Configuring Cisco Mobility Express controller

There are multiple ways one can configure a Cisco Mobility Express controller. They are as follows:

1. CLI Setup Wizard
2. Over–the–Air Setup Wizard
3. Network Plug and Play

- CLI Setup Wizard, on page 1
- Over-the-Air Setup Wizard, on page 2
- Network Plug and Play, on page 4
- APIC-EM Network Plug and Play Deployment Options with Cisco Mobility Express, on page 7
- Connecting Cisco Mobility Access Points, on page 16

CLI Setup Wizard

To use the Setup Wizard from CLI, you must connect to the console port of the Access Point. The default parameters for the console ports are 9600 baud, eight data bits, one stop bit, and no parity. The console ports do not support hardware flow control.

After connecting to the console port on the Access Point, power up the Access Point. After a few minutes, Access Point will start the Controller.

To configure the Mobility Express controller, follow the steps as shown in the example below:

```
System Name [Cisco_2c:3a:40] (31 characters max): me-wlc
Enter Country Code list (enter 'help' for a list of countries) [US]:

Configure a NTP server now? [YES][no]: no
Configure the system time now? [YES][no]: no

Note! Default NTP servers will be used

Management Interface IP Address: 40.40.40.10
Management Interface Netmask: 255.255.255.0
Management Interface Default Router: 40.40.40.1
Cleaning up Provisioning SSID
Create Management DHCP Scope? [yes][NO]: yes
DHCP Network : 40.40.40.0
DHCP Netmask : 255.255.255.0
Router IP: 40.40.40.1
Start DHCP IP address: 40.40.40.11
Stop DHCP IP address: 40.40.40.254
DomainName :
```

```
DNS Server : [OPENDNS][user DNS]
Create Employee Network? [YES][no]: YES
Employee Network Name (SSID)?: WestAutoBody-Employee
Employee VLAN Identifier? [MGMT][1-4095]: MGMT
Employee Network Security? [PSK][enterprise]: PSK
Employee PSK Passphrase (8-38 characters)?: Cisco123
Re-enter Employee PSK Passphrase: Cisco123
Create Guest Network? [yes][NO]: YES
Guest Network Name (SSID)?: WestAutoBody-Guest
Guest VLAN Identifier? [EMPLOYEE][1-4095]: EMPLOYEE
Guest Network Security? [WEB-CONSENT][psk]: WEB-CONSENT
Create Guest DHCP Scope? [yes][NO]: NO
Enable RF Parameter Optimization? [YES][no]: YES
Client Density [TYPICAL][Low][High]: TYPICAL
Traffic with Voice [NO][Yes]: Yes

Configuration correct? If yes, system will save it and reset. [yes][NO]: yes
Cleaning up Provisioning SSID
```

Note The Access Point will reboot and after it comes back up, login to the Mobility Express controller WebUI from the browser using **https://<mangement_ip_address>** Cisco Mobility Express controller uses a self-signed certificate for HTTPS. Therefore, all browsers display a warning message and asks whether you wish to proceed with an exception or not when the certificate is presented to the browser. Accept the risk and proceed to access the Mobility Express Wireless LAN Controller login page.

Over-the-Air Setup Wizard

Over-the-air is a simple and easy way to configure Mobility Express out of the box. Over-the-Air provisioning can be done using a WiFi enabled device or the **Cisco Wireless** app which can be downloaded from App Store for iOS devices and Play Store for Android Devices. The **Cisco Wireless** app provides a minimum set of configurable options to deploy Mobility Express in just a few minutes.

Procedure

Step 1 When the LED on the Access Point **chirps green**, connect a WiFi enabled laptop to the **CiscoAirProvision** SSID. The default password is **password**. The laptop will get an IP address from subnet 192.168.1.0/24.

Note **CiscoAirProvision** SSID is broadcast at **2.4GHz**.

Step 2 Open a web browser and browse to **http://mobilityexpress.cisco.** This will redirect to configuration wizard and the admin account page will appear.

Step 3 Create an admin account on the controller by specifying the following parameters and then click on the **Start** button.

- Enter the admin username. Maximum up to 24 ASCII characters.
- Enter the password. Maximum up to 24 ASCII characters. When specifying a password, ensure that:
  - The password must contain characters from at least three of the following classes – lowercase letters, uppercase letters, digits, special characters.

- No character in the password can be repeated more than three times consecutively.
- The new password must not be the same as the associated username and the username reversed.
- The password must not be cisco, ocsic, or any variants obtained by changing the capitalization of letters of the word Cisco. In addition, you cannot substitute 1, I, or ! for i, 0 for o, or $ for s.

Step 4 In the **Set up Your Controller** section, configure the following:

- Enter the System Name
- Select the Country from the drop-down list
- Date and Time should be auto-filled but one can manually configure it as well
- Select the Timezone from the drop-down list
- Enter the IP address of NTP Server if there is one available. If left blank, NTP Pools will be automatically configured
- Enter the Management IP Address of the controller
- Enter the Subnet Mask
- Enter the Default Gateway

Step 5 Disable **Enable DHCP Server(Management Network)** if an external DHCP server is being used. If internal DHCP server on the Mobility Express controller has to be used, specify the DHCP server related information.

Step 6 Click **Next**.

Step 7 In the **Create Your Wireless Network,** under **Employee Network**, configure the following:

- Enter the Network Name
- Select Security as WPA2 Personal or WPA2 Enterprise from the drop-down list
- If WPA2 Personal is selected, enter the Passphrase

Step 8 One can also enable **RF Parameter Optimization** and configure the following:

- Move the **Client Density** slider as needed
- From the **Traffic Type,** select **Data** or **Data and Voice**

Step 9 Click **Next**.

Step 10 Confirm the settings on the page and click on the **Apply** button. The Access Point will reboot and after it comes up, it will run the controller.

Note The Access Point will reboot and after it comes back up, login to the Mobility Express controller WebUI from the browser using **https:<management_ip_address>.** Cisco Mobility Express controller uses a self-signed certificate for HTTPS. Therefore, all browsers display a warning message and asks whether you wish to proceed with an exception or not when the certificate is presented to the browser. Accept the risk and proceed to access the Mobility Express Wireless LAN Controller login page.

Network Plug and Play

Introduction

The Cisco Network Plug and Play solution provides a simple, secure, unified, and integrated offering for enterprise network customers to ease new site rollouts for provisioning Cisco Mobility Express. The solution allows use of Cloud Redirection service, on-prem, or combination which provide a unified approach to provision enterprise networks comprised of Cisco Mobility Express, Cisco routers, switches, with a near zero touch deployment experience.

You can use the Cisco Network Plug and Play application to pre-provision the site and add Cisco Mobility Express capable access points to the site. This includes entering access point information and uploading a controller configuration file for virtual controller which will run on Mobility Express capable access points.

When an installer installs and powers up the Cisco Mobility Express capable access points, it auto-discovers the Cisco APIC-EM controller by using the DHCP, DNS or cloud redirection service. After the auto-discovery process is complete, the AP downloads the controller configuration file from local PnP server, or communicates with the cloud redirection service for direction to target PnP server.

