Add and Organize Devices

This chapter contains the following topics:

Add Devices to Prime Infrastructure

Cisco Prime Infrastructure uses device, location, and port groups to organize elements in the network. When you view devices in a table or on a map (network topology), the devices are organized in terms of the groups they belong to. When a device is added to Prime Infrastructure, it is assigned to a group named **Unassigned Group**. You can then move the device into the desired groups as described in Create Groups of Devices for Easier Management and Configuration, on page 24.

Note Prime Infrastructure does not support the StackWise Virtual Link (SVL) for the Cisco 9k devices.

Remember To make your **Catalyst 9800 Series** devices send AP and client operational data to Prime Infrastructure, ensure that:

- You enable NETCONF-YANG globally. You can use the following to configure it:

  ```
  device# conf t
  device(config)# netconf-yang
  ```

- You have a user with *privilege 15* with which the device can be managed in Cisco Prime Infrastructure for SSH/Telnet access. You can use the following:

  ```
  username cisco1 privilege 15 password 0 cisco1
  ```

- You enable AAA new-model using command:

  ```
  device(config)# aaa new-model
  ```

  You configure NETCONF-SSH connectivity and edit-config operations:

  ```
  aaa authorization exec default local
  ```

- If Prime Infrastructure is unable to discover a client, please validate the below CLI in devices, which is required for client discovery:

  ```
  wireless client onboarding-event
  ```

Note Same Cisco Catalyst 9800 Series device should not be managed by two Prime server.

You must configure the ASR 9900 set of devices with the **netconf agent tty** and **xml agent tty** commands for them to be effectively overseen by Prime Infrastructure.

Note The list of 9K devices mentioned below are supported in the install mode:

- C9200
- C9200L
- C9300
- C9400
- C9500
- C9500H
- C9600
- C3850
- C3650
- C5760
- C9300L
- IE3400H

Table 1: Methods for Adding Devices

Supported Methods for Adding Devices	See:
Add multiple devices by discovering the neighbors of a seed device using:	Add Devices Using Discovery, on page 4.
• Ping sweep and SNMP polling (Quick Discovery)	• Run Quick Discovery, on page 5
• Customized protocol, credential, and filter settings (useful when you will be repeating the discovery job)	• Run Discovery with Customized Discovery Settings, on page 6
Add multiple devices using the settings specified in a CSV file	Import Devices from Another Source, on page 7
Add a single device (for example, for a new device type)	Add Devices Manually (New Device Type or Series), on page 9

Understand the Discovery Process

Prime Infrastructure performs the following steps during the discovery process:

1. Using ICMP ping, determine if each device is reachable. If Prime Infrastructure is unable to reach the device, the device Reachability status is *Unreachable*.
2. Verify the SNMP credentials. If the device is reachable by ICMP, but the SNMP credentials are not valid, the device Reachability status is *Ping Reachable*.

If the device is reachable by both ICMP and SNMP, the device Reachability status is *Reachable* .

3. Verify Telnet and SSH credentials.
4. Modify the device configuration(s) to add a trap receiver in order for Prime Infrastructure to receive the necessary notifications.
5. Start the inventory collection process to gather all device information.
6. Add the devices to the **Inventory** > **Network Devices** page.

After running discovery, choose **Inventory** > **Device Management** > **Network Devices** to verify that discovery is complete.

Add Devices Using Discovery

Prime Infrastructure supports two discovery methods:

- Ping sweep from a seed device (Quick Discovery). The device name, SNMP community, seed IP address and subnet mask are required. See Run Quick Discovery, on page 5
- Using customized discovery methods (Discovery Settings)—This method is recommended if you want to specify settings and rerun discovery in the future. See Run Discovery with Customized Discovery Settings, on page 6.

Note

- If a discovery job rediscovers an *existing* device and the device's last inventory collection status is **Completed**, Prime Infrastructure does *not* overwrite the existing credentials with those specified in the Discovery Settings. For all other statuses (on existing devices), Prime Infrastructure overwrites the device credentials with those specified in the Discovery Settings.
- Service discovery might take longer than usual when a large number of devices is added during database maintenance windows. Therefore, we recommend that you avoid large-scale operations during the night and on weekends.
- Autonomous APs are filtered out of the discovery process to optimize the discovery time. You need to manually add Autonomous APs using Import Devices or Credential Profile.

The discovery process of a device is carried out in the sequence of steps listed below. As Prime Infrastructure performs discovery, it sets the reachability state of a device, which is: Reachable, Ping Reachable, or Unreachable. A description of the states is provided in Device Reachability and Admin States, on page 17.

1. Prime Infrastructure determines if a device is reachable using ICMP ping. If a device is not reachable, its reachability state is set to **Unreachable**.
2. Server checks if SNMP communication is possible or not.
    - If a device is reachable by ICMP but its SNMP communication is not possible, its reachability state is set to **Ping Reachable**.
    - If a device is reachable by both ICMP and SNMP, its reachability state is **Reachable**.

3. Verifies the device's Telnet and SSH credentials. If the credentials fail, details about the failure are provided in the Network Devices table in the **Last Inventory Collection Status** column (for example, **Wrong CLI Credentials**). The reachability state is not changed.
4. Modifies the device configuration to add a trap receiver so that Prime Infrastructure can receive the necessary notifications (using SNMP).
5. Starts the inventory collection process to gather all device information.
6. Displays all information in the web GUI, including whether discovery was fully or partially successful.

Note When Prime Infrastructure verifies a device’s SNMP read-write credentials, the device log is updated to indicate that a configuration change has been made by Prime Infrastructure (identified by its IP address).

Specify the Management IP Address Type (IPv4/IPv6) for Discovered Devices

For discovered dual-home (IPv4/IPv6) devices, specify whether you want Prime Infrastructure to use IPv4 or IPv6 addresses for management IP addresses.

Note Device inventory has a limited DNS name IPv6 support.

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Discovery**.

Step 2 From the **IPv4/IPv6 Preference for Management Address** drop-down list, choose either **v4** or **v6**.

Note Ensure that the management IP address that you choose is not a mix of IPv4 and IPv6 addresses.

Step 3 Click **Save**.

Run Quick Discovery

Use this method when you want to perform a ping sweep using a single seed device. Only the device name, SNMP community, seed IP address and subnet mask are required. If you plan to use the configuration management features, you must provide the protocol, user name, password, and enable password.

You can view the guest users discovered by Prime Infrastructure by choosing **Services > Network Services > Guest Users**. To see the correct lifetime on guest user accounts after they are discovered, make sure the devices have the correct time settings specified.

Step 1 Choose **Inventory** > **Device Management** > **Discovery**, then click the **Quick Discovery** link at the top right of the window.

Step 2 At a minimum, enter the name, SNMP community, seed IP address, and subnet mask.

Step 3 Click **Run Now**.

What to do next

Click the job hyperlink in the **Discovery Job Instances** area to view the results.

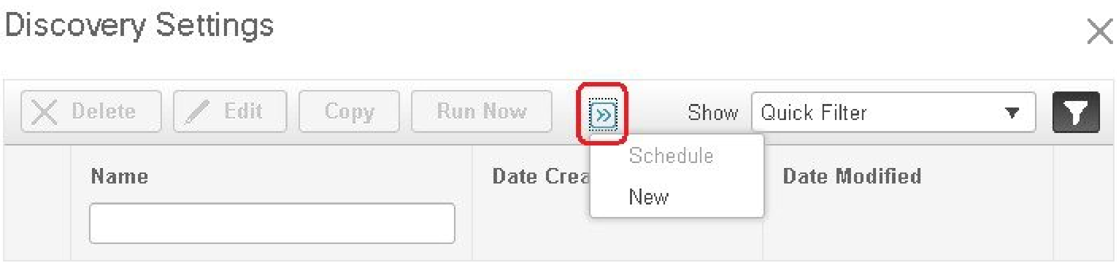
Run Discovery with Customized Discovery Settings

Prime Infrastructure can discover network devices using discovery profiles. A discovery profile contains a collection of settings that instructs Prime Infrastructure how to find network elements, connect to them, and collect their inventory. For example, you can instruct Prime Infrastructure to use CDP, LLDP, OSPF to discover devices, or just perform a simple ping sweep (an example of the results of a ping sweep is provided in Sample IPv4 IP Addresses for Ping Sweep, on page 6.) You can also create filters to fine-tune the collection, specify credential sets, and configure other discovery settings. You can create as many profiles as you need.

