-click a fault to view more information.

The following table describes specific issues you might encounter and how to address them:

Symptom	Cause	Resolution
Organizations and partitions are created in DCNM but no tenants or VDCs are displayed in Prime Network Services Controller	The configurations in DCNM and Prime Network Services Controller are incomplete.	<ol style="list-style-type: none"> 1 Confirm that the Service Configuration parameters are complete for networks created in DCNM. 2 Confirm that Prime Network Services Controller is registered with the VM Manager IP parameter.

Symptom	Cause	Resolution
Networks are created in DCNM but no tenants, VDCs, or subnetworks are displayed in Prime Network Services Controller.	The NSC Adapter does not have an active connection to Prime Network Services Controller.	Use the nsc-adapter-mgr adapter connections command to ensure there is an active connection to Prime Network Services Controller.
	The NSC Adapter is not active on DCNM.	Use the nsc-adapter-mgr adapter connections command to ensure there is an active connection to DCNM.
	Prime Network Services Controller does not have the VM Manager IP.	Confirm that Prime Network Services Controller is registered with the correct VM Manager and provide the VM Manager IP in the VM Manager IP parameter.
	Networks were added to DCNM while Prime Network Services Controller or the NSC Adapter was down.	<ol style="list-style-type: none"> 1 Enter the command nsc-adapter-mgr adapter connections and verify that the connections are correct. 2 In the DCNM GUI, choose the auto-config interface, select the network, click Edit, and then click OK without making changes.
Service networks were deleted in DCNM but the tenants, VDCs, and subnetworks are still shown in Prime Network Services Controller.	Networks were deleted from DCNM while Prime Network Services Controller or the NSC Adapter was down.	<ol style="list-style-type: none"> 1 Enter the command nsc-adapter-mgr adapter connections and verify that the connections are correct. 2 In the DCNM GUI, choose the auto-config interface, select the network, click Edit, and then click OK without making changes.
An edge service was removed from Prime Network Services Controller but the Service Node IP Address is still shown in DCNM.	The service was deleted from Prime Network Services Controller while DCNM or the NSC Adapter was down.	Manually delete the Service Node IP Address in DCNM for the affected partition.
An edge service was deployed in Prime Network Services Controller but the Service Node IP Address is not shown in DCNM.	The service was deployed in Prime Network Services Controller while DCNM or the NSC Adapter was down.	Manually update the Service Node IP Address in DCNM auto-config for the affected partition.

Symptom	Cause	Resolution
Host traffic does not reach the service node.	<ul style="list-style-type: none">• The wrong profile is specified in DCNM for host networks.• The service is not attached to the leaf.	<ul style="list-style-type: none">• Make sure that the correct profile is specified in DCNM for the host network.• Make sure that the auto-config profile and parameters are correct with particular attention to the Service Node IP address.



Configuring InterCloud Resources

This section includes the following topics:

- [InterCloud Resources, page 217](#)
- [InterCloud Licensing Models, page 218](#)
- [InterCloud Configuration Workflow, page 218](#)
- [InterCloud Management User Privileges, page 219](#)
- [Preparing for InterCloud Configuration, page 219](#)
- [Configuring InterCloud Links and Cloud VMs, page 228](#)
- [Managing InterCloud Links, page 249](#)
- [Creating AMI Images from VMs, page 258](#)

InterCloud Resources

Prime Network Services Controller enables you to extend your enterprise data center into a public cloud through the configuration and management of InterCloud resources. InterCloud resources include the following items:

- **Provider account**—Provider accounts enable users to access and take advantage of cloud resources. Public cloud providers generally own and operate the cloud infrastructure, and provide accounts to those who want to use the cloud resources.
- **Virtual Private Clouds (VPCs)**—VPCs are logical groupings of cloud infrastructure components and resources that enable an enterprise data center to extend into a public cloud. A provider account is required to create a VPC.
- **InterCloud links**—InterCloud links are secure connections between an enterprise data center and a public cloud. An InterCloud link includes two virtual gateways: one on the enterprise network and one on the cloud. The gateway on the enterprise network is referred to as the InterCloud extender, and the gateway on the cloud is referred to as the InterCloud switch. A secure Layer 3 tunnel connects the gateways, thereby extending the Layer 2 enterprise network into the cloud.
- **Cloud VMs**—Cloud VMs are VMs that are instantiated within the context of a VPC and InterCloud link on the public cloud. You can create multiple cloud VMs in a single VPC and InterCloud link.

InterCloud Licensing Models


Note

Prime Network Services Controller does not support the Provider Licensing model.

There are two types of InterCloud licensing models that Prime Network Services Controller provides:

- **Platform Licensing**—The cloud VSM enforces the number of cloud VMs created in the Amazon Web Service (AWS). In this licensing model, you must import the bundle into Prime Network Services Controller. The bundle consists of Cisco InterCloud Switch images that will be available as an option to select during InterCloud link creation. A template will be created under the Amazon user account using the available image in the bundle. For more information on this process, see [Configuring InterCloud Links and Cloud VMs](#).
- **Provider Licensing**—Prime Network Services Controller enforces the number of cloud VMs created in the AWS. In this licensing model, you also import the bundle into Prime Network Services Controller, but during InterCloud link creation, you select the Cisco InterCloud Switch template that is available on Amazon Marketplace. Each switch template is capable of supporting a maximum number of VMs and are associated with different costs. Prime Network Services Controller discovers these templates on Amazon Marketplace and displays them in the InterCloud link creation wizard. For more information on this process, see [Configuring InterCloud Links and Cloud VMs](#).

You are given an option to select the licensing model during the first InterCloud link deployment in a cloud VSM. The first InterCloud link deployment per cloud VSM dictates which licensing model is used on that cloud VSM. For more information on creating an InterCloud link, see [Configuring an InterCloud Link](#).


Note

To switch from one license model to the other, you must delete all previous InterCloud links in a cloud VSM.

InterCloud Configuration Workflow

The workflow for configuring and managing InterCloud resources includes the following high-level phases and activities:

Workflow Phase	Activities	Related Topic
Preparation	<ul style="list-style-type: none"> • Configuring policies, profiles, and address pools. • Downloading the required images. • Obtaining a provider account. 	Preparing for InterCloud Configuration, on page 219
Configuration	<ul style="list-style-type: none"> • Creating an InterCloud link. • Placing VM images on the cloud. • Creating VM instances on the cloud. 	Configuring InterCloud Links and Cloud VMs, on page 228

Workflow Phase	Activities	Related Topic
Ongoing management	<ul style="list-style-type: none"> • Updating InterCloud links. • Removing InterCloud links. • Monitoring InterCloud status. • Troubleshooting InterCloud issues. 	Managing InterCloud Links, on page 249
Customization	Creating AMI files from VMs in your data center.	Creating AMI Images from VMs, on page 258

InterCloud Management User Privileges

Prime Network Services Controller provides the following roles and privileges in support of InterCloud management:

Role	Default Privilege	Description
intercloud-infra	InterCloud-Infrastructure	Ability to create and manage the following InterCloud resources: <ul style="list-style-type: none"> • MAC address pools • Cloud provider accounts • InterCloud bundled images • InterCloud links • InterCloud Extenders and Switches
intercloud-server	InterCloud-Server	Ability to create and manage the following cloud resources: <ul style="list-style-type: none"> • Cloud VMs • Creation or migration of VM templates on clouds • Instantiation of cloud VMs

Preparing for InterCloud Configuration

Before you can configure an InterCloud link and cloud VMs, you must complete the procedures described in the following sections.

Configuring Profiles, Policies, and Pools

Successful implementation of an InterCloud link depends on the appropriate configuration of the following items:

- IP groups—See [Adding an IP Group](#), on page 220.



Caution Failure to configure an IP group could permit unauthorized access to your cloud VMs, InterCloud switch, and enterprise data center.

- Access port profiles and trunk port profiles—See [Configuring VSM Port Profiles](#), on page 221.
- Device profiles—See [Configuring an InterCloud Device Profile](#), on page 221.
- MAC address pools—See [Adding a MAC Address Pool](#), on page 223.
- Policies and profiles for InterCloud tunnels—See [Policies and Profiles for InterCloud Tunnels](#), on page 223.

You can also configure the following additional policies for inclusion in a device profile for InterCloud resources:

- Core File policies
- Log File policies
- Syslog policies

For more information about these policies and how to configure them, see [Configuring Device Policies](#), on page 141.

Adding an IP Group

An IP group protects cloud resources by ensuring that SSH access to the public interface of cloud VMs in a VPC is allowed ONLY from IP addresses in the IP group.

In InterCloud Management in Prime Network Services Controller, IP groups are applied on a per-VPC basis. That is, only those IP addresses in an IP group that is associated with a VPC have SSH access to the cloud VMs for that VPC.



Caution Failure to configure an IP group could permit unauthorized access to your cloud VMs, InterCloud switch, and enterprise data center.

Procedure

- Step 1** Choose **InterCloud Management > InterCloud Link > IP Groups**.
- Step 2** Click **Add IP Group**.
- Step 3** In the Add IP Group dialog box, do the following:
 - a) Enter a name for the IP Group.

- b) Click **IP Address Range**.
- c) In the Add IP Address Range dialog box, enter the NATed IP address and prefix for the range of IP addresses to add to the IP group.

Step 4 Click **OK** in the open dialog boxes.

Configuring VSM Port Profiles

Cisco Virtual Supervisor Modules (VSMs) on Cisco Nexus 1000V Series switches must be properly configured to support InterCloud features. Completing the following steps when configuring port profiles on a VSM will ensure that the VSM can communicate with Prime Network Services Controller.

- 1 Configure at least one port profile for the access port and one for the trunk port. For information on configuring port profiles, see the *Cisco Nexus 1000V InterCloud Port Profile Configuration Guide, Release 5.2(1)IC1(1.1)* at http://www.cisco.com/en/US/products/ps12904/products_installation_and_configuration_guides_list.html.
- 2 Publish the default port profile from the so that VSM so that it will be available to Prime Network Services Controller. The **publish port-profile** command uses the format **publish port-profile name** where *name* is the port profile name. For more information, see the *Cisco Nexus 1000V InterCloud Port Profile Configuration Guide, Release 5.2(1)IC1(1.1)* at http://www.cisco.com/en/US/partner/products/ps12904/products_installation_and_configuration_guides_list.html.
- 3 Add the **org root** command to each port profile so that the port will be included in the results of the **show org port brief** command. For more information, see the command reference guides available on cisco.com at http://www.cisco.com/en/US/products/ps11208/tsd_products_support_model_home.html.

VSMs that are capable of registering with InterCloud Extender and InterCloud Switch service modules are automatically displayed when you configure an InterCloud link using either of the following wizards:

- Extend Network to Cloud Wizard
- Add InterCloud Link Wizard

Configuring an InterCloud Device Profile

An InterCloud device profile is a set of custom attributes and device policies that you can apply to an InterCloud extender or switch. You specify device profiles for the InterCloud extender and switch when you create an InterCloud link or by applying a different device profile to the InterCloud extender or switch after the link is deployed.

Prime Network Services Controller includes a default InterCloud device profile. You can edit the default InterCloud device profile, but you cannot delete it.