Pre-requisites

1. APIC-EM Release 1.4 or later with Cisco Network Plug and Play, virtually hosted in a Cisco UCS or equivalent server.
2. Access Points–Cisco 802.11ac Wave 2 access points running Cisco Mobility Express software.
3. Controller Configuration–Cisco Mobility Express controller configuration file to be uploaded on Network PnP.

APIC-EM discovery options

1. DHCP server configured with option 43 to allow Cisco Mobility Express capable access points to auto-discover the APIC-EM controller (option 43 is not required if only testing cloud redirection). DHCP option 43 consists of a string value that is a configured DHCP server: option 43 ascii "5A1N;B2;K4;I192.168.1.123;J80"

Note 192.168.1.123 is the IP address of the APCI-EM Server

2. On–prem PnP server can be added to DNS using ‘pnpserver.yourlocal.domain’ If DHCP discovery fails to get the IP address of the APIC-EM controller, for example, because option 43 is not configured, the Cisco Plug and Play Agent falls back on a DNS lookup method. Based on the network domain name returned by the DHCP server, it constructs a fully qualified domain name (FQDN) for the APIC-EM controller, using the preset hostname pnpserver. For example, if the DHCP server returns the domain name " customer.com ", the Cisco Plug and Play IOS Agent constructs the FQDN "pnpserver.customer.com ". It then uses the local name server to resolve the IP address for this FQDN

3. Cloud redirection service requires a connection to the internet, and valid DNS server that can resolve 'devicehelper.cisco.com'. The cloud redirection service redirect Cisco Mobility Express Access Point to APIC-EM.

Configuring APIC-EM / Network PnP server

Site Pre-Provisioning Workflow

Cisco Network Plug and Play allows you to pre-provision and plan for new sites. When you create a new site, Cisco Network Plug and Play enables you to pre-provision Cisco Mobility Express access point(s) controller, configuration file, product ID, and product serial # for selected Access Points. This simplifies and accelerates the time that it takes to get a site fully functional.

For detailed info pm PnP Config about other functionality, see http://www.cisco.com/c/en/us/support/cloud-systems-management/one-enterprise-network-controller/products-installation-and-configuration-guides-list.html

To pre-provision a site on your network, perform these steps:

1. Importing Cisco Mobility Express controller configuration file to Network PnP
2. Creating a Project
3. Adding Cisco Mobility Express capable Access Point to the Project and associating the controller config.

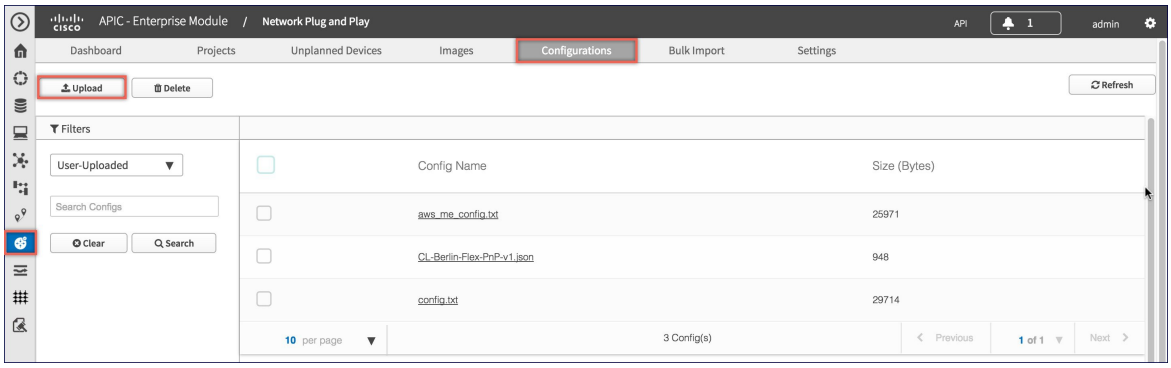
Importing Cisco Mobility Express configuration file to Network PnP

Procedure

Step 1 Login to APIC-EM controller and navigate to Network Plug and Play > Configurations

Step 2 Click on Upload to upload the controller configuration

Step 3 Select a controller configuration file from your local machine

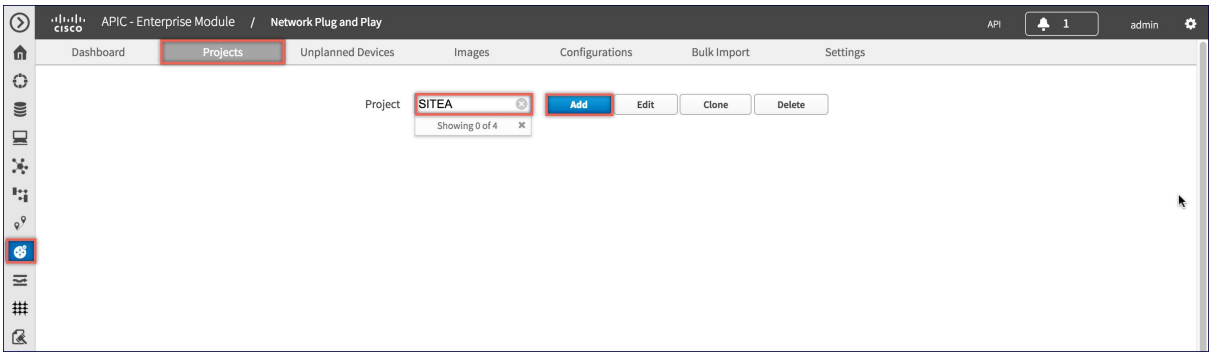


Creating a Project

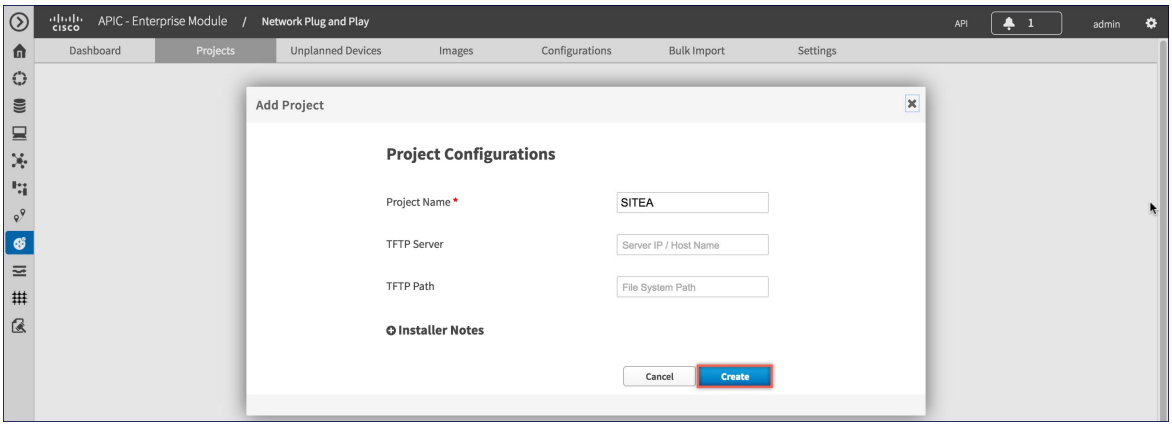
Procedure

Step 1 Navigate to **Network Plug and Play** > **Projects**.

