



Automated Frequency Coordination

- [Automated frequency coordination, on page 1](#)
- [AP height configuration through priming profile, on page 15](#)

Automated frequency coordination

Automated Frequency Coordination (AFC) is an advanced system that

- coordinates the allocation and utilization of spectrum for access points (APs) that operate within the 6-GHz band
- utilizes the Universal Licensing System (ULS) as a regulatory database (encompassing a wide range of frequency bands used by various radio frequency services within a specific region), which is updated daily by the FCC, the regulatory body, and
- ensures seamless and efficient management of spectrum resources, enabling optimal utilization of spectrum and minimizing interference among different radio frequency services.

AFC system benefits and operation

The FCC's decision to open the 6-GHz band for unlicensed Wi-Fi usage brings about significant advantages, including accelerated connectivity and expanded capacity. By unlocking the potential of the 6-GHz band, you can experience unprecedented performance and seamless connectivity, effortlessly engage in data-intensive activities and enjoy immersive online experiences.

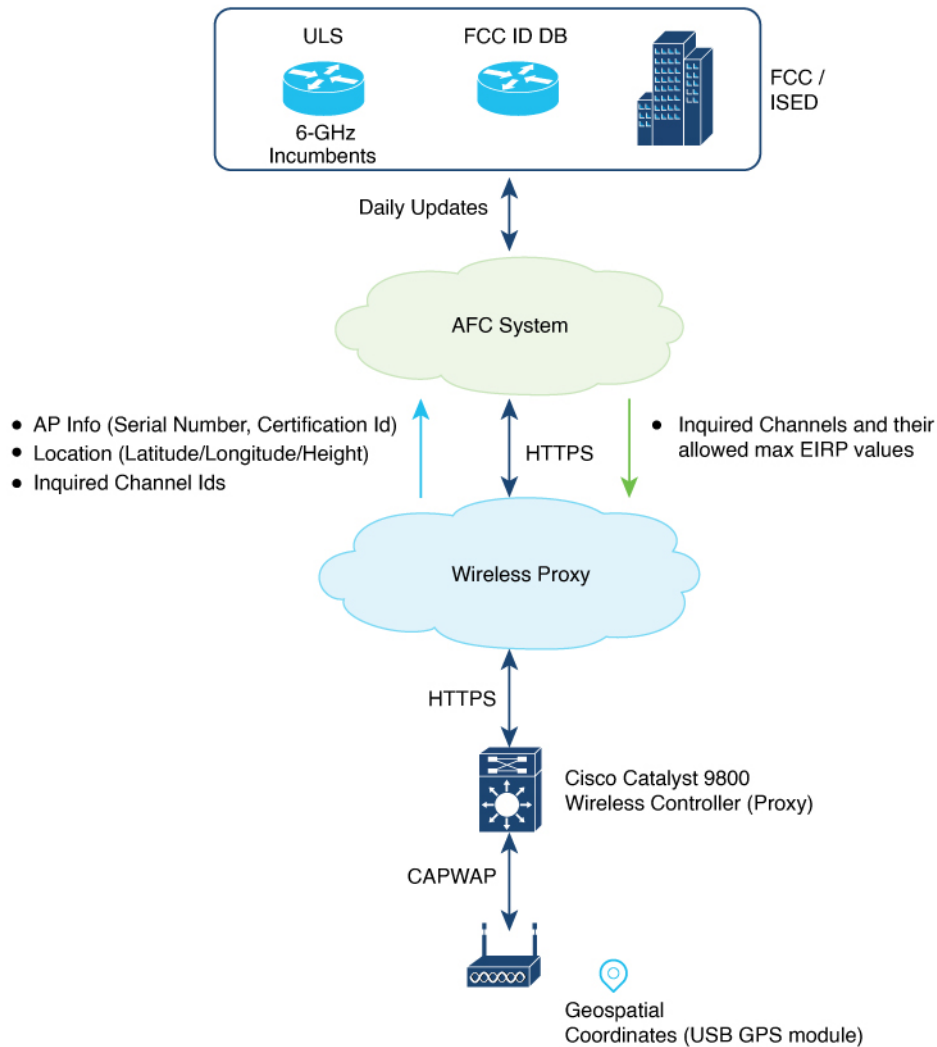
Several other technologies, including fixed satellite services (FSS) used in the broadcast and cable industries, are already active in the 6-GHz band. To ensure that the new unlicensed Wi-Fi entrants do not interfere with current services, FCC has implemented the AFC system for Wi-Fi operation within this band. Indoor APs operate at reduced power levels and are less likely to interfere with current 6-GHz users. The outdoor or standard power APs have a higher probability of causing interference with the existing 6-GHz users. These APs are permitted to operate only within the frequency ranges allocated to each country. For example, in the US, APs are authorized to function in the 5.925-6.425 GHz and 6.525-7.125 GHz bands.