Procedure

Step 1 Choose **InterCloud Management > InterCloud Policies > Device Profiles**.

Step 2 Click **Add Device Profile**.

Step 3 In the General tab in the New Device Profile dialog box, enter a profile name and description, and choose the required time zone.

Step 4 In the Policies tab, provide the following information, then click **OK**:

Field	Description
DNS Servers	You can: <ul style="list-style-type: none"> • Add a new server. • Select an existing server and edit or delete it. • Use the arrows to change priority.
DNS Domains	You can: <ul style="list-style-type: none"> • Add a new domain. • Select an existing domain and edit or delete it.
NTP Servers	You can: <ul style="list-style-type: none"> • Add a new server. • Select an existing server and edit or delete it. • Use the arrows to change priority.
Syslog	You can: <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.
Core File	You can: <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.

Field	Description
Policy Agent Log File	<p>You can:</p> <ul style="list-style-type: none"> • Choose a policy from the drop-down list. • Add a new policy. • Click the Resolved Policy link to review or modify the policy currently assigned.

Adding a MAC Address Pool

Add a MAC address pool to allocate a group of MAC addresses to a Virtual Private Cloud.

Procedure

-
- Step 1** Choose **InterCloud Management > InterCloud Link > MAC Pools**.
- Step 2** Click **Add MAC Address Pool**.
- Step 3** Enter the following information, then click **OK**:
- In the Name field, enter a name for the MAC address pool.
 - In the Start MAC Address field, enter the starting MAC address for the pool in the 12-digit hexadecimal format.
 - In the Total Count field, enter the number of addresses in the pool. The minimum value is 1000 MAC addresses, and the default value is 10000 MAC addresses.
-

Policies and Profiles for InterCloud Tunnels

A tunnel profile pairs a connection parameter policy with a key policy to ensure secure communications for specific tunnel ports. After you configure tunnel profiles, you can apply them to tunnels between the following elements:

- InterCloud extender and InterCloud switch
- InterCloud switch and cloud VM

For information on first configuring the individual policies and then tunnel profiles, see the following topics:

- [Configuring a Connection Parameter Policy, on page 224](#)
- [Adding a Key Policy, on page 225](#)
- [Configuring a Tunnel Profile, on page 226](#)

You can also configure the following additional policies for inclusion in a device profile for InterCloud resources:

- Core File policies
- Log File policies
- Syslog policies

For more information about these policies and how to configure them, see [Configuring Device Policies](#), on page 141.

Configuring a Connection Parameter Policy

A connection parameter policy specifies the basic attributes for connecting an enterprise network to a cloud. A connection parameter policy is used with a key policy in a tunnel profile to ensure secure communications between the enterprise and the cloud.

Procedure

Step 1 Choose **InterCloud Management > InterCloud Policies > Policies > Connection Parameter Policies**.

Step 2 Click **Add Connection Parameter Policy**.

Step 3 In the Add Connection Parameter Policy dialog box, provide the following information, then click **OK**:

Field	Description
Name	Connection parameter policy name.
Description	Policy description.
Protocol	Protocol to use for this policy: TCP or UDP. The default protocol is UDP.
Tunnel Port	Tunnel port for this policy (read-only). The default port is 6644.
Data Channel Port	Data channel port for this policy (read-only). The default port is 6644.
Keep Alive Duration Note Available if protocol is set to UDP.	Length of time, in minutes and seconds, that a connection can exist with no activity before a keepalive message is sent. The default value is one second.
Keep Alive Timeout Note Available if protocol is set to UDP.	Length of time, in minutes and seconds, that a connection can remain idle before it closes. The default value is five minutes.

Adding a Key Policy

A key policy specifies the encryption and hash algorithms, and the length of the rekeying period for a secure connection. A key policy is used with a connection parameter policy in a tunnel profile to ensure secure communications between the enterprise and the cloud.

Procedure

Step 1 Choose **InterCloud Management > InterCloud Policies > Policies > Key Policies**.

Step 2 In the General tab, click **Add Key Policy**.

Step 3 In the Add Key Policy dialog box, provide the following information, then click **OK**:

Field	Description
Name	Policy name.
Description	Brief policy description.
ReKey Period	Length of time (in days, hours, minutes, and seconds) that can elapse before a new key must be generated. The minimum value is five minutes. The default value of 00:00:00:00 indicates that rekeying does not occur.
Encrypt Algorithm	From the drop-down list, choose the encryption method for this policy: <ul style="list-style-type: none"> • AES-128-CBC (default) • AES-128-GCM (not available if TCP protocol is used) • AES-256-CBC • AES-256-GCM (not available if TCP protocol is used) • None
Hash Algorithm	This option is available if you choose AES-128-CBC, AES-256-CBC, or None in the Encrypt Algorithm field. Hash algorithm for this policy: None, SHA-1 (default), SHA-256, or SHA-384. The None option is available if you choose None in the Encrypt Algorithm field.

Configuring a Tunnel Profile

A tunnel profile combines a connection parameter policy with a key policy to ensure secure communications for specific tunnel ports. After you configure a tunnel profile, you can apply the profile to tunnels between the following elements:

- InterCloud extender and InterCloud switch
- InterCloud switch and cloud VM

Procedure

Step 1 Choose **InterCloud Management > InterCloud Policies > Tunnel Profiles**.

Step 2 In the General tab, click **Add Tunnel Profile**.

Step 3 In the Add Tunnel dialog box, enter the following information, then click **OK**:

Field	Description
Name	Profile name.
Description	Brief profile description.
Key Policy	Do any of the following: <ul style="list-style-type: none"> • Choose an existing policy from the drop-down list. • Click Add Key Policy to create a new key policy. • Click the Resolved Policy link to review or modify the key policy currently associated with the profile.
Connection Parameter Policy	Do any of the following: <ul style="list-style-type: none"> • Choose an existing policy from the drop-down list. • Click Add Connection Parameter Policy to create a new connection parameter policy. • Click the Resolved Policy link to review or modify the connection parameter policy currently associated with the profile.

Creating a Provider Account

A cloud provider account is required before you can connect to a public cloud.

If you obtain an Amazon provider account, you will have access to Cisco InterCloud images on Amazon Marketplace. Each InterCloud Switch image supports a different number of cloud VMs, such as 4, 8, or more.

Before You Begin

Obtain the following information:

- Cloud provider access ID.
- Cloud provider access key.

Procedure

- Step 1** Choose **InterCloud Management > InterCloud Link > Provider Accounts**.
- Step 2** Click **Create Provider Account**.
- Step 3** In the Create Provider Account dialog box, provide the following information, then click **OK**:

Field	Description
Name	Provider account name. This name can contain 1 to 16 characters. You can use alphanumeric characters including hyphen, underscore, period, and colon. You cannot change this name after the object has been saved.
Provider Type	Cloud provider (read-only).
Access ID	Alphanumeric text string that identifies the account owner.
Access Key	Unique key for the account.

Importing Platform Images

To improve usability and simplify the process of creating an InterCloud link, Prime Network Services Controller enables you to import a single zipped file from the Prime Network Services Controller Download site (<http://software.cisco.com/cisco/pub/software/portal/select.html?&i=!m&mdfid=284653427>) on www.cisco.com. The zipped file contains the following images and respective version number:

- InterCloud Extender image for the gateway on the enterprise network
- InterCloud Switch Image for the gateway on the cloud
- Cloud VM driver images

After the zipped file is imported, Prime Network Services Controller automatically places the zipped files in the correct locations and populates the Add InterCloud Link Wizard with the images.

**Note**

- When multiple image versions are available, Prime Network Services Controller automatically selects the latest version during VM cloud migration.
- You cannot import the same bundle twice.

This feature helps ensure that you always have appropriate, compatible images available for creating InterCloud links and instantiating cloud VMs.

Procedure

Step 1 Choose **InterCloud Management > InterCloud Link > Images**.

Step 2 Click **Import Bundled Image**.

Step 3 In the Import Bundled Image dialog box:

- Select the type of image you want to import.
- Enter a name and description for the image you are importing.
- In the Import area, provide the following information, then click **OK**:
 - Protocol to use for the import operations: FTP, SCP, or SFTP.
 - Hostname or IP address of the remote host to which you downloaded the images.
 - Account username for the remote host.
 - Account password for the remote host.
 - Image path and filename, starting with a slash (/).

Configuring InterCloud Links and Cloud VMs

To configure an InterCloud link and instantiate one or more VMs in the cloud, complete the following procedures in the order shown:

Procedure	Related Topic
1. Configuring an InterCloud link	Configuring an InterCloud Link, on page 229
2. Importing a VM image	Importing a VM Image, on page 237
3. Creating VM templates on the cloud	Creating Cloud VM Templates, on page 239

Procedure	Related Topic
4. Instantiating VMs on the cloud	Instantiating a Cloud VM from a Cloud Template, on page 244

Configuring an InterCloud Link

The Extend Network to Cloud wizard walks you through the process of configuring an InterCloud link. A configuration summary is displayed at the end of the wizard, allowing you to review the information and choose whether to deploy the InterCloud link immediately or later.

The wizard also enables you to configure the InterCloud link for high availability. If you enable high availability, you can configure the following properties the same for both the primary and secondary InterCloud Extender:

- VM placement
- Port profile for the data trunk interface
- Port profile for the management interface



Note

InterCloud links can be configured only on VMware ESXi hypervisors.

Before You Begin

- Complete the activities described in [Preparing for InterCloud Configuration, on page 219](#).
- Confirm that at least one VSM is registered in Prime Network Services Controller. For more information, see [Verifying VM Registration, on page 182](#).
- Confirm that the default port profile has been published from the VSM. For more information, see [Configuring VSM Port Profiles, on page 221](#).
- Confirm that Prime Network Services Controller has access to a DNS server. If a DNS server is not accessible, Prime Network Services Controller cannot communicate with the Amazon cloud provider. To configure a DNS server, choose **Administration > System Profile > root > Profile > default**, and add a DNS server.
- Confirm that an NTP server is configured in the InterCloud device profile.

Procedure

Step 1 Choose **InterCloud Management > InterCloud Link > VPCs**.

Step 2 Click **Extend Network to Cloud**.

Step 3 In the Configure VPC screen, provide the information described in [Configure VPC Screen, on page 231](#), then click **Next**.

Note If you select a VPC before choosing to add an InterCloud link, the Configure InterCloud Link screen is displayed initially instead of the Configure VPC screen.