Step 2 Enter the name for the Project and click on the Add button.



Step 3 Click on the Create button to create the Project.



Adding Cisco Mobility Express capable Access Point to the Project and associating the controller config

Procedure

Step 1 Navigate to **Network Plug and Play** > **Projects**.

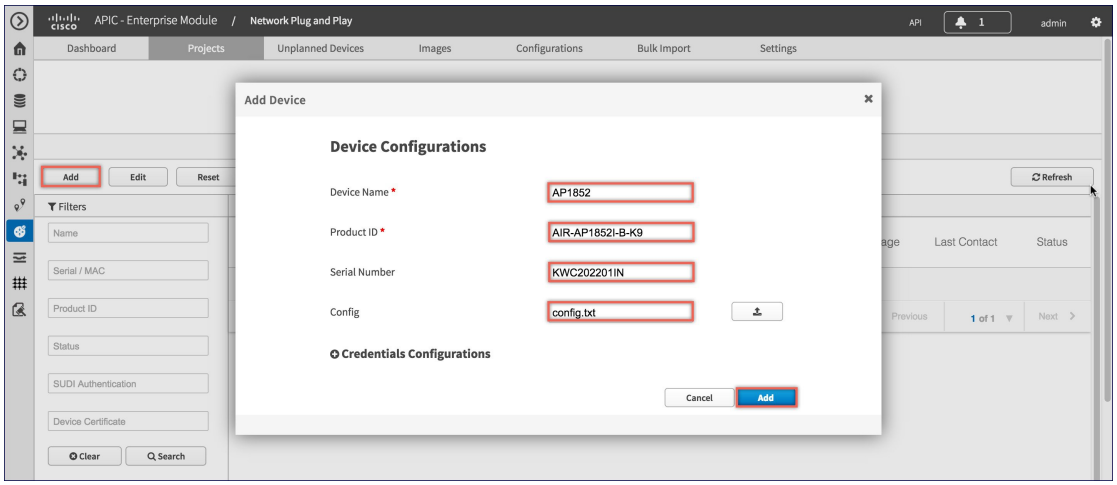
Step 2 Click on Add button under Project Devices.

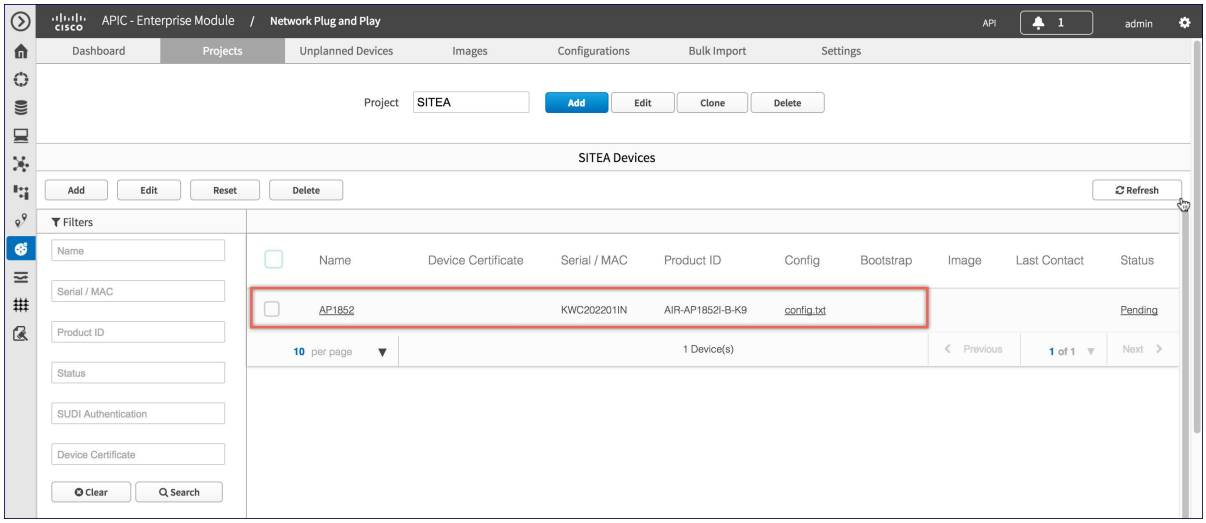
Step 3 In the Add Device window, enter the following:

- Device Name–Enter the device name; unique for each site
- Product ID–Select the Access Point device ID from the drop-down list

- Serial Number–Enter the Serial Number of the Mobility Express Access Point
- Config–You can either upload a new configuration or select the configuration file which was added earlier

Step 4 Click on the Add button.





APIC-EM Network Plug and Play Deployment Options with Cisco Mobility Express

There are two deployment options supported for deploying Cisco Mobility Express with Network Plug and Play.

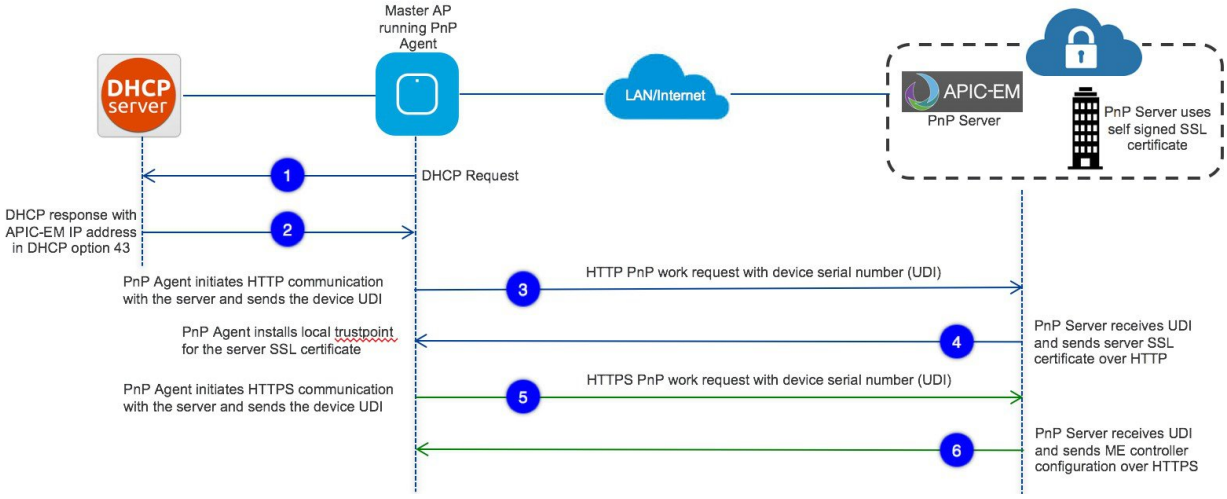
APIC-EM controller in Private Cloud

Cloud Plug and Play Connect redirect to APIC-EM controller

APIC-EM controller in Private Cloud

In this deployment option, there will be an On-Prem APIC-EM controller which can be discovered by Cisco Mobility Express Access Points using option 43 or DNS discovery.