Under the AFC system, a new wireless device is required to verify its compatibility with the existing services. This is done by accessing a registered database of the local AFC system provided by an AFC service provider before starting data transmission. This compatibility check ensures that the device's operation does not cause any interference with the current services. To facilitate the compatibility check, the AFC provider maintains an extensive database containing information about the existing 6-GHz operators, including geolocation details, frequencies in use, power levels, antenna coverage, and other relevant data. For areas where an AFC

service is available, outdoor or standard power 6-GHz Wi-Fi deployments are only authorized if they comply with the AFC guidelines.

Individual standard power APs are exempt from interfacing directly with the AFC system, if the necessary registration data is communicated by a proxy device such as the wireless controller. Still, APs are responsible for providing their precise location information. In return, they receive a designated set of available frequencies suitable for that specific location.

Figure 1: AFC architecture



AFC architecture includes these components:

- Cisco Catalyst APs supporting 6-GHz
- Cisco Catalyst 9800 Series Wireless Controller acting as AFC proxy
- A cloud-based wireless proxy tunneling the communication between the AFC proxy and the AFC system
- AFC System

The 6-GHz AFC workflow operates as follows:

1. A standard power AP joins the system. Before enabling standard power, the AP must get the available frequencies and the power in each frequency range from the AFC system.
2. The AFC proxy sends the AP information to the AFC system.
3. The AFC system computes the available frequencies and maximum allowable power based on the information provided by the regulatory body (FCC for United States).
4. The response is sent back to controller, which may assign a standard power channel to the AP based on the allowed channel list returned by the AFC system.

Supported APs

These Wi-Fi 7 APs support AFC:

Table 1: Wi-Fi 7 APs supporting AFC

Access Point	9178A1	9178A2	9178I1	9176A1	9176I1	9172A1
Number of antenna	External	External	External	External	Internal	Internal



Note The Cisco Wireless 9178I, 9176I, 9176D1, and 9172I Wi-Fi 7 Access Points are not applicable for 17.16.1 release.

Standard power enablement using AFC for US and Canada

Table 2: AFC power enablement: US and Canada

Country	Regulatory Body	Supported Bands	Power Levels	Supported Release
United States (US)	FCC	UNII-5, UNII-7	PSD 23dBm/MHz EIRP 36dBm	17.12.3 onwards
Canada (CA)	ISED	UNII-5, UNII-6, and UNII-7	PSD 23dBm/MHz EIRP 36dBm	17.17.1 onwards



Note AFC is applicable or active for FCC (US) and Canada. You can verify this using the **show wireless afc ap** and **show wireless afc statistics** commands. In countries where AFC is not required, these commands will show no queries or responses for any access points, indicating that AFC is inactive in that region.

Feature history for automated frequency coordination

This table provides release and related information for the feature explained in this module.

This feature is also available in all the releases subsequent to the one in which they are introduced in, unless noted otherwise.

Table 3: Feature history for automated frequency coordination

Release	Feature	Feature Information
Cisco IOS XE 17.12.3	Automated Frequency Coordination	<p>Automated Frequency Coordination (AFC) is an advanced system for coordinating the allocation and utilization of spectrum for access points (APs) that operate within the 6-GHz band.</p> <p>This feature is supported on the following APs:</p> <ul style="list-style-type: none"> • Cisco Catalyst Wireless 9136I Access Point • Cisco Catalyst Wireless 9163E Access Point • Cisco Catalyst Wireless 9166D Access Point • Cisco Catalyst Wireless 9166I Access Point • Cisco Catalyst Wireless 9162I Access Point • Cisco Catalyst Wireless 9164I Access Point • Cisco Catalyst Wireless 9167IW IIoT Access Point

Prerequisites for Automated Frequency Coordination

These are the prerequisites for Automated Frequency Coordination:

- Ensure that there is cloud connectivity from the controller to the cloud, with a DNS entry in place. AFC operates through either the management port or data ports.

