

Provision and Configure Mesh APs Using Cisco Prime Infrastructure 3.x.

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Introduction

This document describes how to provision and configure Cisco Mesh Access Points (APs) using Cisco Prime Infrastructure 3.x.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Deploy a configuration template on Prime Infrastructure 3.x

Components Used

The information in this document is based on these software and hardware versions:

- Prime Infrastructure 3.x
- Cisco Wireless Lan Controller

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, ensure that you understand the potential impact of any command.

Background Information

Root Access Points (RAP)

Root Access Points have wired connections, for example, Ethernet backhaul to a wired network to Wireless LAN Controller (WLC).

Mesh Access Points (MAP)

Mesh Access Points have wireless connections to their WLC. MAPs communicate among themselves and back to the RAP with the use of wireless connections over the 802.11a radio backhaul. MAPs use the Cisco Adaptive Wireless Path Protocol (AWPP) in order to determine the best path through the other mesh access points to the controller.

Configure

Provisioning and configuring Mesh APs via WLC are well demonstrated by the document [Wireless LAN Controller Mesh Network Configuration Example for Releases 5.2 and later](#), and very straight forward. However, when it comes to a large-scale deployment where a significant amount of repeated work need, Cisco Prime Infrastructure can speed up deployment with its unique functions such as device templates.

Step 1. Set up Telnet/SSH and SNMP Connection of WLC on Prime Infrastructure.

Please ensure that the correct SSH/Telnet login credential as well as SNMP details are configured on Prime.

Edit Device ✕

* General ✓

* SNMP ✓

Telnet/SSH ✓

HTTP/HTTPS ✓

Civic Location ✓

Telnet/SSH Parameters

Protocol: SSH2

* CLI Port:

* Timeout: (Secs)

Username:

Password:

Confirm Password:

Enable Password: ?

Confirm Enable Password:

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

Press sync and ensure that the copy of configuration is up-to-date.

		Admin State	Sync	Groups & Sites	Export Device	Show	Quick Filter		
Reach...	Admin Status	Device Name	IP Address	DNS Name	Device Type	Last Inventory Col...	Last Succ		
<input type="checkbox"/>	✓	Managed						Wrong CLI Cred...	October 24
<input type="checkbox"/>	✗	Managed						SNMP Connectiv...	February 1
<input checked="" type="checkbox"/>	✓	Managed	HTTS-5508	10.66.79.42	10.66.79.42	Cisco 5508 Wirele...	Completed	March 6, 2	
<input type="checkbox"/>	✓	Managed					Completed	March 5, 2	
<input type="checkbox"/>	✓	Managed					Completed	March 5, 2	
<input type="checkbox"/>	✓	Managed					Completed	March 6, 2	
<input type="checkbox"/>	✓	Managed					Completed	March 5, 2	

Step 2. Set up WLC Templates in Prime Infrastructure.

Configure Mesh Global Settings.

Navigate to **Configuration > Templates > Features & Technologies > Controller > Mesh > Mesh Settings** and configure the required options for deployment. Then click **Save as New Template** to save the template.

Templates / Features and Technologies / Controller / Mesh
Mesh Settings

Save as New Template Cancel

Templates

Search All

- App Visibility & Control
- Controller
 - 802.11
 - 802.11a or n or ac
 - 802.11b or g or n
 - Application Visibility And Control
 - CLI
 - FlexConnect
 - IPv6
 - Location
 - LyncSDN
 - Management
 - Mesh**
 - Mesh Settings**
 - Netflow
 - PMIP
 - Security
 - System
 - Troubleshooting

Template Detail

General

RootAP to MeshAP Range 12000 (feet)

Client Access on Backhaul Link Enable

Background Scanning Enable

Mesh DCA Channels Enable

Global Public Safety Enable

Mesh RAP Downlink Backhaul 5GHz

Outdoor Access For UNII 1 Band Channels

Security

Security Mode EAP

Add the MAC Address of the Mesh AP to the MAC Filter of the Controller.

Navigate to **Configuration > Templates > Features & Technologies > Controller > Security > AAA > MAC Filtering** and add MAC addresses of AP's MAC address.

