Radio Resource Management Commands

ap dot11 rrm

To configure basic and advanced radio resource management settings for 802.11 devices, use the **ap dot11 rrm** command.

ap dot11 {**24ghz** | **5ghz**} **rrm** {**ccx location-measurement** *sec* | **channel** {**cleanair-event** | **dca** | **device** | **foreign** | **load** | **noise** | **outdoor-ap-dca**} | **coverage** {**data fail-percentage** *pct* | **data packet-count** *count* | **data rssi-threshold** *threshold*} | **exception global** *percentage* | **level global** *number* | **voice** {**fail-percentage** *percentage* | **packet-count** *number* | **rssi-threshold** *threshold*}}

Syntax Description

ccx	Configures Advanced (RRM) 802.11 CCX options.
location-measurement	Specifies 802.11 CCX Client Location Measurements in seconds. The range is between 10 and 32400 seconds.

channel	Configure advanced 802.11-channel assignment parameters.
cleanair-event	Configures cleanair event-driven RRM parameters.
dca	Configures 802.11-dynamic channel assignment algorithm parameters.
device	Configures persistent non-WiFi device avoidance in the 802.11-channel assignment.
foreign	Enables foreign AP 802.11-interference avoidance in the channel assignment.
load	Enables Cisco AP 802.11-load avoidance in the channel assignment.
noise	Enables non-802.11-noise avoidance in the channel assignment.
outdoor-ap-dca	Configures 802.11 DCA list option for outdoor AP.
coverage	Configures 802.11 coverage Hole-Detection.
data fail-percentage *pct*	Configures 802.11 coverage failure-rate threshold for uplink data packets. The range is between 1 and 100
data packet-count *count*	Configures 802.11 coverage minimum-failure-count threshold for uplinkdata packets.
data rssi-threshold *threshold*	Configures 802.11 minimum-receive-coverage level for voice packets.
exception global *percentage*	Configures 802.11 Cisco APs coverage-exception level. The range is between 0 and 100 percent.
level global *number*	Configures 802.11 Cisco AP client-minimum-exception level between 1 and 75 clients.

voice	Configures 802.11 coverage Hole-Detection for voice packets.
fail-percentage *percentage*	Configures 802.11 coverage failure rate threshold for uplink voice packets.
packet-count *number*	Configures 802.11 coverage minimum-uplink-failure count threshold for voice packets.
rssi-threshold *threshold*	Configures 802.11 minimum receive coverage level for voice packets.

Command Default   Disabled

Command Modes   Interface configuration

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   This command applies for both 802.11a and 802.11b bands. But the appropriate commands must be chosen for configuring the parameter.

This example shows how to configure various RRM settings.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm ?
  ccx           Configure Advanced(RRM) 802.11a CCX options
  channel       Configure advanced 802.11a channel assignment parameters
  coverage      802.11a Coverage Hole Detection
  group-member  Configure members in 802.11a static RF group
  group-mode    802.11a RF group selection mode
  logging       802.11a event logging
  monitor       802.11a statistics monitoring
  ndp-type      Neighbor discovery type Protected/Transparent
  profile       802.11a performance profile
  tpc-threshold Configures the Tx Power Control Threshold used by RRM for auto
                power assignment
  txpower       Configures the 802.11a Tx Power Level
```

ap dot11 rrm ccx

To configure radio resource management CCX options for 2.4 GHz and 5GHz devices, use the **ap dot11 rrm ccx** command.

ap dot11 {**24ghz** | **5ghz**} **rrm ccx location-measurement** *interval*

Syntax Description	**location-measurement** *interval*	Specifies the CCX client-location measurement interval value. The range is between 10 and 32400 seconds.

Command Default   None.

Command Modes   Interface configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to set CCX location-measurement interval for a 5-GHz device.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm ccx location-measurement 10
```

ap dot11 rrm channel

To enable radio resource management channel for 2.4 GHz and 5GHz devices, use the **ap dot11 rrm channel** command. To disable the radio resource mangement for 2.4 GHz and 5 GHz devices, use the **no** form of the command.

ap dot11 {**24ghz** | **5ghz**} **rrm channel** {**cleanair-event** | **dca** | **device** | **foreign** | **load** | **noise**}
no ap dot11 {**24ghz** | **5ghz**} **rrm channel** {**cleanair-event** | **dca** | **device** | **foreign** | **load** | **noise**}

Syntax Description	**cleanair-event**	Specifies the cleanair event-driven RRM parameters
	dca	Specifies the 802.11 dynamic channel assignment algorithm parameters
	device	Specifies the persistent non-WiFi device avoidance in the 802.11-channel assignment.
	foreign	Enables foreign AP 802.11-interference avoidance in the channel assignment.
	load	Enables Cisco AP 802.11-load avoidance in the channel assignment.
	noise	Enables non-802.11-noise avoidance in the channel assignment.

