Cisco Wireless LAN Controller Mesh Access Points Command Reference, Release 7.4

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Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
http://www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883

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CONTENTS

Preface

This preface describes the audience, organization, and conventions of the Cisco Wireless LAN Controller Command Reference Guide. It also provides information on how to obtain other documentation. This chapter includes the following sections:

Audience

This publication is for experienced network administrators who configure and maintain Cisco wireless LAN controllers and Cisco lightweight access points.

Document Organization

This document is organized into the following chapters:

Chapter	Description
Overview	Describes how to use the command-line interface (CLI) on the controller.
CLI Commands	Provides detailed information about the CLI commands for the controller.

Document Conventions

This document uses the following conventions:

Convention	Indication
bold font	Commands and keywords and user-entered text appear in **bold** font.
italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
[ ]	Elements in square brackets are optional.
{x | y | z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
`courier` font	Terminal sessions and information the system displays appear in `courier` font.
<>	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.

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 perform an action that could result in equipment damage or loss of data.

Warning This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. (To see translations of the warnings that appear in this publication, refer to the appendix "Translated Safety Warnings.")

Warning Title	Description
Waarschuwing	Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. (Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het aanhangsel "Translated Safety Warnings" (Vertalingen van veiligheidsvoorschriften) raadplegen.)
Varoitus	Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. (Tässä julkaisussa esiintyvien varoitusten käännökset löydät liitteestä "Translated Safety Warnings" (käännetyt turvallisuutta koskevat varoitukset).)
Attention	Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures. Avant d'accéder à cet équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures courantes de prévention des accidents. Pour obtenir les traductions des mises en garde figurant dans cette publication, veuillez consulter l'annexe intitulée « Translated Safety Warnings » (Traduction des avis de sécurité).
Warnung	Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. (Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Anhang mit dem Titel "Translated Safety Warnings" (Übersetzung der Warnhinweise).)
Avvertenza	Questo simbolo di avvertenza indica un pericolo. Si è in una situazione che può causare infortuni. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nell'appendice, "Translated Safety Warnings" (Traduzione delle avvertenze di sicurezza).
Advarsel	Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. (Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i vedlegget "Translated Safety Warnings" [Oversatte sikkerhetsadvarsler].)
Aviso	Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos fisicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. (Para ver as traduções dos avisos que constam desta publicação, consulte o apêndice "Translated Safety Warnings" - "Traduções dos Avisos de Segurança").

Warning Title	Description
¡Advertencia!	Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. (Para ver traducciones de las advertencias que aparecen en esta publicación, consultar el apéndice titulado "Translated Safety Warnings.")
Varning	Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. (Se förklaringar av de varningar som förekommer i denna publikation i appendix "Translated Safety Warnings" [Översatta säkerhetsvarningar].)

Related Documentation

These documents provide complete information about the Cisco Unified Wireless Network solution:

- *Cisco Wireless LAN Controller Configuration Guide*
- *Cisco Wireless LAN Controller System Message Guide*
- *Release Notes for Cisco Wireless LAN Controllers and Lightweight Access Points*

Obtaining Documentation and Submitting a Service Request

For information about obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as an RSS feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service. Cisco currently supports RSS Version 2.0.

Overview

Mesh networking employs Cisco Aironet 1500 Series outdoor mesh access points and indoor mesh access points (Cisco Aironet 1040, 1130, 1140, 1240, 1250, 1260, 3500e, and 3500i series access points) along with the Cisco Wireless LAN Controller, and Cisco Prime Network Control System (NCS) to provide scalable, central management, and mobility between indoor and outdoor deployments. Control and Provisioning of Wireless Access Points (CAPWAP) protocol manages the connection of mesh access points to the network.

Controller software release 7.0.116.0 and later releases support these Cisco Aironet mesh access points:

- Cisco Aironet 1520 series outdoor mesh access points consist of the 1522 dual-radio mesh access point and the 1524PS/Serial Backhaul multi-radio mesh access point.
- Cisco Aironet 1550 series outdoor mesh access points consist of these models:
  - 1552E
  - 1552C
  - 1552I
  - 1552H
  - 1552EU
  - 1552CU

In the 7.0.98.0 release, indoor mesh is available on dual band Cisco Aironet 1130 and 1240 series access points. In the 7.0.116.0 release, indoor mesh is also available on dual band 11n access points (Cisco Aironet 1040, 1140, 1250, 1260, 3500e, and 3500i series access points). Indoor mesh is not supported with 802.11b/g only access points because 5 GHz is required for mesh backhaul access.

