6GHz Standard Power Deployment Of Indoor Access Points

Setup, Maintenance, and Configuration

9039400-00 Rev AA
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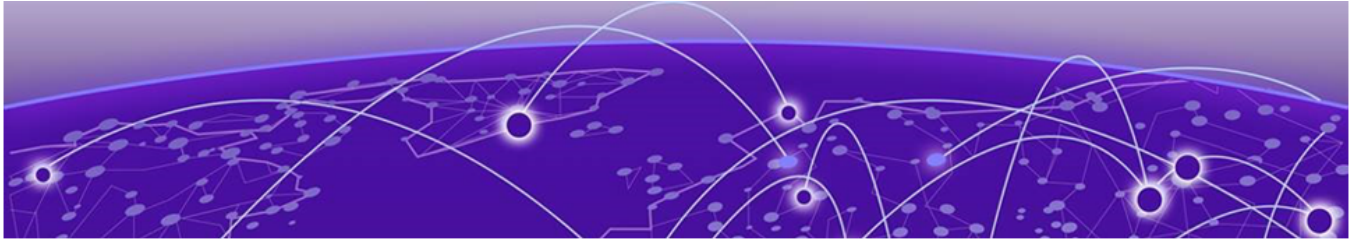

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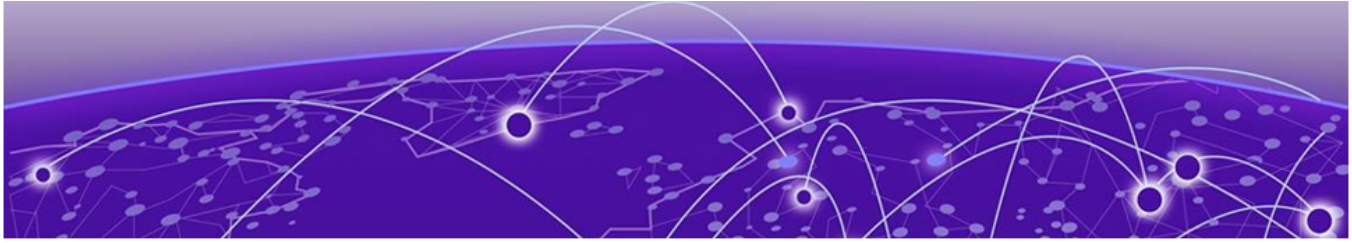

Abstract

The AFC Deployment Guide for Indoor Access Points provides a detailed technical framework for deploying Extreme Networks access points operating in the 6GHz Standard Power (SP) band under Automated Frequency Coordination (AFC) requirements. It specifies supported AP models along with their AFC compatibility, GPS integration, and fallback behavior to Low Power Indoor (LPI) mode. The guide outlines the architecture of AFC deployments, including anchor APs that acquire geo-location via integrated GPS or the ExtremeCloud IQ Mobile Companion app, and APs that use 802.11mc Fine Time Measurement (FTM) for AP-to-AP ranging. It details the role of the Geo-Location Agent in deriving spatial coordinates for spectrum authorization and describes the configuration workflows for ExtremeCloud IQ and ExtremeCloud IQ Controller, including floor plan creation, radio profile settings, AFC spectrum scheduling, and anchor AP designation. Deployment planning includes GPS signal surveys, RF fingerprinting, and use of the AFC Explorer tool for spectrum mapping and compliance validation. Troubleshooting procedures address geo-location failures, subgraph connectivity issues, and startup diagnostics for SP APs under cold boot and controller recovery scenarios. Designed for network engineers, the guide delivers precise operational guidance for managing 6GHz spectrum in enterprise, industrial, and high-density indoor environments.

Preface

Read the following topics to learn about:

- The meanings of text formats used in this document.
- Where you can find additional information and help.
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Table 1: Notes and warnings

Icon	Notice type	Alerts you to...
	Tip	Helpful tips and notices for using the product
	Note	Useful information or instructions
	Important	Important features or instructions

Table 1: Notes and warnings (continued)

Icon	Notice type	Alerts you to...
	Caution	Risk of personal injury, system damage, or loss of data
	Warning	Risk of severe personal injury

Table 2: Text

Convention	Description
`screen displays`	This typeface indicates command syntax, or represents information as it is displayed on the screen.
The words *enter* and *type*	When you see the word *enter* in this guide, you must type something, and then press the Return or Enter key. Do not press the Return or Enter key when an instruction simply says *type*.
Key names	Key names are written in boldface, for example **Ctrl** or **Esc**. If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: Press **Ctrl**+**Alt**+**Del**
Words in italicized type	Italics emphasize a point or denote new terms at the place where they are defined in the text. Italics are also used when referring to publication titles.
NEW!	New information. In a PDF, this is searchable text.

Table 3: Command syntax

Convention	Description
bold text	Bold text indicates command names, keywords, and command options.
italic text	Italic text indicates variable content.
`[ ]`	Syntax components displayed within square brackets are optional. Default responses to system prompts are enclosed in square brackets.
`{ x | y | z }`	A choice of required parameters is enclosed in curly brackets separated by vertical bars. You must select one of the options.
x | **y**	A vertical bar separates mutually exclusive elements.
< >	Nonprinting characters, such as passwords, are enclosed in angle brackets.

Table 3: Command syntax (continued)

Convention	Description
...	Repeat the previous element, for example, *member*[*member*...].
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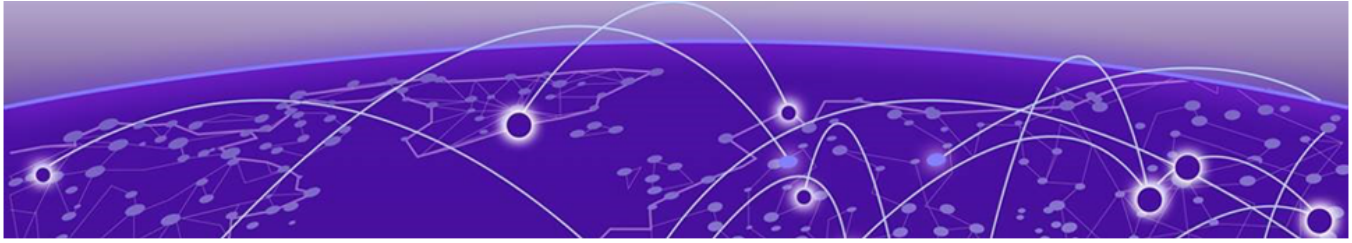


Overview

This guide provides detailed information for an *indoor* Extreme Networks access points deployment for 6GHz Standard Power supported by Automatic Frequency Coordination (AFC). For information on installing your APs, see the installation guide for your AP.