Configuration / Templates / Features & Technologies ★

Templates / ... / Controller / Security / AAA
MAC Filtering

Save as New Template Cancel

Template Basic

Name Author root Device Type CUWN (default)

Description Feature Category MAC Filtering

Tags

Template Detail

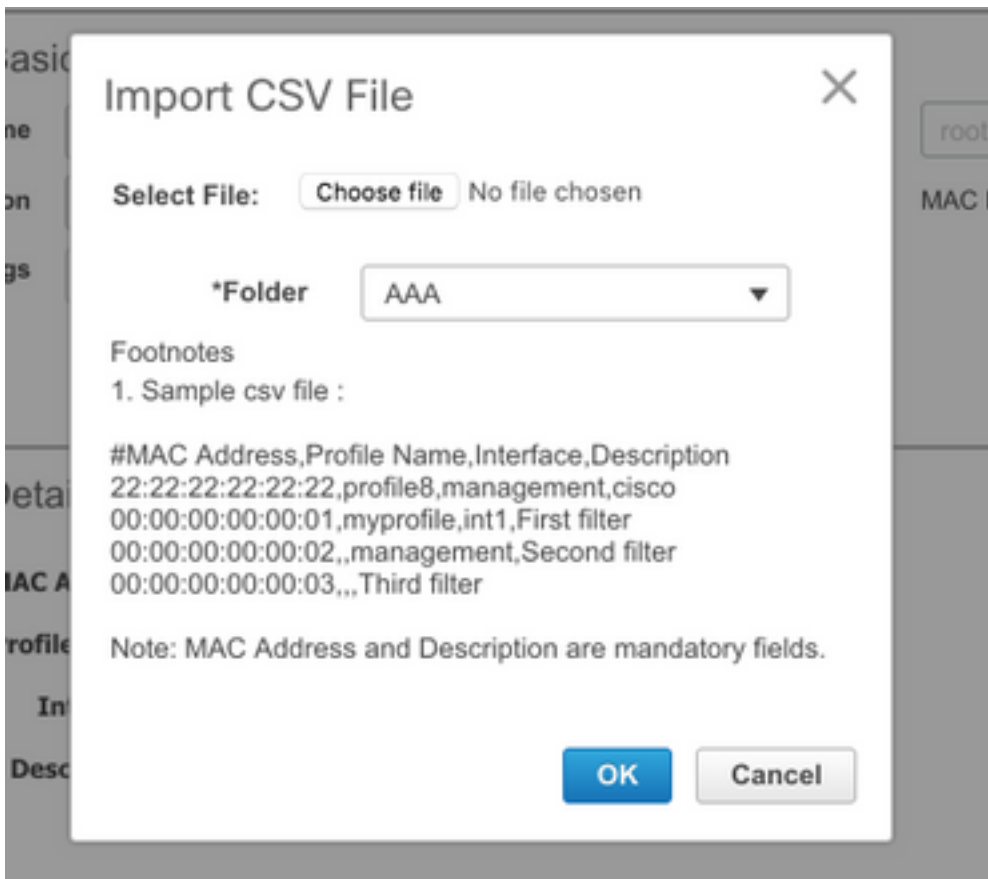
MAC Address

Profile Name Any Profile

Interface management

Description