Figure 1: APIC-EM controller in Private Cloud flow



Option 43 points to APIC-EM controller IP address. To configure DHCP scope with Option 43, it is important follow the format as shown below. In the example below, 192.168.1.123 is the IP address of APIC-EM controller

```
ip dhcp pool pnp_device_pool
network 192.168.1.0 255.255.255.0
default-router 192.168.1.1
option 43 ascii "5A1N;B2;K4;I192.168.1.123;J80"
```

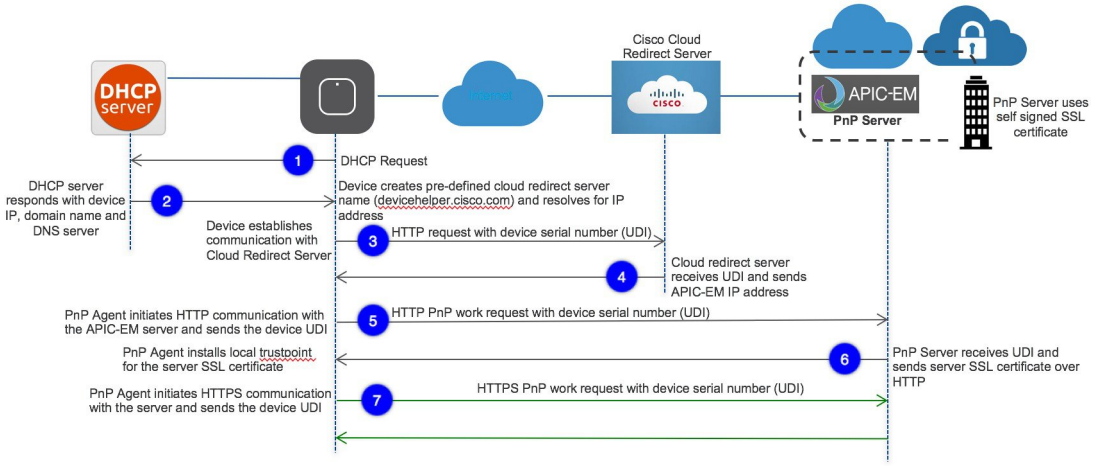
To discover APIC-EM controller using the DNS discovery options, configure the DNS server and domain name on the DHCP scope.

```
ip dhcp pool pnp_device_pool
network 192.168.1.0 255.255.255.0
default-router 192.168.1.1
domain-name cisco.com
dns-server 172.20.229.8
```

Cloud Plug and Play Connect redirect to APIC-EM controller

Cloud re-direction service uses Cisco public hosted cloud to re-direct Cisco Mobility Express capable access points to APIC-EM controller. The minimal requirement is that the Mobility Express Access Points network have DHCP and DNS, and connectivity reachable to Cisco public cloud. There is no need to configure Option 43 on DHCP scope with this deployment option. A simple test would be to obtain DHCP address and ping 'devicehelper.cisco.com' from where the Mobility Express AP will be deployed.

Figure 2: Cloud Plug and Play Device Redirect to APIC-EM controller flow



Cloud Plug and Play Device Redirect Provisioning Workflow

This section describes the steps to redirect Cisco Mobility Express Access Points to APIC-EM controller using Cloud Plug and Play Connect service.

To configure cloud Plug and Play connect redirect service, perform the following steps:

1. Obtain a Smart Account
2. Create APIC-EM Controller Profile
3. Adding Mobility Express capable Access Point to the Devices list
4. Associate Mobility Express capable Access Point to APIC-EM Controller profile

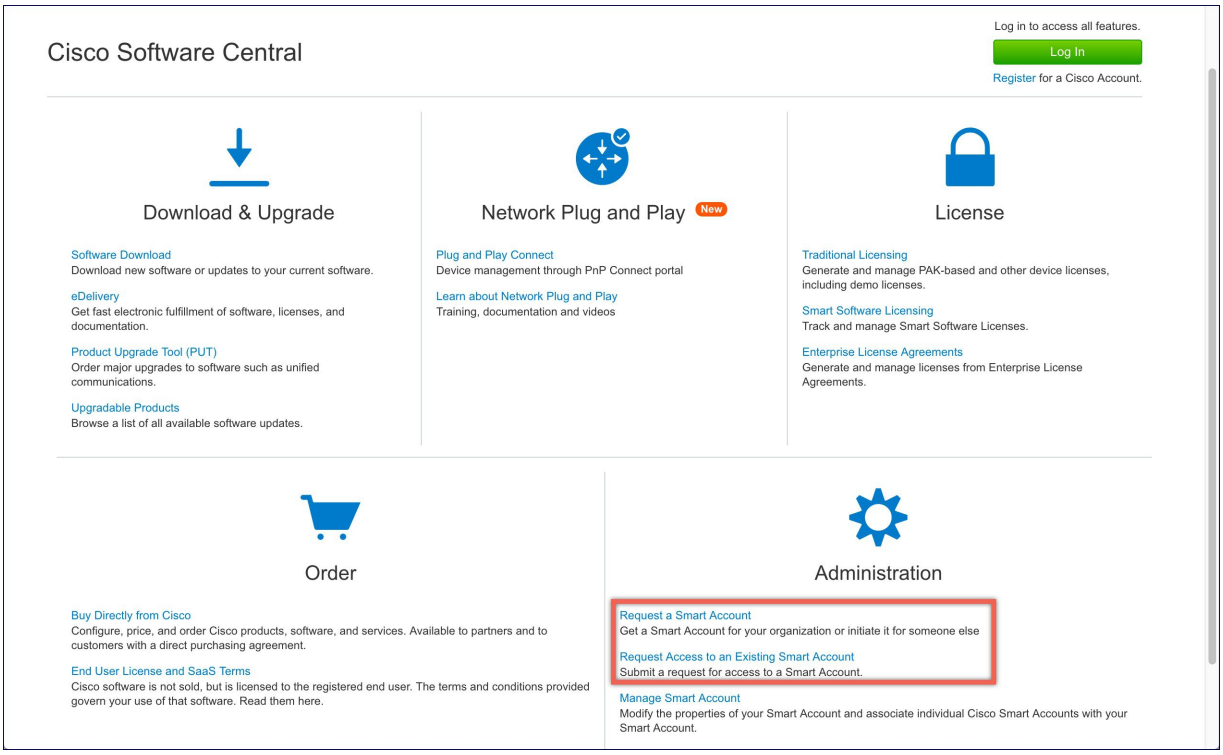
For detailed info on PnP Config about other functionality, see https://www.cisco.com/c/en/us/support/cloud-systems-management/one-enterprise-network-controller/products-installation-and-configuration-guides-list.html