6GHz high-powered Wi-Fi delivered with standard power and AFC is an ideal solution for an area such as a warehouse or other open space where you want better coverage, less interference and higher throughput with fewer APs.

Supported APs for AFC in Canada and the United States

The following APs are approved for a Standard Power (SP) 6GHz AFC deployment in Canada and the United States.

Note
The following table uses the term composite device. A composite device is an AP capable of operating in both Standard Power (SP) and Low Power Indoor (LPI).

Table 4: Supported APs

AP	Integrated GPS Unit	6GHz LPI	6GHz SP
Outdoor APs			
AP5050D	Yes	No	Yes
AP5050U	Yes	No	Yes
AP4060	Yes	No	Yes
AP4060X	Yes	No	Yes

Table 4: Supported APs (continued)

AP	Integrated GPS Unit	6GHz LPI	6GHz SP
Indoor APs If you deploy the following APs as anchor APs, then you will have to use the ExtremeCloud IQ Mobile Companion app (AFC Mobile app).			
AP3000	No	Yes	No
AP3000X	No	Yes	No
AP4020 (composite device)	No	Yes	Yes
AP4020X (composite device)	No	Yes	Yes
AP4020FX	No	Yes	Yes
AP5010	No	Yes	No
AP5020 (composite device)	No	Yes	Yes

Extreme Networks 6GHz Standard Power Solution

The Extreme Networks 6GHz Standard Power (SP) Automated Frequency Coordination (AFC) solution uses a third-party AFC service to regulate standard power operation in the 6GHz Wi-Fi band. The 6GHz SP APs require geo-location coordinates to query the third-party AFC service for 6GHz spectrum. The APs are provided with geo-location coordinates by the Geo-Location Agent running in ExtremeCloud IQ or ExtremeCloud IQ Controller.

To derive the geo-location for all the APs on a floor, the Geo-Location agent does the following four steps:

1. The APs deployed on a floor use 802.11mc Fine Time Measurement (FTM) technology to perform AP-to-AP ranging. The Geo-Location Agent collects the AP-to-AP ranging results and builds one graph or multiple subgraphs of APs placed on the selected floor, with the graph edges representing the estimated distances between the APs.
2. The anchor APs provide geo-location coordinates to the Geo-Location Agent based on their integral or built-in GPS module or by the ExtremeCloud IQ Mobile Companion app (AFC Mobile app).
3. The Geo-Location Agent derives geo-location coordinates for all APs using the geo-location coordinates of the anchor APs in combination with the AP graph and subgraphs derived from the FTM AP-to-AP ranging.
4. Having determined the geo-location coordinates of the APs, the AFC Agent then queries the third-party AFC servers to obtain and assign the AFC 6GHz spectrum for them. The SP service is brought up.

The solution includes the following components:

- Anchor APs - Anchor APs are APs that obtain geo-location coordinates, either from an integrated GPS unit or from the ExtremeCloud IQ Mobile Companion app (AFC Mobile app).

- **Geo-Location Agent** - Collects the GPS coordinates of the anchor APs and - in combination with the graph of APs determined from FTM reports - derives the geo-location coordinates for all APs on a floor. The Geo-Location Agent resides on ExtremeCloud IQ and ExtremeCloud IQ Controller. See Geo-Location Agent on page 13.
- **AFC Service Provider** - Allocates spectrum for APs based on their geo-location coordinates. APs are required to query the AFC service at least once every 24 hours to request a new spectrum. The AFC service provider for Extreme Networks is Wi-Fi Alliance Services (https://www.wi-fi.com/).

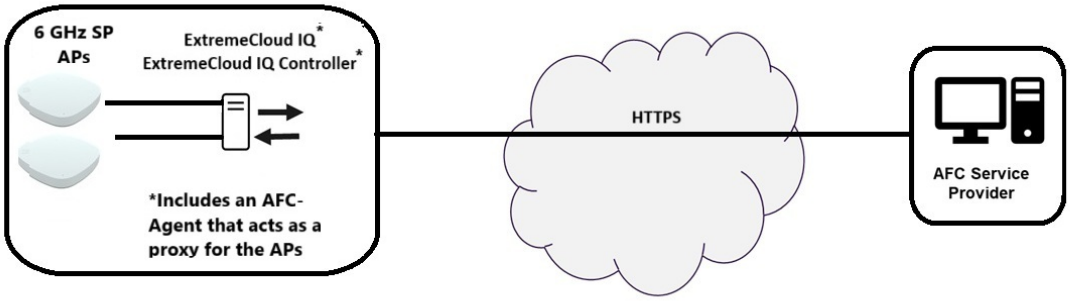


Figure 1: Communication with AFC Service Provider

The following table shows 6GHz Standard Power support by country.

Table 5: Indoor and Outdoor APs

Location	AP Type	Indoor 6GHz	Outdoor 6GHz
United States/ Canada	Indoor	LPI rules or SP with AFC rules	No
United States/ Canada	Outdoor (weatherized enclosure)	Yes SP with AFC rules	Yes SP with AFC rules
Rest of the World	Indoor	LPI rules	No
Rest of the World	Outdoor (weatherized enclosure)	LPI rules	No

In addition, you will use the following tools during deployment:

- **The Extreme Networks AFC Mobile App** - A deployment tool that provides geo-location coordinates to anchor APs. Use it if the anchor APs do not have an integrated GPS unit or if your anchor AP cannot obtain geo-location coordinates. It is available for ExtremeCloud IQ and ExtremeCloud IQ Controller systems. See AFC Mobile App on page 14.
- **The Extreme Networks AFC Explorer Tool** - A planning tool used to determine if a site has sufficient 6GHz spectrum for non-licensed use. If you are using ExtremeCloud IQ Controller to manage your network then you can use the AFC Explorer tool to plan your AFC deployment. See AFC Explorer on page 17.

