



Cisco Flexible Radio Assignment

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Information About Flexible Radio Assignment

Flexible Radio Assignment (FRA) takes advantage of Cisco FRA-capable APs whose radio hardware can operate in multiple roles. The following are the AP models and types of hardware managed by FRA:

Table 1: AP Models and Types of Hardware Managed by FRA

AP Model	FRA Radios	Functions
Cisco Aironet 2800 Series Access Points	2.4/5 XOR	2.4-GHz and 5-GHz or dual 5-GHz operations
Cisco Aironet 3800 Series Access Points	2.4/5 XOR	2.4-GHz and 5-GHz or dual 5-GHz operations
Cisco Aironet 4800 Series Access Points	2.4/5 XOR	2.4-GHz and 5-GHz or dual 5-GHz operations
Cisco Catalyst 9120 Series Access Points	2.4/5 XOR	2.4-GHz and 5-GHz or dual 5-GHz operations
Cisco Catalyst 9130AX Series Access Points	5-GHz Tri-Radio	2.4-GHz 4x4 and single 5-GHz 8x8, or 2.4-GHz 4x4 and dual 5-GHz 4x4
Cisco Catalyst Wireless 9166 Access Points	5/6-GHz XOR	2.4-GHz 4x4 and dual 5-GHz 4x4, or 5-GHz 4x4 and 6-GHz 4x4

FRA performs a number of functions. On the 2.4-GHz and 5-GHz XOR models, FRA establishes the required 2.4-GHz coverage, identifies redundant radios, and converts them to either 5-GHz or a monitor role. For tri-radio and 5/6-GHz XOR models, FRA determines the 2.4-GHz coverage, and the redundant radios are

converted to a monitor role. Additionally, FRA determines the best operating role for the 5-GHz tri-radio (as either a single 8x8 or a dual 4x4), based on connected client capabilities. For the 5/6-GHz XOR radio, the band that the radios should operate on is based on the availability 6-GHz client presence in the regulatory domain.

FRA also manages the resulting configurations of the radios to optimize client experience across flexible roles. Client Steering is responsible for load balancing client connections. For instance, from Cisco Aironet 2800 APs through Cisco Catalyst 9120 Series APs, all the internal antenna AP models perform dual 5-GHz roles as a Macro-Micro cell (a cell within a cell). The antennas on these models are built to support the directionality needed for the micro cell. FRA client steering helps to steer clients to the appropriate radio based on their position within the cell (closer clients are put on the micro cell).

The FRA APs that support external antennas operate as Macro-Macro, which allows full control over power and channels. The CW9166I AP also supports a Macro-Macro model when using the internal antennas.

In Cisco Catalyst 9130 APs and Cisco Catalyst 9136 APs, FRA also manages the operating mode of the band-locked 8x8 5-GHz tri-radio by monitoring client capabilities of connected clients. For instance, if the attached clients are largely Wi-Fi 5-capable clients, then, beam forming should be multi-user MIMO (MU-MIMO), ensuring better capacity with dual 4x4 5-GHz cells. However, if the same cell has a higher number of Wi-Fi 6-capable clients, then 8x8 spatial streams support more MU-MIMO capacity and increase the overall performance of the cell and client experience.

The CW9166 AP is the first AP with a dual-band XOR radio covering the 5-GHz and 6-GHz bands. Criteria for role selection is regulatory domain (that is, if the country's regulatory rules support 6-GHz operations). If yes, 6-GHz is chosen. If not, 5-GHz operations are chosen.

Configuration choices for all FRA radio models include:

- Automatic (Allows FRA to manage role selection automatically)
- Client Serving (Manual role selection of 2.4-GHz, 5-GHz, or 6-GHz, or FRAs are not engaged)
- Monitor (Manual: no FRA)
- Sniffer (Manual: no FRA)

Configuring an FRA Radio (GUI)

Procedure

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- Step 1** Choose **Configuration > Radio Configurations > RRM > FRA**.
- Step 2** In the **Flexible Radio Assignment** window, in the **5/6 GHz Flexible Radio Assignment** section, perform the following steps:
- a) Click the **FRA Status** toggle button to change the FRA status to **Enabled**. By default, the FRA status is **Disabled**.
 - b) Click the **FRA Freeze** toggle button to enable FRA freeze. Enable **FRA Freeze** to lock the radio's current assigned role. When enabled, the radios continue to operate in their role (monitor, sniffer or client serving) until you manually change it or disable FRA Freeze.
 - c) From the **FRA Interval** drop-down list, choose the FRA run interval. The interval value range is from 1 hour to 24 hours. You can choose the FRA run interval value only after you enable the FRA status.