- Step 4** In the Configure InterCloud Link screen, provide the information described in [Configure InterCloud Link Screen, on page 231](#), then click **Next**.
- Step 5** In the InterCloud Extender screen, select the image to use for the InterCloud Extender, then click **Next**. Prime Network Services Controller automatically selects the data store to use for the InterCloud Extender instance.
- Step 6** In the Select VM Placement screen, do one of the following depending on whether or not you enabled high availability, then click **Next**:
- If you did not enable high availability, navigate to and select the ESXi host to use for the InterCloud Extender instance.
 - If you enabled high availability, do one of the following:
 - To use the same ESXi host as the primary InterCloud Extender, in the Secondary area, check the **Same as Primary** check box.
 - To use an ESXi host other than the primary InterCloud Extender, in the Secondary area, navigate to and select the ESXi host to use for the secondary InterCloud Extender instance.
- Step 7** In the Configure Properties screen, provide the information described in [Configure Extender Properties Screen, on page 232](#), then click **Next**.
- Step 8** In the Configure Network Interfaces screen, provide the information described in [Configure Extender Network Interfaces Screen, on page 233](#), then click **Next**.
- Step 9** In the InterCloud Switch screen, do one of the following:
- If you did not check the Use Marketplace ICS check box in the Configure InterCloud Link screen, select the template that you want to use, then click **Next**. The template version must match the version of the InterCloud extender image that you selected in the InterCloud Extender screen.
 - If you checked the Use Marketplace ICS check box in the Configure InterCloud Link screen, select the required image from Amazon Marketplace as follows, then click **Next**:
 - 1 Click **Refresh Marketplace** to ensure that the latest information is displayed.
Note The **Refresh Marketplace** button is available when selecting templates from Amazon Marketplace.
 - 2 Select the required InterCloud Switch template with the number of VMs that you want to purchase. The template version must match the version of the InterCloud Extender image that you selected in the InterCloud Extender screen.
- Step 10** In the Configure Properties screen, provide the information described in [Configure Switch Properties Screen, on page 235](#), then click **Next**.
- Step 11** In the Configure Network Interfaces screen, provide the information described in [Configure Switch Network Interfaces Screen, on page 235](#), then click **Next**.
- Step 12** In the Security screen, provide the information described in [Security Screen, on page 236](#), then click **Next**.
- Step 13** In the Summary screen:
- a) Review the configuration to ensure that it is correct.
 - b) Check the **Deploy** check box to create the InterCloud link when you click **Finish**. Uncheck the **Deploy** check box to create the InterCloud link later.
 - c) Click **Finish**.
-

Field Descriptions

Configure VPC Screen

Field	Description
Name	Virtual Private Cloud (VPC) name.
Description	Brief description.
Provider Account	Do any of the following: <ul style="list-style-type: none"> • Choose a provider account from the drop-down list. • Click Create Provider Account to create a new provider account. • Click the Resolved Provider Account link to review and optionally modify the provider account currently associated with the VPC.
Location	Provider region in which to create the VPC. If the provider account selected in the previous field is already associated with a region, a check mark and the status Completed are displayed next to the drop-down list.
MAC Pool	Do any of the following: <ul style="list-style-type: none"> • Choose a MAC address pool from the drop-down list. • Click Create MAC Address Pool to create a new MAC address pool. • Click the Resolved MAC Pool link to review and optionally modify the MAC address pool currently associated with the VPC.
Default VSM	Default VSM to use for the VPC.

Configure InterCloud Link Screen

Field	Description
InterCloud Link Name	InterCloud link name.

Field	Description
Description	Brief description.
Use Marketplace ICS	Check this check box to select a Cisco InterCloud Switch template from Amazon Marketplace. Clear this check box to select a local InterCloud Switch template.
VSM	Virtual Supervisor Module (VSM) to use for the InterCloud link. This drop-down list is automatically populated with VSMs capable of supporting InterCloud services. The VSMs that are available depend on whether or not you checked the Use Marketplace ICS check box: <ul style="list-style-type: none"> • If you checked the check box, Amazon Marketplace VSMs are listed. • If you cleared the check box, local VSMs are listed.
High Availability	Check the Enable HA check box to indicate that the InterCloud link is in active standby mode. Uncheck the check box to indicate that the InterCloud link is in standalone mode. If you check the check box, subsequent screens will require information for both the primary and secondary InterCloud Extenders and Switches.

Configure Extender Properties Screen

Field	Description
Primary Name	InterCloud Extender name.
Secondary Name	(Displayed if high availability is enabled) Secondary InterCloud Extender name.
Device Profile	Do one of the following: <ul style="list-style-type: none"> • Click the existing profile to review and optionally modify it. • Click Select to choose a different device profile.
SSH User Name	Username for SSH access (read-only). Default value is admin.

Field	Description
SSH Password	Password for SSH access.
Confirm Password	Confirming entry for SSH password.

Configure Extender Network Interfaces Screen

Field	Description
General Tab	
Primary Data Trunk Interface Port Profile	Select the data trunk interface port group to use for the InterCloud Extender port profile.
Secondary Data Trunk Interface Port Profile	Displayed if you did not check the Same as Primary check box in the Select VM Placement screen. Select the data trunk interface port group to use for the secondary InterCloud Extender port profile.
Management Interface	
<i>Primary</i>	
Port Profile	Select the port profile to use for the primary InterCloud Extender management interface.
IP Address	IP address for the management interface.
Netmask	Management interface subnet mask.
Gateway	Management interface gateway IP address.
<i>Secondary</i>	
The following fields are displayed only if high availability is enabled.	
Port Profile	Displayed if you did not check the Same as Primary check box in the Select VM Placement screen. Select the port group to use for the secondary InterCloud Extender management interface port profile.
IP Address	IP address for the secondary management interface.
Netmask	Secondary management interface subnet mask.
Gateway	Secondary management interface gateway IP address.

Field	Description
Advanced Tab	
External Tunnel Interface	<p>Do one of the following:</p> <ul style="list-style-type: none"> • If the external tunnel interface is the same as the Management interface, check the Same as Management Interface check box. • To specify a different external tunnel interface, uncheck the Same as Management Interface check box, and provide the following information for the external tunnel interface: <ul style="list-style-type: none"> • Port group for the port profile • Interface IP address • Subnet mask • Gateway IP address
Primary	
The following fields are displayed if the Same as Management Interface check box is unchecked.	
Port Profile	Port group to use for the external tunnel interface port profile.
IP Address	External tunnel interface IP address.
Netmask	Subnet mask to apply to the external tunnel interface IP address.
Gateway	IP address of the gateway for the external tunnel interface.
Secondary	
The following fields are displayed if the Same as Management Interface check box is unchecked and high availability is enabled.	
Port Profile	Port group to use for the secondary external tunnel interface port profile.
IP Address	Secondary external tunnel interface IP address.
Netmask	Subnet mask to apply to the secondary external tunnel interface IP address.
Gateway	IP address of the gateway for the secondary external tunnel interface.

Field	Description
Internal	
Use Default Internal Interface	<p>Do one of the following:</p> <ul style="list-style-type: none"> • If the internal interface is the same as the default internal interface, check the Use Default Internal Interface check box. • If the internal interface is not the same as the default internal interface, uncheck the Use Default Internal Interface check box, and choose the port profiles to use for the following trunk ports: <ul style="list-style-type: none"> • Enterprise trunk • Tunnel trunk

Configure Switch Properties Screen

Field	Description
Primary Name	InterCloud Switch name.
Secondary Name	(Displayed if high availability is enabled for this link) Secondary InterCloud Switch name.
Device Profile	<p>Do one of the following:</p> <ul style="list-style-type: none"> • Click the existing profile to review and optionally modify it. • Click Select to choose a different device profile.
SSH User Name	Username for SSH access (read-only). Default value is admin.
SSH Password	Password for SSH access.
Confirm Password	Confirming entry for SSH password.

Configure Switch Network Interfaces Screen

Field	Description
General Tab	

Field	Description
Port Profile	From the drop-down list, choose the port profile to use for the InterCloud Switch management interface.
Primary	
IP Address	IP address for the management interface.
Netmask	Management interface subnet mask.
Gateway	Management interface gateway IP address.
Secondary	
The following fields are displayed if high availability is enabled.	
IP Address	IP address for the secondary management interface.
Netmask	Secondary management interface subnet mask.
Gateway	Gateway IP address for the secondary management interface.
Advanced Tab	
Use Default Internal Interface	Check the check box to use the default internal interface for the InterCloud Switch. Uncheck the check box to select a port profile for the tunnel trunk.
Tunnel Trunk Port Profile	Displayed if the Use Default Internal Interface check box is cleared. From the drop-down list, choose the tunnel trunk port profile.

Security Screen

Field	Description
InterCloud Extender to InterCloud Switch Tunnel Profile	<p>Note This option is available only during InterCloud link creation.</p> <p>Do one of the following:</p> <ul style="list-style-type: none"> • Click the existing tunnel profile to review and optionally modify it. • Click Select to choose a different tunnel profile.

Field	Description
InterCloud Switch to VM Tunnel Profile	<p>Note This option is available only during InterCloud link creation.</p> <p>Do one of the following:</p> <ul style="list-style-type: none"> • Click the existing tunnel profile to review and optionally modify it. • Click Select to choose a different tunnel profile.
Access Protection IP Group	<p>Caution You MUST configure an IP Group with permitted IP addresses to prevent unauthorized access to your InterCloud switch and cloud VMs. Failure to configure an IP group could permit unauthorized access to your cloud VMs, InterCloud switch, and enterprise data center.</p> <p>Do any of the following:</p> <ul style="list-style-type: none"> • From the drop-down list, choose an existing IP group. • Click Add IP Group to create a new IP group. • Click the Resolved IP Group link to review or modify the specified IP group.

Importing a VM Image

If desired, you can import VM images independently of the bundled platform images to create cloud VMs. The imported image can be used to create a template on the cloud which, in turn, allows you to instantiate cloud VMs.

Images are available in ISO, OVA, and Amazon Machine Image (AMI) formats. Windows ISO images are not supported.



Note

The first InterCloud link deployment dictates which licensing model is used. For more information on licensing models, see [InterCloud Licensing Models](#).

Procedure

-
- Step 1** Choose **InterCloud Management > Enterprise > VM Images**.
- Step 2** Click **Import VM Image**.
- Step 3** In the Import VM Image dialog box, provide the information described in [Import VM Image Dialog Box](#), on [page 238](#), then click **OK**.
-

Field Descriptions

Import VM Image Dialog Box



Note Windows ISO images are not supported.

Field	Description
Name	VM image name.
Description	VM image description.
Format	VM image format: Amazon Machine Image (AMI), ISO, or OVA.
Properties	
The Properties area is not displayed for OVA images.	
Number of NICs	(AMI images only) Number of NICs for the VM. The value in this field must match the value for the image being imported.
OS	(AMI images only) VM operating system: CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown. The value in this field must match the value for the image being imported.
Architecture	(AMI images only) VM architecture: 32-bit, 64-bit, or Unknown. The value in this field must match the value for the image being imported.
Disk (GB)	Amount of disk space (in gigabytes) for the VM.
CPU Cores	Number of CPU cores for the VM.

Field	Description
Memory (MB)	Amount of memory (in megabytes) for the VM.
Import	
Protocol	Protocol to use for the import operation: FTP, SCP, or SFTP.
Hostname / IP Address	Hostname or IP address of the remote host.
User Name	Account username on the remote host.
Password	Account password on the remote host.
Remote File	Remote filename, starting with a slash (/).

Creating Cloud VM Templates

After you establish an InterCloud link and download the required InterCloud Agent and VM images, you are ready to create VM templates in the cloud. After they are created, these VM templates are used to instantiate cloud VMs.