Indoor Use Cases for 6GHz Standard Power

6GHz Standard Power (SP) with AFC deployment modes are determined by the venue local conditions:

1. Venues that require APs with a ruggedized enclosure, such as stadiums, arenas, warehouses or parking lots. These APs should have an integral - also called a built-in - GPS module.
   a. All or most APs receive a GPS signal, either an outdoor installation or an indoor installation in buildings that are permeable to a GPS signal. The Geo-Location Agent is not needed as the AP's integral GPS module assigns each AP geo-location coordinates.
   b. Only some of the APs are exposed to a GPS signal. The Geo-Location Agent allocates the remaining APs' coordinates based on APs that can lock on a GPS signal and AP-to-AP ranging.
2. Indoor venues using indoor APs. None of the indoor APs have an integral GPS module, so the geo-location coordinates have to be assigned by the Geo-Location Agent based on 11mc FTM AP-to-AP ranging and geo-location coordinates of four or more anchor APs per subgraph. Currently, two use cases are supported:
   a. Anchor APs assigned geo-location coordinates by an operator using the ExtremeCloud IQ IQ Mobile Companion app. Place these APs in areas where an Android phone and the mobile app can provide geo-location coordinates based on a combination of GPS signals, cell phone towers, and Google's proprietary location database.
   b. APs with an integral GPS module installed and exposed to GPS signals. You can install these APs outdoors to provide outdoor service or install them indoors to provide geo-location coordinates. If the anchor APs are outdoor, they are effective only if FTM AP-to-AP ranging can be performed through the building walls.

For more information, see Supported APs for AFC in Canada and the United States on page 10.

Geo-Location Agent

The Geo-Location Agent is a service that resides on ExtremeCloud IQ and ExtremeCloud IQ Controller. It performs the following tasks:

- Uses the collected FTM data to build subgraphs, which are groups of APs that are FTM connected.
- Calculates the geo-location coordinates for APs
- Passes the geo-location coordinates to the AFC agent, which is a service that obtains permission and spectrum for APs to operate in the 6GHz band. The geo-location coordinates are then used to query the third-party AFC server for spectrum information. And finally, the AFC agent receives the spectrum information and this information is assigned to the APs.

The anchor APs present the geo-location coordinates directly to the Geo-Location Agent. These coordinates are determined either by the AP's integral GPS module or

by the AFC Mobile app. At least four anchor APs with known geo-coordinates must be available before a subgraph can be placed on the geographic map.

The Geo-Location Agent also calculates the geo-location coordinates using the 802.11mc Fine Time Measurement (FTM) measurement data. A single AP must be able to determine an FTM distance value to at least three other APs.

AFC Mobile App

Note
The ExtremeCloud IQ Mobile Companion app is supported on both ExtremeCloud IQ and ExtremeCloud IQ Controller. You do not need separate apps for each system.

The ExtremeCloud IQ Mobile Companion app (AFC Mobile app) is a smart phone app that provides geo-location coordinates to anchor APs. Use it during your deployment to assign geo-location coordinates for your anchor APs if the anchor APs do not have an integrated GPS unit or if your anchor AP cannot obtain geo-location coordinates.

The Geo-Location Agent within ExtremeCloud IQ and ExtremeCloud IQ Controller uses the AFC Mobile app coordinates as long as it can ensure that the anchor AP to which the coordinates are assigned has not physically moved. If the Geo-Location Agent detects that an anchor AP has moved from its original location, the coordinates are removed from the system and the installer must us the AFC Mobile app to reassign coordinates to the AP.

Note
Coordinates provided by the AFC Mobile app have priority over GPS-provided coordinates.

For information on using the AFC Mobile App, see Set Anchor APs with Mobile App on page 23. The ExtremeCloud IQ Mobile Companion app is available on Google Play and is supported on Android.

Requirements for AFC Mobile App

The mobile phone on which the ExtremeCloud IQ Mobile Companion app (AFC Mobile app) is installed must meet the following requirements:

- Operating system: Android version 14 or later
- Wi-Fi antenna: 2x2
- Wi-Fi band: minimum 5 GHz (6 GHz preferred)
- Support for FTM RTT

Important
The ExtremeCloud IQ Mobile Companion app **will not function** if your mobile phone does not meet the requirements listed above.

AFC Mobile App Restrictions

The ExtremeCloud IQ Mobile Companion app (AFC Mobile app) utilizes Fused Location Positioning (FLP). FLP is a technology that allows devices to use a combination of GPS, cellular towers, WiFi positioning, Bluetooth beacons for more accurate location tracking.

Note the following:

- The ability of the AFC Mobile app to derive geo-location coordinates depends on the building properties. If the AFC Mobile app cannot derive a location, the geo-location coordinates are unknown. Therefore, no 6 GHz SP operation can be provided by APs at that location.
- The persistence of the coordinates provided by the AFC Mobile app depends on the physical location and the APs deployed at the time the operator assigns the coordinates with the app. The Geo-Location Agent records a Wi-Fi RF fingerprint of the anchor AP that includes a list of three or more neighboring APs. The AFC Mobile app provided coordinates persist through a power cycle only if the Wi-Fi RF fingerprint after the power cycle matches the fingerprint saved by the Geo-Location Agent when the coordinates were originally set.
- The operator must reassign the anchor AP's geo-location coordinates in the following cases:
  - The physical location of the anchor APs and their immediate neighboring APs is changed.
  - Anchor APs and their immediate neighboring APs are replaced or upgraded to newer APs.
  - There are unexpected changes in the RF environment.

Deployment

Use the information in the following section to guide you as you deploy 6GHz Standard Power (SP) for Automated Frequency Coordination (AFC).

See Extreme Networks 6GHz Standard Power Solution on page 11 for a description of the components in the Extreme Networks AFC solution.

Deployment Workflow

The following workflow outlines the basic steps as you deploy your indoor 6GHz Standard Power access points.

