



802.11 Parameters for Cisco Access Points

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2.4-GHz Radio Support

Configuring 2.4-GHz Radio Support for the Specified Slot Number

Before you begin



Note The term *802.11b radio* or *2.4-GHz radio* will be used interchangeably.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	ap name <i>ap-name</i> dot11 24ghz slot 0 SI Example: Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 SI	Enables Spectrum Intelligence (SI) for the dedicated 2.4-GHz radio hosted on slot 0 for a specific access point. For more information, see the <i>Spectrum Intelligence</i> section in this guide.

	Command or Action	Purpose
		Here, 0 refers to the Slot ID.
Step 3	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 antenna {ext-ant-gain <i>antenna_gain_value</i> selection [internal external]}</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 antenna selection internal</pre>	<p>Configures 802.11b antenna hosted on slot 0 for a specific access point.</p> <ul style="list-style-type: none"> • ext-ant-gain: Configures the 802.11b external antenna gain. <i>antenna_gain_value</i>- Refers to the external antenna gain value in multiples of .5 dBi units. The valid range is from 0 to 4294967295. • selection: Configures the 802.11b antenna selection (internal or external).
Step 4	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 beamforming</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 beamforming</pre>	Configures beamforming for the 2.4-GHz radio hosted on slot 0 for a specific access point.
Step 5	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 channel {<i>channel_number</i> auto}</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 channel auto</pre>	Configures advanced 802.11 channel assignment parameters for the 2.4-GHz radio hosted on slot 0 for a specific access point.
Step 6	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 cleanair</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 cleanair</pre>	Enables CleanAir for 802.11b radio hosted on slot 0 for a specific access point.
Step 7	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 dot11n antenna {A B C D}</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 dot11n antenna A</pre>	<p>Configures 802.11n antenna for 2.4-GHz radio hosted on slot 0 for a specific access point.</p> <p>Here,</p> <p>A: Is the antenna port A. B: Is the antenna port B. C: Is the antenna port C. D: Is the antenna port D.</p>
Step 8	<p>ap name <i>ap-name</i> dot11 24ghz slot 0 shutdown</p> <p>Example:</p> <pre>Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 shutdown</pre>	Disables 802.11b radio hosted on slot 0 for a specific access point.

	Command or Action	Purpose
Step 9	ap name <i>ap-name</i> dot11 24ghz slot 0 txpower <i>{tx_power_level auto}</i> Example: Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 txpower auto	Configures transmit power level for 802.11b radio hosted on slot 0 for a specific access point. <ul style="list-style-type: none"> • <i>tx_power_level</i>: Is the transmit power level in dBm. The valid range is from 1 to 8. • auto: Enables auto-RF.

5-GHz Radio Support

Configuring 5-GHz Radio Support for the Specified Slot Number

Before you begin



Note The term *802.11a radio* or *5-GHz radio* will be used interchangeably in this document.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	ap name <i>ap-name</i> dot11 5ghz slot 1 SI Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 SI	Enables Spectrum Intelligence (SI) for the dedicated 5-GHz radio hosted on slot 1 for a specific access point. Here, 1 refers to the Slot ID.
Step 3	ap name <i>ap-name</i> dot11 5ghz slot 1 antenna ext-ant-gain <i>antenna_gain_value</i> Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 antenna ext-ant-gain	Configures external antenna gain for 802.11a radios for a specific access point hosted on slot 1. <i>antenna_gain_value</i> —Refers to the external antenna gain value in multiples of .5 dBi units. The valid range is from 0 to 4294967295.
Step 4	ap name <i>ap-name</i> dot11 5ghz slot 1 antenna mode [omni sectorA sectorB] Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 antenna mode sectorA	Configures the antenna mode for 802.11a radios for a specific access point hosted on slot 1.