Command Default   None.

Command Modes   Interface configuration.

Command History	Release	Modification
	Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines None.

This example shows all the parameters available for **Channel**.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 24ghz rrm channel ?
  cleanair-event  Configure cleanair event-driven RRM parameters
  dca             Config 802.11b dynamic channel assignment algorithm
                  parameters
  device          Configure persistent non-WiFi device avoidance in the 802.11b
                  channel assignment
  foreign         Configure foreign AP 802.11b interference avoidance in the
                  channel assignment
  load            Configure Cisco AP 802.11b load avoidance in the channel
                  assignment
  noise           Configure 802.11b noise avoidance in the channel assignment
```

ap dot11 24ghz rrm channel cleanair-event rogue-contribution

To configure cleanair event driven Radio Resource Management (RRM) rogue contribution parameters, use the **ap dot11 24ghz rrm channel cleanair-event rogue-contribution** command.

ap dot11 24ghz rrm channel cleanair-event rogue-contribution duty-cycle *threshold-value*

Syntax Description	duty-cycle	Sets event-driven RRM rogue contribution duty cycle.
	threshold-value	Custom ED-RRM rogue contribution duty cycle threshold value. Valid value ranges from 1 -99 percent.

Command Default The rogue contribution duty cycle is not set.

Command History	Release	Modification
	16.1	This command was introduced.

Usage Guidelines This command sets event-driven RRM rogue contribution duty cycle.

Example

This example shows how to configure cleanair event driven RRM rogue contribution parameters:

```
 Cisco Controller(config)# ap dot11 24ghz rrm channel cleanair-event rogue-contribution
duty-cycle 1
```

ap dot11 24ghz or 5ghz rrm channel dca add

To add non-default radio resource management DCA channels to the DCA channel list for 2.4 GHz or 5 GHz devices, use the **ap dot11** {**24ghz** | **5ghz** } **rrm channel dca add** command. To remove a default channel from the DCA list, use the **no** form of the command. The DCA channel list contains standard channels matching your country of operation. For example, a regulatory default channel list contains channels 1, 6, and 11.

ap dot11 [{**24ghz** | **5ghz**}] **rrm channel dca add** *number*
no ap dot11 [{**24ghz** | **5ghz**}] **rrm channel dca add** *number*

Syntax Description	*number*	DCA channel number.

Command Default   None.

Command Modes   Global configuration

Command History

Release	Modification
Cisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to add a non-default radio resource management DCA channel to the DCA list for a 2.4 GHz device, using the **ap dot11 24ghz rrm channel dca add 10** command:

```
Device(config)# ap dot11 24ghz rrm channel dca add 10
```

ap dot11 24ghz or 5ghz rrm channel dca remove

To remove a default radio resource management DCA channels from the DCA channel list for 2.4 GHz or 5 GHz devices, use the **ap dot11** {**24ghz** | **5ghz**} **rrm channel dca remove** *number* command. To add a default DCA channel back to the DCA channel list, use the **no** form of the command.

ap dot11 [{**24ghz** | **5ghz**}] **rrm channel dca remove** *number*
no ap dot11 [{**24ghz** | **5ghz**}] **rrm channel dca remove** *number*

Syntax Description	*number*	Specifies the radio resource management DCA channel.

Command Default   None.

Command Modes   Global configuration.

Command History	Release	Modification
	Cisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to remove default radio resource management DCA channel from the DCA list for a 2.4 GHz device, using the **ap dot11 24ghz rrm channel dca remove** command:

```
Device(config)#ap dot11 24ghz rrm channel dca remove 11
```

ap dot11 5ghz rrm channel dca chan-width-11n

To configure DCA channel width for all 802.11n radios in the 5-GHz band, enter the **ap dot11 5ghz rrm channel dca chan-width-11n** *width* command. To disable DCA channel width for all 802.11n radios in the 5-GHz band, use the **no** form of the command.

ap dot11 5ghzrrm channel dca chan-width-11n {**20**|**40**}
noap dot11 5ghzrrm channel dca chan-width-11n {**20**|**40**}

Syntax Description	chan-width-11n	Specifies DCA channel width for all 802.11n radios in the 5-GHz band.
	20	Sets the channel width for 802.11n radios to 20 MHz.
	40	Sets the channel width for 802.11n radios to 40 MHz.

Command Default   The default channel width is 20.

Command Modes   Global configuration.

Command History	Release	Modification
	Cisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to set the channel width for the 802.11n radios to 40 MHz, using the **ap dot11 5ghz rrm channel dca chan-width-11n** command:

```
Device(config)#ap dot11 5ghz rrm channel dca chan-width-11n 40
```

ap dot11 rrm coverage

To enable 802.11 coverage hole detection, use the **ap dot11 rrm coverage** command.

ap dot11 {**24ghz** | **5ghz**} **rrm coverage** [{**data** {**fail-percentage** *percentage* | **packet-count** *count* | **rssi-threshold** *threshold*} | **exceptional global** *value* | **level global** *value* | **voice** {**fail-percentage** *percentage* | **packet-count** *packet-count* | **rssi-threshold** *threshold*}}]

Syntax Description		
	data	Specifies 802.11 coverage hole-detection data packets.
	fail-percentage *percentage*	Specifies 802.11 coverage failure-rate threshold for uplink data packets. The range is between 1 and 100
	packet-count *count*	Specifies 802.11 coverage minimum-failure-count threshold for uplink data packets.
	rssi-threshold *threshold*	Specifies 802.11 minimum-receive-coverage level for voice packets.
	exceptional global *value*	Specifies 802.11 Cisco APs coverage-exception level. The range is between 0 and 100 percent.
	level global *value*	Specifies 802.11 Cisco AP client-minimum-exception level between 1 and 75 clients.
	voice	Specifies 802.11 coverage Hole-Detection for voice packets.
	fail-percentage *percentage*	Specifies 802.11 coverage failure rate threshold for uplink voice packets.
	packet-count *packet-count*	Specifies 802.11 coverage minimum-uplink-failure count threshold for voice packets.
	rssi-threshold *threshold*	Specifies 802.11 minimum receive coverage level for voice packets.

Command Default   None.

Command Modes   Interface configuration.

Command History	**Release**	**Modification**
	Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   If you enable coverage hole-detection, the device automatically determines, based on data that is received from the access points, whether any access points have clients that are potentially located in areas with poor coverage.

If both the number and percentage of failed packets exceed the values that you entered in the **ap dot11 {24ghz | 5ghz} rrm coverage packet-count** and **ap dot11 {24ghz | 5ghz} rrm coverage fail-percentage** commands for a 5-second period, the client is considered to be in a pre-alarm condition. The device uses this information to distinguish between real and false coverage holes and excludes clients with poor roaming logic. A coverage hole is detected if both the number and percentage of failed clients meet or exceed the values entered in the **ap dot11 {24ghz | 5ghz} rrm coverage level-global** and **ap dot11 {24ghz | 5ghz} rrm coverage exceptional-global** commands over a 90-second period. The device determines whether the coverage hole can be corrected and, if appropriate, mitigate the coverage hole by increasing the transmit power level for that specific access point.

This example shows how to set the RSSI-threshold for data in 5-GHz band.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm coverage data rssi-threshold -80
```

ap dot11 rrm group-member

To configure members in 802.11 static RF group, use the **ap dot11 rrm group-member** command. To remove the member, use the **no** form of the command.

ap dot11 {**24ghz** | **5ghz**} **rrm group-member** *controller-name controller-ip*
no ap dot11 {**24ghz** | **5ghz**} **rrm group-member** *controller-name controller-ip*

Syntax Description		
	controller-name	Specifies the name of the controller to be added.
	controller-ip	Specifies the IP address of the controller to be added.

Command Default   None.

