



Radio Resource Management Command Reference, Cisco IOS XE Release 3SE (Catalyst 3650 Switches)

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Preface

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Document Conventions

This document uses the following conventions:

Convention	Description
^ or Ctrl	Both the ^ symbol and Ctrl represent the Control (Ctrl) key on a keyboard. For example, the key combination ^D or Ctrl-D means that you hold down the Control key while you press the D key. (Keys are indicated in capital letters but are not case sensitive.)
bold font	Commands and keywords and user-entered text appear in bold font .
<i>Italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
Courier font	Terminal sessions and information the system displays appear in <i>courier font</i> .
Bold Courier font	Bold Courier font indicates text that the user must enter.
[x]	Elements in square brackets are optional.
...	An ellipsis (three consecutive nonbolded periods without spaces) after a syntax element indicates that the element can be repeated.
	A vertical line, called a pipe, indicates a choice within a set of keywords or arguments.
[x y]	Optional alternative keywords are grouped in brackets and separated by vertical bars.

Convention	Description
{x y}	Required alternative keywords are grouped in braces and separated by vertical bars.
[x {y z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
<>	Nonprinting characters such as passwords are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Reader Alert Conventions

This document may use the following conventions for reader alerts:



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.



Tip

Means *the following information will help you solve a problem*.



Caution

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.



Timesaver

Means *the described action saves time*. You can save time by performing the action described in the paragraph.



Warning

Means *reader be warned*. In this situation, you might perform an action that could result in bodily injury.

Related Documentation

**Note**

Before installing or upgrading the switch, refer to the switch release notes.

- Cisco Catalyst 3650 Switch documentation, located at:
http://www.cisco.com/go/cat3650_docs
- Cisco SFP and SFP+ modules documentation, including compatibility matrixes, located at:
http://www.cisco.com/en/US/products/hw/modules/ps5455/tsd_products_support_series_home.html
- Error Message Decoder, located at:
<https://www.cisco.com/cgi-bin/Support/Errordecoder/index.cgi>

Obtaining Documentation and Submitting a Service Request

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CHAPTER 1

Using the Command-Line Interface

- [Information About Using the Command-Line Interface, page 1](#)
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Information About Using the Command-Line Interface

Command Modes

The Cisco IOS user interface is divided into many different modes. The commands available to you depend on which mode you are currently in. Enter a question mark (?) at the system prompt to obtain a list of commands available for each command mode.

You can start a CLI session through a console connection, through Telnet, a SSH, or by using the browser.

When you start a session, you begin in user mode, often called user EXEC mode. Only a limited subset of the commands are available in user EXEC mode. For example, most of the user EXEC commands are one-time commands, such as **show** commands, which show the current configuration status, and **clear** commands, which clear counters or interfaces. The user EXEC commands are not saved when the switch reboots.

To have access to all commands, you must enter privileged EXEC mode. Normally, you must enter a password to enter privileged EXEC mode. From this mode, you can enter any privileged EXEC command or enter global configuration mode.

Using the configuration modes (global, interface, and line), you can make changes to the running configuration. If you save the configuration, these commands are stored and used when the switch reboots. To access the various configuration modes, you must start at global configuration mode. From global configuration mode, you can enter interface configuration mode and line configuration mode.

This table describes the main command modes, how to access each one, the prompt you see in that mode, and how to exit the mode.

Table 1: Command Mode Summary

Mode	Access Method	Prompt	Exit Method	About This Mode
User EXEC	Begin a session using Telnet, SSH, or console.	Switch>	Enter logout or quit .	Use this mode to <ul style="list-style-type: none"> • Change terminal settings. • Perform basic tests. • Display system information.
Privileged EXEC	While in user EXEC mode, enter the enable command.	Switch#	Enter disable to exit.	Use this mode to verify commands that you have entered. Use a password to protect access to this mode.
Global configuration	While in privileged EXEC mode, enter the configure command.	Switch(config)#	To exit to privileged EXEC mode, enter exit or end , or press Ctrl-Z .	Use this mode to configure parameters that apply to the entire switch.
VLAN configuration	While in global configuration mode, enter the vlan <i>vlan-id</i> command.	Switch(config-vlan)#	To exit to global configuration mode, enter the exit command. To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure VLAN parameters. When VTP mode is transparent, you can create extended-range VLANs (VLAN IDs greater than 1005) and save configurations in the switch startup configuration file.
Interface configuration	While in global configuration mode, enter the interface command (with a specific interface).	Switch(config-if)#	To exit to global configuration mode, enter exit . To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure parameters for the Ethernet ports.