The AFC request is sent only when the controller is onboarded with cloud. This is automatic for hardware platforms like 9800-80, 9800-40 and 9800-L. For cloud controller, you have to manually enter a one-time password (OTP). See Onboarding the Cloud Controller.

- Before sending an AFC request, check whether the AFC service can be requested by using the `show wireless afc ap` command. If command output shows yes or up status for all the parameters of an AP, then request is sent out.
- Standard APs must register with the AFC system by providing these parameters:
 - Geographic coordinates (latitude and longitude)
 - Antenna height above ground level and tolerance as uncertainty height
 - FCC identification number
 - Manufacturer's unique serial number
 - Firewall Requirements - Ensure your network firewall allows outbound traffic to:
 - `dnaservices.cisco.com` on port 443
 - `commercial.ocsp.identrust.com` on port 80

Restrictions for Automated Frequency Coordination

These are the restrictions for AFC:

- AFC is not supported on Embedded Wireless Controller (EWC).

Onboard the cloud controller (GUI)

Onboarding the cloud controller requires the generation of a one-time password (OTP). Controller must register with cloud framework to access any cloud service. The cloud service provides identity management services to the controller and securely authenticates the device.



Note These steps apply only to the Cisco Catalyst 9800-CL Wireless Controller for Cloud, and are not applicable to the hardware-based Catalyst 9800 Wireless Controllers.

Follow these steps to onboard the cloud controller:

Procedure

-
- Step 1** Go to **Cisco DNA portal**.
 - Step 2** Click **Application/Products**.
 - Step 3** Select **Region** using the drop-down and click **Register**.
 - Step 4** Click **Register**.
 - Step 5** Enter the product details such as **Host Name/IP**, **Product Name**, and **Description**.
 - Step 6** Click **Register**.

This generates an OTP.

The OTP token is a BASE64 encoded JSON payload. A sample OTP token is given below:

Example:

```
eyJiYXNlX3VybCI6ICJodHRwczovL21hZ2xldi5tYWdsZXZjbG91ZDMudGVzc2VYWN0aW50ZXJuYWwY29tIiwib3RwIjogImNjNDY3ZDA5NzE1ZjQ3ZWI4NzhhN2UyOTA2Yj11NzE0MTYzYmQzZjAlMWExNDUxZjg2ODViMjVhZDhmNWNkMTQifQo=
```

- Step 7** Copy the OTP.
- Step 8** Go to the controller console.
- Step 9** Run **cloud otp token import** command.
- Step 10** Paste the OTP copied in **Step 7** to the console.

This completes the onboarding procedure. Wait for a few minutes to complete the process.

Configure DNA services (GUI)

Set up integration with the Cisco DNA Cloud by configuring service connection parameters and authentication details for secure operation.

Procedure

Step 1 Choose **Configuration > Services > Cloud Services**.

Step 2 Click **DNA Services Configuration** tab.

The DNA Services Configuration section displays these details:

Note

We recommend that you retain default values for URL, API endpoint path and certificate bundle path.

- **URL:** The base web address of the Cisco DNA Cloud instance that issued the token. This will be used to address the enrollment request.
- **API Endpoint Path:** An API path that allows client applications like AFC to register for notifications for any Cloud state change.
- **Certificate Bundle Path:** The path for certificate-based authentication. In addition to OTP-based authentication, you can use certificate-based authentication.
- **HTTP Proxy (Hostname/IP):** The HTTP proxy that serves incoming HTTPs requests from clients and processes received HTTPs responses.

Step 3 In the **DNA OTP Configuration** section and under **Generate OTP**, select the link provided to navigate to the Cisco DNA website to generate an OTP.

Step 4 Enter the generated OTP in the **OTP Token** field.

Step 5 Click **Submit OTP**.

DNA services are configured. The system establishes a secure connection with the Cisco DNA Cloud, enabling authorized access to cloud-managed services and device management features.

Configure power mode per RF profile (CLI)

Allow or disallow standard power mode in configuration per RF profile for 6-GHz band APs.

You can allow or disallow standard power mode in configuration per RF profile. However, the operating mode for each RF profile is determined based on the configuration, the capabilities of the AP, and the response from the AFC system regarding channel and transmit power values. If there is no connection with the AFC system or if the received Tx power values are extremely low, the AP might automatically switch from standard-power mode to low-power mode as a fallback.

If the standard power granted by the AFC server is greater than the low power, the radio is switched to standard power mode in the case of mixed-mode APs. If the granted standard power is equal to or greater than the low power, the radio is switched to standard power mode.