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CLI Command Keyboard Shortcuts

The table below lists the CLI keyboard shortcuts to help you enter and edit command lines on the controller.

Table 1: CLI Command Keyboard Shortcuts

Action	Description	Keyboard Shortcut
Change	The word at the cursor to lowercase.	Esc I
	The word at the cursor to uppercase.	Esc u
Delete	A character to the left of the cursor.	Ctrl-h, Delete, or Backspace
	All characters from the cursor to the beginning of the line.	Ctrl-u
	All characters from the cursor to the end of the line.	Ctrl-k
	All characters from the cursor to the end of the word.	Esc d
	The word to the left of the cursor.	Ctrl-w or Esc Backspace
Display MORE output	Exit from MORE output.	q, Q, or Ctrl-C
	Next additional screen. The default is one screen. To display more than one screen, enter a number before pressing the Spacebar key.	Spacebar
	Next line. The default is one line. To display more than one line, enter the number before pressing the Enter key.	Enter
Enter an Enter or Return key character.		Ctrl-m
Expand the command or abbreviation.		Ctrl-t or Tab
Move the cursor	One character to the left (back).	Ctrl-b or Left Arrow
	One character to the right (forward).	Ctrl-f or Right Arrow
	One word to the left (back), to the beginning of the current or previous word.	Esc b
	One word to the right (forward), to the end of the current or next word.	Esc f

Action	Description	Keyboard Shortcut
	To the beginning of the line.	Ctrl-a
	To the end of the line.	Ctrl-e
Redraw the screen at the prompt.		Ctrl-l or Ctrl-r
Return to the EXEC mode from any configuration mode		Ctrl-z
Return to the previous mode or exit from the CLI from Exec mode.		exit command
Transpose a character at the cursor with a character to the left of the cursor.		Ctrl-t

Using the Interactive Help Feature

The question mark (?) character allows you to get the following type of help about the command at the command line. The following table lists the interactive help feature list.

Table 2: Interactive Help Feature List

Command	
help	Provides a brief description of the Help feature in any command mode.
? at the command prompt	Lists all commands available for a particular command mode.
partial command?	Provides a list of commands that begin with the character string.
partial command<Tab>	Completes a partial command name.
command ?	Lists the keywords, arguments, or both associated with a command.
command keyword ?	Lists the arguments that are associated with the keyword.

Using the Help Command

Before You Begin

To look up keyboard commands, use the help command at the root level.

help

Help may be requested at any point in a command by entering a question mark '?'. If nothing matches, the help list will be empty and you must back up until entering a '?' shows the available options. Two types of help are available

1. Full help is available when you are ready to enter a command argument (for example show ?) and describes each possible argument.

2. Partial help is provided when an abbreviated argument is entered and you want to know what arguments match the input (for example show pr?).

Examples

```
> help
HELP:
Special keys:
  DEL, BS... delete previous character
  Ctrl-A  .... go to beginning of line
  Ctrl-E  .... go to end of line
  Ctrl-F  .... go forward one character
  Ctrl-B  .... go backward one character
  Ctrl-D  .... delete current character
  Ctrl-U, X. delete to beginning of line
  Ctrl-K  .... delete to end of line
  Ctrl-W  .... delete previous word
  Ctrl-T  .... transpose previous character
  Ctrl-P  .... go to previous line in history buffer
  Ctrl-N  .... go to next line in history buffer
  Ctrl-Z  .... return to root command prompt
  Tab, <SPACE> command-line completion
  Exit    .... go to next lower command prompt
  ?       .... list choices
```

Using the ? command

Before You Begin

To display all of the commands in your current level of the command tree, or to display more information about a particular command, use the ? command.

command name ?

When you enter a command information request, put a space between the **command name** and **?**.

Examples

This command shows you all the commands and levels available from the root level.

```
> ?
clear          Clear selected configuration elements.
config         Configure switch options and settings.
debug          Manages system debug options.
help           Help
linktest       Perform a link test to a specified MAC address.
logout         Exit this session. Any unsaved changes are lost.
ping           Send ICMP echo packets to a specified IP address.
reset          Reset options.
save           Save switch configurations.
show           Display switch options and settings.
transfer       Transfer a file to or from the switch.
```

Using the partial? command

Before You Begin

To provide a list of commands that begin with the character string, use the partial command ?.

partial command?