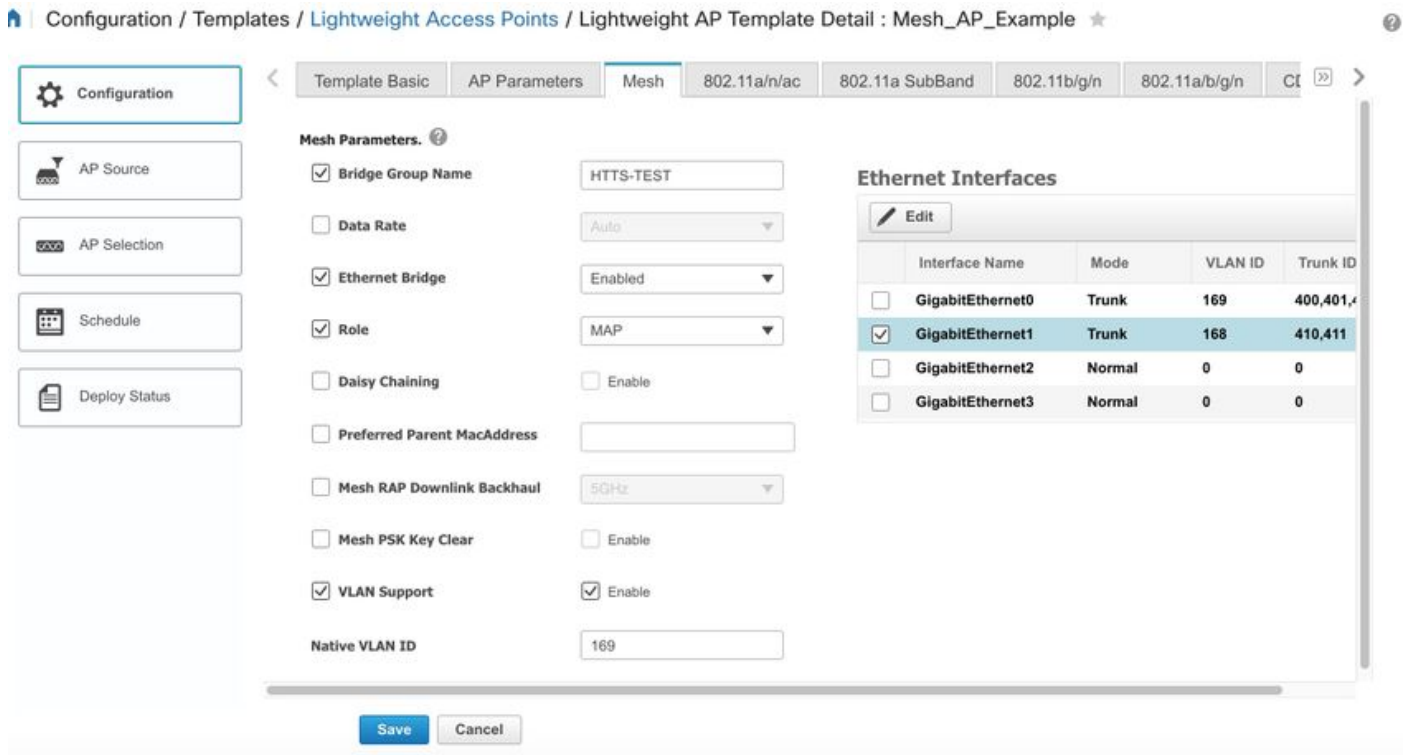
If bulk import is needed, please click on the button circled in red, and follow the example template to tabulate the detailed AP information as a CSV file to be imported.



Click on **Save as New Template** to save this MAC filtering template in the end.

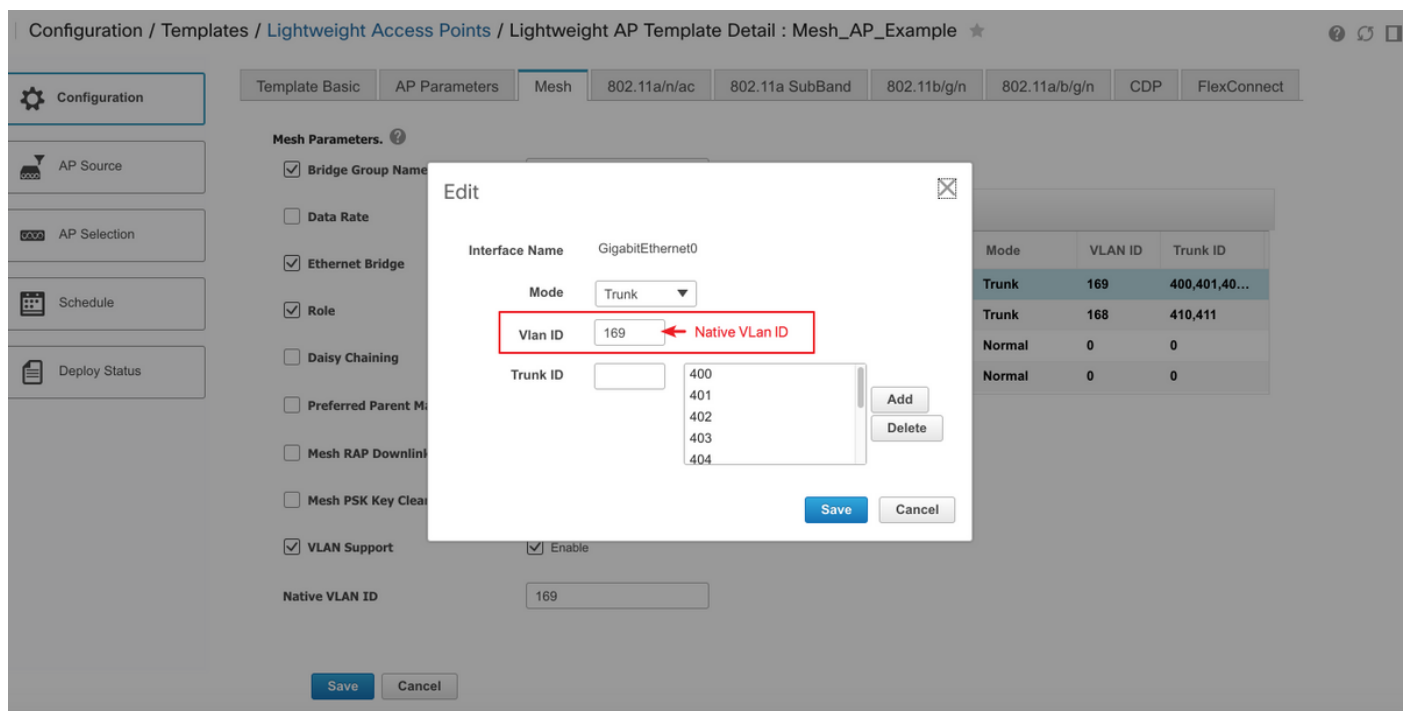
Step 3. Set up AP Templates in Prime Infrastructure.