Table 6: Deployment Workflow

Step	Action	Purpose
1.	Plan your deployment.	Prepare for AP placement.
2.	Install the APs.	Install the APs on site. Follow the installation instructions in the installation guide for your AP. **Note:** Place APs less than 20m (65.61 ft) apart for FTM 11mc AP-to-AP ranging connectivity. Each AP must be able to range to 3 other APs.
3.	Site configuration ExtremeCloud IQ or ExtremeCloud IQ Controller.	Configure APs for Standard Power.
4.	Monitor and troubleshoot.	Resolve any possible deployment issues.

Deployment Planning

The table below lists the minimum number of anchor APs for common deployment scenarios. For a list of supported APs, see Supported APs for AFC in Canada and the United States on page 10.

Table 7: Minimum Number of Required Anchor APs

APs	Minimum Number of Anchor APs
70	4
80	5
100	6
120	7
140	8
170	9
200	10
225	11
250	12

Building properties often determine the degree of shielding blocking the GPS signal. Install anchor APs as close as possible to the building perimeter, such as on an outside wall or near an outside window. You should also choose the anchor AP's location based on the availability of the GPS signal. Determine the best anchor AP position by surveying the GPS signal with a smartphone application. See Measure GPS Signal Strength on page 18.

Plan also for the mounting height of each AP. The height must reflect the antenna height above ground and not the building floor. See Site Floor Plan on page 18

And finally, place APs less than 20m (65.61 ft) apart for FTM 11mc AP-to-AP ranging connectivity. Each AP must be able to range to 3 other APs.

AFC Explorer

If you are using ExtremeCloud IQ Controller to manage your network then you can use the Automatic Frequency Coordination (AFC) Explorer tool - also known as the AFC tool - to plan your AFC deployment.

With the AFC tool, you can:

- Map out the expected coverage area.
- Sample up to 40 locations within this area and assess expected AFC compliance, available frequencies, and authorized transmit power.
- Visually display sampled points as pins on the map for analysis and planning.

For more information, see the AFC Explorer section of the *ExtremeCloud IQ Controller v10.15.01 User Guide* or later.

Measure GPS Signal Strength

About This Task

If you are using anchor-APs with an integrated GPS unit, then use a smart phone and measure the GPS signal strength before you install the APs. The phone must be running an application that can report GPS-only derived geo-locations. The following are possible applications:

- GPS Status
- GnssLogger

Procedure

1. Position the phone at the proposed AP placement area and wait up to 30 minutes for a GPS lock.

   If the phone does not report a GPS coordinate, the location has poor GPS signal and is not recommended for an anchor AP.
2. Repeat Step 1 for each anchor AP.

Site Floor Plan

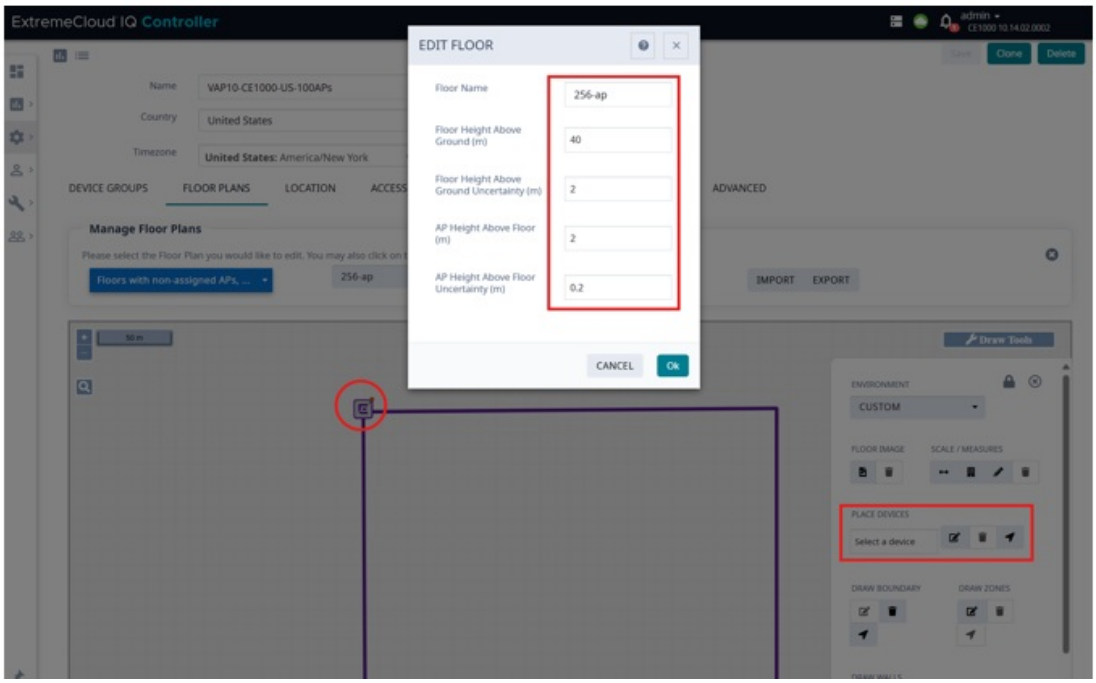


Figure 2: Floor Plan Parameters - ExtremeCloud IQ Controller

AFC deployments require a floor plan for each floor in the deployment. Configure the following settings for each plan:

- Floor plan name
- Floor height above ground level in meters
- Floor height above ground level, uncertainty in meters

- AP height above floor level in meters
- AP height above floor level, uncertainty in meters
- Floor plan Boundary

You can edit an existing floor plan. You do not need a new floor plan for an AFC deployment.

Configuration

Use the information in the following sections to configure 6GHz Standard Power and Geo-Location Agent to comply with AFC. To check if the AP GPS is locked, check the **AP Monitor page** (ExtremeCloud IQ Controller) or **AFC Wireless** (ExtremeCloud IQ).

ExtremeCloud IQ Configuration

Use the following workflow if you use ExtremeCloud IQ as your management option. For more information, see the *ExtremeCloud IQ (Classic) v25.4.0 User Guide* or later.

Note

Before you begin your configuration, do the following:

- Create a Site with **Country** set to **United States** or **Canada**.
- Create a Floor Plan for each floor associated to the site. See Site Floor Plan on page 18.