Note As outdoor APs operate only in standard power mode, the RF profile configuration for the standard power mode is not evaluated.



Note We recommend using standard power indoors for unparalleled speed and coverage. While the client and vendor ecosystem is evolving, the current Cisco standard power technology continues to provide advantages for existing standard power and dual-mode clients. Low-power clients will default to 2.4/5GHz until they are fully upgraded to standard power by the client vendors.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure the RF profile and enter RF profile configuration mode.

Example:

```
Device(config)# ap dot11 6ghz rf-profile rf-profile-name
```

Example:

```
Device(config)# ap dot11 6ghz rf-profile prof-afc
```

Step 3 Configure standard-power mode for 6 GHz band for APs that are capable of low power (LP) and standard power (SP).

Example:

```
Device(config-rf-profile)# tx-power standard
```

APs that support only SP mode are not affected by this setting (SP mode is always enabled).

Step 4 Return to privileged EXEC mode.

Example:

```
Device(config-rf-profile)# end
```

The RF profile is configured with standard power mode for the 6 GHz band, allowing APs to operate in standard power mode when conditions permit.

Configure power mode per RF profile (GUI)

This task enables standard-power service for dual-power mode APs to operate as standard power APs in the 6 GHz spectrum, allowing access to external AFC service through cloud.

The AP can access the external AFC service through cloud. Based on geographical coordinates and spectrum-inquiry requests from APs, the AFC provides responses on the available frequencies and the maximum permissible power in each frequency range.

Procedure

Step 1 Go to **Configuration > Tags & Profiles > RF/Radio**.

Step 2 Click **RF** tab.

To add a new RF profile, see *Configuring an RF Profile (GUI)*. To modify an existing RF profile, select the required RF profile.

Step 3 Enable **Standard-Power Service** to allow dual-power (low power or standard power) mode APs to operate as standard power APs in the 6 GHz spectrum.

The AP can access the external AFC service through cloud. Based on geographical coordinates and spectrum-inquiry requests from APs, the AFC provides responses on the available frequencies and the maximum permissible power in each frequency range.

Note

- This setting is available for the 6-GHz band radio and standard-power supported APs only.
- DNA services need to be configured to connect to AFC. You can configure DNA services in **Configuration > Services > Cloud Services > DNA Services** page.

Step 4 Click **Apply to Device**.

Dual-power mode APs are now configured to operate as standard power APs in the 6 GHz band. They can access external AFC service through the cloud, with available frequencies and maximum permissible power determined by AFC responses.

Configure AP parameters (GUI)

AFC requires the longitude, latitude, and height of the AP to determine the geolocation of the AP. Longitude and latitude of the AP will be automatically calculated based on one of the following methods:

- From an internal or external GPS attached to the AP.
- From an another AP with GPS (also known as anchor AP) and the distance between the two APs.



Note Only a few APs on a floor require the GPS unit. The remaining APs can derive their location from the AP with the GPS unit.

You can use bulk AP provisioning to configure multiple AP parameters for multiple APs simultaneously. GUI path is **Configure > Wireless > Bulk AP Provisioning**.

Procedure

-
- Step 1** Go to **Configuration > Wireless > Access Points**.
- Step 2** In the **All Access Points** section, select a supported AP.
- Step 3** In the **Geolocation** tab, enter these details:
- In the **Height Configuration** section, enter the above ground level height in meters. The range is from -100 to 1000. Enter the tolerance as uncertainty height in meters. The range is from 1 to 100.
 - In the **GNSS External Antenna Configuration** section, enter the cable length in meters. The range is from 1 to 100, with a default of 10. We recommend that you keep the default value of 10 meters with the Cisco provided external antenna.

Note

This option is available on selected models that support an external antenna.

- Step 4** Click **Apply to Device**.

The AP geolocation and antenna parameters are updated. APs without direct GPS will derive their location from anchor APs as needed. Bulk provisioning allows you to configure multiple APs efficiently.

Configure AP parameters (CLI)

Set up AP geolocation parameters including height and GNSS antenna configuration for accurate positioning.

To configure the height and GNSS antenna details of the AP, use the following procedure:

Procedure

-
- Step 1** Enable privileged EXEC mode.

Example:

```
Device> enable
```

- Step 2** Configure the AP Above Ground Level (AGL) height in meters.

Example:

```
Device# ap name ap-name geolocation height height uncertainty uncertainty
```

Example:

```
Device# ap name cisco-ap1 geolocation height 100 uncertainty 10
```

The value range for height is -100 to 1000 meters. The valid range for height uncertainty is 1 to 100 meters.

