

Automatic Frequency Coordination (AFC)

IOS-XE 9800 WLC

Wi-Fi 6E and Wi-Fi 7 use the 6 GHz band. In the United States and Canada, up to 1,200 MHz is available for unlicensed Wi-Fi, while licensed satellite, broadcast, television, and microwave links remain protected. Automatic Frequency Coordination (AFC) checks an access point’s location against incumbent records and authorizes Standard Power channels and power limits.

AFC on Cisco IOS-XE

On Catalyst 9800 Series controllers running Cisco IOS-XE, the wireless controller acts as an AFC proxy between Cisco Catalyst 6 GHz-capable access points and the AFC service provider. Individual access points do not communicate directly with the AFC system; the controller tunnels AFC requests through a cloud-based wireless proxy. The AFC system uses regulatory databases—including the FCC Universal Licensing System (ULS), updated daily—to determine available frequencies and maximum allowable transmit power for each AP location.

AFC architecture includes:

- Cisco Catalyst access points supporting 6 GHz (Wi-Fi 6E and Wi-Fi 7)
- Cisco Catalyst 9800 Series Wireless Controller acting as AFC proxy
- Cloud-based wireless proxy tunneling communication between the controller and AFC system
- AFC system operated by an authorized AFC service provider

Standard Power vs. Low Power Indoor (LPI)

6 GHz access points must operate in one of two regulatory power classes. Low Power Indoor (LPI) access points are restricted to indoor deployment with internal antennas and a maximum Power Spectral Density (PSD) of 5 dBm/MHz. Standard Power access points may operate indoors or outdoors, with internal or external antennas, at up to 23 dBm/MHz PSD and 36 dBm EIRP—but only under AFC control where AFC is required.

Table 1. 6 GHz power limits by channel width for United States and Canada

Bandwidth	PSD max (LPI)	PSD max (Standard Power)	EIRP max (LPI)	EIRP max (Standard Power)
20 MHz	5 dBm/MHz	23 dBm/MHz	18 dBm	36 dBm
40 MHz	5 dBm/MHz	23 dBm/MHz	21 dBm	36 dBm
80 MHz	5 dBm/MHz	23 dBm/MHz	24 dBm	36 dBm
160 MHz	5 dBm/MHz	23 dBm/MHz	27 dBm	36 dBm

When AFC is required

- Indoor access points with internal antennas operating at Standard Power in 6 GHz
- Outdoor or external-antenna access point operation in 6 GHz

AFC operation workflow

- A Standard Power-capable AP joins the controller. Before enabling Standard Power on the 6 GHz radio, the AP must obtain approved channels and power levels from the AFC system.
- The AFC proxy on the Catalyst 9800 controller sends AP geolocation and identification data to the AFC system via the cloud.
- The AFC system computes available frequencies and maximum allowable power based on incumbent data from the regulatory database.
- The AFC response is returned to the controller, which assigns 6 GHz channels and transmit power within AFC-approved limits.
- AFC authorization must be refreshed at least once every 24 hours to remain compliant.

Geolocation requirements

Standard Power APs must provide geographic coordinates (latitude and longitude) and antenna height above ground level (AGL). Coordinates are obtained autonomously via an internal or external GNSS/GPS module, or derived from a neighboring anchor AP with a valid GNSS fix. Height and height uncertainty are configured manually on the controller. Only a subset of APs in a deployment require a GPS module; neighboring APs can derive location from anchor APs via wired proximity or RF neighborship (up to approximately 200 meters).

Fallback behavior

- Indoor APs that fail to renew AFC status must reduce 6 GHz transmit power to Indoor Low Power (LPI) levels. LPI operation is permitted across the full 6 GHz band without active AFC.
- Outdoor APs that fail to renew AFC status must shut down the 6 GHz radio. Outdoor Standard Power operation is limited to U-NII-5 and U-NII-7 in the United States.

Prerequisites and restrictions (IOS-XE)

- Catalyst 9800 controller cloud connectivity
- Outbound firewall access to dnaservices.cisco.com (TCP 443) and commercial.ocsp.identrust.com (TCP 80).
- 6 GHz RF profile with Standard Power Service enabled (for indoor APs). Outdoor APs and APs with external antennas operate in Standard Power in 6GHz by default.
- AP height and height uncertainty configured per AP or via AP priming profile (IOS-XE 17.15.1+).
- AFC is not supported on Embedded Wireless Controller (EWC).

Configuration summary

Enable Standard Power on a 6 GHz RF profile (Configuration > Tags & Profiles > RF/Radio > RF tab, or `ap dot11 6ghz rf-profile <name> / tx-power standard`). Configure AP geolocation height under Configuration > Wireless > Access Points > Geolocation, or using AP priming profiles for scale deployments. Verify AFC status using `show wireless afc ap`, `show wireless afc response`, and `show ap name <ap> afc detail`.