After you create a profile, create and run a discovery job that uses the profile. You can check the results of the discovery job on the **Discovery** page. You can also schedule the job to run again at regular intervals.

Step 1 Choose **Inventory** > **Device Management** > **Discovery**, then click the **Discovery Settings** link at the top right of the window. (If you do not see a Discovery Settings link, click the arrow icon next to the Quick Discovery link.)

Step 2 In the **Discovery Settings** pop-up, click **New**.



Step 3 Enter the settings in the **Discovery Settings** window. Click "**?**" next to a setting to get information about that setting. For example, if you click "**?**" next to **SNMPv2 Credential**, the help pop-up provides a description of the protocol and any required attributes.

Step 4 Click the **Import** button to import the discovery settings from your system.

Step 5 Click the **Export** button to export the discovery settings in XML format.

Step 6 Click **Run Now** to run the job immediately, or **Save** to save your settings and schedule the discovery to run later.

Note When using Firefox to create and save a discovery job, the **Save** and **Cancel** options do not appear in the GUI.

Sample IPv4 IP Addresses for Ping Sweep

The following table provides an example of the results of a ping sweep.

Subnet Range	Number of Bits	Number of IP Addresses	Sample Seed IP Address	Start IP Address	End IP Address
255.255.240.0	20	4094	205.169.62.11	205.169.48.1	205.169.63.254
255.255.248.0	21	2046	205.169.62.11	205.169.56.1	205.169.63.254

255.255.252.0	22	1022	205.169.62.11	205.169.60.1	205.169.63.254
255.255.254.0	23	510	205.169.62.11	205.169.62.1	205.169.63.254
255.255.255.0	24	254	205.169.62.11	205.169.62.1	205.169.63.254
255.255.255.128	25	126	205.169.62.11	205.169.62.1	205.169.63.127
255.255.255.192	26	62	205.169.62.11	205.169.62.1	205.169.63.62
255.255.255.224	27	30	205.169.62.11	205.169.62.1	205.169.63.30
255.255.255.240	28	14	205.169.62.11	205.169.62.1	205.169.63.14
255.255.255.248	29	6	205.169.62.11	205.169.62.9	205.169.63.14
255.255.255.252	30	2	205.169.62.11	205.169.62.9	205.169.63.10
255.255.255.254	31	0	205.169.62.11		
255.255.255.255	32	1	205.169.62.11	205.169.62.11	205.169.62.11

Verify Discovery

When discovery is completed, you can verify if the process was successful.

To verify successful discovery, follow these steps:

Step 1 Choose **Inventory** > **Device Management** > **Discovery**.

Step 2 Choose the discovery job for which you want to view details.

Step 3 Choose **User Jobs** > **Discovery** from the left navigation pane and select the specific job.

Step 4 Under **Discovery Job Instances**, expand the arrow to view details about the devices that were discovered.

If devices are missing:

- Change your discovery settings, then rerun the discovery.
- Add devices manually. See Add Devices Manually (New Device Type or Series), on page 9 for more information.

The **Discovery Job Instances** section now displays **Export** and **Refresh** buttons. You can export the job information as both PDF and CSV.

Import Devices from Another Source

If you have another management system from which you want to import your devices, or if you want to import a spreadsheet that lists all of your devices and their attributes, you can add device information into Prime Infrastructure by importing a bulk device file. You must ensure that the CSV file you plan to import is complete and properly formatted, as explained in Create Device Import CSV Files, on page 8.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**, click the + icon above the Network Devices table and then click **Bulk Import**.

Step 2 From the Operation drop-down list, choose **Device**.

Step 3 Next to Select CSV File, click **Browse** to navigate to and select the CSV file that contains the devices that you want to import.

Step 4 Click **Import**.

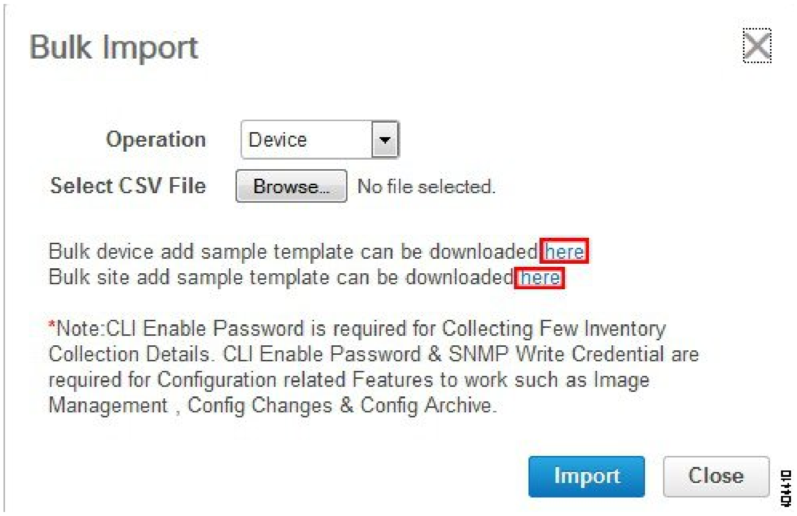
Step 5 Check the status of the import by choosing **Administration** > **Dashboards** > **Job Dashboard** > **UserJobs** > **Device Bulk Import**.

Step 6 Click the arrow to expand the job details and view the details and history for the import job.

Create Device Import CSV Files

If you want to use a CSV file to import your devices from another source into Prime Infrastructure, you should prepare the CSV file using the device template, which you can download from Prime Infrastructure as follows:

1. Choose **Inventory** > **Device Management** > **Network Devices Inventory > Device Management >**. Then click **Bulk Import**.
2. Click the **here** link next to "Bulk device add sample template can be downloaded" (as highlighted in the figure below). The template contains all of the fields and descriptions for the information that must be contained in the CSV device file you plan to import.



Operation: Device

Select CSV File: Browse... No file selected.

Bulk device add sample template can be downloaded here
Bulk site add sample template can be downloaded here

*Note:CLI Enable Password is required for Collecting Few Inventory Collection Details. CLI Enable Password & SNMP Write Credential are required for Configuration related Features to work such as Image Management , Config Changes & Config Archive.

Please note that when you add devices by importing a CSV file, the extent to which Prime Infrastructure can manage these devices will depend on the information you provide in the CSV file. For example: If you do not provide values for the CLI username, CLI password, CLI enable password, and CLI timeout value fields for a device in the CSV file, Prime Infrastructure will be unable to modify that device's configurations, update device software images, or perform other useful functions.

This will also affect collection of complete device inventory. For partial inventory collection in Prime Infrastructure, you must provide values for at least the following fields in the CSV file:

- Device IP address
- SNMP version
- SNMP read-only community strings
- SNMP write community strings
- SNMP retry value
- SNMP timeout value

For full inventory collection in Prime Infrastructure, you must also provide a value for the Protocol field, as well as values for the fields that correspond to the protocol you specify. For example: If you specify a value of `SNMPv3` in the Protocol field, you must also specify values for the SNMPv3 fields in the sample CSV file (such as the SNMPv3 username and authorization password).

You can specify the credential profile in the CSV file to apply the credentials to a set of devices. If you specify the credential profile and also enter the values manually in the CSV file, the device will be managed based on a combination of the manually entered credentials and the credential profile, with the manually entered credentials taking higher priority. For example, if the CSV file contains a credential profile with SNMP and Telnet credentials in addition to manually entered SNMP credentials, then the device is managed based on the manually entered SNMP credentials and the Telnet credentials in the credential profile.

If the CSV file you plan to import contains any User Defined Field (UDF) parameters, you must ensure that you add these UDF parameters before importing the CSV file. You can do this by selecting **Administration** > **Settings** > **System Settings** > **Inventory** > **User Defined Fields** and then adding each of the UDF parameters. The UDF column in your CSV file must be begin with `UDF:`, as indicated in the CSV template. Do not use the special characters : ; and # for UDF field parameters.

Note During bulk import, the CSV file must contain only the IP Address and Credential Profile Name information.

Add Devices Manually (New Device Type or Series)

Use this procedure to add a new device type and to test your settings before applying them to a group of devices.

Step 1 Choose **Inventory > Device Management > Network Devices**.

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 In the **Add Device** dialog box, complete the required fields. Click the **?** icon next to a field for a description of that field.