You can create VM templates in a cloud in the following ways:

- From an imported VM image—See [Creating a Template from a VM Image](#), on page 239.
- From an existing template in your enterprise data center—See [Creating a Cloud Template from an Enterprise Template](#), on page 241.
- From an imported VM image or a VM in the data center under a specific VPC—[Creating a Template Under a VPC](#), on page 242.

Creating a Template from a VM Image

Use this procedure to create a template in a cloud from an existing VM image. The template is created in the specified VPC and can then be used to create VM instances in the cloud.

Procedure

-
- Step 1** Choose **InterCloud Management > Enterprise > VM Images > image**.
 - Step 2** Click **Create Template in Cloud**.
 - Step 3** In the Infrastructure screen in the Create Template in Cloud Wizard, select the VPC in which the template is to reside, then click **Next**.
 - Step 4** In the Template Properties screen, provide the information described in [Template Properties Screen](#), on page 240, then click **Next**.
 - Step 5** In the Network Properties screen, optionally add a port profile to each NIC as follows, then click **Next**:

- a) Right-click the NIC, then choose **Edit**.
- b) In the Edit NIC dialog box, choose the required port profile from the Port Profile drop-down list, then click **OK**.

Step 6 In the Configure Application Parameters screen, provide the information described in [Configure Application Parameters Screen for ISO Templates](#), on page 240, then click **Next**.

Step 7 In the Summary and Apply screen, confirm that the information is accurate, then click **Finish**.

Field Descriptions

Template Properties Screen

Field	Description
Template Name	Cloud template name.
SSH User	SSH account username.
OS Information	
OS	VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	Architecture type (read-only): 32-bit, 64-bit, or Unknown.
Template Properties	
The following fields display values for the enterprise image and the cloud template. The enterprise values are read-only, but you can modify the values for the cloud template.	
Memory (MB)	Amount of memory (in megabytes) for the template.
CPU Cores	Number of CPU cores for the template.
Disk (GB)	Amount of disk space (in gigabytes) for the template.

Configure Application Parameters Screen for ISO Templates

Field	Description
Timezone	Time zone to use when starting a cloud VM using this template.
Hostname	VM hostname.
Root Password	Password for the root account.

Field	Description
Confirm Password	Confirming password entry.
Add-on Packages	Additional packages available for the image being imported. The specific packages listed depend on the ISO image being imported. Check the check boxes of any packages you want to include with the ISO image.

Creating a Cloud Template from an Enterprise Template

You can use an existing VM template in your data center to create a template on the cloud. After you create the template on the cloud, you can use it to instantiate cloud VMs.

Before You Begin

Ensure that at least one VM template is available for you to upload to the cloud.

Procedure

-
- Step 1** Choose **InterCloud Management > Enterprise > VM Managers**.
 - Step 2** In the navigation pane, navigate to the data center, cluster, host, or resource pool with the required template.
 - Step 3** In the Templates table, select the required template, then click **Migrate Template to Cloud**.
 - Step 4** In the Infrastructure screen, select the destination VPC, then click **Next**.
 - Step 5** In the Template Properties screen, provide the information described in [Template Properties Screen, on page 241](#), then click **Next**.
 - Step 6** In the Network Properties screen, optionally assign a port profile to each NIC as follows, then click **Next**:
 - a) Right-click a NIC, then choose **Edit**.
 - b) In the Edit NIC dialog box, select the required port profile from the drop-down list, then click **OK**.
 - Step 7** In the Summary and Apply screen, confirm that the information is correct, then click **Finish**.
-

Field Descriptions

Template Properties Screen

Field	Description
Template Name	Template name on the cloud.
SSH User	Username for SSH access.
OS Information	

Field	Description
OS	VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	VM architecture (read-only): 32-bit, 64-bit, or Unknown.
Template Properties	
The following fields display values for both the enterprise VM and the cloud template. The enterprise values are read-only, but you can modify the values for the cloud template.	
Memory (MB)	Amount of memory (in megabytes) for the template.
CPU Cores	Number of CPU cores for the template.
Disk (GB)	Amount of disk space (in gigabytes) for the template.

Creating a Template Under a VPC

Prime Network Services Controller enables you to create a template under a specific VPC from an imported VM image or a VM in the data center.

Procedure

-
- Step 1** Choose **InterCloud Management > Public Cloud > VPCs > vpc > Templates**.
- Step 2** Click **Add New Template**.
The Add New Template wizard opens.
- Step 3** In the Source Image screen, do one of the following, then click **Next**:
- To use an imported VM image as the source for the template:**
- 1 Click the **Images** tab.
 - 2 Select the VM image to upload to the cloud.
- To use a VM in the data center as the source for the template:**
- 1 Click the **Enterprise Data Center** tab.
 - 2 In the left pane, select the data center, cluster, host, or resource pool with the required template.
 - 3 In the right pane, select the template to upload to the cloud.
- Step 4** In the Template Properties screen, provide the information described in [Template Properties Screen](#), on page 243, then click **Next**.
- Step 5** In the Network Properties screen, optionally assign a port profile to each NIC as follows, then click **Next**:
- a) Right-click the NIC, then choose **Edit**.

- b) In the Edit NIC dialog box, choose the required port profile from the Port Profile drop-down list, then click **OK**.

Step 6 In the Summary and Apply screen, confirm that the information is accurate, then click **Finish**.

Field Descriptions

Template Properties Screen

Field	Description
Template Name	Template name on the cloud.
SSH User	Username for SSH access.
OS Information	
OS	VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	VM architecture (read-only): 32-bit, 64-bit, or Unknown.
Template Properties	
The following fields display values for both the enterprise VM and the cloud template. The enterprise values are read-only, but you can modify the values for the cloud template.	
Memory (MB)	Amount of memory (in megabytes) for the template.
CPU Cores	Number of CPU cores for the template.
Disk (GB)	Amount of disk space (in gigabytes) for the template.

Instantiating Cloud VMs



Note

If you are using an Amazon Marketplace image, you must subscribe to the Amazon Marketplace images using your Amazon account before Prime Network Services Controller can instantiate instances from the images. Visit the product links to subscribe to them:

- Cisco Nexus 1000V InterCloudwith 8 VMs: <https://aws.amazon.com/marketplace/pp/B00FK3WNT8>
- Cisco Nexus 1000V InterCloudwith 32 VMs: <https://aws.amazon.com/marketplace/pp/B00FJKRIJW>
- Cisco Nexus 1000V InterCloudwith 64 VMs: <https://aws.amazon.com/marketplace/pp/B00FJKQ0XM>

The amount of time required to instantiate a cloud VM when using an Amazon Marketplace image depends on the available bandwidth and current traffic load in the Amazon infrastructure. At times, creating a cloud VM might take longer than 10 minutes.

You can instantiate cloud VMs in the following ways:

- From a cloud template—See [Instantiating a Cloud VM from a Cloud Template](#), on page 244.
- From a deployed template or VM in your data center—See [Instantiating a Cloud VM from a Deployed Template or Local VM](#), on page 245.
- By migrating a VM in your data center to the cloud—See [Instantiating a Cloud VM by Migrating an Enterprise VM](#), on page 247.

Instantiating a Cloud VM from a Cloud Template

After you create a VM template on a cloud, you can instantiate one or more cloud VMs.

Procedure

-
- Step 1** Choose **InterCloud Management > Public Cloud > VPCs > vpc > Templates**.
- Step 2** In the Templates table, choose a deployed template, then click **Instantiate VM**.
- Step 3** In the Infrastructure screen, do the following, then click **Next**:
- a) In the VM Name field, enter a name for the cloud VM.
 - b) In the InterCloud Link drop-down list, choose the InterCloud link to use for the cloud VM.
- Step 4** In the VM Properties screen, provide the information described in [VM Properties Screen](#), on page 245, then click **Next**.
- Step 5** In the Network Properties screen, provide the following information, then click **Next**:
- a) In the NICs table, assign a port profile to each NIC by selecting a NIC and then clicking **Edit**. In the Edit NIC dialog box, select the required port profile from the Port Profile drop-down list, then click **OK**.

Note A port profile always belongs to a specific VLAN. Select the port profile according to the VLAN to which the NIC belongs.
 - b) In the DNS Server 1 and DNS Server 2 fields, enter the IP addresses for the DNS servers.

c) In the Domain Name field, enter the DNS domain name.

Step 6 In the Review Summary and Apply screen, confirm that the information is accurate, then click **Finish**.

Field Descriptions

VM Properties Screen

Field	Description
OS Information	
OS	Cloud VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	Architecture type (read-only): 32-bit, 64-bit, or Unknown.
Template Properties	
The following fields display values for both the template and the cloud VM. The values for the template are read-only, but you can modify the values for the cloud VM as needed.	
Memory (MB)	Amount of memory (in megabytes) for the cloud VM.
CPU Cores	Number of CPU cores on the cloud VM.
Disk (GB)	Amount of disk space (in gigabytes) for the cloud VM.

Instantiating a Cloud VM from a Deployed Template or Local VM

You can instantiate a cloud VM if the following are available:

- A deployed template on the cloud
- A VM in your data center

If you instantiate a cloud VM from a VM that has a static IP address in the enterprise data center, you can access the cloud VM by using the same enterprise IP address. If you instantiate a cloud VM from a VM that uses DHCP in the enterprise data center, you can access the cloud VM by using the IP address that the VM obtained from the DHCP server. After the cloud VM is created, the Prime Network Services Controller UI displays the enterprise IP address details for your reference.

Procedure

- Step 1** Choose **InterCloud Management > Public Cloud > VPCs > vpc > VMs**.
- Step 2** Click **Instantiate New VM**.
The Instantiate New VM Wizard opens.
- Step 3** In the Infrastructure screen, choose the required InterCloud Link from the drop-down list, then click **Next**.
- Step 4** In the Source screen, do one of the following:
- To use a VM in your data center:**
- 1 In the Source VM tab, navigate to and select the required data center, cluster, host, or resource pool.
 - 2 From the list of VMs, select the VM to use for the cloud VM.
 - 3 Click **Next**.
- To use a deployed template:**
- 1 Click the **Source Template** tab.
 - 2 From the list of templates, choose the template you want to use for the cloud VM.
 - 3 Click **Next**.
- Step 5** In the VM Properties screen, provide the information as described in [VM Properties Screen, on page 247](#), then click **Next**.
- Step 6** In the Network Properties screen, provide the following information, then click **Next**. The information you need to enter depends on whether you are using a VM or a template to instantiate the cloud VM:
- a) For both VMs and templates, in the NICs table, right-click a NIC entry and choose **Edit**. In the Edit NIC dialog box, select the required port profile from the drop-down list, then click **OK**.
Note The port profile always belongs to a specific VLAN. Select the port profile according to the VLAN to which the NIC belongs.
 - b) For templates, also provide the following DNS information:
 - 1 DNS Server 1—Enter the IP address for the first DNS server.
 - 2 DNS Server 2—Enter the IP address for the second DNS server. This IP address cannot be the same as that for the first DNS server.
 - 3 Domain Name—Enter the DNS domain name.
- Step 7** In the Summary and Apply screen, do one of the following, depending to the source of the cloud VM:
- If the source is a VM in your data center:**
- 1 In the Upon Successful Migration field, indicate whether or not the source VM should be deleted from vCenter after the cloud VM is instantiated. If you choose to delete the VM from vCenter, the deletion is permanent and the VM cannot be retrieved.
 - 2 Confirm that the rest of the information is correct.
 - 3 Click **Finish**.
- If the source is a deployed template:**

- 1 Confirm that the information is accurate.
- 2 Click **Finish**.