There should be no space between the command and the question mark.

Examples This example shows how to provide a command that begin with the character string “ad”:

```
> controller> config>ad?
```

The command that matches with the string “ad” is as follows:

```
advanced
```

Using the partial command<tab>

Before You Begin

To completes a partial command name, use the partial command<tab> command.

partial command<tab>

There should be no space between the command and <tab>.

Examples This example shows how to complete a partial command name that begin with the character string “ad”:

```
> Controller>config>cert<tab> certificate
```

Using the command ?

Examples To list the keywords, arguments, or both associated with the command, use the command ?.

command ?

There should be space between the command and the question mark.

This example shows how to list the arguments and keyword for the command acl:

```
> Controller >config acl ?
```

Information similar to the following appears:

```
apply          Applies the ACL to the data path.
counter        Start/Stop the ACL Counters.
create         Create a new ACL.
```

```
delete          Delete an ACL.
rule            Configure rules in the ACL.
cpu             Configure the CPU Acl Information
```

command keyword ?

To list the arguments that are associated with the keyword, use the command keyword ?

command keyword ?

Usage Guidelines

There should be space between the keyword and the question mark.

Examples

This example shows how to display the arguments associated with the keyword cpu:

```
> controller>config acl cpu ?
```

Information similar to the following appears:

```
none            None - Disable the CPU ACL
<name>          <name> - Name of the CPU ACL
```

command keyword ?

CLI Commands

The Cisco Wireless LAN solution command-line interface (CLI) enables operators to connect an ASCII console to the Cisco Wireless LAN Controller and configure the controller and its associated access points. This chapter describes the how to control and configure Mesh access points using the controller commands and contains the following sections:

Show Mesh Commands

Use the **show mesh** commands to see settings for outdoor and indoor mesh access points.

show mesh ap

To display settings for mesh access points, use the **show mesh ap** command.

show mesh ap {**summary** | **tree**}

Syntax Description

summary	Displays a summary of mesh access point information including the name, model, bridge virtual interface (BVI) MAC address, United States Computer Emergency Response Team (US-CERT) MAC address, hop, and bridge group name.
tree	Displays a summary of mesh access point information in a tree configuration, including the name, hop counter, link signal-to-noise ratio (SNR), and bridge group name.

Command Default

None.

Examples

This example shows how to display a summary format:

```
> show mesh ap summary
AP Name AP Model              BVI MAC              CERT MAC         Hop    Bridge Group Name
------------------  -------------------  -----------------  ------------------   -----  --
SB_RAP1 AIR-LAP1522AG-A-K9   00:1d:71:0e:d0:00  00:1d:71:0e:d0:00   0      sbox
SB_MAP1 AIR-LAP1522AG-A-K9   00:1d:71:0e:85:00  00:1d:71:0e:85:00   1      sbox
SB_MAP2 AIR-LAP1522AG-A-K9   00:1b:d4:a7:8b:00  00:1b:d4:a7:8b:00   2      sbox
SB_MAP3 AIR-LAP1522AG-A-K9   00:1d:71:0d:ee:00  00:1d:71:0d:ee:00   3      sbox
Number of Mesh APs.............................. 4
Number of RAPs.................................. 1
Number of MAPs.................................. 3
```

This example shows how to display settings in a hierarchical (tree) format:

```
> show mesh ap tree
 ========================================================
||  AP Name [Hop Counter, Link SNR, Bridge Group Name] ||
 ========================================================
[Sector 1]
----------
SB_RAP1[0,0,sbox]
  |-SB_MAP1[1,32,sbox]
    |-SB_MAP2[2,27,sbox]
      |-SB_MAP3[3,30,sbox]
--------------------------------------------------------
Number of Mesh APs.............................. 4
Number of RAPs.................................. 1
Number of MAPs.................................. 3
--------------------------------------------------------
```

Related Commands

config mesh alarm

config mesh astools

config mesh battery-state

show mesh astools stats

To display antistranding statistics for outdoor mesh access points, use the **show mesh astools stats** command.

show mesh astools stats [*cisco_ap*]

Syntax Description

cisco_ap	(Optional) Antistranding feature statistics for a designated mesh access point.