	Command or Action	Purpose
Step 5	ap name <i>ap-name</i> dot11 5ghz slot 1 antenna selection [internal external] Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 antenna selection internal	Configures the antenna selection for 802.11a radios for a specific access point hosted on slot 1.
Step 6	ap name <i>ap-name</i> dot11 5ghz slot 1 beamforming Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 beamforming	Configures beamforming for the 5-GHz radio hosted on slot 1 for a specific access point.
Step 7	ap name <i>ap-name</i> dot11 5ghz slot 1 channel {<i>channel_number</i> auto width [20 40 80 160]} Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 channel auto	Configures advanced 802.11 channel assignment parameters for the 5-GHz radio hosted on slot 1 for a specific access point. Here, <i>channel_number</i> - Refers to the channel number. The valid range is from 1 to 173.
Step 8	ap name <i>ap-name</i> dot11 5ghz slot 1 cleanair Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 cleanair	Enables CleanAir for 802.11a radio hosted on slot 1 for a given or specific access point.
Step 9	ap name <i>ap-name</i> dot11 5ghz slot 1 dot11n antenna {A B C D} Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 dot11n antenna A	Configures 802.11n for 5-GHz radio hosted on slot 1 for a specific access point. Here, A- Is the antenna port A. B- Is the antenna port B. C- Is the antenna port C. D- Is the antenna port D.
Step 10	ap name <i>ap-name</i> dot11 5ghz slot 1 rrm channel <i>channel</i> Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 rrm channel 2	Is another way of changing the channel hosted on slot 1 for a specific access point. Here, <i>channel</i> - Refers to the new channel created using 802.11h channel announcement. The valid range is from 1 to 173, provided 173 is a valid channel in the country where the access point is deployed.
Step 11	ap name <i>ap-name</i> dot11 5ghz slot 1 shutdown Example:	Disables 802.11a radio hosted on slot 1 for a specific access point.

	Command or Action	Purpose
	Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 shutdown	
Step 12	ap name <i>ap-name</i> dot11 5ghz slot 1 txpower {<i>tx_power_level</i> auto} Example: Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 txpower auto	Configures 802.11a radio hosted on slot 1 for a specific access point. <ul style="list-style-type: none"> • <i>tx_power_level</i>- Is the transmit power level in dBm. The valid range is from 1 to 8. • auto- Enables auto-RF.

Information About Dual-Band Radio Support

The Dual-Band (XOR) radio in Cisco 2800, 3800, 4800, and the 9120 series AP models offer the ability to serve 2.4-GHz or 5-GHz bands or passively monitor both the bands on the same AP. These APs can be configured to serve clients in 2.4-GHz and 5-GHz bands, or serially scan both 2.4-GHz and 5-GHz bands on the flexible radio while the main 5-GHz radio serves clients.

Cisco APs models up and through the Cisco 9120 APs are designed to support dual 5-GHz band operations with the *i* model supporting a dedicated Macro/Micro architecture and the *e* and *p* models supporting Macro/Macro. The Cisco 9130AXI APs and the Cisco 9136 APs support dual 5-GHz operations as Micro/Messo cell.

When a radio moves between bands (from 2.4-GHz to 5-GHz and vice versa), clients need to be steered to get an optimal distribution across radios. When an AP has two radios in the 5-GHz band, client steering algorithms contained in the Flexible Radio Assignment (FRA) algorithm are used to steer a client between the same band co-resident radios.

The XOR radio support can be steered manually or automatically:

- Manual steering of a band on a radio—The band on the XOR radio can only be changed manually.
- Automatic client and band steering on the radios is managed by the FRA feature that monitors and changes the band configurations as per site requirements.



Note RF measurement will not run when a static channel is configured on slot 1. Due to this, the dual band radio slot 0 will move only with 5-GHz radio and not to the monitor mode.

When slot 1 radio is disabled, RF measurement will not run, and the dual band radio slot 0 will be only on 2.4-GHz radio.