- Step 3** (Optional) Configure AP GNSS antenna external cable length, in meters.

Example:

```
Device# ap name ap-name geolocation gnss antenna external cable-length length
```

Example:

```
Device# ap name cisco-ap1 geolocation gnss antenna external cable-length 10
```



```
Device# show wireless afc ap
```

AP Name	Radio MAC	AFC	Power Mode	Current	AP	6GHz	
Radio	RF-Profile	RF-Profile	AFC Country	Location	Height		
State	Admin State	tx-power std	Status	Capability	Power Mode	Admin State	Admin
			allowed	known	known		
APCC9C.3EF1.1620	10f9.20fe.36a0	Inactive	SP/LPi	LPi	Up	Down	
Yes	Yes	Yes	Yes	Yes			
AP687D.B45C.17AC	687d.b45f.1af0	Active	SP/LPi	SP	Up	Up	
Yes	Yes	Yes	Yes	Yes			
AP-ARCTIC	fc58.9a18.c890	Inactive	SP/LPi	LPi	Up	Up	
Yes	Yes	Yes	Yes	No			

AFC geolocation information

To see AFC geolocation information to be used in an AFC Request, use this command:

```
Device# show wireless afc geolocation
```

AP Name	Radio MAC	Location	Longitude	Latitude	Major-axis	Minor-axis	
Orientation	Area-of-uncert	Height	Height	Uncertainty			
(degrees)	(sq. meters)	Type	(meters)	(degrees)	(degrees)	(meters)	(meters)
AP687D.B45C.16A4	687d.b45f.0e90	Lin Polygon	-122.400140	37.794910			
	1122	AGL	150	6			
					-122.399340	37.795020	
					-122.399180	37.794390	
					-122.400040	37.794270	
AP687D.B45C.17AC	687d.b45f.1af0	Ellipse	-73.977760	40.760168	9	9	
5.340000	254	AGL	129	3			

! The afc geolocation information given in the output refers to coordinates to be used for future AFC requests.

! They do not represent the coordinates used by past AFC requests; for such info see AFC responses in 'show wireless afc response' command.

```
.
.
.
```

AFC geolocation information of a Cisco AP

To see geolocation information of a Cisco AP, use this command:

```
Device# show ap name AP687D.B45C.17AC afc geolocation
```

```
Location type           : Ellipse
Center ellipse - longitude : -73.977769
Center ellipse - latitude  : 40.760168
Ellipse major-axis (meters) : 8
Ellipse minor-axis (meters) : 8
Ellipse orientation       : 2.5
Height (meters)          : 129
Uncertainty (meters)     : 3
```

AFC response for an AP service request

To see the response from AFC for a service request from an AP, use this command:

```
Device# show ap name AP687D.B45C.17AC afc response
```

```
AP name           : AP687D.B45C.17AC
AP MAC Address    : 687d.b45f.1af0
Response Code     : SUCCESS
Request ID        : 2
Expire Time       : 11/14/2021 21:56:30
Last Rcvd Time    : 11/14/2021 17:56:29
Global Operating Class : 131
Channel Cfi / Max Eirp :
   1      / 36.000000
   5      / 33.668693
   9      / 36.000000
  13      / 36.000000
  17      / 35.223532
  21      / 36.000000
  25      / 36.000000
  29      / 36.000000
  33      / 26.664962
  37      / 27.799478
  41      / 36.000000
  45      / 36.000000
  49      / 36.000000
  53      / 36.000000
```

```
.
.
.
```