Obtain a Smart Account

Procedure

Step 1 Go to http://software.cisco.com

Step 2 Request a Smart Account or Log In (existing Smart Account holders)

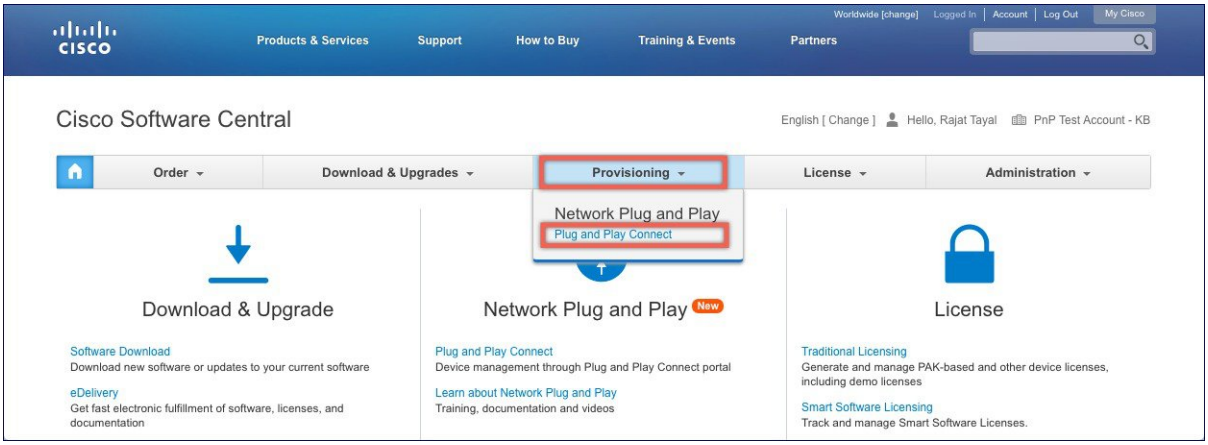


Create APIC-EM Controller Profile

Procedure

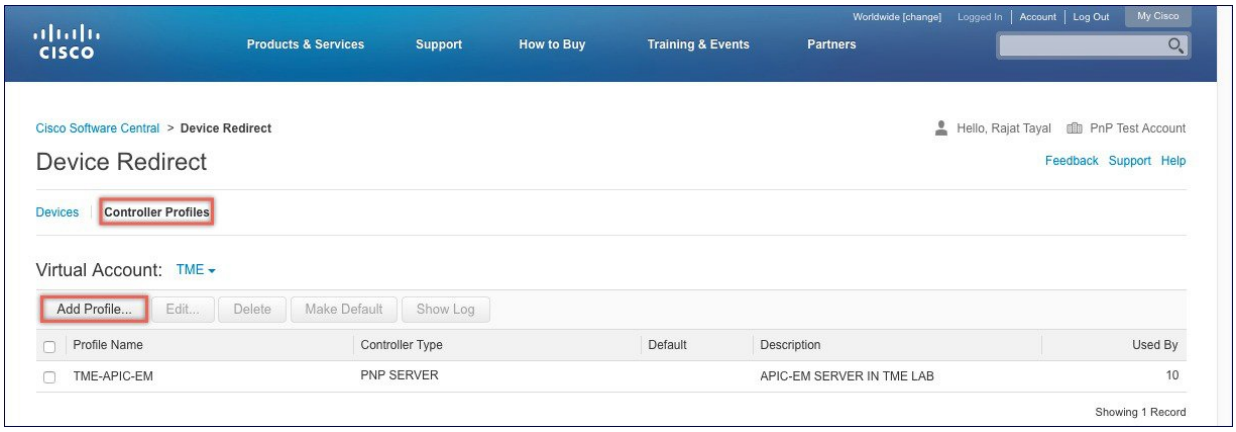
Step 1 Go to http://software.cisco.com and login

Step 2 Navigate to Provisioning > Plug and Play Connect

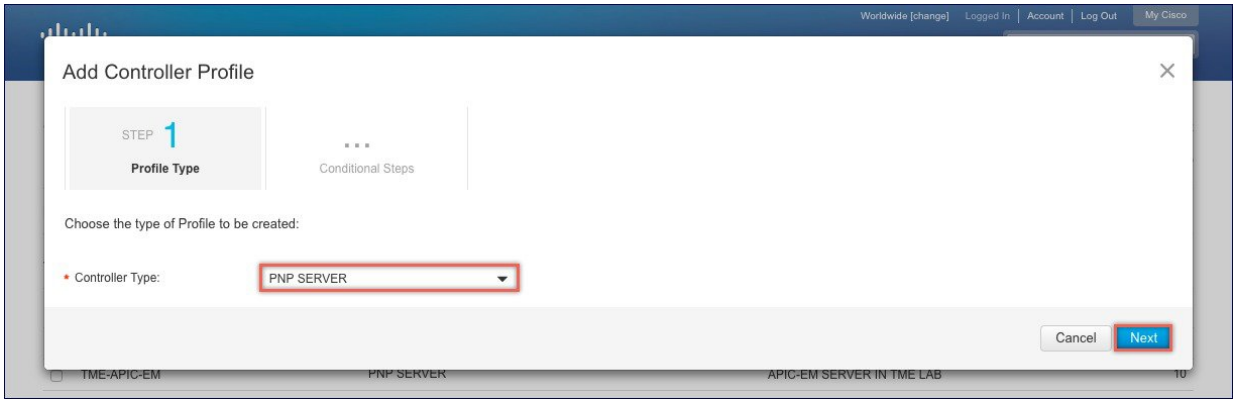


Step 3 Click on Controller Profiles. Select a Virtual Account. If you do have one, create a Virtual Account first.

Step 4 Click on the Add Profile to create a new controller profile.



Step 5 Select Controller Type as PNP Server from the drop-down list and click on Next.



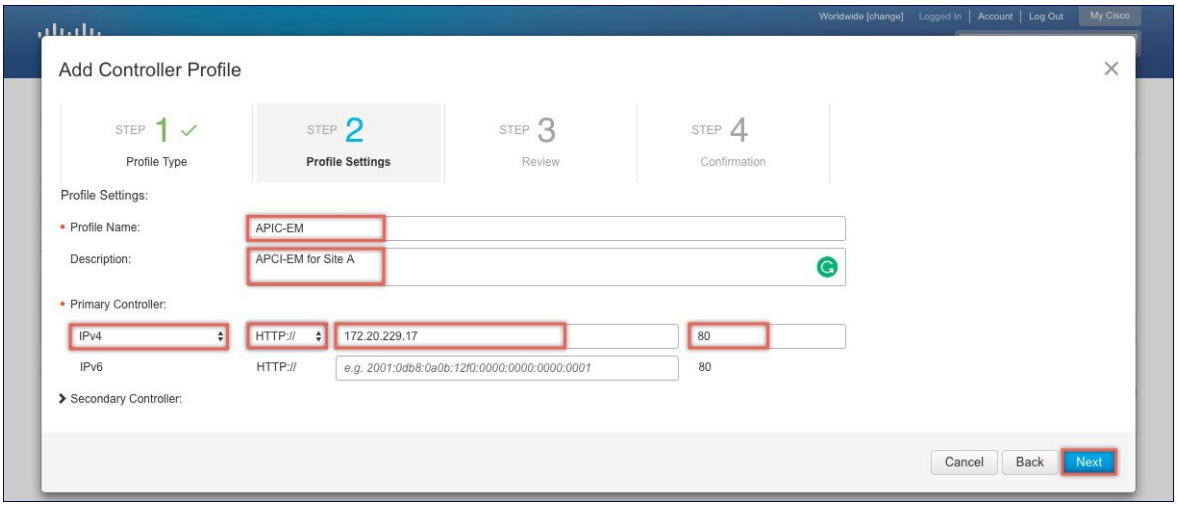
Step 6 Enter the following and click **Next**.