Note You must enter the **HTTP/HTTPS Parameters** in the **Add Device** dialog box while adding the IE1k device. Neglecting this information will cause the device to move to the Partial Collection Failure state.

Note Telnet/SSH information is mandatory for devices using compliance policy. Even if the default timeout for Telnet/SSH (60 sec) and SNMP (10Sec) differ between devices based on the network latency, the devices can be configured.

You can mandate the SSH key validation for the added device, by selecting the **Strict host check key for SSH** check box in the **Administration > Settings > System Settings > Inventory> Inventory** page. This enables you to specify the algorithm and SSH key under Telnet/SSH Parameters.

If you do not want to manually specify the algorithm and SSH key while adding the device, select the **Trust SSH key on first use** check box in the **Administration >Settings > System Settings > Inventory> Inventory** page. The SSH key sent from the device during its first communication will be trusted and added to the device credentials. This saved key will be auto populated when the device is added in future and used for validation.

Step 4 (Optional) Click **Verify Credentials** to validate the credentials before adding the device.

To verify HTTPS credentials for devices like UCS chassis, make sure that you retrieve certificates from the devices and add those to Prime Infrastructure's truststore. To add the certificates to Prime Infrastructure's truststore, use the following commands:

- ncs key importcacert <*name*> <*certificate filename*> repository <*name of repository*>
- ncs stop
- ncs start

Step 5 Click **Add** to add the device with the settings you specified.

Note User Defined Field (UDF) parameters will be available for the new device only if you first choose **Administration** > **Settings** > **System Settings** > **Inventory** > **User Defined Fields** and then add these UDF parameters. Do not use the special characters : ; and # for UDF field parameters.

Note Not providing Telnet/SSH credentials may result in partial collection of inventory data.

Note For NCS 2000 devices, the **Enable Single Session TL1** setting takes effect only for devices running release 11.0 onwards.

Note Prime Infrastructure, by default, does not accept UCS with self-signed certification. User can enable it manually by adding the following lines in the */opt/CSCOlumos/xmp_inventory/xde-home/inventoryDefaults/ncsCIMC.def* file.

```
<default attribute="HTTPS_TRUST_CONDITION">always</default>
```

```
<default attribute="HTTPS_HOSTNAME_VERIFICATION_STRATEGY">allow_all</default>
```

Note Each device must have a Unique SNMP Engine ID. If same Engine Id is used in two devices, an alarm will be raised with conflicting device details. The SNMP Engine Id's unique check will happen only if we manage the device with SNMP v3 credentials.

Configuring SNMP Engine Id

Usage Guidelines

The SNMP engine ID is a unique string used to identify the device for administrative purposes. You do not need to specify an engine ID for the device; a default string is generated using Cisco's enterprise number (1.3.6.1.4.1.9) and the MAC address of the first interface on the device. For further details on the SNMP engine ID, see RFC 2571.

If you specify your own ID, note that the entire 24-character engine ID is not needed if it contains trailing zeros. Specify only the portion of the engine ID up until the point where only zeros remain in the value. For example, to configure an engine ID of 123400000000000000000000, you can specify **snmp-server engineID local 1234**.

The value for the engine ID is displayed in hexadecimal value pairs. If the length of the input is an odd number, the last digit will be prepended with a zero ("0"). For example, if the engine ID is 12345, the ID is treated as 12:34:05 internally. Hence, the engine ID is displayed as 123405 in the **show running configuration** command output.

Changing the value of the SNMP engine ID has significant effects. A user's password (entered on the command line) is converted to a message digest5 algorithm (MD5) or Secure Hash Algorithm (SHA) security digest. This digest is based on both the password and the local engine ID. The command line password is then destroyed, as required by RFC 2274. Because of this deletion, if the local value of the engineID changes, the security digests of SNMPv3 users will become invalid, and the users will have to be reconfigured.

Similar restrictions require the reconfiguration of community strings when the engine ID changes. A remote engine ID is required when an SNMPv3 inform is configured. The remote engine ID is used to compute the security digest for authenticating and encrypting packets sent to a user on the remote host.

The following example specifies the local SNMP engine ID:

```
Router(config)# snmp-server engineID local <engine-id>
```

Add Devices to Prime Infrastructure

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Note Prime Infrastructure does not support the StackWise Virtual Link (SVL) for the Cisco 9k devices.

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  ```
  device# conf t
  device(config)# netconf-yang
  ```

- You have a user with *privilege 15* with which the device can be managed in Cisco Prime Infrastructure for SSH/Telnet access. You can use the following:

  ```
  username cisco1 privilege 15 password 0 cisco1
  ```

- You enable AAA new-model using command:

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  device(config)# aaa new-model
  ```

  You configure NETCONF-SSH connectivity and edit-config operations:

  ```
  aaa authorization exec default local
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- If Prime Infrastructure is unable to discover a client, please validate the below CLI in devices, which is required for client discovery:

  ```
  wireless client onboarding-event
  ```

Note Same Cisco Catalyst 9800 Series device should not be managed by two Prime server.

You must configure the ASR 9900 set of devices with the **netconf agent tty** and **xml agent tty** commands for them to be effectively overseen by Prime Infrastructure.

Note The list of 9K devices mentioned below are supported in the install mode:

- C9200
- C9200L
- C9300
- C9400
- C9500
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- C3650
- C5760
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- IE3400H

Table 2: Methods for Adding Devices

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Add a Virtual Device Context Device

In Prime Infrastructure, Cisco NX-OS software supports Virtual Device Contexts (VDCs), which partition a single physical device into multiple logical devices that provide fault isolation, management isolation, address allocation isolation, service differentiation domains, and adaptive resource management. A VDC allows a switch to be virtualized at the device level. It runs as a separate logical entity within the switch that maintains its own set of running software processes, has its own configuration, and is managed by an administrator.

VDC1 is the default (Admin) VDC and has a special role: It allows you to configure child VDCs and allocate resources.

Prime Infrastructure manages all Cisco Nexus switch features (including VDCs) on devices running Cisco NX-OS software release 6.2(12) or later.

To add the device with the default VDC, complete the following procedure:

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 From the **Add Device** drop-down list, choose **Add Device**.

Step 3 Specify the required settings in the various tabs.

To view a description of a particular parameter, place your cursor over its **?** icon.

Step 4 (Optional) Click **Verify Credentials** to confirm that the credentials you entered are valid before adding the device.

Step 5 Click **Add** to add the device with the settings you specified.

After successful inventory collection, the device with the default VDC is added. Subsequently, child VDCs are added automatically and the configuration is stored in the Prime Infrastructure database.

Add a Meraki Device to Prime Infrastructure

You can monitor all Meraki Access Point, Meraki Security Appliances and Meraki switches in Cisco Prime Infrastructure. Cisco Prime Infrastructure uses SNMP protocol to extract information about the Meraki devices, from Cloud, for both monitoring and inventory purposes.

Integrating Cisco Meraki into Cisco Prime Infrastructure requires the following;

- Enable SNMP on the Dashboard
- Add the Meraki Dashboard to the Cisco Prime Infrastructure Server
- Verify Connectivity

To add a Meraki device to Prime Infrastructure, perform the following steps :

Step 1 Choose **Inventory** > **Device Management** > **Network Devices.**

Step 2 Click the + icon above the Network Devices table, then choose **Add Device**.

Step 3 Enter the **IP Address** or **DNS Name** of the Meraki Dashboard.

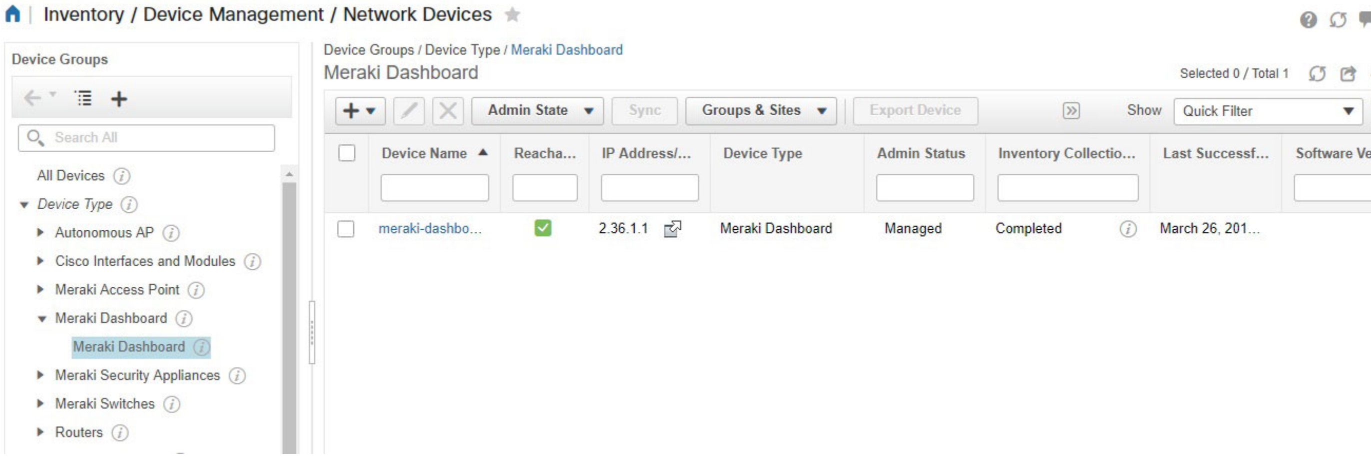
Step 4 Enter the SNMP v2/v3 credentials in the **Add Device** screen.

Step 5 (Optional) Click **Verify Credentials** to validate the credentials before adding the device.

Step 6 Click **Add** to add the devices with the settings you specified. The device details will be displayed in the right pane. Some of which include:

- Device Name
- Reachability/Status
- IP address/DNS name

- Device Type or Model
- MAC address
- Client Count
- Serial Number
- Mesh Status
- Network Name.



□	Device Name ▲	Reacha...	IP Address/...	Device Type	Admin Status	Inventory Collectio...	Last Successf...	Software Ve
□	meraki-dashbo...	✓	2.36.1.1	Meraki Dashboard	Managed	Completed	March 26, 201...	

The Meraki Dashboard remains the single point of configuration for Meraki devices. Cisco Prime makes it very easy to get to any specific device by including a device link next to the IP Address of the device. These links will launch a browser window that will bring the administrator right to the device in the Meraki Dashboard which helps you to extract comprehensive information about a particular device.

Note You must select an appropriate device group from the group selector/object selector in the **Network Devices** page to view the required the Access Points, Switches, and Security Appliances.

Prerequisites for Adding Wireless Controllers

Note the following information when adding wireless devices to Prime Infrastructure:

- When you remove a wireless controller from Prime Infrastructure, a warning message appears to confirm whether the access points associated with that controller also need to be removed.
- If you are adding a controller across a GRE link using IPSec or a lower MTU link with multiple fragments, you may need to adjust the values of Maximum VarBinds per Get PDU and Maximum VarBinds per Set PDU. If these values are too high, the controller might not be added to Prime Infrastructure.

  To adjust the Maximum VarBinds per Get PDU or Maximum VarBinds per Set PDU values: Stop the Prime Infrastructure server, choose **Administration** > **Settings** > **Network and Device** > **SNMP**, and edit the Maximum VarBinds per Get PDU and Maximum VarBinds per Set PDU values to 50 or lower.

- If you are adding a wireless controller and receive the error message "Sparse table not supported", verify that you are running compatible versions of both Prime Infrastructure and WLC before retrying. For information on compatible versions of the two products, see the Cisco Wireless Solutions Software Compatibility Matrix entry for Prime Infrastructure, on Cisco.com.
- Prime Infrastructure acts as a trap receiver for controllers you add. The following traps are enabled on the controller: 802.11 Disassociation, 802.11 Deauthentication, and 802.11 Authenticated.
- When you add a new controller, the Reachability of the controller will be listed as "Unknown" while Prime Infrastructure attempts to communicate with the new controller. The controller's Reachability changes to "Reachable" or "Ping Reachable" once the communication with the controller is successful.
- When Compliance is enabled, the WLC can go to partial inventory collection state due to the following reasons:
    - CLI credential does not have read-write privilege.
    - WLC closes the connection during synchronization.
    - WLC does not respond in the configured time out period.
- To update the credentials of multiple controllers in bulk, choose **Inventory** > **Network Devices** > **Wireless Controllers**. Then select the controllers you need to update and click the **Edit** icon. Finally, select the credential profile and click **Update** or **Update & Sync**.
- You can also update the credentials of multiple controllers in bulk by creating a CSV file that contains a list of controllers to be updated. Make sure there is one controller per line, with each line a comma-separated list of the controller attributes you want updated.
    - Choose **Inventory** > **Network Devices** > **Wireless Controllers**.
    - Click the **+** icon above the table.
    - Choose **Bulk Import** and browse to the CSV file.

Validate Added Devices and Troubleshoot Problems

To monitor the discovery process, follow these steps:

Step 1 To check the discovery process, choose **Inventory** > **Device Management** > **Discovery**.

Step 2 Expand the job instance to view its details, then click each of the following tabs to view details about that device's discovery:

- Reachable—Devices that were reached using ICMP. Devices may be reachable, but not modeled, this may happen due to various reasons as discussed in Add Devices Using Discovery, on page 4. Check the information in this tab for any failures.
- Filtered—Devices that were filtered out according to the customized discovery settings.
- Ping Reachable—Devices that were reachable by ICMP ping but could not be communicated using SNMP. This might be due to multiple reasons: invalid SNMP credentials, SNMP not enabled in device, network dropping SNMP packets, etc.

- Unreachable—Devices that did not respond to ICMP ping, with the failure reason.
- Unknown—Prime Infrastructure cannot connect to the device by ICMP or SNMP.

Note For devices that use the TL1 protocol, make sure that node names do not contain spaces. Otherwise, you will see a connectivity failure.

Step 3 To verify that devices were successfully added to Prime Infrastructure, choose **Inventory** > **Device Management** > **Network Devices**. Then:

- Verify that the devices you have added appear in the list. Click a device name to view the device configurations and the software images that Prime Infrastructure collected from the devices.
- View details about the information that was collected from the device by hovering your mouse cursor over the Inventory Collection Status field and clicking the icon that appears.
- Check the device's Reachability and Admin Status columns. See Device Reachability and Admin States, on page 17.

To verify that Prime Infrastructure supports a device, refer to *Cisco Prime Infrastructure Supported Devices*.

Check a Device's Reachability State and Admin Status

Use this procedure to determine whether Prime Infrastructure can communicate with a device (reachability state) and whether it is managing that device (admin status). The admin status also provides information on whether the device is being successfully managed by Prime Infrastructure.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Locate your device in the Network Devices table.

a) From the **Show** drop-down list (at the top right of the table), choose **Quick Filter**.

b) Enter the device name (or part of it) in the text box under the **Device Name** column.