Field Descriptions

VM Properties Screen

Field	Description
VM Name	Cloud VM name.
SSH User	Username for SSH access.
OS Information	
OS	VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	VM architecture (read-only): 32-bit, 64-bit, or Unknown.
Template Properties	
The following fields display values for both the template and the cloud VM. The template values are read-only, but you can modify the values for the cloud VM as needed.	
Memory (MB)	Amount of memory (in megabytes) for the VM.
CPU Cores	Number of CPU cores for the VM.
Disk (GB)	Amount of disk space (in gigabytes) for the VM.

Instantiating a Cloud VM by Migrating an Enterprise VM

You can migrate an existing VM in your data center to the cloud and thereby create a new cloud VM. After you migrate the enterprise VM to the cloud, you cannot migrate it back to the enterprise data center. However, when you migrate the VM to the cloud, you can retain the original VM in the data center.



Note

Do not make any changes to a VM or its structure in VMware vCenter while the VM is being migrated to the cloud. Similarly, do not make any changes to a VM or its structure in VMware while aborting the migration of the VM to the cloud. If you need to make changes in VMware vCenter that affect the VM, abort or terminate any migration in progress, make the changes in VMware vCenter, and then migrate the VM to the cloud.

Before You Begin

- Ensure that at least one interface is enabled on the VM.
- Disable any service or application on the VM that uses port 22. After migration, the SSH server that is installed on the cloud VM listens on port 22 for communications with Prime Network Services Controller.

Procedure

-
- Step 1** Choose **InterCloud Management > Enterprise > VM Managers**.
- Step 2** In the navigation pane, navigate to and select the data center, cluster, host, or resource pool with the required template.
- Step 3** In the VMs table, select the VM to use for the VM template, then click **Migrate VM to Cloud**.
- Step 4** In the Infrastructure screen, select the InterCloud link to use for the VM template, then click **Next**.
- Step 5** In the VM Properties screen, provide the information described in [VM Properties Screen, on page 248](#), then click **Next**.
- Step 6** In the Network Properties screen, optionally assign a port profile to each NIC as follows, then click **Next**:
- Right-click the NIC, then click **Edit**.
 - In the Edit NIC dialog box, choose the required port profile from the Port Profile drop-down list, then click **OK**.
- Step 7** In the Summary and Apply screen:
- In the Upon Successful Migration field, indicate whether or not the data center VM is to be deleted after the template is successfully created on the cloud.
 - Confirm that the rest of information is correct.
 - Click **Finish**.
-

Field Descriptions

VM Properties Screen

Field	Description
VM Name	Original VM name.
SSH User	Username for SSH access.
OS Information	
OS	VM operating system (read-only): CommunityEnterprise OS (CentOS), Red Hat Enterprise Linux (RHEL), Windows, or Unknown.
Architecture	VM architecture (read-only): 32-bit, 64-bit, or Unknown.

Field	Description
Template Properties	
The following fields display values for both the enterprise VM and the cloud template. The enterprise values are read-only, but you can modify the values for the cloud template.	
Memory (MB)	Amount of memory (in megabytes) for the VM.
CPU Cores	Number of CPU cores for the VM.
Disk (GB)	Amount of disk space (in gigabytes) for the VM.

Managing InterCloud Links

In addition to creating InterCloud links, you can update them, delete them, monitor their status, or troubleshoot related issues. For more information, see the following topics:

- [Updating an InterCloud Link](#), on page 249
- [Updating an InterCloud Link in High Availability Mode](#), on page 250
- [Deleting an InterCloud Link](#), on page 250
- [Monitoring InterCloud Resources and Status](#), on page 251
- [Troubleshooting InterCloud Issues](#), on page 255

Updating an InterCloud Link

Prime Network Services Controller enables you to update the images for an InterCloud Extender and Switch for a deployed link.



Note

If you undeploy an InterCloud link while the InterCloud link is being upgraded, the InterCloud Switch might not be terminated on the cloud. If this occurs, you will need to manually remove the InterCloud Switch from the cloud when the link is undeployed.

Before You Begin

Ensure that a VM Manager is configured in Prime Network Services Controller.

Procedure

- Step 1** Choose **InterCloud Management > InterCloud Link > VPCs > vpc > intercloud-link**.
- Step 2** Click **Update**.

The InterCloud Link Update Wizard is displayed.

- Step 3** In the InterCloud Link screen, check the check boxes of the images to update, then click **Next**. You can update one or both images.
The screens that are displayed in the wizard depend on the images that you select. For example, if you select to update the InterCloud Extender image, the screen for the InterCloud Switch image is not displayed.
- Step 4** In the InterCloud Extender screen:
- Click **Refresh** to ensure that the latest information is displayed.
The table is refreshed with the available InterCloud Extender templates.
 - Select the required InterCloud Extender template, then click **Next**.
- Step 5** In the Select VM Placement screen, navigate to and select the VM host to use for the update, then click **Next**.
- Step 6** In the InterCloud Switch screen, select the image for the update, then click **Next**. Whether you update one or both images, the images must have the same version.
- Step 7** In the Summary screen, confirm that the information is correct, then click **Finish**.
-

Updating an InterCloud Link in High Availability Mode

Use this procedure to update both the primary and secondary devices in an InterCloud link that is configured for high availability.

Procedure

- Step 1** Update the InterCloud link as described in [Updating an InterCloud Link](#), on page 249.
- Step 2** Trigger a switchover as follows:
- Choose **InterCloud Management > InterCloud Link > VPCs > vpc**.
 - In the InterCloud Links table, select the link that you updated in Step 1, and click **Switchover**.
- Step 3** Update the InterCloud link again.
-

Deleting an InterCloud Link

If you need to delete an InterCloud link, you can safely do so after terminating all VMs that are associated with the link and moving the link to the Undeployed state.

If you undeploy an InterCloud link, the InterCloud Switch template used by this InterCloud link is not deleted because it can be used by other InterCloud links. Instead, if you undeploy an InterCloud link while the creation of InterCloud Switch template is in progress, the template creation process continues.

If desired, you can delete the InterCloud Switch template while it is being deployed, which will stop the template deployment. To delete an InterCloud Switch template, choose **InterCloud Management > InterCloud Link > InterCloud Switch Templates > switch-template**, and then click **Delete**.

In rare situations, you might encounter a scenario in which the following events occur:

- 1 You create an InterCloud link that refers to an InterCloud Extender that is registered to Prime Network Services Controller.
- 2 The InterCloud Extender client is in the *lost-visibility* operational state in the Service Registry (**Administration > Service Registry > Clients**).
- 3 You delete the InterCloud Extender client from the Service Registry and then try to deploy the InterCloud link, which fails because the InterCloud Extender no longer exists.

If you encounter this situation, after you delete the InterCloud Extender client from the Service Registry, also delete the InterCloud link that refers to the deleted InterCloud Extender.

Procedure

-
- Step 1** Choose **InterCloud Management > Public Cloud > VPCs > vpc > VMs**.
 - Step 2** In the VMs table, select each VM that is associated with the link you want to delete, then click **Abort** or **Terminate**. The Abort option is available while the VM is being created, and the Terminate option is available after the VM has been created.
 - Step 3** After the VMs have been terminated or aborted, choose **InterCloud Management > InterCloud Link > VPCs > vpc**.
 - Step 4** In the InterCloud Links table, select the link that you want to delete, then click **Undeploy**.
 - Step 5** After Prime Network Services Controller displays Undeployed in the Deploy State column for that link, select the link and click **Delete**.
 - Step 6** When prompted, confirm the deletion.
-

Monitoring InterCloud Resources and Status

Prime Network Services Controller provides the following options for monitoring InterCloud resources and status:

- [Recent Jobs Table](#), on page 251
- [Monitoring Tab](#), on page 252
- [Status Fields and Labels](#), on page 253
- [Task Tabs](#), on page 253
- [Faults Table](#), on page 254
- [Audit Logs](#), on page 255

Recent Jobs Table

The Recent Jobs table appears by default for the following tabs under InterCloud Management:

- Enterprise
- Public Cloud

- InterCloud Link

The table displays recent jobs submitted with the most recent job at the top, and the number of job records in the table. The jobs are displayed for 12 hours. Each job contains the following information:

Field	Description
Name	Job name.
Status	Job status and duration (in days, hours, minutes, and seconds).
Description	Job description.
Message	Associated message issued for the job.
Retry Count	Number of retries for the job.
Start Time	Date and time when the job started.
End Time	Date and time when the job completed.

Some jobs, such as creating an InterCloud link, contain subordinate tasks. Expand the icon next to the job name in the Recent Jobs table to view subordinate tasks and their status.

You can resize the table as needed to view more or fewer jobs, and you can minimize the table until needed by clicking the icon next to the table name or the Minimize icon.

Monitoring Tab

Prime Network Services Controller monitors and displays statistical information for InterCloud links and cloud VMs. This information is displayed in a Monitoring tab that is available by choosing either of the following:

- **InterCloud Management > Public Cloud > VPCs > vpc > intercloud-link > Monitoring tab**
- **InterCloud Management > Public Cloud > VPCs > vpc > InterCloud Links tab > intercloud-link > Edit > Monitoring tab**

The following table describes the information that is displayed in the Monitoring tab:

Field	Description
Last Refresh Time	Date and time that the information was last updated.
Refresh	Refreshes the information that is displayed.
Table	
Name	Cloud VM name.
CPU	Percent CPU used.

Field	Description
Memory	Percent memory used.
Collection Time	Time that the statistics were collected.
Rx Errors	Number of receive errors.
Rx Packets	Number of receive packets.
Tx Errors	Number of transmission errors.
Tx Packets	Number of transmission packets.

Status Fields and Labels

Status fields with labels and icons are available in many screens and dialog boxes throughout Prime Network Services Controller. In InterCloud Management, depending on the object, common statuses are:

- Deploying
- Deployed
- Undeploying
- Undeployed
- In-progress
- Completed
- Failed
- Aborted
- Success

Icons accompany these statuses for quick visual reference.

Task Tabs

Task tabs are available in many of the Edit and Properties dialog boxes for InterCloud resources. These dialog boxes include:

- Edit InterCloud Extender
- Edit InterCloud Switch
- Edit Infrastructure Image
- Edit InterCloud Agent Image
- InterCloud Switch Template Properties
- Edit Provider Account

- Edit VM Image
- InterCloud Switch Template Properties

The Task tab includes the following information, enabling you to monitor the status of the specific object:

Field	Description
Description	Task description.
Status	Task status.
Stage Descriptor	Description of the current stage.
Tries	Number of times the task has been tried.
Previous Status	Status of the previous task only. This field does not provide the status of the current task.
Remote Err Code	Remote error code.
Remote Err Description	Description of the remote error.
Remote Inv Result	Remote error result.
Time Stamp	Date and time when the task completed.
Progress	Progress of the current task, indicated by the percent complete, a progress bar, or both.