a. Profile Name

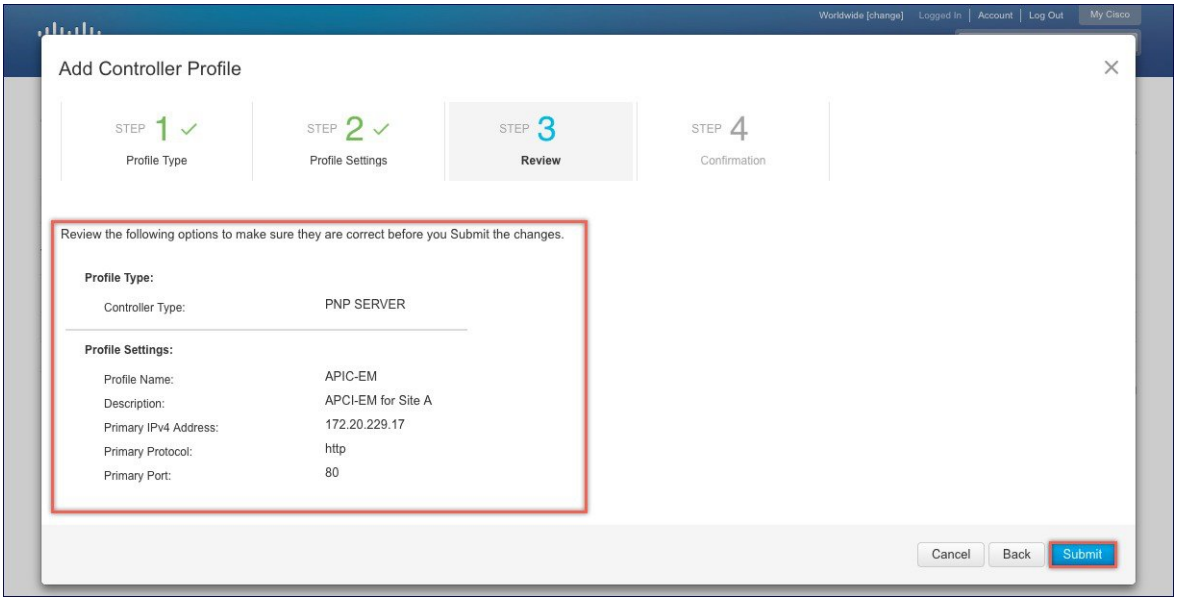
b. Description

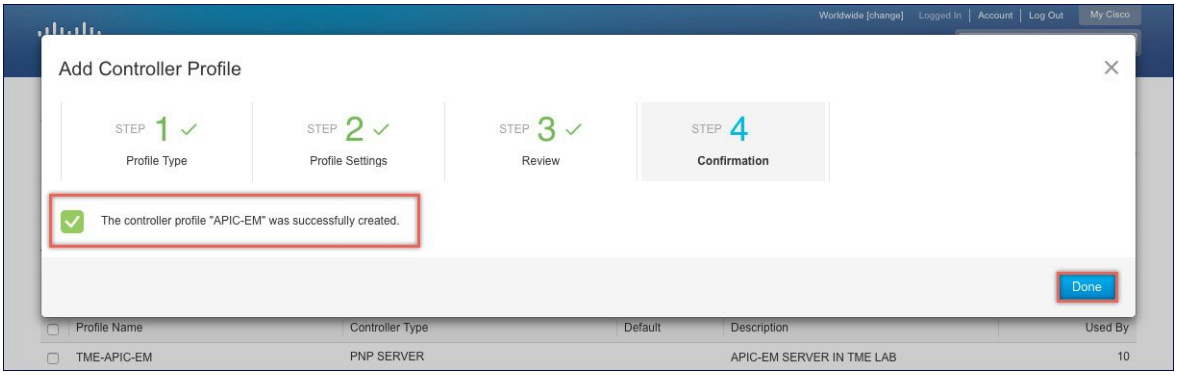
c. Select IPv4 or IPv6, HTTP or HTTPS and enter the IP address if the PNP Server

Note If you select HTTPS, then you would have import a SSL certificate. Also, optionally one can enter information of the secondary controller.



Step 7 Review the entries and click on Submit button to add the Controller Profile and finally click **Done**.





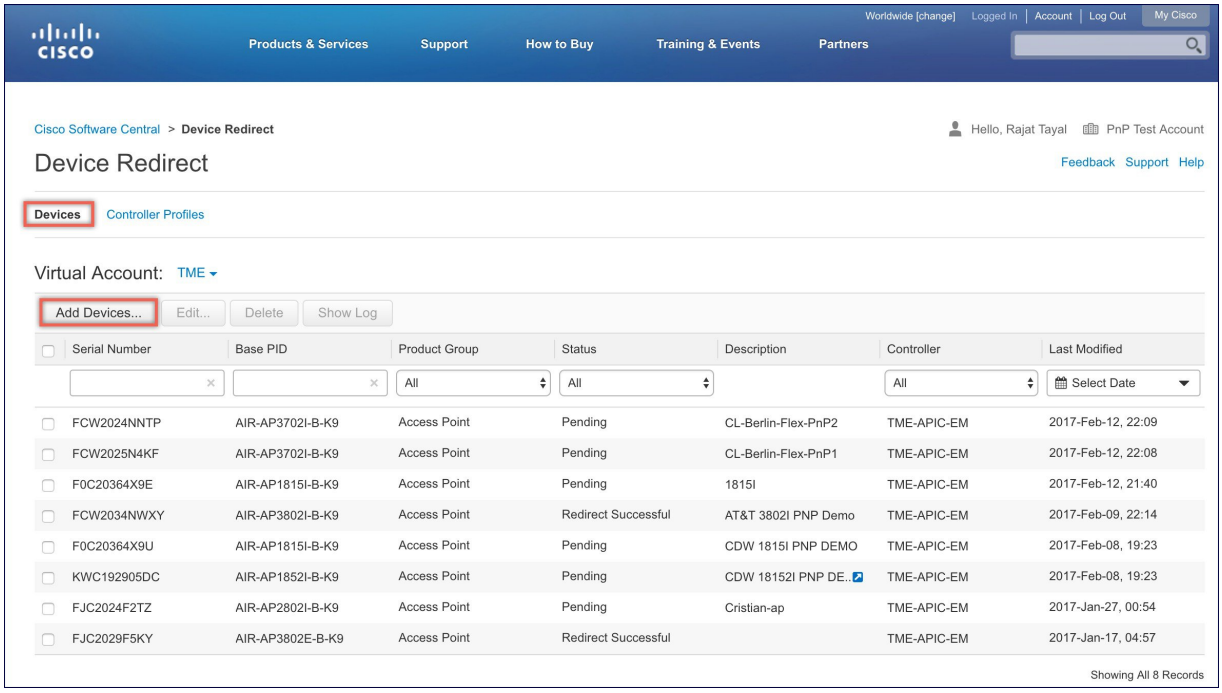
Adding Cisco Mobility Express capable Access Point to the Devices list