Step 3 Check the information in the **Reachability** and **Admin Status** columns. See Device Reachability and Admin States, on page 17 for descriptions of these states.

Device Reachability and Admin States

Device Reachability State—Indicates whether can communicate with the device using all configured protocols.

Table 3: Device Reachability State

Icon	Device Reachability State	Description	Troubleshooting

✅	Reachable	Prime Infrastructure can reach the device using SNMP, or the NCS 2K device using ICMP.	—
⚠	Ping reachable	Prime Infrastructure can reach the device using Ping, but not via SNMP.	Although ICMP ping is successful, check for all possible reasons why SNMP communication is failing. Check that device SNMP credentials are the same in both the device and in Prime Infrastructure, whether SNMP is enabled on the device, or whether the transport network is dropping SNMP packets due to reasons such as mis-configuration, and so on.
❌	Unreachable	Prime Infrastructure cannot reach the device using Ping.	Verify that the physical device is operational and connected to the network.
❓	Unknown	Prime Infrastructure cannot connect to the device.	Check the device.

Device Admin State—Indicates the configured state of the device (for example, if an administrator has manually shut down a device, as opposed to a device being down because it is not reachable by Ping).

Table 4: Device Admin State

Device Admin State	Description	Troubleshooting
Managed	Prime Infrastructure is actively monitoring the device.	Not Applicable.
Maintenance	Prime Infrastructure is checking the device for reachability but is not processing traps, syslogs, or TL1 messages.	To move a device back to Managed state, see Move a Device To and From Maintenance State, on page 19.

Unmanaged	Prime Infrastructure is not monitoring the device.	In the Network Devices table, locate the device and click the "i" icon next to the data in the **Last Inventory Collection Status** column. The popup window will provide details and troubleshooting tips. Typical reasons for collection problems are: • Device SNMP credentials are incorrect. • The Prime Infrastructure deployment has exceeded the number of devices allowed by its license. • A device is enabled for switch path tracing only. If a device type is not supported, its Device Type will be **Unknown**. You can check if support for that device type is available from Cisco.com by choosing **Administration** > **Licenses and Software Updates** > **Software Update** and then clicking **Check for Updates**.
Unknown	Prime Infrastructure cannot connect to the device.	Check the device.

Move a Device To and From Maintenance State

When a device's admin status is changed to Maintenance, Prime Infrastructure will neither poll the device for inventory changes, nor will it process any traps or syslogs that are generated by the device. However, Prime Infrastructure will continue to maintain existing links and check the device for reachability.

See Device Reachability and Admin States, on page 17 for a list of all admin states and their icons.

Step 1 From the Network Devices table, choose **Admin State** > **Set to Maintenance State**.

Step 2 To return the device to the fully managed state, choose **Admin State** > **Set to Managed State**.

Note You can also schedule devices to maintenance on specific date and time and return them back to Managed state on specific date and time using **Schedule Maintenance State** and **Schedule Managed State** options.

Edit Device Parameters

You can edit the device parameters of a single device or multiple devices by choosing Inventory > Device Management > Network Devices.

To edit device parameters, follow these steps:

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Select a single device or multiple devices and then click the **Edit** icon.

Editing more than 9 devices triggers a job in the **Job Dashboard** page. The status of the bulk edit is displayed in that page.

Step 3 Update the required parameters.

Step 4 Click **Update** to update the parameters of all of the selected devices or **Update & Sync** to update and synchronize the devices with the updated parameters.

Synchronize Devices

To synchronize the Prime Infrastructure database with the configuration running on a device, you can force an inventory collection.

To synchronize devices, follow these steps:

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Select the device whose configuration you want synchronized with the configuration stored in the Prime Infrastructure database.

Step 3 Click **Sync**.

Note If the synchronized device is a default/Admin VDC, then all the configuration of all the child VDCs are synchronized automatically and the configuration is updated in the Prime Infrastructure database. Admin VDC sync will also add the newly added VDC in hardware to the user interface or delete the deleted VDC in hardware from the user interface.

Smart Inventory

Smart Inventory allows only limited features to be collected if the commit id on the device is not changed. Otherwise, full collection of features will happen. Smart Inventory aims to reduce the amount of data transferred between Prime Infrastructure and the device in a smart way. Prime Infrastructure will do a major inventory collection and full config archive only when there is a change in the configuration of the device. If there is no change in the running configuration of the device, only the physical information like images, flash, files, interface status, etc will be collected from the device. If there is no change in the running config of the device, config archive will not be triggered.

To enable Smart Inventory:

Step 1 Choose **Administration** > **System Settings** > **Inventory** > **Smart Inventory**.

Step 2 Select the **Enable Smart Inventory Globally** check box. All the supported devices will be listed.

Note You can also enable/disable Smart Inventory for the individual devices. Select the required devices and click **Enable** or **Disable** button.

Add NAM HTTP/HTTPS Credentials

If you are using Cisco Network Analysis Modules (NAMs) to monitor your network, you must add HTTPS credentials so that Prime Infrastructure can retrieve data from them. This is especially important for users who have licensed Assurance features, as most Assurance features depend on NAM data to work.

Prime Infrastructure polls NAMs directly via HTTP (or HTTPS) to collect their data. This type of polling requires Prime Infrastructure to store each NAMs' HTTP credentials. Unlike with SNMP community strings and Telnet/SSH credentials, you cannot enter NAM HTTP credentials during the discovery process. You can only specify NAM HTTP credentials after the modules are discovered or added to inventory.

Follow these steps to add HTTP credentials for a single NAM. You can repeat this task for all NAMs from which you want Prime Infrastructure to collect data.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices** > **Device Type** > **Cisco Interfaces and Modules** > **Network Analysis Modules**.

Step 2 Select one of the NAMs and click **Edit**.

Step 3 In the **Edit Device** window, under **Http Parameters**:

- Protocol—Select the HTTP protocol, HTTP or HTTPS. The TCP Port will change automatically to the default port for the protocol that you have selected.
- TCP Port—Enter a different TCP Port if you want to override the default.
- Username—Enter the name of a user who can access the NAM via HTTP or HTTPS.
- Password—Enter the password for the username that you entered.
- Confirm Password—Enter the password a second time to confirm.

Step 4 Choose **Update**.

Export Device Information to a CSV File

When you export the device list to a file, all device information is exported into a CSV file. The file is then compressed and encrypted using a password you select. The exported file contains information about the device's SNMP credentials, CLI settings, and geographical coordinates. The exported file includes device credentials but does not include credential profiles.

Caution Exercise caution while using the CSV file as it lists all credentials for the exported devices. You should ensure that only users with special privileges can perform a device export.

Step 1 Choose **Inventory** > **Device Management** > **Network Devices**.

Step 2 Select the devices that you want to export, then click **Export Device** (or click » and choose **Export Device**).

Step 3 In the **Export Device** dialog box, add and confirm a password that will be used to encrypt the exported CSV file. Users will need to supply this password to open the exported file. Optionally, enter the Export File Name. Depending on your browser configuration, you can open or save the compressed file.

Step 4 Click **Export**.

Note You can open the file only if ZipCrypto encryption is enabled.

If you want to export the device details in to CSV file without Device credentials, click ↗ next to settings icon. Any number of device details can be exported into this CSV file. But, you cannot use this CSV file to import the devices.

Apply Device Credentials Consistently Using Credential Profiles

Credential profiles are collections of device credentials for SNMP, Telnet/SSH, HTTP, and TL1. When you add devices, you can specify the credential profile the devices should use. This lets you apply credential settings consistently across devices.

If you need to make a credential change, such as changing a device password, you can edit the profile so that the settings are updated across all devices that use that profile.

To view the existing profiles, choose **Inventory > Device Management > Credential Profiles**.

Create a New Credential Profile

Use this procedure to create a new credential profile. You can then use the profile to apply credentials consistently across products, or when you add new devices.