Command Modes   Interface configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to add a controller in the 5-GHz automatic-RF group

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm group-member ABC 10.1.1.1
```

ap dot11 rrm monitor

To monitor the 802.11-band statistics, use the **ap dot11 rrm monitor** command. To disable, use the **no** form of the command.

ap dot11 {**24ghz** | **5ghz**} **rrm monitor** {**channel-list** | {**all** | **country** | **dca**} | **coverage** | **load** | **noise** | **signal**}
no ap dot11 {**24ghz** | **5ghz**} **rrm monitor** {**channel-list** | **coverage** | **load** | **noise** | **signal**}

Syntax Description		
	channel-list	Sets the 802.11 noise/interference/rogue monitoring channel-list.

all	Specifies to monitor all the channels.
country	Specifies to monitor channels used in configured country code
dca	Specifies to monitor channels used by dynamic channel assignment.
coverage	Specifies 802.11 coverage measurement interval. The range is between 60 and 3600 in seconds
load	Specifies 802.11 load measurement interval. The range is between 60 and 3600 in seconds
noise	Specifies 802.11 noise measurement interval (channel scan interval). The range is between 60 and 3600 in seconds
signal	Specifies 802.11 signal measurement interval (neighbor packet frequency). The range is between 60 and 3600 in seconds

Command Default   None.

Command Modes   Interface Configuration

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines   None.

This example shows how to enable monitoring all the 5-GHz band channels.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm monitor channel-list all
```

ap dot11 rrm profile

To configure Cisco lightweight access point profile settings on supported 802.11 networks, use the **ap dot11 rrm profile** command.

ap dot11 {**24ghz** | **5ghz**} **rrm profile** {**customize** | **foreign** *value* | **noise** *value* | **throughput** *value* | **utilization** *value*}

Syntax Description

customize	Enables performance profiles.
foreign *value*	Specifies the 802.11 foreign 802.11 interference threshold value. The range is between 0 and 100 percent.
noise *value*	Specifies the 802.11 foreign noise threshold value. The range is between -127 and 0 dBm

throughput *value*	Specifies the 802.11a Cisco AP throughput threshold value. The range is between 1000 and 10000000 bytes per second
utilization *value*	Specifies the 802.11a RF utilization threshold value. The range is between 0 and 100 percent

Command Default Disabled.

Command Modes Interface configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines None.

This example shows how to set the threshold value for the noise parameter.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm profile noise -50
```

ap dot11 rrm tpc-threshold

To configure the tx-power control threshold used by RRM for auto power assignment, use the **ap dot11 rrm tpc-threshold** command. To disable, use the **no** form of the command.

ap dot11 {**24ghz** | **5ghz**} **rrm tpc-threshold** *value*
no ap dot11 {**24ghz** | **5ghz**} **rrm tpc-threshold**

Syntax Description *value*   Specifies the power value. The range is between -80 and -50.

Command Default None.

Command Modes Interface configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines None.

This example shows how to configure the tx-power control threshold used by RRM for auto power assignment.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm tpc-threshold -60
```

ap dot11 rrm txpower

To configure the 802.11 tx-power level, use the **ap dot11 rrm txpower** command. To disable the 802.11 tx-power level, use the **no** form of the command.

ap dot11 {**24ghz** | **5ghz**} **rrm txpower** {**auto** | **max** *powerLevel* | **min** *powerLevel* | **once***power-level*} **noap dot11** {**24ghz** | **5ghz**} **rrm txpower** {**auto** | **max** *powerLevel* | **min** *powerLevel* | **once***power-level*}

Syntax Description		
	auto	Enables auto-RF.
	max *powerLevel*	Configures maximum auto-RF tx power. The range is between -10 to -30.
	min *powerLevel*	Configures minimum auto-RF tx power. The range is between -10 to -30.
	once	Enables one-time auto-RF.

Command Default   None.

Command Modes   Interface configuration.

Command History	Release	Modification
	Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.
	Cisco IOS XE 3.3SE	The **no** form of the command is introduced.

Usage Guidelines   None.