Faults Table

Faults tables are present throughout the Prime Network Services Controller UI in main screens and many dialog boxes. Fault tables assist in troubleshooting and monitoring status by providing the following information:

Field	Description
Severity	One of the following fault severities: <ul style="list-style-type: none"> • Critical • Major • Minor • Warning • Info • Condition • Cleared

Field	Description
Affected Object	Managed object that is affected by this fault. Click the object name to view the properties for this object.
Cause	Unique identifier associated with the event that caused the fault.
Last Transition	Date and time when the severity last changed. If the severity has not changed, the original creation date is displayed.
Ack	Acknowledged state.
Type	One of the following fault types: <ul style="list-style-type: none"> • fsm • environmental • equipment
Description	Fault description.

To view more information about a fault and optionally acknowledge it, double-click the fault. The Fault Properties dialog box is displayed with additional details.

Audit Logs

The InterCloud Management tab includes a Diagnostics subtab with an Audit Logs entry. When monitoring InterCloud status or troubleshooting InterCloud issues, the Audit Logs table can provide the following information:

- Unique entry identifier
- Object associated with the entry
- User associated with the entry
- Date and time the fault occurred
- Action associated with the entry: Creation, Modification, or Deletion
- Cause associated with the entry
- Description

Troubleshooting InterCloud Issues

The following topics describe how to resolve problems that can arise when using InterCloud resources:

- [Amazon Marketplace Images Are Not Available](#), on page 256

- [Incorrect Cloud VM Licensing Model](#), on page 256
- [InterCloud Clients Lose Connectivity to Prime Network Services Controller](#), on page 256
- [Prime Network Services Controller Does Not Display IP Addresses for Cloud VMs](#), on page 257

Amazon Marketplace Images Are Not Available

If Amazon Marketplace images are not available when you attempt to create an InterCloud link using the Add InterCloud Link Wizard, use the information in the following table to identify and fix the issue:

If This Occurs:	Do This:
In the InterCloud Switch screen, the Refresh Marketplace button is dimmed or invisible, and only user-created and local InterCloud Switch images are displayed.	In the Configure InterCloud Link Screen, confirm that the Use Marketplace ICS check box is checked.
In the InterCloud Switch screen, only user-provided and local InterCloud Switch images are displayed.	In the Configure InterCloud Link Screen, confirm that the Use Marketplace ICS check box is checked.
In InterCloud Switch screen, Amazon Marketplace images are not discovered even after you click Refresh Marketplace .	Confirm that the provider account and the provider region are correct.

Incorrect Cloud VM Licensing Model



Note Prime Network Services Controller does not support the Provider Licensing model.

If you notice that platform (cloud VSM) licensing is being enforced for an InterCloud link even though the link was created by using Amazon Marketplace, use the following procedure to resolve the issue.

Procedure

-
- Step 1** Confirm that the cloud VSM is the same version as that included in the Prime Network Services Controller bundle.
- Step 2** Confirm that Prime Network Services Controller has indicated that the cloud VSM is to run in Marketplace mode instead of using InterCloud licensing.
-

InterCloud Clients Lose Connectivity to Prime Network Services Controller

InterCloud clients might lose connectivity to Prime Network Services Controller upon occasion. For example, if the Prime Network Services Controller server's IP address and shared secret are changed via the CLI while

an InterCloud link is configured, the InterCloud clients will lose connectivity with the Prime Network Services Controller server and will not be able to reconnect.

Use the following procedure to reestablish connectivity for the VSM, InterCloud Extender, and InterCloud Switch clients.



Note You must manually update the IP address of the VSM whether or not an InterCloud link is deployed.

Procedure

- Step 1** Using SSH, connect to the VSM, and update the IP address and shared secret password for Prime Network Services Controller.
- Step 2** Using SSH, connect to the InterCloud Extender and update the Prime Network Services Controller IP address.
- Step 3** Using the GUI:
- Choose **InterCloud Management > InterCloud Link > VPCs > vpc > intercloud-link**.
 - Click the **InterCloud Link** tab.
 - In the InterCloud Switch table, select the required switch and click **Reboot**.
After the InterCloud Switch reboots, it will reestablish connectivity.
-

Prime Network Services Controller Does Not Display IP Addresses for Cloud VMs

Occasionally, Prime Network Services Controller does not display IP addresses for cloud VM instances. For example, this situation occurs if you instantiate a cloud VM from a VM that uses DHCP in the enterprise data center. If this occurs, you can view the cloud VM IP addresses by entering the **show org port brief** command on the VSM or by using the following procedure.

Procedure

- Step 1** Create a port profile and include the **org root** command.
- Step 2** When creating a cloud VM, assign a port profile that has the org defined.
- Step 3** After the cloud VM is instantiated, initiate traffic on the DHCP IP address so that it appears in the IP database (IPDB) on the InterCloud Switch.
- Step 4** On the InterCloud Switch, enter the following command to obtain the IP address:

```
show intercloud vm vm-name system info
```

Creating AMI Images from VMs

Prime Network Services Controller enables you to create Amazon Machine Image (AMI) images from Windows and Linux VMs in your enterprise data center.

For both Windows and Linux VMs, you can obtain a virtual machine VMDK file by completing the following steps:

- 1 Power off the VM on the vCenter Client.
- 2 Select the VM.
- 3 In the vCenter Client, choose **File > Export OVF Template** to export the VM as a single OVA file.
- 4 Use the **tar** utility to untar the exported file and obtain the VM's disk.

For more information on creating AMI images from VMs, see the following topics:

- [Creating an AMI Image from a Windows VM, on page 258](#)
- [Creating an AMI Image from a Linux VM, on page 259](#)

Creating an AMI Image from a Windows VM

This procedure enables you to create an Amazon Machine Image (AMI) image from a Windows VM and import it as a VM image into Prime Network Services Controller.

Before You Begin

- Confirm that the following firewall ports are open on the Windows firewall on any third-party firewall installed in the VM:
 - 22—TCP
 - 6644—TCP, UDP
- Ensure that IPv4 is enabled on the VM's NICs as follows:
 - 1 Open `ncpa.cpl`.
 - 2 For each NIC in the VM, right-click and confirm that IPv4 is enabled.

Procedure

-
- Step 1** Download icami.exe from <http://www.cisco.com/go/services-controller>.
 - Step 2** In VMware vCenter, upload the downloaded icami.exe file to your Windows VM running on vCenter.
 - Step 3** Run icami.exe with admin privileges.
 - Step 4** Shut down the Windows VM.
 - Step 5** Using vCenter, export the OVF template as OVA.
 - Step 6** Extract the VMDK from the OVA.
 - Step 7** Using **dd** or a similar utility, convert the VMDK to raw images.
 - Step 8** Using **gzip** or **bzip**, compress the images.
 - Step 9** Using the Prime Network Services Controller GUI, import the VM image by choosing **InterCloud Management > Enterprise > VM Images > Import VM Image**.
-

Creating an AMI Image from a Linux VM

This procedure describes how to create an Amazon Machine Image (AMI) image from a Linux VM. After you create the AMI image, you can import it as a VM image into Prime Network Services Controller. This procedure uses the **vmware-mount** utility, which is a part of the vSphere disk development tool that you can download from <https://my.vmware.com/web/vmware/details?productId=2&downloadGroup=VDDK50>.

Procedure

-
- Step 1** Download the VM disk image (VMDK) onto a Linux host.
 - Step 2** Mount the VMDK as a flat file by using the **vmware-mount** command, as follows:

```
# vmware-mount -f vmdk-image /mount/point
```

where *vmdk-image* is the VMDK filename and */mount/point* is the desired directory.

- Step 3** Attach a loop device to the flat file by using the **losetup** command:

```
# losetup /dev/loopn /mnt/vmdk/file
```

where *loopn* is the loop device and *file* is the name of the flat file.

- Step 4** Access partitions on the disk image as follows:
 - a) Enter the **fdisk** command to view the disk partitions as shown in the following example for loop device */dev/loop0* :

```
# fdisk -l /dev/loop0
```

Device	Boot	Start	End	Blocks	Id	System
/dev/loop0p1	*	1	64	512000	83	Linux

```
/dev/loop0p2          64          784      5778432      8e      Linux LVM
```

- b) Create a device for each partition on the disk image by entering the **kpartx** command, as follows:

```
# kpartx -a /dev/loop0
# ls /dev/mapper/
control  loop0p1  loop0p2
```

This command creates device files for all physical partitions on the disk file and maps the logical volumes that reside in the partition.

- c) (Optional) Enter the **pvs** command to identify the volume groups that are present on the disk image. The command with example output resembles the following:

```
# pvs
PV /dev/mapper/loop0p2 VG vg_mowgli lvm2 [5.51 GiB / 0 free]
```

In this example, the second partition (/dev/mapper/loop0p2) contains the volume group `vg_mowgli`.

- d) (Optional) View the logical volumes by entering the **lvscan** command as shown in the following example:

```
# lvscan
inactive          '/dev/vg_mowgli/lv_root'[1.85 GiB] inherit
inactive          '/dev/vg_mowgli/lv_swap'[3.66 GiB] inherit
```

- Step 5** Mount the partitions and logical volume to recreate the Linux file system hierarchy under / (root) by completing the following steps:

Note In this example, the logical volume /dev/vg_mowgli/lv_root is the root (/) partition.

- a) Activate the logical volume by using the **lvchange** command so that it can be mounted:

```
# lvchange -ay /dev/vg_mowgli/lv_root
```

- b) Mount the logical volume on a directory on the host system (/mnt/fs in this example):

```
# mount /dev/vg_mowgli/lv_root /mnt/fs/
```

- c) List the contents of the logical volume to confirm that this is the root of the filesystem:

```
# ls /mnt/fs/
bin boot cgroup dev etc home lib lib64 lost+found media mnt opt proc
root sbin selinux
srv sys tmp usr var
```

- d) Obtain the filesystem mount points by entering the **cat** command:

```
# cat /mnt/fs/etc/fstab
/dev/mapper/vg_mowgli-lv_root  /          ext4    defaults    1 1
UUID=44cb64be-62bc-4297-9a8d-beb3493a2362  /boot     ext4    defaults    1 2
/dev/mapper/vg_mowgli-lv_swap swap       swap    defaults    0 0
```

In this example:

- /dev/mapper/vg_mowgli-lv_root mounts at /.
- /dev/mapper/vg_mowgli-lv_swap is the swap partition.
- The partition with the UUID 44cb64be-62bc-4297-9a8d-beb3493a2362 mounts at /boot.

e) Obtain the UUID and LABEL of a partition by entering the **blkid** command on the partition device file:

```
# blkid /dev/mapper/loop0p1

/dev/mapper/loop0p1:UUID="44cb64be-62bc-4297-9a8d-beb3493a2362"
TYPE="ext4"
```

f) Recreate the filesystem by using the information gained from the **fstab** command:

```
# mount /dev/mapper/loop0p1 /mnt/fs/boot/
```

The Linux file system is successfully recreated with all partitions mounted as in fstab. That is, the file system present on vmdk has been recreated inside the /mnt/fs directory on the host system.

