Cisco Access Points with Tri-Radio

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This topic describes the Tri-Radio feature for Cisco Access Points (APs).

Access Points with three radios are designed for high density environments. The APs by default run one dedicated 2.4-GHz 4x4 mode radio and one 5-GHz 8x8 mode radio. In the default mode, the radios are managed by the Flexible Radio Assignment (FRA), and the Dual Radio Mode is in the disabled state indicating that the radios have either been assigned as client serving 8x8 radio or have not yet been evaluated by FRA.

When you enable the dual radio mode setting, the 8x8 radio is split to two independent 5-GHz 4x4 radios. In this mode, slot 1 and slot 2 are active independent 4x4 radio interfaces. They can serve different user groups with different assigned channels.

Note   To disable the dual radio mode, you must first disable the admin status of the subordinate radio. Otherwise, a warning message is displayed.

A tri-radio AP has upto two configurable 5-GHz radios. The following table describes the radio role and its deployment benefits:

In Cisco IOS XE Dublin 17.13.1, the **ap tri-radio** command cannot be configured, since the Tri-radio settings are enabled by default, and cannot be disabled.

Table 1: 5-GHz Radio Operational Modes and Criteria

Radio Role		Driving Factors
Radio 1	**Radio 2**	
8x8 Client-Serving	None	• Preferred operation: 160 MHz or 80 + 80 MHz • Higher MU-MIMO stations • Required higher number of Spatial Streams (SS)
4x4 Client-Serving	4x4 Client-Serving	• Preferred operation: 80 MHz or below • High Capacity in low or medium density • Directional antenna units (Coverage Slicing)
4x4 Client-Serving	4x4 Monitor	• Preferred operation: 80 MHz or below • Lower MU-MIMO stations • Better channel reuse in high density • Monitoring application requires 4x4 Rx

The following table lists the different radio modes and roles supported by the AP:

Table 2: Tri-Radio AP Radio Configuration

Setup	Radio Mode	Maximum Radio Capability	Dual Role Mode
1	2.4-GHz + 5-GHz	2.4-GHz, 4 antennas, 4SS, and 20 MHz 5-GHz, 8 antennas, 4SS, and 160 MHz	Disabled
2	2.4-GHz + 5-GHz	2.4-GHz, 4 antennas, 4SS, and 20 MHz 5-GHz, 8 antennas, 8SS, and 80 MHz	Disabled

Setup	Radio Mode	Maximum Radio Capability	Dual Role Mode
3	2.4-GHz + 5-GHz + 5-GHz	2.4-GHz, 4 antennas, 4SS, and 20 MHz 5-GHz, 4 antennas, 4SS, and 80 MHz 5-GHz, 4 antennas, 4SS, and 80 MHz	Enabled

In the Cisco IOS XE 17.2.1 Release, FRA manages the role assignment for each radio independently. You can set the radio mode as automatic or manual, and select either Client-Serving role or Monitor role as the radio role. Based on the dual radio mode configuration, the role selection is available for one or for both interfaces.

Guidelines and Restrictions for Tri-Radio Access Points

- Dual radio mode is set to **Auto** by default. FRA manages the dual radio mode in **Auto** mode.

- The tri-radio support for AP with external antenna is as follows:

  - RP-TNC antenna is supported in Cisco Catalyst 9130AX Series APs.

  - The C-ANT9101, C-ANT9102, and C-ANT9103 antennas on Cisco Catalyst 9130AX Series APs support 2 radios (2.4-GHz (4x4) and 5-GHz (8x8)). This antennas does not support two 5-GHz (4x4) radios due to hardware limitation.

- From Cisco IOS XE Cupertino 17.7.x, the Tri-Radio feature is supported in Cisco Catalyst 9124 Series APs.

Configuring Tri-Radio

Configuring Tri-Radio for AP (GUI)

Procedure

Step 1 Choose **Configuration** > **Radio Configurations** > **Network**.

The **Network** > **5 GHz Radios** page is displayed.

Step 2 In the **General** section, the **Tri-Radio Mode** check box is enabled by default.

Note You cannot disable the **Tri-Radio Mode** configuration.