Navigate to **Configuration > Templates > [Lightweight Access Points](#)** and create a new template. Please create two different templates for RAP and MAP and add any features/settings that are used in the deployment such as a user-defined Bridge Group Name (BGN) name, virtual LAN (VLAN) support and Role, to the template. The example shows a MAP with multiple VLAN support, and two interfaces (that trunk a few different VLANs on two ports), and a customised BGN (named HTTS-TEST).



The example shows a RAP with multiple VLAN support and a customised **BGN** named HTTS-TEST.

In order to edit the VLAN setting of a particular interface, please select the interface that you would like to edit, and click on the **Edit** button on the top left concern of **Ethernet Interfaces** section. Please note that the VLAN ID here is equivalent to the Native VLAN ID in the WLC setting. Trunk IDs are the VLAN IDs that are needed to be trunked on a specific port.



Step 4. Set up CLI Templates for Any Missing Options in Prime Infrastructure for WLC or AP.

Due to the reason that not all the settings are available on Prime, **CLI templates** are need to map and automate our deployment process for a few global mesh options such as VLAN

Transparent. In order to configure this part, please navigate to **Configuration > Templates > Features & Technologies > Controller > Security > AAA > MAC Filtering**. A sample of **CLI Content** in Prime in order to disable VLAN transparent in the global WLC setting is:

```
<MLTCMD>config mesh ethernet-bridging vlan-transparent disable
```

```
y</MLTCMD>
```

The screenshot shows the Prime CLI Template configuration interface. The 'Template Basic' section includes fields for Name (MESH_VLAN_DISABLE), Author (root), Device Type (Wireless Controller), Description, Feature Category (CLI), and OS Version. The 'Template Detail' section shows the CLI content: `<MLTCMD>config mesh ethernet-bridging vlan-transparent disable` followed by `y</MLTCMD>` on the next line. Red boxes highlight the 'Device Type' dropdown and the CLI content area.

This is the reason why a **y** is needed on the second line:

```
(Cisco Controller) >config mesh ethernet-bridging vlan-transparent enable
Changing VLAN Transparent will affect the clients connected to AP Ethernet interface.
Are you sure you want to continue? (y/N)y
```

Vlan Transparent mode has been disabled

and ideally, all the answers to any warning prompts (such as **y** or **N**) should be taken into consideration when a properly-working CLI template is written.

Note: header `<MLTCMD>` and `</MLTCMD>` are needed for any CLI combination that is more than one line. For more information about how to create a working CLI Template on Prime, please refer to this guide [PI 3.2. Creation of User Defined CLI Template with Single Line and Multiple Line Command](#).

Step 5. Review and Deploy the Templates that are Configured.

There are a few types of templates that are configured and please review all of information before they are deployed.