Step 6 Validate the image for the Amazon Xen Hypervisor by completing the following steps:

a) Verify that the operating system and version are supported by Prime Network Services Controller by checking the contents of the file etc/redhat-release:

```
# cat /mnt/fs/edt/redhat-release
Red Hat Enterprise Linux Server release 6.2 (Santiago)
```

b) Review the contents of grub.conf to determine the version of Linux kernel present on the filesystem that is set to boot by default. The following example displays the contents of a grub.conf file and provides the following information:

- The value of the parameter default identifies the default entry (0).
- A single kernel is present in the disk image and is set to boot by default.
- The version of the kernel that is set to boot by default is displayed in the kernel entry. In this example, the version is 2.6.32-220.el6.x86_64.

```
# grub.conf generated by anaconda
#
# Note that you do not have to rerun grub after making changes to this
file
# NOTICE: You have a /boot partition. This means that
#         all kernel and initrd paths are relative to /boot/, eg.
#         root (hd0,0)
#         kernel /vmlinuz-version ro root=/dev/mapper/vg-mowgli-lv_root
#         initrd /initrd-[generic-]version.img
# boot
default=0
timeout=5
splashimage=(hd0,0)/grub/splash.xmp.gz
hiddenmenu
```

```

title Red Hat Enterprise Linux (2.6.32-220.el6.x86_64)
    root (hd0,0)
    kernel /vmlinuz-2.6.32.220.el6.x86_64 ro
root=/dev/mapper/vg_mowgli-lv_root
    initrd /initramfs-2.6.32-220.el6.x86_64.img

```

c) In the file `/mnt/fs/boot/config-kernel-version`, verify that the following flags are set to y:

- `CONFIG_PARAVIRT_GUEST=y`
- `CONFIG_XEN=y`
- `CONFIG_PARAVIRT=y`
- `CONFIG_NETFILTER=y`

Step 7 Create a new disk image to copy the filesystem present on the VMDK by completing the following steps:

a) Create a new disk by using the `qemu-img` command:

```

qemu-img create -f raw myami.img 6G
Formatting 'myami.img', fmt=raw size=6442450944

```

b) Attach the new image file to a loop device and format it so that it is the same as the source VMDK image filesystem:

```

# losetup /dev/loop1 myami.img
# mkfs.ext4 /dev/loop1

```

c) Label the new image, as in the following example:

```

# e4label /dev/loop1 _/
# blkid /dev/loop1
/dev/loop1: LABEL="_/"  UUID="9cf14199-a0ff-4501-bb2f-9a7bc020b1e2"
TYPE="ext4"

```

d) Mount the new image file:

```

# mkdir /mnt/amifs
# mount /dev/loop1 /mnt/amifs

```

Step 8 Copy the file system contents from the source image to the new image:

```

# cp -ar /mnt/fs/* /mnt/amifs/

```

Step 9 Configure the new image as described in the following steps:

a) Modify `/mnt/amifs/etc/fstab` so that it reflects the partitioning on the new image. For example:

```

LABEL=_/ ext4 defaults 1 1
devpts /dev/pts devpts gid=5,mode=620 0 0
sysfs /sys sysfs defaults 0 0
proc /proc proc defaults 0 0

```

- b) Create a udev rule to change the first Ethernet interface to csc0 by creating the file /mnt/amifs/etc/udev/rules.d/70-persistent-net.rules and adding the following content:

```
SUBSYSTEM=="net", DRIVERS=="vif", ATTRS{nodename}=="device/vif/0",
NAME="csc0"
```

- c) Create an interface file named /mnt/p1/etc/sysconfig/network-scripts/ifcfg-csc0 and add the following content:

```
ONBOOT=yes
DEVICE=csc0
BOOTPROTO=dhcp
```

- d) Enable networking by editing the file /mnt/amifs/etc/sysconfig/network and setting NETWORKING to yes.
e) Edit grub.conf so that it looks similar to the following:

```
default=0
timeout=2
title Red Hat Enterprise Linux (2.6.32-71.el6.x86_64)
    root (hd0)
    kernel /boot/vmlinuz-2.6.32-71.el6.x86_64 ro root=LABEL=/_
    selinux=0 console=hvc0
```

Step 10 Add the driver RPM by completing the following steps:

- a) Create the directory /mnt/amifs/opt/.cisco and copy the driver RPM into this directory:

```
mkdir -p /mnt/amifs/opt/.cisco
cp csw.1.1.2.rhel6_2.x86-64.rpm /mnt/amifs/opt/.cisco
```

- b) Create the files version_cur and version_gold in /opt/.cisco and place the driver version in each file. You can obtain the driver version from the name of the file. For example, a file with the name csw.1.1.2.rhel6_2.x86_64 has the driver version 1.1.2.

```
cat /mnt/amifs/opt/.cisco/version_cur
1.1.2
cat /mnt/amifs/opt/.cisco/version_gold
1.1.2
```

- c) For each ifcfg-ethn file in /mnt/amifs/sysconfig/network-scripts/, create an entry in interface.conf using the syntax `interface-interface-number,interface-name,random-mac-address` where:

- *interface-number* is the number assigned to the interface, starting with 1.
- *interface-name* is the name assigned to the interface.
- *random-mac-address* is a MAC address.

The following is an example interface.conf file for two interfaces:

```
cat /mnt/amifs/opt/.cisco/interface.conf
```

```
interface-1,ether0,00:0f:f7:dd:8a:37  
interface-2,ether1,00:0f:f7:34:40:ae
```

Step 11 Add the initialization scripts for starting the subagent:

```
# cp csw /mnt/amifs/etc/init.d/  
# chroot /mnt/amifs/ chkconfig --level 34 csw on
```

Step 12 Add the getkeys script for fetching Amazon keys:

```
# cp getkeys /mnt/amifs/etc/init.d/  
# chroot /mnt/amifs/ chkconfig --34 getkeys on
```

Step 13 Unmount and close the AMI image by entering the following commands:

```
//Unmount the disk image file  
# umount /mnt/amifs/  
  
//Detach the loop device  
# losetup -d dev/loop0
```

Step 14 Unmount and close the VMDK by entering the following commands:

```
//Unmount partitions  
# umount /mnt/fs/boot  
# umount /mnt/fs  
  
//Deactivate all logical volumes present  
# lvchange -an /dev/vg-mowgli/lv_root  
  
//Delete device mappings  
# kpartx -d /dev/loop0  
  
//Detach the loop device  
# losetup -d /dev/loop0  
  
//Unmount the VMDK file  
# vmware-mount -d /mnt/vmdk
```



Configuring Administrative Operations

This section includes the following topics:

- [Administrative Operation Conventions, page 265](#)
- [Managing Backup Operations, page 265](#)
- [Restoring a Backup Configuration, page 270](#)
- [Managing Export Operations, page 274](#)
- [Configuring Import Operations, page 278](#)

Administrative Operation Conventions

The following conventions apply when performing the administrative operations described in this section:

- The remote file location you specify must start with a slash (/) and include the full path and file name. Do not use relative paths.
- The user name and password on the remote system must be correct, and the user specified must have read and write permissions on the remote system.
- The file on the remote system must be a valid file, and the size cannot be zero.
- For backup and export operations, if the Task tab contains a Remote Err Description of *No such file*, reboot the Prime Network Services Controller VM via vCenter.

Managing Backup Operations

We recommend that you use backup and restore operation as a disaster recovery mechanism. To migrate configuration data from one Prime Network Services Controller server to another, use export and import operations.

Creating a Backup Operation

Before You Begin

Obtain the backup server IP address or hostname and authentication credentials.

Procedure

Step 1 Choose **Administration > Operations**.

Step 2 Click **Create Backup Operation**.

Step 3 In the Create Backup Operation dialog box, complete the following fields, then click **OK**:

Field	Description
Admin State	<p>One of the following administrative states:</p> <ul style="list-style-type: none"> • enabled—Backup is enabled. The system runs the backup operation when you click OK. • disabled—Backup is disabled. The system does not run the backup operation when you click OK. If you choose this option, all fields in the dialog box remain visible.
Type	<p>Backup type.</p> <p>The backup creates a copy of the whole database file. You can use this file for disaster recovery if you need to recreate every configuration on your system. This field is not editable.</p>
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the backup file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p>

Field	Description
Password	<p>Password the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the backup operation immediately.</p>
Absolute Path Remote File	<p>Full path of the backup filename.</p> <p>This entry must start with a slash (/) and must not contain a relative path.</p>

Running a Backup Operation

Procedure

- Step 1** Choose **Administration > Operations > Backup-server** where *backup-server* is the server on which the backup file is stored.
- Step 2** In the General tab, enter the following information:
- In the Admin State field, choose **enabled**.
 - In the Password field, enter the password for the identified user.
 - (Optional) Change the content of the other available fields.
- Step 3** Click **Save**.
Prime Network Services Controller takes a snapshot of the configuration type that you selected and uploads the file to the network location.
- Step 4** (Optional) To view the progress of the backup operation, click the **Task** tab. The Task tab provides the information described in the following table. The operation continues to run until it is completed.

Field	Description
Description	Task description.
Status	Task status.
Stage Descriptor	Description of the current stage.
Tries	Number of times the task has been tried.

Field	Description
Previous Status	Status of the previous task only. This field does not provide the status of the current task.
Remote Err Code	Remote error code.
Remote Err Description	Description of the remote error.
Remote Inv Result	Remote error result.
Time Stamp	Date and time when the task completed.
Progress	Progress of the current task, indicated by the percent complete, a progress bar, or both.

Editing a Backup Operation

Before You Begin

Obtain the backup server IP address or hostname and authentication credentials.

Procedure

- Step 1** Choose **Administration > Operations**.
- Step 2** Select the backup operation you want to edit, then click **Edit**.
- Step 3** In the Edit Backup dialog box, modify the information as required, then click **OK**.

Field	Description
Admin State	One of the following administrative states: <ul style="list-style-type: none"> • enabled—Backup is enabled. The system runs the backup operation when you click OK. • disabled—Backup is disabled. The system does not run the backup operation when you click OK. If you choose this option, all fields in the dialog box remain visible.

Field	Description
Type	<p>Backup type.</p> <p>The backup creates a copy of the whole database file. You can use this file for disaster recovery if you need to recreate every configuration on your system. This field is not editable.</p>
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the backup file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p>
Password	<p>Password the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the backup operation immediately.</p>
Absolute Path Remote File	<p>Full path of the backup filename.</p> <p>This entry must start with a slash (/) and must not contain a relative path.</p>

Deleting a Backup Operation

Procedure

-
- Step 1** Choose **Administration > Operations**.
 - Step 2** Select the backup operation you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

Restoring a Backup Configuration

Procedure

-
- Step 1** Install the Prime Network Services Controller virtual machine. For information, see the [Cisco Prime Network Services Controller 3.2 Quick Start Guide](#).
 - Step 2** Uninstall the VSG policy agents. Connect the Secure Shell to the VSG console for this task. This step does not disrupt traffic.
 - Note** Perform this step for all VSGs that are associated with the Prime Network Services Controller that you are restoring.