Configuring Default XOR Radio Support

Before you begin



Note The default radio points to the XOR radio hosted on slot 0.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	ap name <i>ap-name</i> dot11 dual-band antenna ext-ant-gain <i>antenna_gain_value</i> Example: Device# ap name <i>ap-name</i> dot11 dual-band antenna ext-ant-gain 2	Configures the 802.11 dual-band antenna on a specific Cisco access point. <i>antenna_gain_value</i> : The valid range is from 0 to 40.
Step 3	ap name <i>ap-name</i> [no] dot11 dual-band shutdown Example: Device# ap name <i>ap-name</i> dot11 dual-band shutdown	Shuts down the default dual-band radio on a specific Cisco access point. Use the no form of the command to enable the radio.
Step 4	ap name <i>ap-name</i> dot11 dual-band role manual client-serving Example: Device# ap name <i>ap-name</i> dot11 dual-band role manual client-serving	Switches to client-serving mode on the Cisco access point.
Step 5	ap name <i>ap-name</i> dot11 dual-band band 24ghz Example: Device# ap name <i>ap-name</i> dot11 dual-band band 24ghz	Switches to 2.4-GHz radio band.
Step 6	ap name <i>ap-name</i> dot11 dual-band txpower {<i>transmit_power_level</i> auto} Example:	Configures the transmit power for the radio on a specific Cisco access point.

	Command or Action	Purpose
	Device# ap name <i>ap-name</i> dot11 dual-band txpower 2	<p>Note</p> <p>When an FRA-capable radio (slot 0 on 9120 AP[for instance]) is set to Auto, you cannot configure static channel and Txpower on this radio.</p> <p>If you want to configure static channel and Txpower on this radio, you will need to change the radio role to Manual Client-Serving mode.</p>
Step 7	<p>ap name <i>ap-name</i> dot11 dual-band channel <i>channel-number</i></p> <p>Example:</p> <pre>Device# ap name <i>ap-name</i> dot11 dual-band channel 2</pre>	<p>Enters the channel for the dual band.</p> <p><i>channel-number</i>—The valid range is from 1 to 173.</p>
Step 8	<p>ap name <i>ap-name</i> dot11 dual-band channel auto</p> <p>Example:</p> <pre>Device# ap name <i>ap-name</i> dot11 dual-band channel auto</pre>	<p>Enables the auto channel assignment for the dual-band.</p>
Step 9	<p>ap name <i>ap-name</i> dot11 dual-band channel width {20 MHz 40 MHz 80 MHz 160 MHz}</p> <p>Example:</p> <pre>Device# ap name <i>ap-name</i> dot11 dual-band channel width 20 MHz</pre>	<p>Chooses the channel width for the dual band.</p>
Step 10	<p>ap name <i>ap-name</i> dot11 dual-band cleanair</p> <p>Example:</p> <pre>Device# ap name <i>ap-name</i> dot11 dual-band cleanair</pre>	<p>Enables the Cisco CleanAir feature on the dual-band radio.</p>
Step 11	<p>ap name <i>ap-name</i> dot11 dual-band cleanair band {24 GHz 5 GMHz}</p> <p>Example:</p> <pre>Device# ap name <i>ap-name</i> dot11 dual-band cleanair band 5 GHz</pre> <pre>Device# ap name <i>ap-name</i> [no] dot11 dual-band cleanair band 5 GHz</pre>	<p>Selects a band for the Cisco CleanAir feature.</p> <p>Use the no form of this command to disable the Cisco CleanAir feature.</p>
Step 12	<p>ap name <i>ap-name</i> dot11 dual-band dot11n antenna {A B C D}</p> <p>Example:</p>	<p>Configures the 802.11n dual-band parameters for a specific access point.</p>

	Command or Action	Purpose
	Device# ap name <i>ap-name</i> dot11 dual-band dot11n antenna A	
Step 13	show ap name <i>ap-name</i> auto-rf dot11 dual-band Example: Device# show ap name <i>ap-name</i> auto-rf dot11 dual-band	Displays the auto-RF information for the Cisco access point.
Step 14	show ap name <i>ap-name</i> wlan dot11 dual-band Example: Device# show ap name <i>ap-name</i> wlan dot11 dual-band	Displays the list of BSSIDs for the Cisco access point.

Configuring XOR Radio Support for the Specified Slot Number (GUI)

Procedure

-
- Step 1** Click **Configuration > Wireless > Access Points**.
- Step 2** In the **Dual-Band Radios** section, select the AP for which you want to configure dual-band radios.
- The AP name, MAC address, CleanAir capability and slot information for the AP are displayed. If the Hyperlocation method is HALO, the antenna PID and antenna design information are also displayed.
- Step 3** Click **Configure**.
- Step 4** In the **General** tab, set the **Admin Status** as required.
- Step 5** Set the **CleanAir Admin Status** field to Enable or Disable.
- Step 6** Click **Update & Apply to Device**.
-

Configuring XOR Radio Support for the Specified Slot Number

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.