- Mesh Settings template under Controller Templates
- CLIs of missing options under CLI Templates
- MAC Filtering template under AAA Templates
- RAP/MAP settings under lightweight AP templates

Generally, the first three templates are needed to be deployed to a controller, before RAP/MAPs are connected through a wired port and join the WLC. After MAP/RAP joined WLC through a wired port, you can push the RAP/MAP settings from Prime Infrastructure to APs. Finally, when MAP is disconnected from the wired connection and join RAP via it wireless backhaul, you can test the wireless mesh connectivity

Verify

Verify Mesh AP Status.

Use this section to confirm that your configuration works properly.

While you wait for APs to join the WLC, please **Sync** the controller on Prime again and navigate to **Monitor > Managed Elements > Network Devices** and use keyword **Bridge** in the AP Mode column to filter out any MAP/RAPs. **Registered** in Operational Status column means that AP is successfully joined the controller.

The screenshot shows the 'Monitor / Managed Elements / Network Devices' page. A table lists network devices. One device, 'HTTS-5508', is highlighted in blue. Its 'Admin Status' is 'Managed', 'IP Address' is '10.66.79.42', and 'Device Type' is 'Cisco 5508 Wireless...'. The 'Operational Status' column shows 'Synchronizing', which is highlighted with a red box. Above the table, the 'Sync' button is also highlighted with a red box.

The screenshot shows the 'Monitor / Managed Elements / Network Devices' page filtered to 'Unified AP'. The table lists three devices: 'HTTS-2702I-MESH', 'HTTS-2702I-RAP', and 'HTTS-3602I-RAP'. The 'AP Mode' column for all three is 'Bridge', and the 'Operational Status' column for all three is 'Registered'. Both the 'AP Mode' and 'Operational Status' columns are highlighted with red boxes. The 'Sync' button is also visible above the table.

In order to check the Parent(s) of a MAP or any children of a RAP, please navigate to **Mesh > Mesh Links** for more details. If you would like to set up a preferred parent for a specific MAP, please go to step 3 in the previous section and configure a preferred parent.

Home / Device Groups / Device Type / Unified AP / HTTS-2702I-MESH

Device Details | Configuration

Features

- System
 - Summary
 - AP Utilization
 - CDP Neighbors
 - Clients
 - Interfaces
 - Mesh**
 - Mesh Links**
 - Mesh Statistics

Features/Mesh
Mesh Links (Data shown from device)

[Edit/View](#)

Type	AP Name	AP MAC Address	PER	Link Detail	Link Test	Link Test
Parent	HTTS-2702I-RAP	00:27:e3:f5:2f:90	0%	Details	AP to Neigh	Neigh to AP
Tentative Parent	HTTS-3602I-RAP	34:a8:4e:80:e0:f0	-	Details	AP to Neigh	Neigh to AP

[Mesh Link Alarms](#) [Mesh Link Events](#)

Footnotes:

- Link is out of date. This can be because the AP has been replaced or the APs can no longer communicate

Verify Job Status of Templates Deployed.

In order to view the status of deployment job of each template, please navigate to **Administration > Dashboards > Job Dashboard > (Name of the deployed template)**

Home / Administration / Dashboards / Job Dashboard / Mesh-VLAN_Trans_disable_2

Recurrence: None
Description: N/A

Showing latest 5 Job instances [Show All](#) Total 1

Run ID	Status	Duration(hh:mm:ss)	Start Time	Completion Time
130281715	Failure	00:05:01	2019-03-06 13:35	2019-03-06 13:40

Job summary Failed deployment on 1 device(s).

Job Results for Mesh-VLAN_Trans_disable Total 1

Device	Status	Transcript
10.66.79.42	Failed	Error : Connection timed out while executing the command

Troubleshoot

This section provides the information you can use to troubleshoot your configuration.

Case 1. Prime: Job Dashboard "Error: Connection timed out while executing the command"

Please check the command in the CLI template and ensure that MLTCMD headers are included if there are more than one command in the template.

Case 2. Prime: Job Dashboard "Error: Connection closed while executing the command"

Please check the Telnet/SSH credential for the WLC and ensure that the correct protocol is selected.

Related Information

- [PI 3.2. Creation of User Defined CLI Template with Single Line and Multiple Line Command](#)

- [Wireless LAN Controller Mesh Network Configuration Example for Releases 5.2 and later](#)
- [Technical Support & Documentation - Cisco Systems](#)