Table 8: ExtremeCloud IQ Configuration Workflow

Step	Action	Purpose
1.	Navigate to **Radio Profiles** and configure the **Supported Power Modes** to **SP**. You can also modify radio profile settings when you configure a device template.	Allows a 6GHz AP to operate at SP. AP drops to Low Power Indoors (LPI) if AFC spectrum authorization is unavailable. The default setting is LPI. **Note:** APs that support SP/LPI fallback operate in LPI power mode until they're assigned spectrum information. Then they transition to SP power mode. SP-only APs keep Wi-Fi2 radio **Off** until the spectrum information is assigned. Then the Wi-Fi2 radio turns **On** in SP power mode. For more information, see "About Radio Profiles" in *ExtremeCloud IQ (Classic) v25.4.0 User Guide or later.*
2.	Assign the AP to a 6GHz floor.	-

Table 8: ExtremeCloud IQ Configuration Workflow (continued)

Step	Action	Purpose
3.	Assign the new SP mode radio profile to the AP.	-
4.	Navigate to **Network Policies** and configure at least one SSIDs: • Ensure at least one SSID is created with 5GHZ radio turned **On**. • Ensure at least one SSID is created with 6GHZ radio turned **On**. Push the configuration to the AP. See "Configure the SSID for a Standard Wireless Network" in *ExtremeCloud IQ (Classic) v25.4.0 User Guide* or later.	Note the following: • 5GHz is used for 802.11mc Fine Time Measurement (FTM). AP-to-AP Ranging occurs automatically once the SSID is created and the policy is pushed to the AP. • 6GHz is used by Standard Power. The FTM policy is pushed to all APs within an indoor 6 GHZ floor.
5.	If you are using an anchor AP with an integrated GPS unit, then navigate to **AFC Wireless View** and set the AP as **Anchor** from the **Actions**.	Designates your anchor APs. **Note:** Anchor APs without a GPS unit must be set using the ExtremeCloud IQ Mobile Companion app
6.	(Optional) Navigate to the Site tab and customize the **AFC Schedule Update**. Toggle the parameter **On** and set the **Hours** and **Minutes** fields.	The default setting is 12:00 AM local time. The AFC service must be refreshed at least once every 24 hours to maintain authorization in compliance with AFC requirements.
7.	If your anchor APs *do not* have integral GPS units, then have a co-worker go to the anchor points and configure the geo-coordinates using the AFC Mobile app.	Assigns geo-coordinates to the anchor APs. See Set Anchor APs with Mobile App on page 23.
8.	Go to the **AFC Wireless** page and monitor the AFC status.	After several minutes, the AP should report the AFC status, including the following information: • Geo-location information • AFC spectrum information • 6GHz radios information If you have successfully configured your APs, then the **AFC Status** should be **Available**.

ExtremeCloud IQ Controller Configuration

Use the following workflow if you use ExtremeCloud IQ Controller as your management option. For more information, see the *ExtremeCloud IQ Controller v10.15.01 User Guide* or later.

Note

Before you begin your configuration, do the following:

- Create a Site with **Country** set to **United States** or **Canada**.
- Create a Floor Plan for each floor associated to the site. See Site Floor Plan on page 18.

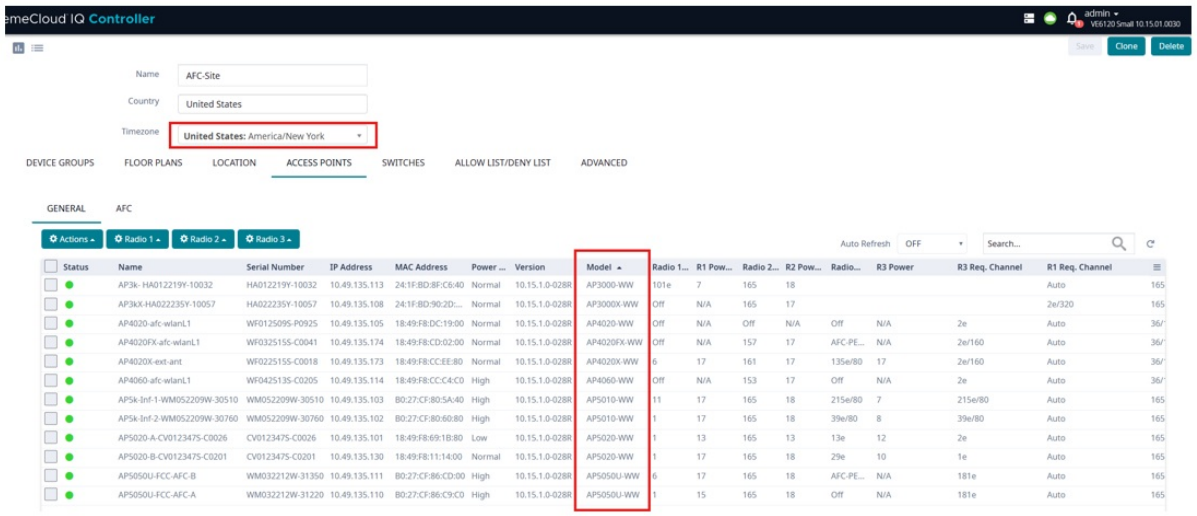


Figure 3: Access Points Tab in ExtremeCloud IQ Controller

Table 9: Configuration Workflow for ExtremeCloud IQ Controller

Step	Action	Purpose
1.	Assign APs to Floor Plan, either individually or in bulk.	AFC requires a floor plan for each floor of the deployment. See Site Floor Plan on page 18.
2.	Enable AP to AP ranging. Go to **Configure** > **Sites** and select a site from the list. Next, select the **Advanced** tab. Enable **FTM AP-to-AP Ranging**.	Enable the 802.11mc Fine Time Measurement (FTM).
3.	(Optional) Set the daily update time for AFC spectrum updates. The **AFC Schedule Update** feature is found on the **Advance** tab of the **Sites** window.	The default setting is 12 midnight local time. The AFC service must be refreshed at least once every 24 hours to maintain authorization.

