802.11 Parameters for Cisco Access Points

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** *ap-name* **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, *Spectrum Intelligence* section in this guide.

	Command or Action	Purpose
		Here, **0** refers to the Slot ID.
Step 3	**ap name** *ap-name* **dot11 24ghz slot 0 antenna** {**ext-ant-gain** *antenna_gain_value* | **selection** [**internal** | **external**]} **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 antenna selection internal`	Configures 802.11b antenna hosted on slot 0 for a specific access point. • **ext-ant-gain**: Configures the 802.11b external antenna gain. *antenna_gain_value*- 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). **Note** • For APs supporting self-identifying antennas (SIA), the gain depends on the antenna, and not on the AP model. The gain is learned by the AP and there is no need for controller configuration. • For APs that do not support SIA, the APs send the antenna gain in the configuration payload, where the default antenna gain depends on the AP model. • Cisco Catalyst 9120E and 9130E APs support self-identifying antennas (SIA). Cisco Catalyst 9115E APs do not support SIA antennas. Although Cisco Catalyst 9115E APs work with SIA antennas, the APs do not auto-detect SIA antennas nor add the correct external gain.
Step 4	**ap name** *ap-name* **dot11 24ghz slot 0 beamforming** **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 beamforming`	Configures beamforming for the 2.4-GHz radio hosted on slot 0 for a specific access point.

	Command or Action	Purpose
Step 5	**ap name** *ap-name* **dot11 24ghz slot 0 channel** {*channel_number* | **auto**} **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 channel auto`	Configures advanced 802.11 channel assignment parameters for the 2.4-GHz radio hosted on slot 0 for a specific access point.
Step 6	**ap name** *ap-name* **dot11 24ghz slot 0 cleanair** **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 cleanair`	Enables CleanAir for 802.11b radio hosted on slot 0 for a specific access point.
Step 7	**ap name** *ap-name* **dot11 24ghz slot 0 dot11n antenna** {**A** | **B** | **C** | **D**} **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 dot11n antenna A`	Configures 802.11n antenna for 2.4-GHz radio hosted on slot 0 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 8	**ap name** *ap-name* **dot11 24ghz slot 0 shutdown** **Example:** `Device# ap name AP-SIDD-A06 dot11 24ghz slot 0 shutdown`	Disables 802.11b radio hosted on slot 0 for a specific access point.
Step 9	**ap name** *ap-name* **dot11 24ghz slot 0 txpower** {*tx_power_level* | **auto**} **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. • *tx_power_level*: 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** *ap-name* **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** *ap-name* **dot11 5ghz slot 1 antenna ext-ant-gain** *antenna_gain_value* **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. *antenna_gain_value*—Refers to the external antenna gain value in multiples of .5 dBi units. The valid range is from 0 to 4294967295. **Note** • For APs supporting self-identifying antennas (SIA), the gain depends on the antenna, and not on the AP model. The gain is learned by the AP and there is no need for controller configuration. • For APs that do not support SIA, the APs send the antenna gain in the configuration payload, where the default antenna gain depends on the AP model. • Cisco Catalyst 9120E and 9130E APs support self-identifying antennas (SIA). Cisco Catalyst 9115E APs do not support SIA antennas. Although Cisco Catalyst 9115E APs work with SIA antennas, the APs do not auto-detect SIA antennas nor add the correct external gain.

	Command or Action	Purpose
Step 4	**ap name** *ap-name* **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.
Step 5	**ap name** *ap-name* **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** *ap-name* **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** *ap-name* **dot11 5ghz slot 1 channel** {*channel_number* | **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, *channel_number*- Refers to the channel number. The valid range is from 1 to 173.
Step 8	**ap name** *ap-name* **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** *ap-name* **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** *ap-name* **dot11 5ghz slot 1 rrm channel** *channel* **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, *channel*- Refers to the new channel created using 802.11h channel announcement. The valid range is from 1 to 173, provided 173 is

	Command or Action	Purpose
		a valid channel in the country where the access point is deployed.
Step 11	**ap name** *ap-name* **dot11 5ghz slot 1 shutdown** **Example:** `Device# ap name AP-SIDD-A06 dot11 5ghz slot 1 shutdown`	Disables 802.11a radio hosted on slot 1 for a specific access point.
Step 12	**ap name** *ap-name* **dot11 5ghz slot 1 txpower** {*tx_power_level* | **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. • *tx_power_level*- 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** *ap-name* **dot11 dual-band antenna ext-ant-gain** *antenna_gain_value* **Example:** `Device# ap name ap-name dot11 dual-band antenna ext-ant-gain 2`	Configures the 802.11 dual-band antenna on a specific Cisco access point. *antenna_gain_value*: The valid range is from 0 to 40.
Step 3	**ap name** *ap-name* **[no] dot11 dual-band shutdown** **Example:** `Device# ap name ap-name 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** *ap-name* **dot11 dual-band role manual client-serving** **Example:** `Device# ap name ap-name dot11 dual-band role manual client-serving`	Switches to client–serving mode on the Cisco access point.
Step 5	**ap name** *ap-name* **dot11 dual-band band 24ghz** **Example:** `Device# ap name ap-name dot11 dual-band band 24ghz`	Switches to 2.4-GHz radio band.
Step 6	**ap name** *ap-name* **dot11 dual-band txpower** {*transmit_power_level* | **auto**} **Example:**	Configures the transmit power for the radio on a specific Cisco access point.