RF profile details

To see the details of an RF profile, use the following command:

```
Device# show ap rf-profile name default-rf-profile-6ghz detail
```

```
Description           : default rfprofile for 6GHz radio
RF Profile Name        : default-rf-profile-6ghz
Band                   : 6 GHz
Transmit Power Threshold v1 : -70 dBm
Min Transmit Power     : -10 dBm
Max Transmit Power     : 30 dBm
Operational Rates
  802.11 6GHZ 6M Rate   : Mandatory
  802.11 6GHZ 9M Rate   : Supported
  802.11 6GHZ 12M Rate  : Mandatory
  802.11 6GHZ 18M Rate  : Supported
  802.11 6GHZ 24M Rate  : Mandatory
  802.11 6GHZ 36M Rate  : Supported
  802.11 6GHZ 48M Rate  : Supported
  802.11 6GHZ 54M Rate  : Supported
Max Clients             : 200
Trap Threshold
  Clients               : 12 clients
  Interference          : 10%
  Noise                 : -70 dBm
  Utilization           : 80%
Multicast Data Rate     : auto
Rx SOP Threshold        : auto
Load Balancing
  Window                : 5 clients
```

```

Denial                               : 3 count
Coverage Data
  Data                                : -80 dBm
  Voice                               : -80 dBm
  Minimum Client Level                : 3 clients
  Exception Level                     : 25%
RSSI Settings
  RSSI Low Check                      : Disabled
  RSSI Threshold                      : -127 dbm
DCA Channel List                      :
Unused Channel List                  :
PSC Channel List                     :
DCA Bandwidth                        : best
DBS Min Channel Width                : 20 MHz
DBS Max Channel Width                : MAX ALLOWED
DCA Foreign AP Contribution          : Enabled
State                                 : Up
  Client utilization threshold        : 5%
  Client Reset count                 : 1
Client Network Preference             : default
802.11ax
  OBSS PD                             : Disabled
  Non-SRG OBSS PD Maximum             : -62 dBm
  SRG OBSS PD                         : Disabled
  SRG OBSS PD Minimum                 : -82 dBm
  SRG OBSS PD Maximum                 : -62 dBm
  Broadcast Probe Response            : Disabled
  FILS Discovery                      : Disabled
  Multi-BSSID Profile Name            : default-multi-bssid-profile
NDP mode                              : Auto
Guard Interval                      : 800ns
PSC Enforcement                      : Disabled
Standard-Power mode                  : Allowed

```

AFC power-mode of a Cisco AP

To see AFC power-mode of a Cisco AP, use the following command:

```

Device# show ap name AP687D.B45C.17AC dot11 6ghz power-mode

Standard-power mode                  : Allowed

```

802.11 parameter configuration of a Cisco AP

To see the 802.11 parameter configuration of a Cisco AP, use the following command:

```

Device# show ap name AP687D.B45C.1908 config dot11 6ghz

AP 6GHZ Power Mode                  : Low Power Indoor
Low Power Indoor Capable             : Yes
Standard Power Capable               : Yes

```

AFC event details

To see detailed information about AFC events for a Cisco AP, use the following command:

```

Device# show ap name AP687D.B45C.1908 afc detail

AFC event history

Timestamp                           Event                               AFC Status   Context

```

```

-----
-----
08/07/2023 16:07:01.244077 AFC_EVT_REQ_RESP_RECEIVED Active ReqId
12195125900336565037 Response code: 0; SUCCESS
08/07/2023 16:06:55.491957 AFC_EVT_REQ_SENT Inactive ReqId
12195125900336565037 Sent to AFC System
08/07/2023 16:06:51.823938 AFC_EVT_REQ_QUEUED Inactive AFC request queued:
immediate scheduling
08/07/2023 15:28:54.608117 AFC_EVT_REQ_INACTIVE Inactive No location
information available; No height information available;

```

AP height configuration through priming profile

AP height configuration through priming profile is a provisioning method that

- enables configuration of the Z coordinate (height) for multiple access points through a centralized profile approach
- provides pre-provisioning capabilities for seamless addition of new APs to the network, and
- ensures guaranteed configuration push when APs join the controller, overcoming the limitations of individual AP height configuration in Privileged EXEC mode.

Height configuration methods comparison

Until Cisco IOS XE 17.14.1, Automated Frequency Coordination (AFC) used geolocation attributes (X,Y, and Z) for an AP to be determined, to request for 6 GHz channel availability from the AFC server, for a given location. As per the regulatory requirement, the X and Y coordinates are obtained autonomously through GPS or GNSS directly, or through derivation. The Z coordinate (mandatory parameter), which refers to the height, is configured manually. In case of the controller, the height is programmed per AP, in the Privileged EXEC mode.

In this approach, the AP is joined, in order to configure height, and additional parameters that are configured in the Privileged EXEC mode.

However, following are the restrictions to the current implementation:

- There is no guarantee that all the APs will be configured with height. APs may flap during configuration, failing to set the height.
- Provisioning height individually for an AP in a large scale deployment could become cumbersome.
- The height once configured is persistent. Therefore, if you move an AP across floors, you must re-provision height as well.
- The AP height should be re-provisioned when a new AP is added to the network.

To overcome these constraints, from Cisco IOS XE 17.15.1 onwards, AP height is configured through priming profile.