Command Default

None.

Examples

This example shows how to display anti-stranding statistics on all outdoor mesh access points:

```
> show mesh astools stats
Total No of Aps stranded : 0
```

This example shows how to display anti-stranding statistics for access point *sb_map1*:

```
> show mesh astools stats sb_map1
Total No of Aps stranded : 0
```

Related Commands

show mesh config

config mesh astools

show mesh stats

show mesh backhaul

To check the current backhaul, use the **show mesh backhaul** command.

show mesh backhaul *cisco_ap*

Syntax Description

cisco_ap	Name of the access point.

Command Default

None.

Examples

This example shows how to display the current backhaul:

```
> show mesh backhaul
```

If the current backhaul is 5 GHz, the output is as follows:

```
Basic Basic Attributes for Slot  0
    Radio Type..................................... RADIO_TYPE_80211g
    Radio Role..................................... DOWNLINK ACCESS
    Administrative State .......................... ADMIN_ENABLED
    Operation State ............................... UP
      Current Tx Power Level ...................... 1
If the current backhaul is 2.4 GHz, the output is as follows:
Basic Attributes for Slot  1
    Radio Type..................................... RADIO_TYPE_80211a
    Radio Subband.................................. RADIO_SUBBAND_ALL
    Radio Role..................................... DOWNLINK ACCESS
    Administrative State .......................... ADMIN_ENABLED
    Operation State ............................... UP
      Current Tx Power Level ...................... 1
      Current Channel ............................. 165
      Antenna Type................................. EXTERNAL_ANTENNA
      External Antenna Gain (in .5 dBm units).... 0
Current Channel.................................6
Antenna Type....................................Externa_ANTENNA
External Antenna Gain (in .5 dBm units)...........0
```

Related Commands

show mesh config

config mesh astools

show mesh stats

show mesh cac

To display call admission control (CAC) topology and the bandwidth used or available in a mesh network, use the **show mesh cac** command.

show mesh cac {**summary** | {**bwused** {**voice** | **video**} | **access** | **callpath** | **rejected**} *cisco_ap*}

Syntax Description

summary	Displays the total number of voice calls and voice bandwidth used for each mesh access point.
bwused	Displays the bandwidth for a selected access point in a tree topology.
voice	Displays the mesh topology and the voice bandwidth used or available.
video	Displays the mesh topology and the video bandwidth used or available.
access	Displays access voice calls in progress in a tree topology.
callpath	Displays the call bandwidth distributed across the mesh tree.
rejected	Displays voice calls rejected for insufficient bandwidth in a tree topology.
cisco_ap	Mesh access point name.

Command Default

None.

Examples

This example shows how to display a summary of the call admission control settings:

```
> show mesh cac summary
AP Name              Slot#    Radio  BW Used/Max  Calls
-----------------  -------  -----  -----------  -----
SB_RAP1              0        11b/g   0/23437      0
                     1        11a     0/23437      0
SB_MAP1              0        11b/g   0/23437      0
                     1        11a     0/23437      0
SB_MAP2              0        11b/g   0/23437      0
                     1        11a     0/23437      0
SB_MAP3              0        11b/g   0/23437      0
                     1        11a     0/23437      0
```

This example shows how to display the mesh topology and the voice bandwidth used or available:

```
> show mesh cac bwused voice SB_MAP1
AP Name               Slot#    Radio      BW Used/Max
-------------        -------  -----      -----------
    SB_RAP1             0      11b/g       0/23437
                        1      11a         0/23437
|   SB_MAP1             0      11b/g       0/23437
                        1      11a         0/23437
||  SB_MAP2             0      11b/g       0/23437
                        1      11a         0/23437
||| SB_MAP3             0      11b/g       0/23437
                        1      11a         0/23437
```

This example shows how to display the access voice calls in progress in a tree topology:

```
> show mesh cac access 1524_Map1
    AP Name              Slot#   Radio     Calls
    -------------       -------  -----    -----
    1524_Rap              0      11b/g      0
                          1      11a        0
                          2      11a        0
|   1524_Map1             0      11b/g      0
                          1      11a        0
                          2      11a        0
||  1524_Map2             0      11b/g      0
                          1      11a        0
                          2      11a        0
```

Related Commands

config 802.11 cac video acm

config 802.11 cac video roam-bandwidth

config 802.11 cac video max-bandwidth

config 802.11 cac video tspec-inactivity-timeout

config 802.11 cac voice acm

config 802.11 cac voice roam-bandwidth

config 802.11 cac voice max-bandwidth

config 802.11 cac voice tspec-inactivity-timeout

config 802.11 cac voice load-based

debug cac voice

show mesh client-access

To display the backhaul client access configuration setting, use the **show mesh client-access** command.

show mesh client-access

Syntax Description This command has no arguments or keywords.