Table 9: Configuration Workflow for ExtremeCloud IQ Controller (continued)

Step	Action	Purpose
4.	Enable SP with LPI as fallback. Go to **Configure** > **Devices** > **Access Points**. Select the **Radios** tab for your AP. Select **Advanced** to display the radio settings. Navigate to 6GHz Power Mode and select **SP with LPI Fallback** from the pull down menu.	Allows a AP's 6GHz radio to operate in SP mode.
5.	Enable your anchor APs. From your **Site** window, select the **Access Points** tab. Select the **AFC** tab and choose your anchor AP from the display list. Select the **Configuration** gear followed by the **Professional Install** tab. Enable **Anchor AP**.	Designates your anchor APs.
6.	Perform the AP-to-AP FTM ranging. Activate the **Range** button located on the **Subgraph** page under the **Geo Diagnostics** tab. Wait 3 minutes then activate the **Derive-Location** button. Refresh the window.	Report AP-to-AP ranging to ExtremeCloud IQ Controller.
7.	If your anchor APs *do not* have integral GPS units, then have a co-worker go to the anchor points and configure the geo-coordinates using the AFC Mobile app.	Assigns geo-coordinates to the anchor APs. See Set Anchor APs with Mobile App on page 23.
8.	Once all of the anchor APs have geo-coordinates select the **Derive-Location** button again.	Activates the geo-coordinates and AFC service.

Set Anchor APs with Mobile App

Before You Begin

Download the Mobile App to your phone. The app is available on Google Play and is supported on Android.

ExtremeCloud IQ - You need an Extreme cloud account with required licenses.

ExtremeCloud IQ Controller - Your mobile device needs to be on the same network as the controller. You also need an FQDN or IP Address of your controller and the login credentials.

About This Task

The ExtremeCloud IQ Mobile Companion app provides onboarding and monitoring of networking devices from your smartphone. You can use the mobile app when deploying AFC to locate the anchor APs and set the AP's geolocation.

Set the geo-coordinates for your anchor APs after you have configured the AP in ExtremeCloud IQ or ExtremeCloud IQ Controller. Approach an anchor candidate AP to within 5 meters and perform the following steps.

Procedure

1. Approach to within 5m (16.4 ft.) of the anchor AP.
2. Login to the Mobile App.

   ExtremeCloud IQ - Login to the Cloud Network.

   ExtremeCloud IQ Controller - Login to the Local Network.

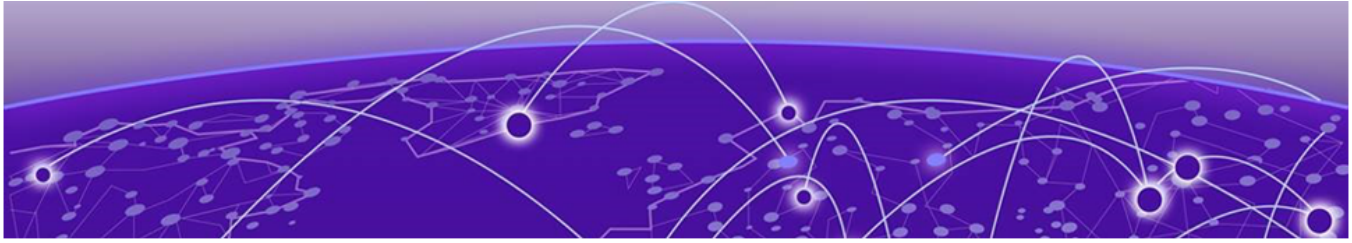
   The Geo Location window appears. If the Geo Location does not appear, then your phone does not support the Mobile App.
3. On the Mobile App, under Geo Location, press **Set**.
4. Select an AP to set as an anchor.

   The AP LED should fast blink Amber.
5. If you can see the anchor candidate's blinking lights, press **Confirm**.

   If you cannot see the anchor candidate's blinking lights, press **Return To Candidates**. Move to another location where an AP is installed so the mobile phone gets a better fix on the geolocation and try again.
6. To set the AP as an anchor, press **Set Anchor with Geo Coordinates**.
7. To set another anchor AP, press **Set More Anchors**.

Results

You can now finish your ExtremeCloud IQ or ExtremeCloud IQ Controller configuration. See ExtremeCloud IQ Configuration on page 20 or ExtremeCloud IQ Controller Configuration on page 22.



Monitor and Troubleshoot

Note

You must reassign the anchor AP's geo-coordinates in the following cases:

- The physical location of the anchor APs and their immediate neighboring APs have changed.
- Anchor APs and their immediate neighboring APs are replaced or upgraded to newer APs.
- There are unexpected changes in the RF environment.

Use the information in the following sections as you monitor the status of your 6GHz Standard Power APs.

The 6GHz Standard Power Startup Process

Use the following information to troubleshoot the startup process for a standard power (SP) 6GHz AP starting up from zero power or a cold reboot.

1. The SP AP powers up:
    a. The 6GHz LPI service starts up.
    b. ExtremeCloud IQ deletes previously reported FTM and GPS data.
    c. APs discover the neighboring APs. They collect the FTM ranging data and upload new data to ExtremeCloud IQ.
    d. AP with a built-in GPS module starts collecting GPS samples and uploads new data to ExtremeCloud IQ.
    e. Geo-Location Agent:
        i. APs - The FTM data is used to locate the APs on the floor map. The Geo-Location Agent determines their geo-locations.

ii. Anchor APs with GPS module:

a. The FTM data is used to locate the anchor APs on the floor map. The Geo-Location Agent determines if the anchor AP has been moved from previous location. If the AP has been moved, then the new GPS coordinates are used to locate the AP and the agent re-aligns the map to the new coordinates.

iii. Anchor APs set up by Mobile App:

a. The FTM data is used to locate the anchor APs on the map. The Geo-Location Agent determines if anchor AP was moved from previous location. If the AP has moved, then the operator is alerted to use the Mobile App and provide new geo-location coordinates for the anchor AP.

f. Using the updated geo-location, the AFC agent queries the AFC server and restores AFC service.

2. The SP AP operating with co-ordinates coming out of a soft reboot, or one with the device still powered on.

a. After ExtremeCloud IQ adopts the AP, then ExtremeCloud IQ restores the previous location and spectrum of the AP as the AP was not moved.