Step 3 Click **Apply**

Configuring the Tri-Radio (CLI)

Procedure

	Command or Action	Purpose
Step 1	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 2	[no] **ap tri-radio** **Example:** `Device(config)# ap tri-radio`	Configures all supporting tri-radio AP's dual radio role in auto mode. Use the **[no]** form of the command to disable the feature.

Configuring 5-GHz Dual Radio Mode for AP (GUI)

Procedure

Step 1 Choose **Configuration** > **Wireless** > **Access Points**.

Step 2 On the **Access Points** page, click the **5 GHz Radios** section and select a Cisco 9130 Series AP from the list. The **Edit Radios 5 GHz Band** window is displayed.

Step 3 In the **Edit Radios 5-GHz Band** > **Configure** > **General** tab, under **Dual Radio Mode**, select one from the following radio button options

- Auto: Permits FRA to decide the mode for this AP.

- Enabled: Enables Dual Radio mode for this AP.

- Disabled: Disables Dual Radio mode for this AP.

Step 4 Click **Update & Apply to Device**.

Configuring the Dual Radio Mode and Enabling Slots (CLI)

Procedure

	Command or Action	Purpose
Step 1	**ap name** *ap-name* **dot11 5ghz slot** {**1**	**2** } **shutdown** **Example:** `Device# ap name ap-name dot11 5ghz slot 1 shutdown`	(Optional) Disables the 802.11a radio on Cisco AP.

	Command or Action	Purpose
Step 2	**ap name** *ap-name* **dot11 5ghz slot 1 dual-radio mode** { **disable** | **enable**| **auto** } **Example:** `Device# ap name ap-name dot11 5ghz slot 1 dual-radio mode enable`	Configures the 802.11a dual and tri-radio on the AP. Enable **auto** to allow RRM to switch the AP between dual radio or tri radio mode based on the channel width configuration. In **auto** mode, the slot 2 state is managed by the RRM. Use the **disable** keyword to disable the dual-radio. **Note** When the AP is set to **auto** mode, the dual radio mode is disabled by default.
Step 3	**ap name** *ap-name* **no dot11 5ghz slot** {**1** | **2** } **shutdown** **Example:** `Device# ap name ap-name no dot11 5ghz slot 1 shutdown`	Enables the 802.11a radio on Cisco AP.

Setting Radio Roles for Slots (CLI)

Procedure

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. Enter your password, if prompted.
Step 2	**ap name** *ap-name* **dot11** { **24ghz** | **5ghz**| **6ghz** } **slot** *<slot ID>* **radio role** {**auto** | **manual** {**monitor** | **client-serving**}} **Example:** `Device# ap name ap-name dot11 5ghz slot 2 radio role manual monitor`	Sets the radio role manual to either client serving or monitor.

Configuring the Tri-Radio Dual Radio Role (CLI)

Procedure

	Command or Action	Purpose
Step 1	**ap name** *ap-name* **dot11 5ghz slot** {**1** | **2** } **radio role** {**auto**| **manual** {**client-serving** | **monitor**} **Example:** `Device# ap name 9130axtrial dot11 5ghz slot 1 radio role manual monitor`	Configures the 802.11a radio role independently for each supporting AP's radio. The channel and the Tx power values can be configured when the radio role is set to **manual** mode.

	Command or Action	Purpose
Step 2	**ap name** *ap-name* **dot11 24ghz slot 0 radio role** {**auto**| **manual** {**client-serving** | **monitor**}	Configures the 802.11b radio role independently for the supporting AP's radio.
	Example:	
	`Device# ap name 9130axtrial dot11 24ghz slot 0 radio role manual client-serving`	

Verifying Tri-Radio Configuration on the Controller

To verify that the dual radio mode is enabled, use the following **show** command:

```
• Device# show ap name APXXXX.4XXX.04XX config slot 1 | inc Dual
  Dual Radio Capable                         : True
  Dual Radio Mode                            : Enabled
  Dual Radio Operation mode                  : Auto
```

To verify the tri-radio status, use the following **show** command:

```
•
  Device# show ap triradio status
  Tri-Radio Status : Enabled
```

To verify that the radio role is set, use the following **show** command:

```
• show ap name ap-name config slot <slot_number> | i Radio
  Radio Type                                 : 802.11ax - 5 GHz
  Radio Subband                              : All
  Radio Role                                 : Auto
  Radio Mode                                 : Local
  Radio SubType                              : Main
```