This example shows how to enables auto-RF once.

```
Device#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Device(config)#ap dot11 5ghz rrm txpower once
```

show ap dot11 24ghz

To display the 2.4 GHz RRM parameters, use the **show ap dot11 24ghz** command.

show ap dot11 24ghz {**ccx** | **channel** | **coverage** | **group** | **l2roam** | **logging** | **monitor** | **profile** | **receiver** | **summary** | **txpower**}

Syntax Description		
	ccx	Displays the 802.11b CCX information for all Cisco APs.

channel	Displays the configuration and statistics of the 802.11b channel assignment.
coverage	Displays the configuration and statistics of the 802.11b coverage.
group	Displays the configuration and statistics of the 802.11b grouping.
l2roam	Displays 802.11b l2roam information.
logging	Displays the configuration and statistics of the 802.11b event logging.
monitor	Displays the configuration and statistics of the 802.11b monitoring.
profile	Displays 802.11b profiling information for all Cisco APs.
receiver	Displays the configuration and statistics of the 802.11b receiver.
summary	Displays the configuration and statistics of the 802.11b Cisco APs.
txpower	Displays the configuration and statistics of the 802.11b transmit power control.

Command Default None.

Command Modes Global configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines None.

This example shows how to display configuration and statistics of the 802.11b coverage.

```
Device#show ap dot11 24ghz coverage

Coverage Hole Detection
  802.11b Coverage Hole Detection Mode            : Enabled
  802.11b Coverage Voice Packet Count             : 100 packet(s)
  802.11b Coverage Voice Packet Percentage        : 50%
  802.11b Coverage Voice RSSI Threshold           : -80 dBm
  802.11b Coverage Data Packet Count              : 50 packet(s)
  802.11b Coverage Data Packet Percentage         : 50%
  802.11b Coverage Data RSSI Threshold            : -80 dBm
  802.11b Global coverage exception level         : 25 %
  802.11b Global client minimum exception level   : 3 clients
```

show ap dot11 5ghz

To display the 5GHz RRM parameters, use the **show ap dot11 5ghz** command.

show ap dot11 5ghz {**ccx** | **channel** | **coverage** | **group** | **l2roam** | **logging** | **monitor** | **profile** | **receiver** | **summary** | **txpower**}

Syntax Description

ccx	Displays the 802.11a CCX information for all Cisco APs.
channel	Displays the configuration and statistics of the 802.11a channel assignment.
coverage	Displays the configuration and statistics of the 802.11a coverage.
group	Displays the configuration and statistics of the 802.11a grouping.
l2roam	Displays 802.11a l2roam information.
logging	Displays the configuration and statistics of the 802.11a event logging.
monitor	Displays the configuration and statistics of the 802.11a monitoring.
profile	Displays 802.11a profiling information for all Cisco APs.
receiver	Displays the configuration and statistics of the 802.11a receiver.
summary	Displays the configuration and statistics of the 802.11a Cisco APs.
txpower	Displays the configuration and statistics of the 802.11a transmit power control.

Command Default None.

Command Modes Global configuration.

Command History

Release	Modification
Cisco IOS XE 3.2SECisco IOS XE 3.3SE	This command was introduced.

Usage Guidelines None.

This example shows configuration and statistics of 802.11a channel assignment.

```
Device#show ap dot11 5ghz channel

Automatic Channel Assignment
  Channel Assignment Mode                    : AUTO
  Channel Update Interval                     : 12 Hours
  Anchor time (Hour of the day)               : 20
  Channel Update Contribution                 : SNI..
  Channel Assignment Leader                   : web (9.9.9.2)
  Last Run                                    : 16534 seconds ago
  DCA Sensitivity Level                       : MEDIUM (15 dB)
  DCA 802.11n Channel Width                   : 40 Mhz
  Channel Energy Levels
      Minimum                                 : unknown
      Average                                 : unknown
      Maximum                                 : unknown
  Channel Dwell Times
      Minimum                                 : unknown
      Average                                 : unknown
      Maximum                                 : unknown
  802.11a 5 GHz Auto-RF Channel List
  Allowed Channel List                        : 36,40,44,48,52,56,60,64,149,153,1
```

```
                57,161
Unused Channel List                         : 100,104,108,112,116,132,136,140,1

                65
802.11a 4.9 GHz Auto-RF Channel List
Allowed Channel List                        :
Unused Channel List                         : 1,2,3,4,5,6,7,8,9,10,11,12,13,14,

                15,16,17,18,19,20,21,22,23,24,25,26
DCA Outdoor AP option                       : Disabled
```

show ap dot11 5ghz