Step 1 Select **Inventory** > **Device Management** > **Credential Profiles**.

Step 2 If an existing credential profile has most of the settings you need, select it and click **Copy**. Otherwise, click **Add**.

Step 3 Enter a profile name and description. If you have many credential profiles, make the name and description as informative as possible because that information will be displayed on the Credential Profiles page.

Step 4 Enter the credentials for the profile. When a device is added or updated using this profile, the content you specify here is applied to the device.

The SNMP read community string is required.

Step 5 Click **Save Changes**.

Apply a New or Changed Profile to Existing Devices

Use this procedure to perform a bulk edit of devices and change the credential profile the devices are associated with. This operation overwrites any existing association between a device and a credential profile. You can also use this operation to synchronize device configurations with the new settings.

Note Make sure the profile’s credential settings are correct before following this procedure and selecting **Update and Sync**. That operation will synchronize the devices with the new profile.

Step 1 Configure the credential profile using one of these methods:

- Create a new credential profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, and clicking **Add**.
- Edit an existing profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, selecting the profile, and clicking **Edit**.

Step 2 When you are satisfied with the profile, choose **Inventory** > **Device Management** > **Network Devices**.

Step 3 Filter and select all of the devices you want to change (bulk edit).

Step 4 Click **Edit**, and select the new credential profile from the Credential Profile drop-down list.

Step 5 Save your changes:

- **Update** saves your changes to the Prime Infrastructure database.
- **Update and Sync** saves your changes to the Prime Infrastructure database, collects the device's physical and logical inventory, and saves all inventory changes to the Prime Infrastructure database.

Delete a Credential Profile

This procedure deletes a credential profile from Prime Infrastructure. If the profile is currently associated with any devices, you must disassociate them from the profile.

Step 1 Check whether any devices are using the profile.

a) Go to **Inventory** > **Device Management** > **Credential Profiles**.
b) Select the credential profile to be deleted.
c) Click **Edit**, and check if any devices are listed on the Device List page. If any devices are listed, make note of them.

Step 2 If required, disassociate devices from the profile.

a) Go to **Inventory** > **Device Management** > **Network Devices**.
b) Filter and select all of the devices you want to change (bulk edit).
c) Click **Edit**, and choose **--Select--** from the Credential Profile drop-down list.
d) Disassociate the devices from the old profile by clicking **OK** in the warning dialog box.

Step 3 Delete the credential profile by choosing **Inventory** > **Device Management** > **Credential Profiles**, selecting the profile, and clicking **Delete**.

Export and Import a Credential Profile

You can export and import the credentials profile from device management using the following steps:

Step 1 Choose **Inventory** > **Device Management** > **Credential Profiles**

Step 2 Select the credential profile that you want to export, click **Export Profile**.

Step 3 Enter the following credentials in the Export Profile pop-up window:

- Password
- Confirm Password
- Export File Name

Step 4 Click **Export** to save the zip file which contains Profile and Profile associated with devices csv files.

Step 5 To import the credential profile, use the following steps:

Step 6 Login to the Prime Infrastructure Server.

Step 7 Choose **Inventory** > **Device Management** > **Credential Profiles**.

Step 8 Click **Bulk Import**.

Step 9 In the Bulk Import pop-up, browse the credential profile .csv file and Click **Import**.

Caution You should not import **Profile_associated_devices** .csv files during bulk import.

Step 10 Once the import is completed, the credential profile bulk import job is created. You can navigate to **Administration > Dashboard > Job Dashboard > User Jobs > Credential Profile Bulk Import** to check the job.

Create Groups of Devices for Easier Management and Configuration

Organizing your devices into logical groupings simplifies device management, monitoring, and configuration. As you can apply operations to groups, grouping saves time and ensures that configuration settings are applied consistently across your network. In smaller deployments where all devices can be configured with the same settings, you may only need to create one general device group. The grouping mechanism also supports subgroups. You will see these groups in many of the Prime Infrastructure GUI windows.

When a device is added to Prime Infrastructure, it is assigned to a location group named **Unassigned**. If you are managing a large number of devices, be sure to move devices into other groups so that the Unassigned Group membership does not become too large.

How Groups Work

Groups do not perform access control. Access control is determined by virtual domains. For information on this difference, see Groups and Virtual Domains, on page 28).

For information on the specific types of groups, see the related topics Network Device Groups, on page 25 and Port Groups, on page 26.

For information on how elements are added to groups, see How Elements Are Added to Groups: Dynamic, Manual, and Mixed Groups, on page 28.

Network Device Groups

The following table lists the supported types of network device groups. The device groups can be accessed from the Inventory.

Network Device Group Type	Membership Criteria	Can Be Created or Edited By Users?
Device Type	Devices are grouped by family (for example, Routers, Switches and Hubs, and so forth). Under each device family, devices are further grouped by series. New devices are automatically assigned to the appropriate family and series groups. For example, a Cisco ASR 9006 would belong to Routers (family) and Cisco ASR 9000 Series Aggregation Services Routers (series). Note the following: • You cannot create a device type group; these are dynamic groups that are system-defined. Instead, use device criteria to create a user-defined group and give it an appropriate device name. • Device type groups are not displayed in Network Topology maps. • Unsupported devices discovered by Prime Infrastructure are automatically assigned the **Unsupported Cisco Device** device type and are listed under **Device Type** > **Unsupported Cisco Device Family**.	No

Location	Location groups allow you to group devices by location. You can create a hierarchy of location groups(such as theater, country, region, campus, building, and floor) by adding devices manually or by adding devices dynamically. A device should appear in one location group only, though a higher level "parent" group will also contain that device. For example, a device that belongs to a *building* location group might also indirectly belong to the parent campus group. By default, the top location of the hierarchy is the **All Locations** group. All devices that have not been assigned to a location appear under the Unassigned group under All Locations.	Yes
User Defined	Devices are grouped by a customizable combination of device and location criteria. You can customize group names and use whatever device and location criteria you need. The location groups you create gets synchronized with the wireless maps, depending on the selected group such as Campus, Building, Outdoor Area or Indoor Area. Therefore, the location group that you create can be viewed under **Maps** > **Wireless Maps** > **Site Maps**, and similarly the site you create under maps can be viewed under **Inventory** > **Group Management** > **Network Device Groups**, in the hierarchical way.	Yes

Port Groups

The following table lists the supported types of port groups.

Port Group Type	Membership Criteria	Can be created or edited by users?
Port Type	Grouped by port type, speed, name, or description. Ports on new devices are automatically assigned to the appropriate port group. You cannot create Port Type groups. Instead, use device criteria to create a user-defined group, and create subgroups under the user-defined group.	No; instead create a User Defined Group

System Defined	Grouped by port usage or state. Ports on new devices are automatically assigned to the appropriate port group. Link Ports—Ports that are connected to another Cisco device or other network devices and are operating on “VLAN” mode and are assigned to a VLAN. Trunk Ports—Ports that are connected to a Cisco device or other network devices (Switch/Router/Firewall/Third party devices) and operating on “Trunk” mode in which they carry traffic for all VLANs. Access Ports—Ports that are connected to an end host, IP phone, servers, Access Points (AP) or video end points and operating on “Access” mode in which they carry traffic for only one particular VLAN. Unconnected Ports—Ports that are not connected to any device, their admin status is down, or their operational state is down. If the status of a port goes down, it is automatically added to Unconnected Port group. You cannot delete the ports in this group, and you cannot re-create this group as a sub group of any other group. You cannot create System Defined Port groups. Instead, use device criteria to create a user-defined group, and create subgroups under the user-defined group. **Note** As the WAN Interfaces is a static group, automatic port addition is not applicable. Hence, you must add the ports manually to the group.	No; instead create a User Defined Group