Example:

VMware

```
vsg# conf t
vsg(config)# vnmc-policy-agent
vsg(config-vnmc-policy-agent)# no policy-agent-image
```

Hyper-V Hypervisor

```
vsg# conf t
vsg(config)# nsc-policy-agent
vsg(config-nsc-policy-agent)# no policy-agent-image
```

- Step 3** Disable the ASA 1000V policy agent.

Example:

```
VMware
```

```
asa# conf t
asa(config)# no vnm policy-agent
```

Hyper-V Hypervisor

Not available.

Step 4 Uninstall the VSM policy agents. Connect the Secure Shell to the VSM console for this task. This step does not disrupt traffic.

Note Perform this step for all VSMs that are associated with the Prime Network Services Controller you are restoring.

Example:

VMware

```
vsm# conf t
vsm(config)# vnm policy-agent
vsm(config-vnm policy-agent)# no policy-agent-image
```

Hyper-V Hypervisor

```
vsm# conf t
vsm(config)# nsc policy-agent
vsm(config-nsc policy-agent)# no policy-agent-image
```

Step 5 Restore the Prime Network Services Controller database. Connect the Secure Shell to the Prime Network Services Controller CLI for this task. Depending upon your Prime Network Services Controller backup location, restore using FTP, SCP, or SFTP.

Example:

```
nsc# connect local-mgmt
nsc(local-mgmt)# restore scp://username@server/path
```

Step 6 In the Prime Network Services Controller GUI, choose **Resource Management > Resources > VSMs**, and do the following:

- Wait until each registered VSM displays the operational status of lost-visibility.
- Choose each VSM, and click **Delete**.

Step 7 In the Prime Network Services Controller GUI, choose **Resource Management > Resources > VSMs**, and verify that the deleted VSMs are not displayed.

Step 8 Reregister the VSMs associated with Prime Network Services Controller by entering the following commands for each VSM:

Example:

VMware
<pre>vsm# conf t vsm(config)# vnmc-policy-agent vsm(config-vnmc-policy-agent)# registration-ip <i>PrimeNSC-ip-address</i> vsm(config-vnmc-policy-agent)# shared-secret <i>password</i></pre>
Hyper-V Hypervisor
<pre>vsm# conf t vsm(config)# nsc-policy-agent vsm(config-nsc-policy-agent)# registration-ip <i>PrimeNSC-ip-address</i> vsm(config-nsc-policy-agent)# shared-secret <i>password</i></pre>

Step 9 Reinstall the VSM policy agents.

Note If the VSM policy agents must be upgraded, install the new software now.

Example:

VMware
<pre>vsm# conf t vsm(config)# vnmc-policy-agent vsm(config-vnmc-policy-agent)# policy-agent-image bootflash:nsc-vsmpa.n.n.n.bin</pre>
Hyper-V Hypervisor
<pre>vsm# conf t vms(config)# nsc-policy-agent vsm(config-nsc-policy-agent)# policy-agent-image bootflash:nsc-vsmpa.n.n.n.bin</pre>

Step 10 Wait until all the VSMs have registered with Prime Network Services Controller and are displayed under **Resource Management > Resources > VSMs**.

Step 11 Reregister the VSGs associated with Prime Network Services Controller by entering the following commands for each VSG:

Example:

VMware

```
vsg# conf t
vsg(config)# vnmc-policy-agent
vsg(config-vnmc-policy-agent)# registration-ip PrimeNSC-ip-address
vsg(config-vnmc-policy-agent)# shared-secret password
```

Hyper-V Hypervisor

```
vsg# conf t
vsg(config)# nsc-policy-agent
vsg(config-nsc-policy-agent)# registration-ip PrimeNSC-ip-address
vsg(config-nsc-policy-agent)# shared-secret password
```

Step 12 Reinstall the VSG policy agents.

Note If the VSG policy agents must be upgraded, install the new software now.

Example:

VMware

```
vsg# conf t
vsg(config)# vnmc-policy-agent
vsg(config-vnmc-policy-agent)# policy-agent-image bootflash:nsc-vsgpa.n.n.n.bin
```

Hyper-V Hypervisor

```
vsg# conf t
vsg(config)# nsc-policy-agent
vsg(config-nsc-policy-agent)# policy-agent-image bootflash:nsc-vsgpa.n.n.n.bin
```

Step 13 Re-enable the ASA 1000V policy agent.

Example:

VMware

```
asa# conf t
asa(config)# vnmc policy-agent
asa(config-vnmc-policy-agent)# shared-secret password
asa(config-vnmc-policy-agent)# registration host PrimeNSC-ip-address
```

Hyper-V Hypervisor

Not available.

Step 14 Verify the following states after the restore process is complete:

Note The restore process could take a few minutes depending upon your setup environment.

- a) Using the VSG CLI, verify that your configurations are restored to their earlier state.
 - b) Using the Prime Network Services Controller GUI, verify that your objects and policies are restored to their earlier state.
 - c) Using the ASA 1000V CLI, verify that your configurations are restored to their earlier state.
-

Managing Export Operations

Use export and import operations to migrate data from one Prime Network Services Controller server to another. To back up and restore Prime Network Services Controller data (for example, as a disaster recovery mechanism), use backup and restore operations.

Creating an Export Operation

The associations of compute and edge firewalls with VSGs and ASA 1000Vs, respectively, are not included in export or import data. Only firewall definitions are included, such as device profiles and policies. If an imported firewall did not exist in the system, it will not be associated to a VSG or ASA 1000V after the import operation. If an imported firewall already existed in the system, the association state remains the same.

InterCloud data is not included in export or import operations. The affected InterCloud data includes:

- Provider account information
- InterCloud links and components
- Cloud VMs

Before You Begin

Obtain the remote file server IP address or hostname and authentication credentials before performing an export.

Procedure

Step 1 Choose **Administration > Operations**.

Step 2 Click **Create Export Operation**.

Step 3 In the Create Export Operation dialog box, provide the required information as described in the following table, then click **OK**:

Field	Description
Admin State	<p>One of the following administrative states:</p> <ul style="list-style-type: none"> • enabled—Export is enabled. The system runs the export operation when you click OK. • disabled—Export is disabled. The system does not run the export operation when you click OK. If you choose this option, all fields in the dialog box remain visible.
Type	<p>One of the following export types:</p> <ul style="list-style-type: none"> • config-all • config-logical • config-system
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the export file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p>
Password	<p>The password the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the export operation immediately.</p>
Absolute Path Remote File (.tgz)	<p>Full path of the .tgz filename.</p> <p>This entry must start with a slash (/) and must not contain a relative path.</p>

Editing an Export Operation



Note

The associations of compute and edge firewalls with VSGs and ASA 1000Vs, respectively, are not included in export or import data. Only firewall definitions are included, such as device profiles and policies. If an imported firewall did not exist in the system, it will not be associated to a VSG or ASA 1000V after the import operation. If an imported firewall already existed in the system, the association state remains the same.

Before You Begin

Obtain the remote file server IP address or hostname and authentication credentials before performing an export.

Procedure

Step 1 Choose **Administration > Operations**.

Step 2 In the Operations table, select the export operation you want to edit, then click **Edit**.

Step 3 In the Edit Export dialog box, modify the fields as appropriate, then click **OK**.

Field	Description
Admin State	One of the following administrative states: <ul style="list-style-type: none"> • enabled—Export is enabled. The system runs the export operation when you click OK. • disabled—Export is disabled. The system does not run the export operation when you click OK. If you choose this option, all fields in the dialog box remain visible.
Type	One of the following export types: <ul style="list-style-type: none"> • config-all • config-logical • config-system

Field	Description
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the export file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p>
Password	<p>The password the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the export operation immediately.</p>
Absolute Path Remote File (.tgz)	<p>Full path of the .tgz filename.</p> <p>This entry must start with a slash (/) and must not contain a relative path.</p>

Deleting an Export Operation

Procedure

-
- Step 1** In the Navigation pane, choose **Administration > Operations**.
 - Step 2** In the Operations table, select the export operation you want to delete.
 - Step 3** When prompted, confirm the deletion.
-

Configuring Import Operations

Creating an Import Operation

Before You Begin

Obtain the remote file server IP address or hostname and authentication credentials.



Note

The association of compute and edge firewalls with VSGs and ASA 1000Vs, respectively, are not included in the export or import data. Only the compute and edge firewall definitions are included, such as device profiles and policies. Therefore, if an imported firewall did not exist in the system, it will not be associated to a VSG or ASA 1000V after the import operation. If an imported firewall already existed in the system, the association state remains the same.



Caution

When the configuration data is imported into the Prime Network Services Controller server, you might see an error message and get logged out, followed by the display of a new Prime Network Services Controller certificate. This error occurs because the Prime Network Services Controller hostname, domain name, or both have changed. The VM Manager Extension needs to be exported again and installed on vCenter. To continue with the import, accept the Prime Network Services Controller certificate and log into Prime Network Services Controller again.

Procedure

Step 1 Choose **Administration > Operations**.

Step 2 Click **Create Import Operation**.

Step 3 In the Create Import Operation dialog box, provide the following information as required, then click **OK**:

Field	Description
Admin State	One of the following administrative states: <ul style="list-style-type: none"> • enabled—Import is enabled. The system runs the import operation as soon as you click OK. • disabled—Import is disabled. The system does not run the import operation when you click OK. If you choose this option, all fields in the dialog box remain visible.
Action	Action to be taken on a file: merge.

Field	Description
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the import file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p>
Password	<p>Password the system uses to log into the remote server.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the import operation immediately.</p>
Absolute Path Remote File (.tgz)	<p>Full path of the .tgz filename.</p> <p>This entry must start with a slash (/) and must not contain a relative path.</p>

Editing an Import Operation

Before You Begin

Obtain the remote file server IP address or hostname and authentication credentials.

Procedure

Step 1 Choose **Administration > Operations**.

Step 2 Select the import operation that you want to edit, then click **Edit**.

Step 3 In the Edit dialog box, modify the fields as required, then click **OK**.

Field	Description
Admin State	<p>One of the following administrative states:</p> <ul style="list-style-type: none"> • enabled—Import is enabled. The system runs the import operation as soon as you click OK. • disabled—Import is disabled. The system does not run the import operation when you click OK. If you choose this option, all fields in the dialog box remain visible.
Action	Action to be taken on a file: merge.
Protocol	<p>Protocol used when communicating with the remote server:</p> <ul style="list-style-type: none"> • FTP • SCP • SFTP
Hostname/IP Address	<p>Hostname or IP address of the device where the import file is stored.</p> <p>This entry cannot be changed when editing the operation.</p> <p>Note If you use a hostname instead of an IP address, you must configure a DNS server.</p>
User	<p>Username the system uses to log into the remote server.</p> <p>This field is displayed if you choose enabled in the Admin State field.</p>
Password	<p>Password the system uses to log into the remote server.</p> <p>Note Prime Network Services Controller does not store this password. You do not need to enter this password unless you intend to enable and run the import operation immediately.</p>

Field	Description
Absolute Path Remote File (.tgz)	Full path of the .tgz filename. This entry must start with a slash (/) and must not contain a relative path.

Deleting an Import Operation

Procedure

- Step 1** Choose **Administration > Operations**.
 - Step 2** Select the import operation that you want to delete, then click **Delete**.
 - Step 3** When prompted, confirm the deletion.
-