3. ExtremeCloud IQ Contoller – availability pair recovery

a. ExtremeCloud IQ Controller Upgrade, single ExtremeCloud IQ Controller boot or crash:

i. All AP co-ordinates are synchronized between both controllers. A seamless recovery is expected if only one of the controller reboots.

b. Both controllers lose power:

i. The AP coordinates are lost

ii. The FTM and GPS data must be collected from scratch and all co-ordinates recalculated.

Outages

When ExtremeCloud IQ or ExtremeCloud IQ Controller report the spectrum information to an AP, it indicates an expiration time. Expiration time is 24 hours ahead of the last spectrum refresh, as shown on the AFC tab for each AP.

If the spectrum is not refreshed within 24 hours, the AP enters into a grace period. The grace period extends until midnight the next day in the local timezone.

Note the following behavior:

- ExtremeCloud IQ Controller - If a new AFC spectrum is not obtained within the grace period, then the AP 6GHz radios revert to Low Power Indoors (LPI) power mode, if LPI is supported. Otherwise, the 6GHz radios stop operating.
- ExtremeCloud IQ - If a new AFC spectrum is not obtained within the grace period, then the AP 6GHz radios stop operating. In a future release, this behavior will be revised to correspond to ExtremeCloud IQ.

See Supported APs for AFC in Canada and the United States on page 10 for a list of APs that support LPI.

6GHz Radio Power AFC

When an AP fails to obtain 6GHz SP spectrum allocation when querying the AFC server, the AP's behavior depends on the AP model and its configuration.

LPI Fall Back

You can configure an AP to fall back to LPI if obtaining the SP Spectrum channel plan from the AFC server fails.

- Low Power Indoor (Default)

  In Low Power Indoor (LPI) mode, 6GHz radios use power and channel settings from the regulatory compliance table compliance table and the AP does not require AFC spectrum. The AP goes into service immediately after it boots. LPI operates over U-NII 5,6,7, and 8. A radio that is configured with LPI mode is not an AFC AP, and does not appear on the AFC tab.
- Standard Power (with fallback to LPI)

  In standard power (SP) mode, AP 6GHz radios can operate at SP or LPI. The SP power level depends on geo-location coordinates of the AP and on receiving AFC spectrum from the AFC server. If AFC spectrum is not available, the radio falls back to the LPI power level. In SP mode the channel list is limited to U-NII 5, and 7 (in the US). As soon as ExtremeCloud IQ and ExtremeCloud IQ Controller determines the geo-location for the AP and receives AFC spectrum from the server, the 6GHz radio transitions to the SP power level. If the AFC spectrum cannot be renewed, the 6GHz radio falls back to the LPI power level.

  The list of supported channels in LPI fallback mode is limited to the channels supported by SP mode. This way, the AP will not have to change channels when switching between SP and LPI modes.

Geo-location is Unavailable

If an AP with a built-in GPS module does not report the geo-location after 30 minutes then do a GPS signal survey and find a better location for the AP. It is possible that some buildings shield the GPS signal and the GPS antenna. For more information, see Conduct a GPS Survey with a Smart Phone.

The Geo-Location Agent builds an AP graph of each floor plan that has an assigned access point. The graph is based on the FTM AP-to-AP ranging results, with the edges

of the graph representing the estimated distances between the APs. The graph is placed on the map based on the geo-location reported by the anchor APs.

Note

The Geo-location Agent derives coordinates for the APs if the following conditions are met:

- AP Graph Connectivity - Each AP on the floor must be able to determine the FTM distance to a minimum of three neighboring APs.
- Number of anchor APs - The AP Graph must be connected to a minimum of four anchor APs

If the AP Graph Connectivity requirement is not met for all the APs on the floor, then the Geo-Location Agent creates several Sub-graphs or cliques, with each cliques including a subgroup of APs.The APs belonging to Sub-graphs can have geo-location coordinates assigned or not assigned.

ExtremeCloud IQ Troubleshoot and Monitor

The AFC Wireless view shows all APs that support Standard Power with Automatic Frequency Coordination (AFC). A dashboard summary displays AFC Status, Geo Location, and AFC Mismatch information among other information for the APs.

Navigate **Manage** > **Devices** and select **AFC Wireless** from the View drop-down list.

For more information, see the AFC Wireless View section of the "Manage", *ExtremeCloud IQ (Classic) v25.4.0 User Guide* or later.

Recalculate Geo-Location Co-ordinates

About This Task

If you use ExtremeCloud IQ as your network management option, you can recalculate your Geo-Location co-ordinates. Perform this task if the Geo-Location status is **Unavailable** on the **AFC Wireless** page.

Procedure

1. Navigate **Utilities** > **Tools**.
2. Select one of the following from the pull down menu:
   - **Recalulate GPS Location** - Choose this option if you want to recalculate the GPS co-ordinates for all APs on the floor.
   - **Send AP Range Information**- Choose this option if you want to request updated FTM ap-to-ap ranging information for all APs on the floor.

View AFC Geo-Location Floor Report

About This Task

Use the AFC Geo-Location Floor Report for debugging issues and confirming if the Geo-location Agent was able to calculate the geo-coordinates.

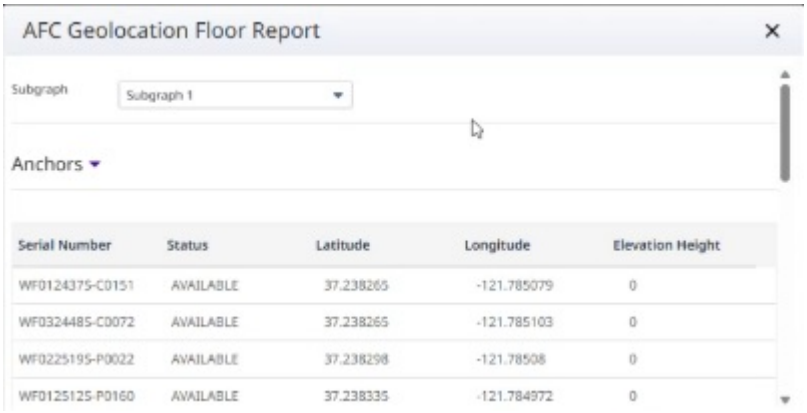


Figure 4: AFC Geo-Location Floor Report

Procedure

1. Select a single AP or all of the APs.
2. Navigate **Utilities** > **Diagnostics** > **AFC Geolocation Report**

Results

AFC Geo-Location Floor Report window appears

ExtremeCloud IQ Controller Troubleshoot and Monitor

Use the information in the following sections to assist you with monitoring your AFC status on ExtremeCloud IQ Controller.