User Defined	Grouped by a customizable combination of port criteria, and you can name the group. If the group is dynamic and a port matches the criteria, it is added to the group.	Yes

Data Center Groups

The following table lists the supported types of data center groups.

Table 5: Data Center Group Supported Types

Data Center Group Type	Membership Criteria	Can be created or edited by users?
System Defined	Grouped by type (Data Center, Cluster, Virtual Machine (VM), Host). You cannot create System Defined Data Center Groups. Instead, use device criteria to create a user-defined Data Center group, and create subgroups under the user-defined group.	No. Can create User Defined Groups for VMs and Hosts
User Defined	Grouped by customizable combination of device and location criteria. You can customize group names and use whatever device criteria you need.	Yes

How Elements Are Added to Groups: Dynamic, Manual, and Mixed Groups

How elements are added to a group depends on whether the group is dynamic, manual, or mixed.

Method for Adding Devices	Description
Dynamic	Prime Infrastructure automatically adds a new element to the group if the element meets the group criteria. While there is no limit to the number of rules that you can specify, the performance for updates may be negatively impacted as you add more rules.
Manual	Users add the elements manually when creating the group or by editing the group.
Mixed	Elements are added through a combination of dynamic rules and manual additions.

The device inheritance in parent-child user defined and location groups are as follows:

- User Defined Group—When you create a child group:
  - If the parent and child groups are both dynamic, the child group can only access devices that are in the parent group.
  - If the parent group is static and the child group is dynamic, the child group can access devices that are outside of the parent group.
  - If the parent and child groups are dynamic and static, the child group "inherits” devices from the parent device group.
- Location Group—The parent group inherits the child group devices.

Note There is no limit on the number of child groups created under the parent group. Also, there is no limit on the hieararchy level of the child groups.

Groups and Virtual Domains

While groups are logical containers for elements, access to the elements is controlled by virtual domains. This example shows the relationship between groups and virtual domains.

- A group named **SanJoseDevices** contains 100 devices.
- A virtual domain named **NorthernCalifornia** contains 400 devices. Those devices are from various groups and include 20 devices from the **SanJoseDevices** group.

Users with access to the **NorthernCalifornia** virtual domain will be able to access the 20 devices from the **SanJoseDevices** group, but not the other 80 devices in the group. For more details, see Create Virtual Domains to Control User Access to Devices.

Create User-Defined Device Groups

To create a new device type group, use the user-defined group mechanism. You must use this mechanism because device type groups are a special category that is used throughout Prime Infrastructure. The groups that you create appear in the **User Defined** category.

To create a new group, complete the following procedure:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 In the **Device Groups** pane, click the **+** (**Add**) icon and then choose **Create User Defined Group**.

Step 3 Enter the group's name and description. If other user-defined device type groups exist, you can set one as the parent group by choosing it from the **Parent Group** drop-down list. If you do not select a parent group, the new group resides in the **User-Defined** folder (by default).

Note The group name must not contain special characters such as ', ", <, >, &, ?, and /.

Step 4 Add devices to the new group:

If you want to add devices that meet your criteria automatically, enter the criteria in the **Add Devices Dynamically** area. To group devices that fall within a specific range of IP addresses, enter that range in square brackets. For example, you can specify the following:

- IPv4-10.[101-155].[1-255].[1-255] and 10.126.170.[1-180]
- IPv6-2014::5217:[0000-ffff]:fe22:[1e40-1f41]

Note While there is no limit on the number of rules you can specify for a dynamic group, group update performance could become slower as the number of rules increases.

If you want to add devices manually, do the following:

a. Expand the **Add Devices Manually** area and then click **Add**.

b. In the **Add Devices** dialog box, check the check boxes for the devices you want to add, then click **Add**.

Step 5 Click the **Preview** tab to see the members of your group.

Step 6 Click **Save**.

The new device group appears in the folder that you selected in Step 3.

Note The dynamically added device group cannot be deleted after its creation. If you want to add and define devices manually, then you have to delete the dynamically created device group and create a new device group.

Note You can also create device groups by navigating to **Inventory** > **Device Management** > **Configuration Archive** > **Archives** > **Create Group**.

View All Groups to Which a Device Belongs

To view the list of device groups to which a device belongs, follow these steps:

Step 1 Choose **Inventory** > **Device Management** > **Network Devices** or **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Enter an IP address or device name in the Search field in the Device Group pane on the left, to view the list of all groups to which the device belongs.

You can also search the group by entering the group name in the search field.

Create Location Groups

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 In the **Device Groups** pane on the left, click the **Add** icon, then choose **Create Location Group**.

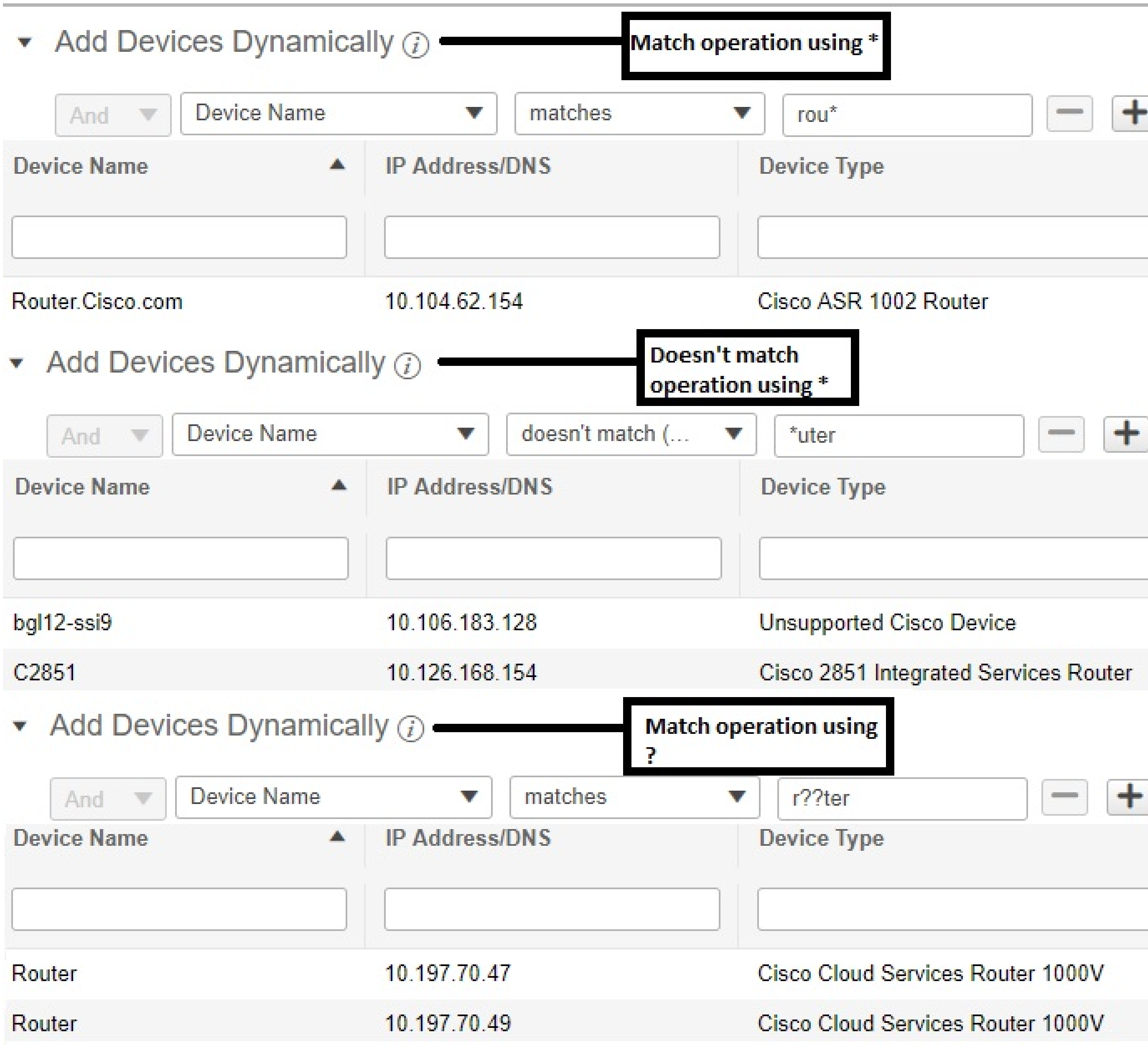
Step 3 Enter the name and description, and choose a group from the **Parent Group** drop-down list. By default, the group will be an All Locations subgroup (that is, displayed under the **All Locations** folder).

Step 4 If you are creating a device group based on geographical location, for example, all devices located in a building at a specific address, select the Geographical Location check box and specify the GPS coordinates of the group or click the **View Map** link and click on the required location in the map. The GPS coordinates will be populated automatically in this case. Note that location groups defined with a geographic location are represented by a group icon in the geo map. The devices you add to the group will inherit the GPS coordinates of the group. Note that if geographical location is the primary reason for grouping a set of devices, it is recommended that the devices you add to the group do not have their own GPS coordinates that are different from the group's.

If you want to specify **Civic Location**, select the location from the drop-down list, by manually entering the search key word.

Step 5 If you want devices to be added automatically if they meet certain criteria, enter the criteria in the **Add Device Dynamically** area. Otherwise, leave this area blank.

The rules, **matches** and **doesn't match**, support wildcard characters. You can include wildcard characters (* and ?) in the search text as shown below:



Add Devices Dynamically

Match operation using *

And | Device Name | matches | rou*

Device Name	IP Address/DNS	Device Type
Router.Cisco.com	10.104.62.154	Cisco ASR 1002 Router

Add Devices Dynamically

Doesn't match operation using *

And | Device Name | doesn't match (... | *uter

Device Name	IP Address/DNS	Device Type
bgl12-ssi9	10.106.183.128	Unsupported Cisco Device
C2851	10.126.168.154	Cisco 2851 Integrated Services Router

Add Devices Dynamically

Match operation using ?

And | Device Name | matches | r??ter

Device Name	IP Address/DNS	Device Type
Router	10.197.70.47	Cisco Cloud Services Router 1000V
Router	10.197.70.49	Cisco Cloud Services Router 1000V

While there is no limit on the number of rules that you can specify for a dynamic group, as the number of rules increases, the group update performance could become slower.

Step 6 If you want to add devices manually:

a) Under **Add Devices Manually**, click **Add**.

b) In the **Add Devices** dialog box, locate devices you want to add, then click **Add**.

Step 7 Click the **Preview** tab to see the group members.

Step 8 Click **Save**, and the new location group appears under the folder you selected in Step 3 (**All Locations**, by default).

Note Numeric alone Floor Group name is considered as floor index automatically. Please make sure that the planned "Numeric alone Floor Group name" index is not used in any of the existing floors of that building using the Edit view option of the existing floors in Maps GUI.

To create numeric/digits value as Floor Group:

- launch Maps GUI, click **Building**.
- Edit the existing floors in Maps GUI, change the existing floor index value from ***1*** to other value.
- Click **Save**

launch the Maps GUI. click building.

When you edit a location group, you may change the group type if the following conditions are met:

- The group type is Default.
- The group does not have any subgroups.

Create Groups Using CSV Files

To import a group using a CSV file that lists all attributes of the group that you want to add into Prime Infrastructure, follow these steps.

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**, then click **Import Groups**.

Step 2 Click the **here** link to download the sample template for the CSV file.

Make sure that you retain the required information in the CSV file as mentioned in the Template.