These are the advantages when you configure the height of the AP through priming profile:

- Easy to update the height for a group of APs

- Pre-Provisioning feature
- Guaranteed configuration push when AP joins
- Moving around APs across different floors inherit the consistent configurations based on the filter
- Seamless addition of new APs

Guidelines for AP height configuration through priming profile

Follow these guidelines when configuring AP height through priming profile:

- If the height attribute is configured under the priming profile, the Priming Override attribute replaces the already configured height of the AP.
- The Priming Override attribute is unique for each priming profile, therefore, all the attributes within the priming profile are overwritten.
- Removal of height related configuration through priming profile has no effect on the configured height, but the configuration attributes are removed. The last configured height is retained.
- During an upgrade, if the height is not configured in the priming profile, it does not replace the already configured height.

Configure AP height through priming profile (GUI)

Use this task to set the height and height uncertainty values for access points, which are required for geolocation services. The height is measured in relation to the main ground surface (Above Ground Level - AGL).

Procedure

Step 1 Choose **Configuration > Tags & Profiles > AP Priming**.

Step 2 Click **Add**.

The **Add New AP Priming Profile** window is displayed.

Step 3 In the **Add New AP Priming Profile** window, complete the following steps:

- In the **Profile Name** field, enter the new AP priming profile name.
- Enter the **Primary Controller Name**, **Primary Controller IP**, **Secondary Controller Name**, **Secondary Controller IP**, **Tertiary Controller Name**, **Tertiary Controller IP** details.
- Check the **Geolocation** check box to configure the geolocation details.
- In the **Height** field, enter the height of the AP in meters. The default value is 0.

Note

Configure **Height** together with **Height Uncertainty**.

The height of the AP is measured in relation to the main ground surface, also known as Above Ground Level (AGL). Remove height and uncertainty values to clear the height configuration.

- In the **Height Uncertainty** field, enter the height uncertainty in meters. The default value is 1.

Note

Configure **Height Uncertainty** together with **Height**.

Step 4 Use the **Priming Override** slider to enable or disable priming override.

Note

When the Priming Override features is enabled, all the attributes configured under priming profile is pushed to AP.

Step 5 Click **Apply to Device**.

The AP priming profile with height configuration is created and applied to the device.

Configure AP height through priming profile (CLI)

Set AP height and uncertainty values through a priming profile to enable accurate geolocation tracking.

Use priming profiles to configure AP height parameters when you need to establish geolocation coordinates for access points in your wireless network deployment.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure a profile to prime APs and enter priming configuration mode.

Example:

```
Device(config)# wireless profile ap priming priming-profile-name
```

Step 3 Configure the AP geolocation height and uncertainty, in meters.

Example:

```
Device(config-priming)# geolocation height ap-geolocation-height uncertainty height-uncertainty
```

Example:

```
Device(config-priming)# geolocation height 372 uncertainty 64
```

Step 4 Override the existing priming configuration.

Example:

```
Device(config-priming)# priming-override
```

Note

The height and uncertainty for an AP is updated only if priming-override is enabled.

The AP priming profile is configured with height parameters and can be applied to access points to set their geolocation coordinates.

Apply priming profile using filters (GUI)

Configure and apply a priming profile to selected access points efficiently.

Procedure

Step 1 Choose **Configuration > Tags & Profiles > Tags**.

Step 2 Click the **AP** tab and then click the **Filter** tab.

Step 3 Click **Add**.

The **Associate Tags to AP** window is displayed.

Step 4 In the **Associate Tags to AP** window, complete the following steps:

- a) In the **Rule Name** field, enter the rule name.
- b) Use the **Active** slider to indicate if the rule is active or not.
- c) In the **Priority** field, set a priority for the active rule. The valid range is between 0 and 1023.
- d) From the **Tag** drop-down list, choose **Priming**.
- e) From the **Priming Profile** drop-down list, choose the priming profile, or, search by navigating to the **Priming Profile configuration** window.

Step 5 Click **Apply to Device**.

The priming profile is applied to access points matching the filter criteria.

Apply priming profile using filter (CLI)

Apply priming profiles to APs using filters to automate the provisioning process based on AP naming patterns.

Priming profiles allow you to pre-configure access points with specific settings before they join the network. Using filters based on AP names enables automatic application of these profiles to matching access points.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure a filter to prime APs and enter the AP priming filter configuration mode.