Step 3

In the **2.4/5 GHz Flexible Radio Assignment** section, perform the following steps:

- a) Click the **FRA Status** toggle button to change the FRA status to **Enabled**. By default, the FRA status is **Disabled**.
- b) Click the **FRA Freeze** toggle button to enable FRA freeze. Enable **FRA Freeze** to lock the radio's current assigned role. When enabled, the radios continue to operate in their role (monitor, sniffer or client serving) until you manually change it or disable FRA Freeze.
- c) From the **FRA Interval** drop-down list, choose the FRA run interval. The interval value range is from 1 hour to 24 hours. You can choose the FRA run interval value only after you enable the FRA status.
- d) From the **FRA Sensitivity** drop-down list, choose the percentage of Coverage Overlap Factor (COF) required to consider a radio as redundant. You can select the supported value only after you enable the FRA status.

The supported values are as follows:

- **Low**: 100 percent
- **Medium** (default): 95 percent
- **High**: 90 percent
- **Higher**: 85 percent
- **Even Higher**: 80 percent
- **Super High**: 50 percent

- e) Check the **Client Aware** check box to take decisions on redundancy.

When enabled, the **Client Aware** feature monitors the dedicated 5-GHz radio. When the client load passes a preset threshold, the Flexible Radio assignment is automatically changed from a monitor role to a 5-GHz role, effectively doubling the capacity of the cell on demand. After the capacity crisis is over and Wi-Fi load returns to normal, the radios resume their previous roles.

- f) In the **Client Select** field, enter a value for client selection. The valid value range is between 0 and 100 percent. The default value is 50 percent.

This means that if the dedicated 5-GHz interface reaches 50 percent channel utilization, it triggers the monitor role dual-band interface to transition to a 5-GHz client-serving role.

- g) In the **Client Reset** field, enter a reset value for the client. The valid value range is between 0 and 100 percent. The default value is 5 percent.

When the AP is operating as a dual 5-GHz AP, this setting indicates the reduction in the combined radios' overall channel utilization required to reset the dual-band radio to monitor role.

Step 4

Click **Apply** to save the configuration.

Enabling FRA (CLI)

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 2	[no] ap fra Example: Device(config)# [no] ap fra	Enables or disables FRA on the AP.
Step 3	[no] ap fra 5-6ghz Example: Device(config)# ap fra 5-6ghz	Enables FRA 5-GHz or 6-GHz on APs that support XOR (5-GHz or 6-GHz). Use the no form of this command to disable this feature.
Step 4	[no] ap fra freeze Example: Device(config)# ap fra freeze	Enables FRA freeze. Use the no form of this command to disable this feature.
Step 5	[no] ap fra 5-6ghz freeze Example: Device(config)# ap fra 5-6ghz freeze	Enables FRA 5-GHz or 6-GHz freeze. Use the no form of this command to disable this feature.
Step 6	ap fra interval Example: Device(config)# ap fra interval 3	Configures the FRA interval, in hours. The range is from 1 to 24 hours. Note The FRA interval must be more than the configured RRM interval.
Step 7	ap fra 5-6ghz interval number-of-hours Example: Device(config)# ap fra 5-6ghz interval 4	Configures the FRA 5-GHz or 6-GHz interval, in hours. The valid range is from 1 to 24 hours.
Step 8	ap fra sensitivity {high medium low} Example: Device(config)# ap fra sensitivity high	Configures FRA sensitivity. <ul style="list-style-type: none"> • high: Sets the FRA Coverage Overlap Sensitivity to high. • medium: Sets the FRA Coverage Overlap Sensitivity to medium. • low: Sets the FRA Coverage Overlap Sensitivity to low.

Configuring Client FRA in RF Profile (CLI)

Procedure

	Command or Action	Purpose
Step 1	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 2	ap dot11 6ghz rf-profile rf-profile-name Example: Device(config)# ap dot11 6ghz rf-profile rf-profile-name	Configures the RF profile and enters RF profile configuration mode.
Step 3	client-aware-fra client-count-reset client-count Example: Device(config-rf-profile)# client-aware-fra client-count-reset 1	Configures the client count threshold for the radio to switch from 6-GHz to 5-GHz band. The valid range is from 1 to 10 clients.
Step 4	client-aware-fra client-reset-util util-percentage Example: Device(config-rf-profile)# client-aware-fra client-reset-util 5	Configures the utilization threshold for the radio to switch from 6-GHz to 5-GHz band. The valid range is from 0 to 100 percent.

Verifying FRA XOR 5-GHz and 6-GHz Details

To view the FRA 5-GHz and 6-GHz configuration details, run the following command:

```
Device# show ap fra 5-6ghz
```

To view the client utilization threshold and client reset count, run 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
```

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Max Clients                : 200
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PSC Channel List          : 5,21,37,53,69,85,101,117,133,149,165,181,197,213,229
DCA Bandwidth              : best
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             : none
PSC Enforcement            : Disabled

```



Note The **client utilization threshold** is the utilization threshold for radios to switch from 6-GHz to 5-GHz band. The **client reset count** is the client count threshold for radios to switch from 6-GHz to 5-GHz band.