Mode	Access Method	Prompt	Exit Method	About This Mode
Line configuration	While in global configuration mode, specify a line with the line vty or line console command.	Switch(config-line)#	To exit to global configuration mode, enter exit . To return to privileged EXEC mode, press Ctrl-Z or enter end .	Use this mode to configure parameters for the terminal line.

Using the Help System

You can enter a question mark (?) at the system prompt to display a list of commands available for each command mode. You can also obtain a list of associated keywords and arguments for any command.

SUMMARY STEPS

1. **help**
2. *abbreviated-command-entry ?*
3. *abbreviated-command-entry <Tab>*
4. **?**
5. *command ?*
6. *command keyword ?*

DETAILED STEPS

	Command or Action	Purpose
Step 1	help Example: Switch# help	Obtains a brief description of the help system in any command mode.
Step 2	<i>abbreviated-command-entry ?</i> Example: Switch# di? dir disable disconnect	Obtains a list of commands that begin with a particular character string.
Step 3	<i>abbreviated-command-entry <Tab></i> Example: Switch# sh conf<tab> Switch# show configuration	Completes a partial command name.

	Command or Action	Purpose
Step 4	? Example: Switch> ?	Lists all commands available for a particular command mode.
Step 5	<i>command</i> ? Example: Switch> show ?	Lists the associated keywords for a command.
Step 6	<i>command keyword</i> ? Example: Switch(config)# cdp holdtime ? <10-255> Length of time (in sec) that receiver must keep this packet	Lists the associated arguments for a keyword.

Understanding Abbreviated Commands

You need to enter only enough characters for the switch to recognize the command as unique.

This example shows how to enter the **show configuration** privileged EXEC command in an abbreviated form:

```
Switch# show conf
```

No and Default Forms of Commands

Almost every configuration command also has a **no** form. In general, use the **no** form to disable a feature or function or reverse the action of a command. For example, the **no shutdown** interface configuration command reverses the shutdown of an interface. Use the command without the keyword **no** to reenable a disabled feature or to enable a feature that is disabled by default.

Configuration commands can also have a **default** form. The **default** form of a command returns the command setting to its default. Most commands are disabled by default, so the **default** form is the same as the **no** form. However, some commands are enabled by default and have variables set to certain default values. In these cases, the **default** command enables the command and sets variables to their default values.

CLI Error Messages

This table lists some error messages that you might encounter while using the CLI to configure your switch.

Table 2: Common CLI Error Messages

Error Message	Meaning	How to Get Help
<code>% Ambiguous command: "show con"</code>	You did not enter enough characters for your switch to recognize the command.	Reenter the command followed by a question mark (?) without any space between the command and the question mark. The possible keywords that you can enter with the command appear.
<code>% Incomplete command.</code>	You did not enter all of the keywords or values required by this command.	Reenter the command followed by a question mark (?) with a space between the command and the question mark. The possible keywords that you can enter with the command appear.
<code>% Invalid input detected at '^' marker.</code>	You entered the command incorrectly. The caret (^) marks the point of the error.	Enter a question mark (?) to display all of the commands that are available in this command mode. The possible keywords that you can enter with the command appear.

Configuration Logging

You can log and view changes to the switch configuration. You can use the Configuration Change Logging and Notification feature to track changes on a per-session and per-user basis. The logger tracks each configuration command that is applied, the user who entered the command, the time that the command was entered, and the parser return code for the command. This feature includes a mechanism for asynchronous notification to registered applications whenever the configuration changes. You can choose to have the notifications sent to the syslog.



Note Only CLI or HTTP changes are logged.

How to Use the CLI to Configure Features

Configuring the Command History

The software provides a history or record of commands that you have entered. The command history feature is particularly useful for recalling long or complex commands or entries, including access lists. You can customize this feature to suit your needs.