	Command or Action	Purpose
Step 2	ap name <i>ap-name</i> dot11 dual-band slot 0 antenna ext-ant-gain <i>external_antenna_gain_value</i> Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 antenna ext-ant-gain 2</pre>	Configures dual-band antenna for the XOR radio hosted on slot 0 for a specific access point. <i>external_antenna_gain_value</i> - Is the external antenna gain value in multiples of .5 dBi unit. The valid range is from 0 to 40.
Step 3	ap name <i>ap-name</i> dot11 dual-band slot 0 band {24ghz 5ghz} Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 band 24ghz</pre>	Configures current band for the XOR radio hosted on slot 0 for a specific access point.
Step 4	ap name <i>ap-name</i> dot11 dual-band slot 0 channel { <i>channel_number</i> auto width [160 20 40 80]} Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 channel 3</pre>	Configures dual-band channel for the XOR radio hosted on slot 0 for a specific access point. <i>channel_number</i> - The valid range is from 1 to 165.
Step 5	ap name <i>ap-name</i> dot11 dual-band slot 0 cleanair band {24Ghz 5Ghz} Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 cleanair band 24Ghz</pre>	Enables CleanAir features for dual-band radios hosted on slot 0 for a specific access point.
Step 6	ap name <i>ap-name</i> dot11 dual-band slot 0 dot11n antenna {A B C D} Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 dot11n antenna A</pre>	Configures 802.11n dual-band parameters hosted on slot 0 for a specific access point. Here, A - Enables antenna port A. B - Enables antenna port B. C - Enables antenna port C. D - Enables antenna port D.
Step 7	ap name <i>ap-name</i> dot11 dual-band slot 0 role {auto manual [<i>client-serving</i> monitor]} Example: <pre>Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 role auto</pre>	Configures dual-band role for the XOR radio hosted on slot 0 for a specific access point. The following are the dual-band roles: <ul style="list-style-type: none"> • auto- Refers to the automatic radio role selection. • manual- Refers to the manual radio role selection.
Step 8	ap name <i>ap-name</i> dot11 dual-band slot 0 shutdown	Disables dual-band radio hosted on slot 0 for a specific access point.

	Command or Action	Purpose
	Example: Device# <code>ap name AP-SIDD-A06 dot11 dual-band slot 0 shutdown</code> Device# <code>ap name AP-SIDD-A06 [no] dot11 dual-band slot 0 shutdown</code>	Use the no form of this command to enable the dual-band radio.
Step 9	ap name <i>ap-name</i> dot11 dual-band slot 0 txpower { <i>tx_power_level</i> auto } Example: Device# <code>ap name AP-SIDD-A06 dot11 dual-band slot 0 txpower 2</code>	Configures dual-band transmit power for XOR radio hosted on slot 0 for a specific access point. <ul style="list-style-type: none"> • <i>tx_power_level</i>- Is the transmit power level in dBm. The valid range is from 1 to 8. • auto- Enables auto-RF.

Receiver Only Dual-Band Radio Support

Information About Receiver Only Dual-Band Radio Support

This feature configures the dual-band Rx-only radio features for an access point with dual-band radios.

This dual-band Rx-only radio is dedicated for Analytics, Hyperlocation, Wireless Security Monitoring, and BLE AoA*.

This radio will always continue to serve in monitor mode, therefore, you will not be able to make any channel and *tx-rx* configurations on the 3rd radio.

Configuring Receiver Only Dual-Band Parameters for Access Points

Enabling CleanAir with Receiver Only Dual-Band Radio on a Cisco Access Point (GUI)

Procedure

-
- Step 1** Choose **Configuration > Wireless > Access Points**.
 - Step 2** In the **Dual-Band Radios** settings, click the AP for which you want to configure the dual-band radios.
 - Step 3** In the **General** tab, enable the **CleanAir** toggle button.
 - Step 4** Click **Update & Apply to Device**.
-

Enabling CleanAir with Receiver Only Dual-Band Radio on a Cisco Access Point

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	ap name <i>ap-name</i> dot11 rx-dual-band slot 2 cleanair band {24Ghz 5Ghz} Example: Device# ap name AP-SIDD-A06 dot11 rx-dual-band slot 2 cleanair band 24Ghz Device# ap name AP-SIDD-A06 [no] dot11 rx-dual-band slot 2 cleanair band 24Ghz	Enables CleanAir with receiver only (Rx-only) dual-band radio on a specific access point. Here, 2 refers to the slot ID. Use the no form of this command to disable CleanAir.