Step 3 Click **Choose File** in the **Import Groups** dialog box, and select the CSV file that contains the group that you want to import.

Step 4 Click **Import**.

Step 5 Choose **Administration** > **Dashboards** > **Job Dashboard**, then click **Import Groups** to view the status of the job.

Export Groups to CSV Files

To export group information as a CSV file, follow these steps.

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Select PI or APIC-EM.

Step 3 Click **Export Groups** to download the CSV file including the details of all location groups, into your local system.

Add APs to Device Groups and Location Groups

SUMMARY STEPS

1. Choose **Inventory** > **Group Management** > **Network Device Groups**.
2. In the Device Groups pane on the left, hover the mouse over the expand icon next to **User Defined** or **Location** and click **Add SubGroup**.
3. Enter the name, description, and parent group (if any).
4. Add APs in one of the following ways:
5. Click **Preview** to view the APs that are automatically added to the group based on the specified rule and the manually added APs.
6. Click **Save**.

DETAILED STEPS

	Command or Action	Purpose
Step 1	Choose **Inventory** > **Group Management** > **Network Device Groups**.	
Step 2	In the Device Groups pane on the left, hover the mouse over the expand icon next to **User Defined** or **Location** and click **Add SubGroup**.	
Step 3	Enter the name, description, and parent group (if any).	
Step 4	Add APs in one of the following ways:	• Manually—Click Add under Add Devices Manually and select the APs you want to add to the group. • Dynamically—Specify rules to which APs must comply before they are added to this port group. You do not add APs to dynamic groups. Prime Infrastructure adds APs that match the specified rules to the dynamic group. If you select any type of Location group other than Default, the APs will not be added dynamically.
Step 5	Click **Preview** to view the APs that are automatically added to the group based on the specified rule and the manually added APs.	
Step 6	Click **Save**.	If the group has **Unified AP** or **Third Party AP** as a member, a new tab is added in the right hand table in the Device Work Center, to display the APs.

Create Port Groups

To create a port group, follow these steps:

Step 1 Choose **Inventory** > **Group Management** > **Port Groups**.

Step 2 From **Port Groups** > **User Defined**, hover your cursor over the "i" icon next to **User Defined** and click **Add SubGroup** from the popup window.

Step 3 Enter the name and description, and choose a group from the **Parent Group** drop-down list. By default, the port group will be under the **User Defined** folder.

Step 4 Choose the devices a port must belong to in order to be added to the group. From the **Device Selection** drop-down list, you can select:

- **Device**—To choose devices from a flat list of all devices.
- **Device Group**—To choose device groups (Device Type, Location, and User Defined groups are listed).

Step 5 If you want ports to be added automatically if they meet your criteria, enter the criteria in the **Add Ports Dynamically** area. Otherwise, leave this area blank.

While there is no limit on the number of rules that you can specify for a dynamic group, the group update performance could become slower as the number of rules increases.

Step 6 If you want to add devices manually:

a) Under **Add Ports Manually**, click **Add**.

b) In the **Add Ports dialog** box, locate devices you want to add, then click **Add**.

Step 7 Click the **Preview** tab to see the group members.

Step 8 Click **Save**, and the new port group appears under the folder you selected in Step 3 (**User Defined**, by default).

Create User-Defined Data Center Groups

In addition to the out-of-box data center and cluster groups, you can create user-defined groups for VMs and hosts. To create a user-defined group, complete the following procedure:

Step 1 Choose **Inventory** > **Device Management** > **Compute Devices**.

Step 2 From the **Compute Resources** pane, locate **User Defined Hosts and VMs** and place your cursor over its *i* (**information**) icon.

Step 3 From the **Actions** area, click **Add Subgroup**.

The **Add Device Subgroup** page opens.

Step 4 Enter the group's name and description, and then choose the folder the group will reside in from the **Parent Group** down-down list.

Step 5 Add devices to the location group:

- If you want to add devices that meet your criteria automatically, enter the criteria in the **Add Devices Dynamically** area.

  Note While there is no limit on the number of rules you can specify for a dynamic group, group update performance could become slower as the number of rules increases.

- If you want to add devices manually, do the following:

  a. Expand the **Add Devices Manually** area and then click **Add**.

  b. In the **Add Devices** dialog box, check the check boxes for the devices you want to add, then click **Add**.

Step 6 Click the **Preview** tab to see the devices that will belong to the group.

Step 7 Click **Save**. The new group appears in the folder you selected in Step 4.

Edit User-Defined Groups

You can change the parent group, add devices, and modify device rules using the edit option.

Procedure

	Command or Action	Purpose
Step 1	Choose **Inventory** > **Group Management** > **Network Device Groups**.	
Step 2	In the Device Groups pane on the left, click the name of the group you want to edit.	
Step 3	Click **Edit** and modify the details.	When you are editing a location group, you can change the group type to Campus, if: • The group type is Default. • The group does not have any subgroups.
Step 4	Click **Preview** to view the updated device details.	
Step 5	Click **Save** to save the updated device details.	

Make Copies of Groups

When you create a duplicate of a group, Prime Infrastructure names the group **CopyOf***group-name* by default. You can change the name, if required.

To duplicate a group follow these steps:

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Choose the group from the Device Groups pane on the left.

Step 3 Locate the device group you want to copy, then click the "i" icon next to it to open the pop-up window.

Step 4 Click **Duplicate Group** (do not make any changes yet) and click **Save**. Prime Infrastructure creates a new group called **CopyOf***group-name*.

Step 5 Configure your group as described in Create User-Defined Device Groups, on page 29 and Create Location Groups, on page 30.

Step 6 Verify your group settings by clicking the **Preview** tab and examining the group members.

Step 7 Click **Save** to save the group.

Copy User-Defined and Location Groups

You can duplicate any user-defined or location group using the Duplicate Group option. The duplicated group will contain all of the values from the original group, which you can modify. The populated group name will have a prefix of "CopyOf" by default. You can change the name, if required.

If you duplicate a child group, a copy of the child group is created under the same parent group.

If you duplicate a parent group, a copy of the respective child groups are created.

Procedure

	Command or Action	Purpose
Step 1	Choose **Inventory** > **Group Management** > **Network Device Groups**.	
Step 2	In the **Device Groups** pane on the left, locate the device group you want to duplicate. Then click the "i"icon next to the name of the group to display the popup menu.	
Step 3	Click **Duplicate Group** and update the group details.	
Step 4	Click **Preview** to view the duplicate group details.	
Step 5	Click **Save** to save the duplicate group.	

Hide Groups That Do Not Have Any Members

By default, Prime Infrastructure will display a group in the web GUI even if the group has no members. Users with Administrator privileges can change this setting so that empty groups are hidden—that is, they are not displayed in the web GUI. (Hidden groups are not deleted from Prime Infrastructure.)

Step 1 Choose **Administration** > **Settings** > **System Settings**, then choose **Inventory** > **Grouping**.

Step 2 Uncheck **Display groups with no members**, and click **Save**.

We recommend that you leave the **Display groups with no members** check box selected if you have a large number of groups and devices. Unselecting it can slow system performance.

Delete Groups

Make sure the group you want to delete has no members, otherwise Prime Infrastructure will not allow the operation to proceed.

Step 1 Choose **Inventory** > **Group Management** > **Network Device Groups**.

Step 2 Locate the device group you want to delete in the Device Groups pane on the left, then click the "i" icon next to it to open the pop-up window.

Step 3 Click **Delete Group** and click **OK**.

Create Compute Resource Groups

In addition to out-of-box groups for Compute Services devices such as Data Centers and clusters, you can create user-defined groups for UCS servers, hosts and VMs.

Procedure

	Command or Action	Purpose
Step 1	Choose **Inventory** > **Compute Device Groups**	
Step 2	In the Compute Resources at left, hover the mouse over the expand icon next to **User Defined UCS** or **User Defined Hosts and VMs** and click Add SubGroup.	
Step 3	Enter the group name and description, and select a parent group, if applicable.	
Step 4	In the Add Devices Dynamically pane, specify the rules that you want to apply to the devices in the group.	
Step 5	In the Add Devices Manually pane, choose the compute resources that you want to assign to the group.	
Step 6	Click Preview to view the devices that are automatically added to the group based on the specified rule and the manually added devices.	
Step 7	Click **Save** to add the compute resource group with the settings that you specified.	