Changing the Command History Buffer Size

By default, the switch records ten command lines in its history buffer. You can alter this number for a current terminal session or for all sessions on a particular line. This procedure is optional.

SUMMARY STEPS

1. **terminal history** [*size number-of-lines*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	terminal history [<i>size number-of-lines</i>] Example: Switch# terminal history size 200	Changes the number of command lines that the switch records during the current terminal session in privileged EXEC mode. You can configure the size from 0 to 256.

Recalling Commands

To recall commands from the history buffer, perform one of the actions listed in this table. These actions are optional.



Note

The arrow keys function only on ANSI-compatible terminals such as VT100s.

SUMMARY STEPS

1. **Ctrl-P** or use the **up arrow** key
2. **Ctrl-N** or use the **down arrow** key
3. **show history**

DETAILED STEPS

	Command or Action	Purpose
Step 1	Ctrl-P or use the up arrow key	Recalls commands in the history buffer, beginning with the most recent command. Repeat the key sequence to recall successively older commands.
Step 2	Ctrl-N or use the down arrow key	Returns to more recent commands in the history buffer after recalling commands with Ctrl-P or the up arrow key. Repeat the key sequence to recall successively more recent commands.

	Command or Action	Purpose
Step 3	show history Example: Switch# <code>show history</code>	Lists the last several commands that you just entered in privileged EXEC mode. The number of commands that appear is controlled by the setting of the terminal history global configuration command and the history line configuration command.

Disabling the Command History Feature

The command history feature is automatically enabled. You can disable it for the current terminal session or for the command line. This procedure is optional.

SUMMARY STEPS

1. `terminal no history`

DETAILED STEPS

	Command or Action	Purpose
Step 1	terminal no history Example: Switch# <code>terminal no history</code>	Disables the feature during the current terminal session in privileged EXEC mode.

Enabling and Disabling Editing Features

Although enhanced editing mode is automatically enabled, you can disable it and reenble it.

SUMMARY STEPS

1. `terminal editing`
2. `terminal no editing`

DETAILED STEPS

	Command or Action	Purpose
Step 1	terminal editing Example: Switch# <code>terminal editing</code>	Reenables the enhanced editing mode for the current terminal session in privileged EXEC mode.

	Command or Action	Purpose
Step 2	terminal no editing Example: Switch# <code>terminal no editing</code>	Disables the enhanced editing mode for the current terminal session in privileged EXEC mode.

Editing Commands Through Keystrokes

The keystrokes help you to edit the command lines. These keystrokes are optional.



Note

The arrow keys function only on ANSI-compatible terminals such as VT100s.

Table 3: Editing Commands

Editing Commands	Description
Ctrl-B or use the left arrow key	Moves the cursor back one character.
Ctrl-F or use the right arrow key	Moves the cursor forward one character.
Ctrl-A	Moves the cursor to the beginning of the command line.
Ctrl-E	Moves the cursor to the end of the command line.
Esc B	Moves the cursor back one word.
Esc F	Moves the cursor forward one word.
Ctrl-T	Transposes the character to the left of the cursor with the character located at the cursor.
Delete or Backspace key	Erases the character to the left of the cursor.
Ctrl-D	Deletes the character at the cursor.
Ctrl-K	Deletes all characters from the cursor to the end of the command line.
Ctrl-U or Ctrl-X	Deletes all characters from the cursor to the beginning of the command line.
Ctrl-W	Deletes the word to the left of the cursor.

Esc D	Deletes from the cursor to the end of the word.
Esc C	Capitalizes at the cursor.
Esc L	Changes the word at the cursor to lowercase.
Esc U	Capitalizes letters from the cursor to the end of the word.
Ctrl-V or Esc Q	Designates a particular keystroke as an executable command, perhaps as a shortcut.
Return key	Scrolls down a line or screen on displays that are longer than the terminal screen can display. Note The More prompt is used for any output that has more lines than can be displayed on the terminal screen, including show command output. You can use the Return and Space bar keystrokes whenever you see the More prompt.
Space bar	Scrolls down one screen.
Ctrl-L or Ctrl-R	Redisplays the current command line if the switch suddenly sends a message to your screen.