Compatible Access Point Models

The following Cisco Catalyst wireless access points support AFC when managed by a Catalyst 9800 Series controller running a supported IOS-XE release. All listed Wi-Fi 6E and Wi-Fi 7 models are FCC Standard Power certified. Model names reflect Catalyst / IOS-XE nomenclature; equivalent CW-series SKUs share the same hardware platform.

Wi-Fi 6E access points (indoor)

- Cisco Catalyst Wireless 9136I
- Cisco Catalyst Wireless 9162I
- Cisco Catalyst Wireless 9164I
- Cisco Catalyst Wireless 9166I
- Cisco Catalyst Wireless 9166D1
- Cisco Catalyst Wireless 9167IW (Industrial IoT)

Wi-Fi 6E access points (outdoor)

- Cisco Catalyst Wireless 9163E – includes internal GPS/GNSS for AFC geolocation
- Cisco Catalyst Wireless 9167E (Industrial IoT)
- Cisco Catalyst Wireless 9165E (Industrial IoT)

Wi-Fi 7 access points (indoor)

- Cisco Wireless 9171I
- Cisco Wireless 9172I/H
- Cisco Wireless 9174I/E
- Cisco Wireless 9176I/D1
- Cisco Wireless 9178I

Wi-Fi 7 access points (outdoor)

- Cisco Wireless 9179F – includes internal GPS/GNSS for AFC geolocation
- Cisco Wireless 9177I/D/E – includes internal GPS/GNSS for AFC geolocation

GNSS/GPS notes

Access points with built-in GNSS (9163E, 9176, 9177, 9178, 9179F) can auto-report location to the controller for AFC. Other indoor models support the Cisco CW-ACC-GPS1 USB GPS module (compatible with models that expose a powered USB port, such as 9136I, 9162I, 9164I, and 9166I). External GNSS antenna extension is supported via CW-ANT-GPS1-M-00 (up to 10 m cable length; default 10 m in controller configuration).

Survey mode with GNSS

Starting with IOS-XE 26.2.1, Site Survey Mode supports GNSS to verify stable satellite lock at proposed AP locations—a prerequisite for AFC-compliant 6 GHz Standard Power operation.

The 6 GHz radio does not operate in Standard Power during the survey; that requires a formal AFC response.

Feature Matrix

Table 2. AFC feature matrix (IOS-XE)

Country	Regulatory Body	Supported UNII Bands	Power Levels	Minimum IOS-XE Release	Management Platform
United States (US)	FCC	UNII-5, UNII-7	PSD 23 dBm/MHz; EIRP 36 dBm	17.12.3	Catalyst 9800 Series (IOS-XE)
Canada (CA)	ISED	UNII-5, UNII-6, UNII-7	PSD 23 dBm/MHz; EIRP 36 dBm	17.17.1	Catalyst 9800 Series (IOS-XE)

Table 3. Supported access points by region and IOS-XE release

AP Models	IOS-XE Release: US Availability	IOS-XE Release: Canada Availability
9136I, 9162I, 9164I, 9166I, 9166D1, 9163E, 9167I/E, 9165E	17.12.3+	17.17.1+
9176I, 9176D1, 9178I	17.15.2+	17.17.1+
9172, 9172H	17.17.1+	
9178F	17.18.1+	
9171I, 9174I, 9174E	17.18.2+	
9177I, 9177D, 9177E	26.2.1+	

Table 4. AFC capability matrix

Capability	Supported	Notes
Standard Power 6 GHz (AFC)	Yes	Requires cloud-connected Catalyst 9800
Low Power Indoor (LPI) fallback	Yes	Automatic when AFC unavailable (indoor APs)
GNSS Location	Yes	Built-in on 9163E, 9176I/D1, 9178I, 9179F, 9177I/D/E; USB-based GNSS on select indoor models
Geolocation propagation	Yes	Derived location from anchor AP (wired or RF neighbor, ~200 m)
AP height via priming profile	Yes	IOS-XE 17.15.1+; recommended for large deployments
Standard Power RF profile (CLI)	Yes	ap dot11 6ghz rf-profile <name> / tx-power standard
24-hour AFC refresh	Yes	Regulatory requirement; automatic via controller
AFC verification CLI	Yes	show wireless afc ap statistics response geolocation

References

- Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide, IOS XE 26.1.x – Automated Frequency Coordination:
https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/26-1/config-guide/wl-26-1-cg/m_afc.html
- Cisco Catalyst 9800 Series Wireless Controller Software Configuration Guide, Cisco IOS XE Dublin 17.12.x: https://www.cisco.com/c/en/us/td/docs/wireless/controller/9800/17-12/config-guide/b_wl_17_12_cg/m_afc.html
- Cisco Automated Frequency Coordination (AFC) FAQ:
<https://www.cisco.com/c/en/us/products/collateral/networking/wireless/access-points/automated-frequency-coordination-faq.html>

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