



# Cisco Flexible Radio Assignment

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## Information About Flexible Radio Assignment

Flexible Radio Assignment (FRA) takes advantage of the dual-band radios included in APs. The FRA is a new feature added to the RRM to analyze the Neighbor Discovery Protocol (NDP) measurements, which manages the hardware used to determine the role of the new flexible radio (2.4 GHz, 5 GHz, or monitor) in your network.

Traditional legacy dual-band APs always had 2 radio slots, (1 slot per band) and were organized by the band they were serving, that is slot 0= 802.11b,g,n and slot 1=802.11a,n,ac.

### XOR Support in 2.4-GHz or 5-GHz Bands

The flexible radio (XOR) offers the ability to serve the 2.4-GHz or the 5-GHz bands, or passively monitor both bands on the same AP. The AP models that are offered are designed to support dual 5-GHz band operations, with the Cisco APs *i* model supporting a dedicated Macro/Micro architecture, and the *e* and *p* models supporting Macro/Macro architecture.

When using FRA with the internal antenna (*i* series models), two 5-GHz radios can be used in a Micro/Macro cell mode. When using FRA with external antenna (*e* and *p* models) the antennas may be placed to enable the creation of two completely separate macro (wide-area cells) or two micro cells (small cells) for HDX or any combination.

FRA calculates and maintains a measurement of redundancy for 2.4-GHz radios and represents this as a new measurement metric called COF (Coverage Overlap Factor).

This feature is integrated into existing RRM and runs in mixed environments with legacy APs. The **AP MODE** selection sets the entire AP (slot 0 and slot1) into one of several operating modes, including:

- Local Mode
- Monitor Mode
- FlexConnect Mode
- Sniffer Mode
- Spectrum Connect Mode

Before XOR was introduced, changing the mode of an AP propagated the change to the entire AP, that is both radio slot 0 and slot 1. The addition of the XOR radio in the slot 0 position provides the ability to operate a single radio interface in many of the previous modes, eliminating the need to place the whole AP into a mode. When this concept is applied to a single radio level, it is called *role*. Three such roles can be assigned now:

- Client Serving
- Either 2.4 GHz(1) or 5 GHz(2)
- Monitor-Monitor mode (3)

**Note**

- MODE: Assigned to a whole AP (slot 0 and slot 1)
- ROLE: Assigned to a single radio interface (slot 0)

## Benefits of the FRA

- Solves the problem of 2.4–GHz over coverage.
- Creating two diverse 5–GHz cells doubles the airtime that is available.
- Permits one AP with one Ethernet drop to function like two 5–GHz APs.
- Introduces the concept of Macro/Micro cells for airtime efficiency.
- Allows more bandwidth to be applied to an area within a larger coverage cell.
- Can be used to address nonlinear traffic.
- Enhances the High-Density Experience (HDX) with one AP.
- XOR radio can be selected by the corresponding user in either band–servicing client mode or monitor mode.

## Configuring an FRA Radio (CLI)

### Procedure

	Command or Action	Purpose
<b>Step 1</b>	<b>enable</b>  <b>Example:</b> Device# <b>enable</b>	Enters privileged EXEC mode.
<b>Step 2</b>	<b>configure terminal</b>  <b>Example:</b> Device# <b>configure terminal</b>	Enters global configuration mode.

	Command or Action	Purpose
<b>Step 3</b>	<b>[no] ap fra</b> <b>Example:</b> Device(config)# [no] ap fra	Enables or disables FRA on the AP.
<b>Step 4</b>	<b>ap fra interval</b> <b>Example:</b> Device(config)# ap fra interval 3	Configures the FRA interval in hours. The range is 1 to 24 hours. <b>Note</b> The FRA interval has to be more than the configured RRM interval.
<b>Step 5</b>	<b>ap fra sensitivity {high   medium   low}</b> <b>Example:</b> Device(config)# ap fra sensitivity high	Configures the FRA sensitivity. <ul style="list-style-type: none"> <li>• <b>high:</b> Sets the FRA Coverage Overlap Sensitivity to <b>high</b>.</li> <li>• <b>medium:</b> Sets the FRA Coverage Overlap Sensitivity to <b>medium</b>.</li> <li>• <b>low:</b> Sets the FRA Coverage Overlap Sensitivity to <b>low</b>.</li> </ul>
<b>Step 6</b>	<b>end</b> <b>Example:</b> Device(config)# end	Returns to privileged EXEC mode. Alternatively, you can also press <b>Ctrl-Z</b> to exit global configuration mode.
<b>Step 7</b>	<b>ap fra revert {all   auto-only} {auto   static}</b> <b>Example:</b> Device# ap fra revert all auto	Rolls back the XOR Radio state. <ul style="list-style-type: none"> <li>• <b>all:</b> Reverts all XOR Radios</li> <li>• <b>auto-only:</b> Revert only XOR radios currently in automatic band selection.</li> <li>• <b>auto:</b> Sets the XOR radios in automatic band selection.</li> <li>• <b>static:</b> Sets the XOR radio in static 2.4-GHz band.</li> </ul>
<b>Step 8</b>	<b>show ap dot11 {24ghz   5ghz} summary</b> <b>Example:</b> Device# show ap dot11 5ghz summary	Shows the configuration and statistics of 802.11 Cisco APs
<b>Step 9</b>	Device# <b>show ap fra</b> <b>Example:</b> Device# show ap fra  FRA State : Disabled FRA Sensitivity : medium (95%)	Shows the current FRA configuration.

	Command or Action	Purpose
	<pre>FRA Interval           : 1 Hour(s)  AP Name          MAC Address Slot ID  Current-Band      COF % Suggested Mode</pre> <hr/> <pre>AP00A6.CA36.295A    006b.f09c.8290 0          2.4GHz          None 2.4GHz</pre> <pre>COF : Coverage Overlap Factor test_machine#</pre>	
<b>Step 10</b>	<p><b>show ap name <i>ap-name</i> config dot11 dual-band</b></p> <p><b>Example:</b></p> <pre>Device# show ap name config dot11 dual-band</pre>	Shows the current 802.11 dual-band parameters in a given AP.

## Configuring an FRA Radio (GUI)

### Procedure

- Step 1** Choose **Configuration > Radio Configurations > RRM > FRA**.
- Step 2** In the **Flexible Radio Assignment** window, enable FRA status and determine the overlapping 2.4 GHz or 5 GHz coverage for each AP, choose **Enabled** in the **FRA Status** field. By default, the FRA status is disabled.
- Step 3** Under the **FRA Interval** drop-down list, choose the FRA run interval. The interval values range from 1 hour to 24 hours. You can choose the FRA run interval value only after you enable the FRA status.
- Step 4** 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

The **Last Run** and **Last Run Time** fields will show the time FRA was run last and the time it was run.

- Step 5** Check the **Client Aware** check box to take decisions on redundancy.

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

**Step 6** In the **Client Select** field, enter a value for client selection. The valid values range between 0 and 100 percent. The default value is 50 percent.

This means that if the dedicated 5-GHz interface reaches 50% channel utilization, this will trigger the monitor role dual-band interface to transition to a 5-GHz client-serving role.

**Step 7** In the **Client Reset** field, enter a reset value for the client. The valid values range between 0 and 100 percent. The default value is 5 percent.

Once 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 8** Click **Apply** to save the configuration.

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