Editing Command Lines That Wrap

You can use a wraparound feature for commands that extend beyond a single line on the screen. When the cursor reaches the right margin, the command line shifts ten spaces to the left. You cannot see the first ten characters of the line, but you can scroll back and check the syntax at the beginning of the command. The keystroke actions are optional.

To scroll back to the beginning of the command entry, press **Ctrl-B** or the left arrow key repeatedly. You can also press **Ctrl-A** to immediately move to the beginning of the line.



Note

The arrow keys function only on ANSI-compatible terminals such as VT100s.

The following example shows how to wrap a command line that extends beyond a single line on the screen.

SUMMARY STEPS

1. **access-list**
2. **Ctrl-A**
3. **Return** key

DETAILED STEPS

	Command or Action	Purpose
Step 1	access-list Example: <pre>Switch(config)# access-list 101 permit tcp 10.15.22.25 255.255.255.0 10.15.22.35 Switch(config)# \$ 101 permit tcp 10.15.22.25 255.255.255.0 10.15.22.35 255.25 Switch(config)# \$t tcp 10.15.22.25 255.255.255.0 131.108.1.20 255.255.255.0 eq Switch(config)# \$15.22.25 255.255.255.0 10.15.22.35 255.255.255.0 eq 45</pre>	<p>Displays the global configuration command entry that extends beyond one line.</p> <p>When the cursor first reaches the end of the line, the line is shifted ten spaces to the left and redisplayed. The dollar sign (\$) shows that the line has been scrolled to the left. Each time the cursor reaches the end of the line, the line is again shifted ten spaces to the left.</p>
Step 2	Ctrl-A Example: <pre>Switch(config)# access-list 101 permit tcp 10.15.22.25 255.255.255.0 10.15.25\$</pre>	<p>Checks the complete syntax.</p> <p>The dollar sign (\$) appears at the end of the line to show that the line has been scrolled to the right.</p>
Step 3	Return key	<p>Execute the commands.</p> <p>The software assumes that you have a terminal screen that is 80 columns wide. If you have a different width, use the terminal width privileged EXEC command to set the width of your terminal.</p> <p>Use line wrapping with the command history feature to recall and modify previous complex command entries.</p>

Searching and Filtering Output of show and more Commands

You can search and filter the output for **show** and **more** commands. This is useful when you need to sort through large amounts of output or if you want to exclude output that you do not need to see. Using these commands is optional.

SUMMARY STEPS

1. `{show | more} command | {begin | include | exclude} regular-expression`

DETAILED STEPS

	Command or Action	Purpose
Step 1	<code>{show more} command {begin include exclude} regular-expression</code>	Searches and filters the output.

	Command or Action	Purpose
	<p>Example:</p> <pre>Switch# show interfaces include protocol Vlan1 is up, line protocol is up Vlan10 is up, line protocol is down GigabitEthernet1/0/1 is up, line protocol is down GigabitEthernet1/0/2 is up, line protocol is up</pre>	<p>Expressions are case sensitive. For example, if you enter exclude output, the lines that contain output are not displayed, but the lines that contain output appear.</p>

Accessing the CLI on a Switch Stack

You can access the CLI through a console connection, through Telnet, a SSH, or by using the browser.

You manage the switch stack and the stack member interfaces through the active switch. You cannot manage stack members on an individual switch basis. You can connect to the active switch through the console port or the Ethernet management port of one or more stack members. Be careful with using multiple CLI sessions on the active switch. Commands that you enter in one session are not displayed in the other sessions. Therefore, it is possible to lose track of the session from which you entered commands.



Note

We recommend using one CLI session when managing the switch stack.

If you want to configure a specific stack member port, you must include the stack member number in the CLI command interface notation.

To debug the standby switch, use the **session standby ios** privileged EXEC command from the active switch to access the IOS console of the standby switch. To debug a specific stack member, use the **session switch stack-member-number** privileged EXEC command from the active switch to access the diagnostic shell of the stack member. For more information about these commands, see the switch command reference.

Accessing the CLI Through a Console Connection or Through Telnet

Before you can access the CLI, you must connect a terminal or a PC to the switch console or connect a PC to the Ethernet management port and then power on the switch, as described in the hardware installation guide that shipped with your switch.

If your switch is already configured, you can access the CLI through a local console connection or through a remote Telnet session, but your switch must first be configured for this type of access.