Procedure

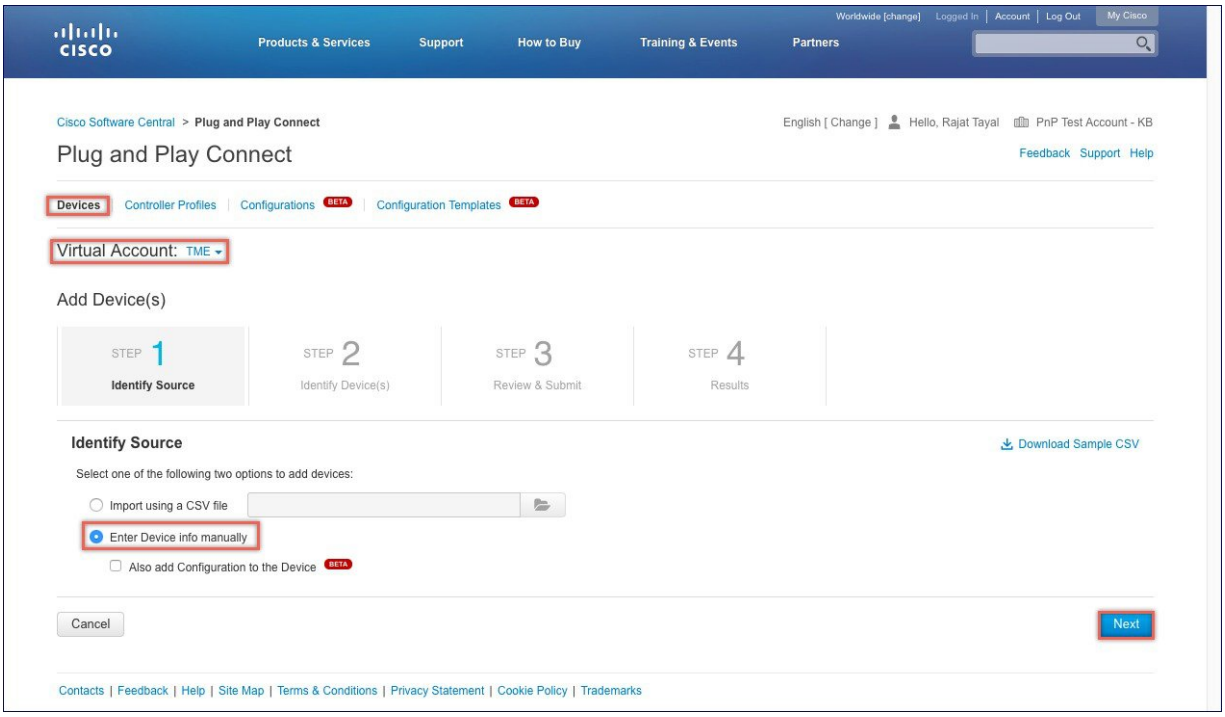
Step 1 Navigate to Provisioning > Plug and Play Connect. Click on Devices.

Step 2 Click on Devices. Select a Virtual Account. If you do have one, create a Virtual Account first.

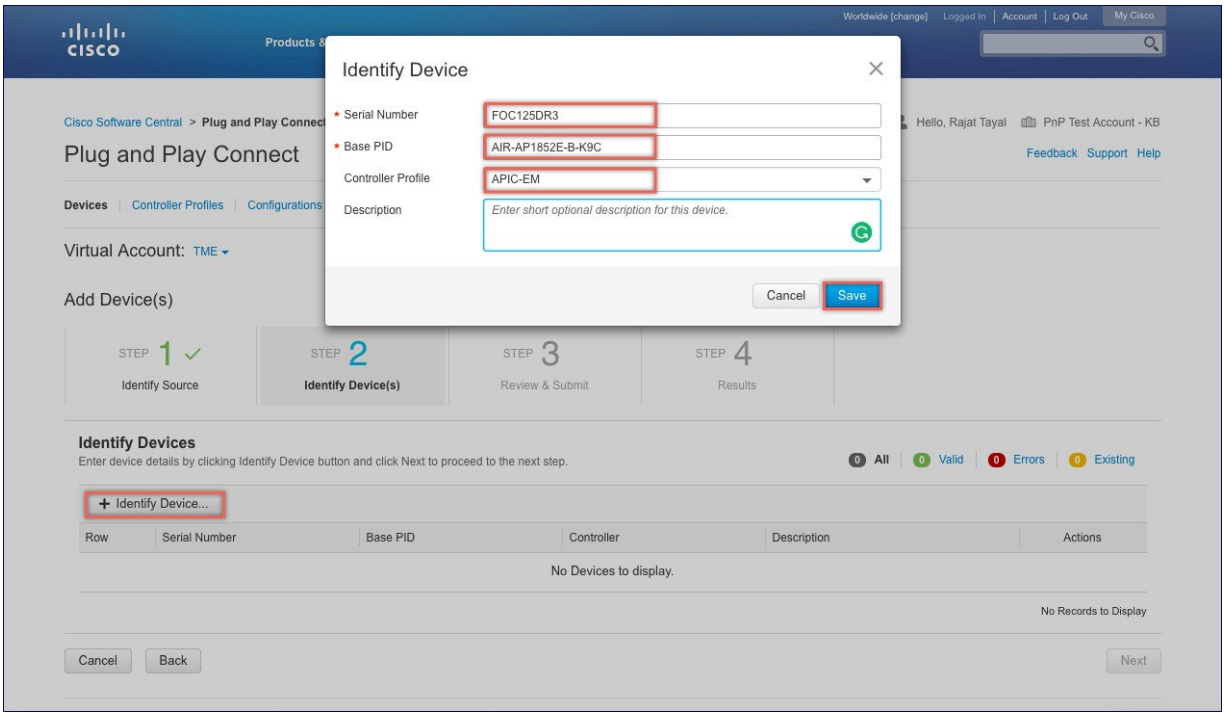
Step 3 Click on Add Devices button to add a new device (Mobility Express Access Point).