AFC Tab

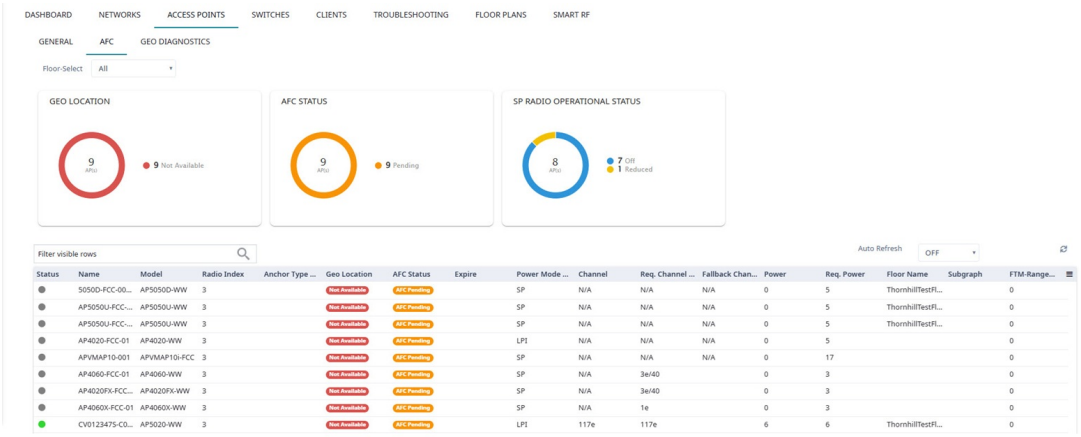


Figure 5: The AFC Diagnostic Tab

To monitor AFC status on ExtremeCloud IQ Controller, go to **Monitor** > **Sites** or **Floor Maps** and select the **AFC** tab.

The AFC tab displays 6GHz SP specific parameters for the subset of APs supporting SP. After 30 minutes, the AP should report the AFC status, including the following information:

- Geo-location information
- AFC spectrum information
- 6GHz radios information

For more information, see the "Monitor" chapter of the *ExtremeCloud IQ Controller User Guide*

Geo Diagnostics Tab

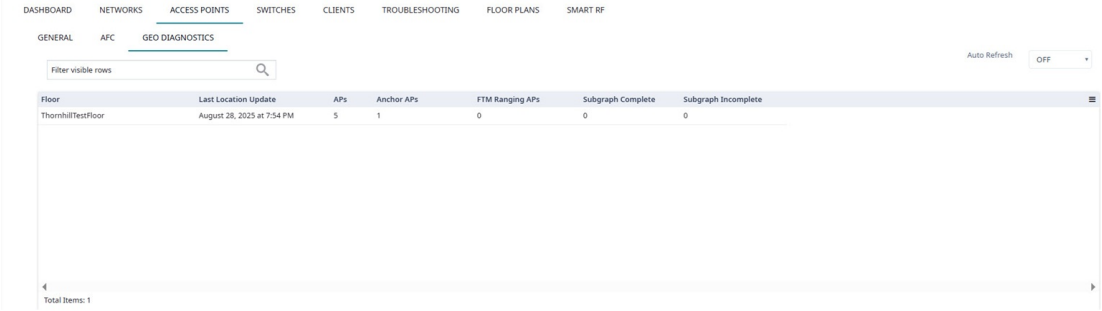


Figure 6: The Geo Diagnostics Tab

Information displayed under the Geo Diagnostics tab assists installers with assessing the Geo-Location Agent operation. This information allows installers to determine if there are enough APs configured and if there is sufficient AP density to ensure that the Geo-Location Agent can derive coordinates for all APs.

The Geo Diagnostics tab is visible only if one or more floor plans is configured with a sufficient number AFC eligible APs to perform FTM AP-to-AP ranging. View the details displayed under this tab to assess Geo-Location Agent operations (**Sites** > **Access Points** > **Geo Diagnostics**).

For more information, see the "Monitor" chapter of the *ExtremeCloud IQ Controller User Guide*.

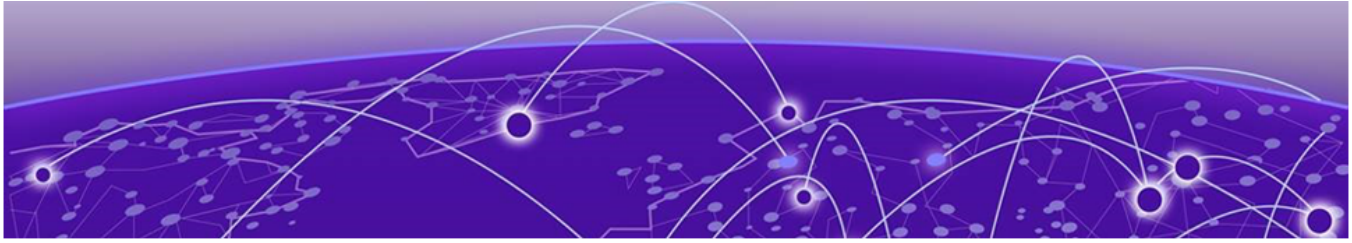
ExtremeCloud IQ Controller Image Upgrade

After upgrading ExtremeCloud IQ Controller to a new image:

- The AFC spectrum is preserved and the 6GHz Standard Power (SP) is maintained.
- The geo-coordinates derived by the Geo-Location Agent are **not** preserved, and users have 24 hours to restore the Geo-Location Agent coordinates **for each floor**. Activate the **Range** button then the **Derive-Location** button located on the

Subgraph page under the **Geo Diagnostics** tab. If you don't do this action within the 24-hour window, the AFC SP spectrum expires and the SP service is revoked.

This issue will be addressed in a future release.



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