Disabling Receiver Only Dual-Band Radio on a Cisco Access Point (GUI)

Procedure

-
- Step 1** Choose **Configuration > Wireless > Access Points**.
- Step 2** In the **Dual-Band Radios** settings, click the AP for which you want to configure the dual-band radios.
- Step 3** In the **General** tab, disable the **CleanAir Status** toggle button.
- Step 4** Click **Update & Apply to Device**.
-

Disabling Receiver Only Dual-Band Radio on a Cisco Access Point

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	ap name <i>ap-name</i> dot11 rx-dual-band slot 2 shutdown Example: Device# ap name AP-SIDD-A06 dot11 rx-dual-band slot 2 shutdown Device# ap name AP-SIDD-A06 [no] dot11 rx-dual-band slot 2 shutdown	Disables receiver only dual-band radio on a specific Cisco access point. Here, 2 refers to the slot ID. Use the no form of this command to enable receiver only dual-band radio.

Configuring Client Steering (CLI)

Before you begin

Enable Cisco CleanAir on the corresponding dual-band radio.

Procedure

	Command or Action	Purpose
Step 1	enable Example: Device# enable	Enters privileged EXEC mode.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	wireless macro-micro steering transition-threshold balancing-window number-of-clients(0-65535) Example: Device(config)# wireless macro-micro steering transition-threshold balancing-window 10	Configures the micro-macro client load-balancing window for a set number of clients.
Step 4	wireless macro-micro steering transition-threshold client count number-of-clients(0-65535) Example: Device(config)# wireless macro-micro steering transition-threshold client count 10	Configures the macro-micro client parameters for a minimum client count for transition.
Step 5	wireless macro-micro steering transition-threshold macro-to-micro RSSI-in-dBm(-128-0) Example: Device(config)# wireless macro-micro steering transition-threshold macro-to-micro -100	Configures the macro-to-micro transition RSSI.
Step 6	wireless macro-micro steering transition-threshold micro-to-macro RSSI-in-dBm(-128-0) Example: Device(config)# wireless macro-micro steering transition-threshold micro-to-macro -110	Configures the micro-to-macro transition RSSI.

	Command or Action	Purpose
Step 7	wireless macro-micro steering probe-suppression aggressiveness <i>number-of-cycles(-128—0)</i> Example: Device(config)# wireless macro-micro steering probe-suppression aggressiveness -110	Configures the number of probe cycles to be suppressed.
Step 8	wireless macro-micro steering probe-suppression hysteresis <i>RSSI-in-dBm</i> Example: Device(config)# wireless macro-micro steering probe-suppression hysteresis -5	Configures the macro-to-micro probe in RSSI. The range is between -6 to -3.
Step 9	wireless macro-micro steering probe-suppression probe-only Example: Device(config)# wireless macro-micro steering probe-suppression probe-only	Enables probe suppression mode.
Step 10	wireless macro-micro steering probe-suppression probe-auth Example: Device(config)# wireless macro-micro steering probe-suppression probe-auth	Enables probe and single authentication suppression mode.
Step 11	show wireless client steering Example: Device# show wireless client steering	Displays the wireless client steering information.

Verifying Cisco Access Points with Dual-Band Radios

To verify the access points with dual-band radios, use the following command:

```
Device# show ap dot11 dual-band summary
```

```
AP Name Subband Radio      Mac      Status Channel Power Level Slot ID Mode
-----
4800    All 3890.a5e6.f360 Enabled (40)* *1/8    (22 dBm)    0  Sensor
4800    All 3890.a5e6.f360 Enabled N/A    N/A        2          Monitor
```