You can use one of these methods to establish a connection with the switch:

- Connect the switch console port to a management station or dial-up modem, or connect the Ethernet management port to a PC. For information about connecting to the console or Ethernet management port, see the switch hardware installation guide.
- Use any Telnet TCP/IP or encrypted Secure Shell (SSH) package from a remote management station. The switch must have network connectivity with the Telnet or SSH client, and the switch must have an enable secret password configured.

- The switch supports up to 16 simultaneous Telnet sessions. Changes made by one Telnet user are reflected in all other Telnet sessions.
- The switch supports up to five simultaneous secure SSH sessions.

After you connect through the console port, through the Ethernet management port, through a Telnet session or through an SSH session, the user EXEC prompt appears on the management station.



Radio Resource Management Commands

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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 <i>pct</i>	Configures 802.11 coverage failure-rate threshold for uplink data packets. The range is between 1 and 100
data packet-count <i>count</i>	Configures 802.11 coverage minimum-failure-count threshold for uplinkdata packets.

data rssi-threshold <i>threshold</i>	Configures 802.11 minimum-receive-coverage level for voice packets.
exception global <i>percentage</i>	Configures 802.11 Cisco APs coverage-exception level. The range is between 0 and 100 percent.
level global <i>number</i>	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 <i>percentage</i>	Configures 802.11 coverage failure rate threshold for uplink voice packets.
packet-count <i>number</i>	Configures 802.11 coverage minimum-uplink-failure count threshold for voice packets.
rssi-threshold <i>threshold</i>	Configures 802.11 minimum receive coverage level for voice packets.

Command Default

Disabled

Command Modes

Interface configuration

Command History

Release	Modification
	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.

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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 <i>interval</i>	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
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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 management 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	Parameter	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
		This command was introduced.

Usage Guidelines None.

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

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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 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:

```
Switch(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:

```
Switch(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:

```
Switch(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*|**rss-threshold** *threshold*}|**exceptional global** *value*|**level global** *value*|**voice** {**fail-percentage** *percentage*|**packet-count** *packet-count*|**rss-threshold** *threshold*}]

Syntax Description

data	Specifies 802.11 coverage hole-detection data packets.
fail-percentage <i>percentage</i>	Specifies 802.11 coverage failure-rate threshold for uplink data packets. The range is between 1 and 100
packet-count <i>count</i>	Specifies 802.11 coverage minimum-failure-count threshold for uplink data packets.
rss-threshold <i>threshold</i>	Specifies 802.11 minimum-receive-coverage level for voice packets.
exceptional global <i>value</i>	Specifies 802.11 Cisco APs coverage-exception level. The range is between 0 and 100 percent.
level global <i>value</i>	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 <i>percentage</i>	Specifies 802.11 coverage failure rate threshold for uplink voice packets.
packet-count <i>packet-count</i>	Specifies 802.11 coverage minimum-uplink-failure count threshold for voice packets.
rss-threshold <i>threshold</i>	Specifies 802.11 minimum receive coverage level for voice packets.

Command Default

None.

Command Modes

Interface configuration.

Command History

Release	Modification
	This command was introduced.

Usage Guidelines

If you enable coverage hole-detection, the switch 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 switch 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 switch 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.

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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

<i>controller-name</i>	Specifies the name of the controller to be added.
<i>controller-ip</i>	Specifies the IP address of the controller to be added.

Command Default

None.

Command Modes

Interface configuration.

Command History

Release	Modification
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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 <i>value</i>	Specifies the 802.11 foreign 802.11 interference threshold value. The range is between 0 and 100 percent.
noise <i>value</i>	Specifies the 802.11 foreign noise threshold value. The range is between -127 and 0 dBm
throughput <i>value</i>	Specifies the 802.11a Cisco AP throughput threshold value. The range is between 1000 and 10000000 bytes per second
utilization <i>value</i>	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
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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

<i>value</i>	Specifies the power value. The range is between -80 and -50.
--------------	--

Command Default

None.

Command Modes

Interface configuration.

Command History

Release	Modification
	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.

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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
	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.

```
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(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
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#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
	This command was introduced.

Usage Guidelines

None.

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

```
Switch#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

```



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