	Command or Action	Purpose
	`Device# ap name ap-name dot11 dual-band txpower 2`	**Note** 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. 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.
Step 7	**ap name** *ap-name* **dot11 dual-band channel** *channel-number* **Example:** `Device# ap name ap-name dot11 dual-band channel 2`	Enters the channel for the dual band. *channel-number*—The valid range is from 1 to 173.
Step 8	**ap name** *ap-name* **dot11 dual-band channel auto** **Example:** `Device# ap name ap-name dot11 dual-band channel auto`	Enables the auto channel assignment for the dual-band.
Step 9	**ap name** *ap-name* **dot11 dual-band channel width** {**20 MHz** | **40 MHz** | **80 MHz** | **160 MHz**} **Example:** `Device# ap name ap-name dot11 dual-band channel width 20 MHz`	Chooses the channel width for the dual band.
Step 10	**ap name** *ap-name* **dot11 dual-band cleanair** **Example:** `Device# ap name ap-name dot11 dual-band cleanair`	Enables the Cisco CleanAir feature on the dual-band radio.

Step 11	**ap name** *ap-name* **dot11 dual-band cleanair band** {**24 GHz | 5 GMHz**}
	Example:
	`Device# ap name ap-name dot11 dual-band cleanair band 5 GHz`
	`Device# ap name ap-name [no] dot11 dual-band cleanair band 5 GHz`
		Selects a band for the Cisco CleanAir feature.
		Use the **no** form of this command to disable the Cisco CleanAir feature.

Step 12	**ap name** *ap-name* **dot11 dual-band dot11n antenna** {**A | B | C | D**} **Example:**	Configures the 802.11n dual-band parameters for a specific access point.

	Command or Action	Purpose
	`Device# ap name ap-name dot11 dual-band dot11n antenna A`	
Step 13	**show ap name** *ap-name* **auto-rf dot11 dual-band** **Example:** `Device# show ap name ap-name auto-rf dot11 dual-band`	Displays the auto-RF information for the Cisco access point.
Step 14	**show ap name** *ap-name* **wlan dot11 dual-band** **Example:** `Device# show ap name ap-name 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** *ap-name* **dot11 dual-band slot 0 antenna ext-ant-gain** *external_antenna_gain_value* **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 antenna ext-ant-gain 2`	Configures dual-band antenna for the XOR radio hosted on slot 0 for a specific access point. *external_antenna_gain_value* - Is the external antenna gain value in multiples of .5 dBi unit. The valid range is from 0 to 40. **Note** • For APs supporting self-identifying antennas (SIA), the gain depends on the antenna, and not on the AP model. The gain is learned by the AP and there is no need for controller configuration. • For APs that do not support SIA, the APs send the antenna gain in the configuration payload, where the default antenna gain depends on the AP model.
Step 3	**ap name** *ap-name* **dot11 dual-band slot 0 band** {**24ghz** | **5ghz**} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 band 24ghz`	Configures current band for the XOR radio hosted on slot 0 for a specific access point.
Step 4	**ap name** *ap-name* **dot11 dual-band slot 0 channel** {*channel_number* | **auto** | **width** [**160** | **20** | **40** | **80**]} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 channel 3`	Configures dual-band channel for the XOR radio hosted on slot 0 for a specific access point. *channel_number*- The valid range is from 1 to 165.
Step 5	**ap name** *ap-name* **dot11 dual-band slot 0 cleanair band** {**24Ghz** | **5Ghz**} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 cleanair band 24Ghz`	Enables CleanAir features for dual-band radios hosted on slot 0 for a specific access point.
Step 6	**ap name** *ap-name* **dot11 dual-band slot 0 dot11n antenna** {**A** | **B** | **C** | **D**} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 dot11n antenna A`	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.

	Command or Action	Purpose
		C- Enables antenna port C. **D**- Enables antenna port D.
Step 7	**ap name** *ap-name* **dot11 dual-band slot 0 role** {**auto** | **manual** [**client-serving** | **monitor**]} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 role auto`	Configures dual-band role for the XOR radio hosted on slot 0 for a specific access point. The following are the dual-band roles: • **auto**- Refers to the automatic radio role selection. • **manual**- Refers to the manual radio role selection.

Step 8	**ap name** *ap-name* **dot11 dual-band slot 0 shutdown**
	Example:
	`Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 shutdown`
	`Device# ap name AP-SIDD-A06 [no] dot11 dual-band slot 0 shutdown`
		Disables dual-band radio hosted on slot 0 for a specific access point.
		Use the **no** form of this command to enable the dual-band radio.

Step 9	**ap name** *ap-name* **dot11 dual-band slot 0 txpower** {*tx_power_level* | **auto**} **Example:** `Device# ap name AP-SIDD-A06 dot11 dual-band slot 0 txpower 2`	Configures dual-band transmit power for XOR radio hosted on slot 0 for a specific access point. • *tx_power_level*- 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** *ap-name* **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** *ap-name* **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)*	Configures the macro-micro client parameters for a minimum client count for transition.

	Command or Action	Purpose
	Example: `Device(config)# wireless macro-micro steering transition-threshold client count 10`	
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.
Step 7	**wireless macro-micro steering probe-suppression aggressiveness** *number-of-cycles(–128—0)* **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** *RSSI-in-dBm* **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.

	Command or Action	Purpose
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
```