Example:

```
Device(config)# ap filter name ap-filter-name type priming
```

Priming filter is always persistent on the AP.

Note

Assign filter priority after filter creation.

Step 3 Configure a filter based on the AP name regular expression match.

Example:

```
Device(config-ap-pr-filter)# ap name-regex ap-filter-string
```

Step 4 Map the priming profile to the filter.

Example:

```
Device(config-ap-pr-filter)# profile priming-profile-name
```

Step 5 Return to global configuration.

Example:

```
Device(config-ap-pr-filter)# exit
```

Step 6 Configure priority for the named AP filter.

Example:

```
Device(config)# ap filter priority priority-value filter-name filter-name
```

Example:

```
Device(config)# ap filter priority 2 filter-name height_filter
```

The priming profile is now applied using the filter configuration, and matching access points will automatically receive the specified profile settings when they join the network.

Apply priming profile statically (GUI)

Establish static associations between access points and priming profiles using the graphical user interface.

Procedure

Step 1 Choose **Configuration > Tags & Profiles > Tags**.

Step 2 Click the **AP** tab and then click the **Static** tab.

Step 3 Click **Add**.

The **Associate Tags to AP** window is displayed.

Step 4 In the **Associate Tags to AP** window, complete the following steps:

- a) In the **AP MAC Address** field, enter the AP MAC address.
- b) From the **Policy Tag Name** drop-down list, choose the required tag name or search by navigating to the **Policy Tag Configuration** window.
- c) From the **Site Tag Name** drop-down list, choose the required tag name or search by navigating to the **Site Tag Configuration** window.
- d) From the **RF Tag Name** drop-down list, choose the required tag name or search by navigating to the **RF Tag Configuration** window.
- e) From the **Priming Profile** drop-down list, choose the priming profile, or, search by navigating to the **Priming Profile Configuration** window.

Step 5 Click **Apply to Device**.

The static priming profile association is now configured for the selected access point.

Apply priming profile statically (CLI)

Apply a priming profile to an AP to configure its initial settings and behavior.

Priming profiles allow you to statically configure APs with specific settings before deployment. This is useful for standardizing AP configurations across your network infrastructure.

Procedure

Step 1 Enter global configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Configure the Ethernet MAC address of the AP.

Example:

```
Device(config)# ap H.H.H
```

Example:

```
Device(config)# ap CC-XX-3E-XX-FC-XX
```

Step 3 Map a priming profile to the AP.

Example:

```
Device(config-ap-tag)# priming priming-profile-name
```

Example:

```
Device(config-ap-tag)# priming priming-profile-height
```

The priming profile is now statically applied to the specified AP, configuring it with the predefined settings from the profile.

AP priming profile verification

Verify AP priming profile configurations, including all profiles overview, detailed profile information, AP configuration details, and geolocation data.

Verify all priming AP profiles

To verify all AP priming profiles, use this command:

```
Device# show wireless profile ap priming all
```

Profile Name	Primary Controller Name	Primary Controller IP	Secondary Controller Name	Secondary Controller IP	Tertiary Controller Name	Tertiary Controller IP	Height	Uncertainty	Type	Override
priming_profile_height		9.9.XX.XX					8GBXXX			
	0.0.0.0						372	64	AGL	Enabled
										0.0.0.0

Verify AP priming profile details

To verify the details of an AP priming profile, use this command:

```
Device# show wireless profile ap priming detailed priming_profile_height
Profile Name                : priming_profile_height
Primary Controller Name     : 8GBXXX
Primary Controller IP       : 9.9.XX.XX
Secondary Controller Name   :
Secondary Controller IP     : 0.0.0.0
Tertiary Controller Name    :
Tertiary Controller IP     : 0.0.0.0
Height                      : 372
Uncertainty                 : 64
Type                       : AGL
Override                    : Enabled
```

Verify AP information

To verify information of a Cisco AP, which includes the AP priming details, use this command:

```
Device# show ap name Cisco-AP conf general | sec Prim
Priming Profile             : priming_profile_height
Priming Override           : Enabled
Priming Source              : Filter
Priming Filter name        : height_filter
```

Verify AP geolocation information

To verify the detailed information of the AP geolocation, use this command:

```
Device# show ap name Cisco-AP geolocation detail
AP Name                    : Cisco-AP
GNSS present               : No
Location                   : NA
Height type                : AGL
  Source                   : Manual
  Height (meters)          : 372
  Uncertainty (meters)    : 64
  Last update              : 05/22/2024 08:54:34
```