Command Default None.

Examples This example shows how to display backhaul client access configuration settings for a mesh access point:

```
> show mesh client-access
Backhaul with client access status: enabled
Backhaul with client access extended status(3 radio AP): disabled
```

Related Commands **config mesh client-access**

show mesh config

To display mesh configuration settings, use the **show mesh config** command.

show mesh config

Syntax Description

This command has no arguments or keywords.

Command Default

None.

Examples

This example shows how to display global mesh configuration settings:

```
> show mesh config
Mesh Range...................................... 12000
Mesh Statistics update period.................. 3 minutes
Backhaul with client access status............. disabled
Backhaul with extended client access status..... disabled
Background Scanning State...................... enabled
Backhaul Amsdu State........................... disabled
Mesh Security
   Security Mode............................... EAP
   External-Auth............................... disabled
   Use MAC Filter in External AAA server....... disabled
   Force External Authentication.............. disabled
Mesh Alarm Criteria
   Max Hop Count............................... 4
   Recommended Max Children for MAP............ 10
   Recommended Max Children for RAP............ 20
   Low Link SNR................................ 12
   High Link SNR............................... 60
   Max Association Number...................... 10
   Association Interval........................ 60 minutes
   Parent Change Numbers....................... 3
Parent Change Interval..................... 60 minutes
Mesh Multicast Mode............................ In-Out
Mesh Full Sector DFS........................... enabled
Mesh Ethernet Bridging VLAN Transparent Mode..... disabled
Mesh DCA channels for serial backhaul APs....... enabled
Mesh Slot Bias................................. enabled
```

Related Commands

show mesh stats

show mgmtuser

config mesh alarm

show mesh env

To display global or specific environment summary information for mesh networks, use the **show mesh env** command.

show mesh env {**summary** | *cisco_ap*}

Syntax Description

summary	Displays global environment summary information.
cisco_ap	Name of access point for which environment summary information is requested.

Command Default

None.

Examples

This example shows how to display global environment summary information:

```
> show mesh env summary
AP Name             Temperature(C)  Heater   Ethernet  Battery
------------------  --------------  ------   --------  -------
ap1130:5f:be:90      N/A             N/A      DOWN     N/A
AP1242:b2.31.ea      N/A             N/A      DOWN     N/A
AP1131:f2.8d.92      N/A             N/A      DOWN     N/A
AP1131:46f2.98ac     N/A             N/A      DOWN     N/A
ap1500:62:39:70      -36             OFF      UP       N/A
```

This example shows how to display an environment summary for an access point:

```
> show mesh env SB_RAP1
AP Name..................................... SB_RAP1
AP Model.................................... AIR-LAP1522AG-A-K9
AP Role..................................... RootAP
Temperature................................. 21 C, 69 F
Heater...................................... OFF
Backhaul.................................... GigabitEthernet0
GigabitEthernet0 Status..................... UP
    Duplex.................................. FULL
    Speed................................... 100
    Rx Unicast Packets...................... 114754
    Rx Non-Unicast Packets.................. 1464
    Tx Unicast Packets...................... 9630
    Tx Non-Unicast Packets.................. 3331
GigabitEthernet1 Status..................... DOWN
  POE Out................................... OFF
Battery..................................... N/A
```

Related Commands

show mesh stats

show mesh neigh

To display summary or detailed information about the mesh neighbors for a specific mesh access point, use the **show mesh neigh** command.

show mesh neigh {**detail** | **summary**} {*cisco_ap* | **all**}

Syntax Description

detail	Displays the channel and signal-to-noise ratio (SNR) details between the designated mesh access point and its neighbor.
summary	Displays the mesh neighbors for a designated mesh access point.
cisco_ap	Cisco lightweight access point name.
all	Displays all access points.

Note If an AP itself is configured with the **all**keyword, the **all**keyword access points take precedence over the AP that is named **all**.