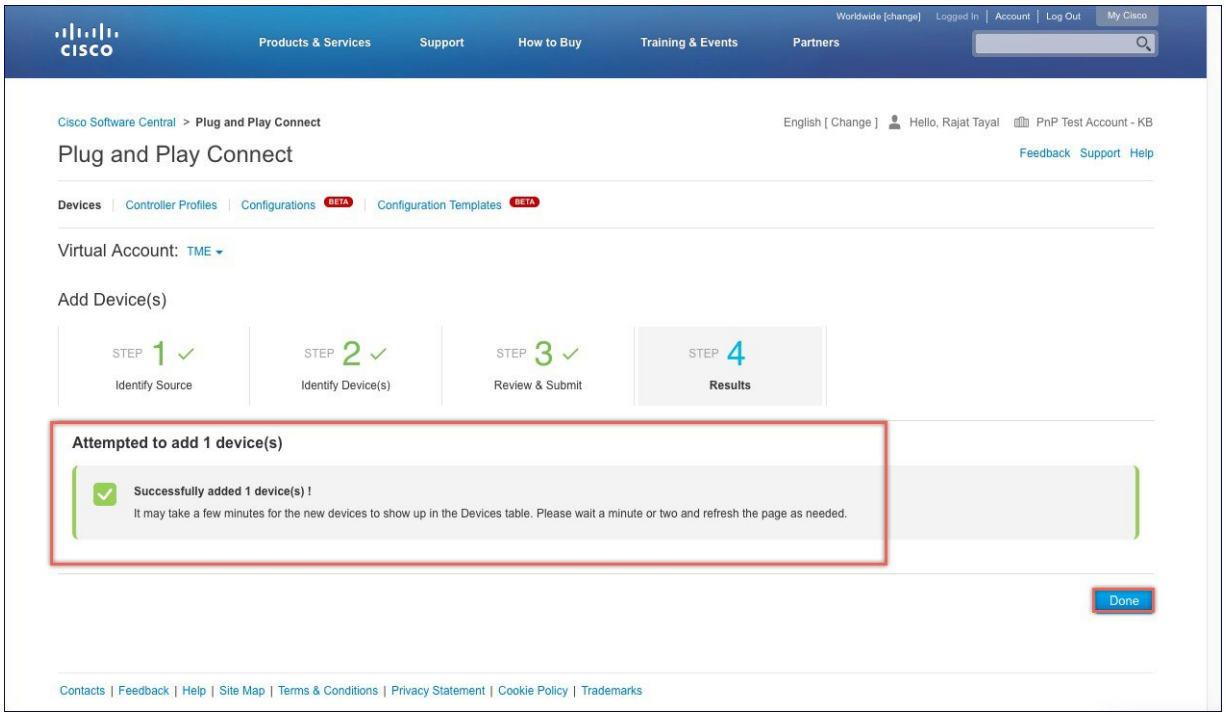
Step 4 Import a csv file with the Device info or select Enter Device info manually. Click **Next**.



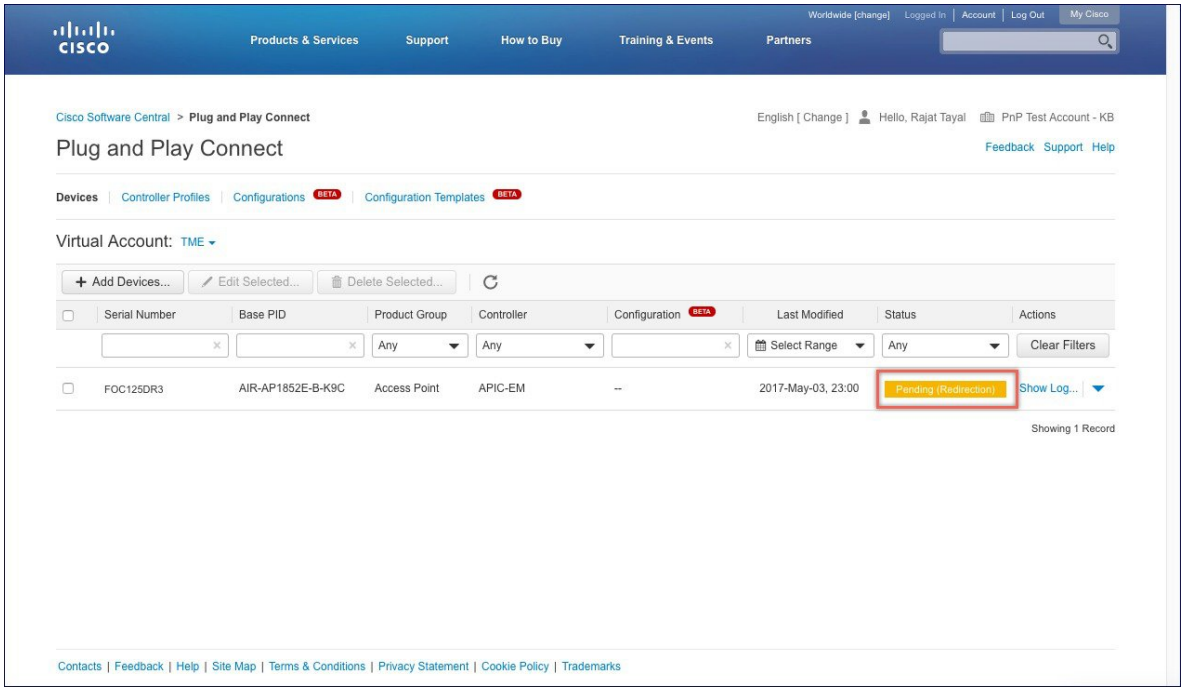
Step 5 Click on Identify Device button. The Identify Device window will pop up. Enter Serial Number, select Base PID, and Controller Profile(created earlier). Click on the Save button followed by Next button.



Step 6 Review the entries and click on Submit button to add the Device. Finally, click Done.



Step 7 Verify that the Device has been added and the status is Pending (Redirection).



Connecting Cisco Mobility Access Points

To bring up a new Mobility Express site, make sure that Plug and Play service has been configured with Mobility Express Access Points with related controller configuration. If APIC-EM controller in Private Cloud deployment option is used, Option 43 or DNS discovery on DHCP scope must be configured. If Cloud Plug and Play Connect redirect to APIC-EM controller deployment option is used, make sure all the related configuration on Cloud Plug and Play Connect has also been done for successful redirect to APIC-EM controller.

Now, it is time to connect the Mobility Express Access Points at the site. One may connect one or more Access Points at a site. It is important to note that if multiple Mobility Express Access Points are connected at a site, Master Election will happen first and only after Master Access Point has been elected, it will initiate communication with the Network Plug and Play service and download the controller configuration file regardless of the deployment option. The other Access Points will not initiate communicate with the Network Plug and Play service. After the controller configuration file has been downloaded on the Access Point, it will reboot and after it comes up, it will run the controller. The rest of the Access Points at the site will join this Master Access Point as Subordinate Access Points.