Examples

This example shows how to display a neighbor summary of an access point:

```
> show mesh neigh summary RAP1
AP Name/Radio Mac Channel Rate  Link-Snr  Flags      State
----------------- ------- ----- -------- --------   --------
00:1D:71:0F:CA:00 157      54     6        0x0        BEACON
00:1E:14:48:25:00 157      24     1        0x0        BEACON
MAP1-BB00         157      54     41       0x11       CHILD BEACON
```

This example shows how to display the detailed neighbor statistics of an access point:

```
> show mesh neigh detail RAP1
AP MAC : 00:1E:BD:1A:1A:00 AP Name: HOR1522_MINE06_MAP_S_Dyke
backhaul rate 54
FLAGS : 860 BEACON
worstDv 255, Ant 0, channel 153, biters 0, ppiters 0
Numroutes 0, snr 0, snrUp 8, snrDown 8, linkSnr 8
adjustedEase 0, unadjustedEase 0
txParent 0, rxParent 0
poorSnr 0
lastUpdate 2483353214 (Sun Aug 4 23:51:58 1912)
parentChange 0
Per antenna smoothed snr values: 0 0 0 0
Vector through 00:1E:BD:1A:1A:00
```

The following table lists the output flags displayed for the **show mesh neigh detail** command.

Table 3: Output Flags for the show mesh neigh detail command

Output Flag	Description
AP MAC	MAC address of a mesh neighbor for a designated mesh access point.
AP Name	Name of the mesh access point.
FLAGS	Describes adjacency. The possible values are as follows: • UPDATED—Recently updated neighbor. • NEIGH—One of the top neighbors. • EXCLUDED—Neighbor is currently excluded. • WASEXCLUDED—Neighbor was recently removed from the exclusion list. • PERMSNR—Permanent SNR neighbor. • CHILD—A child neighbor. • PARENT—A parent neighbor. • NEEDUPDATE—Not a current neighbor and needs an update. • BEACON—Heard a beacon from this neighbor. • ETHER—Ethernet neighbor.
worstDv	Worst distance vector through the neighbor.
Ant	Antenna on which the route was received.
channel	Channel of the neighbor.
biters	Number of black list timeouts left.
ppiters	Number of potential parent timeouts left.
Numroutes	Number of distance routes.
snr	Signal to Noise Ratio.
snrUp	SNR of the link to the AP.
snrDown	SNR of the link from the AP.
linkSnr	Calculated SNR of the link.
adjustedEase	Ease to the root AP through this AP. It is based on the current SNR and threshold SNR values.
unadjustedEase	Ease to the root AP through this AP after applying correct for number of hops.

Output Flag	Description
txParent	Packets sent to this node while it was a parent.
rxparent	Packets received from this node while it was a parent.
poorSnr	Packets with poor SNR received from a node.
lastUpdate	Timestamp of the last received message for this neighbor
parentChange	When this node last became parent.
per antenna smoother SNR values	SNR value is populated only for antenna 0.

Related Commands

show mesh config

show mesh env

show mesh path

To display the channel and signal-to-noise ratio (SNR) details for a link between a mesh access point and its neighbor, use the **show mesh path** command.

show mesh path *cisco_ap*

Syntax Description

cisco_ap	Mesh access point name.

Command Default

None.

Examples

This example shows how to display channel and SNR details for a designated link path:

```
> show mesh path mesh-45-rap1
AP Name/Radio Mac Channel Rate  Link-Snr  Flags      State
----------------- ------- ----- -------- --------   --------
MAP1-BB00         157      54     32       0x0       UPDATED NEIGH PARENT BEACON
RAP1              157      54     37       0x0        BEACON
```

Related Commands

config mesh battery-state

config mesh client-access

config mesh range

config mesh linktest

show mesh stats

config mesh range

show mesh neigh

show mesh per-stats

To display the percentage of packet errors for packets transmitted by the neighbors of a specified mesh access point, use the **show mesh per-stats** command.

show mesh per-stats summary {*cisco_ap* | **all**}

Syntax Description

summary	Displays the packet error rate stats summary.
cisco_ap	Name of mesh access point.
all	Displays all mesh access points.

Note If an AP itself is configured with the **all**keyword, the **all**keyword access points take precedence over the AP that is named **all**.

Usage Guidelines

The packet error rate percentage equals 1, which is the number of successfully transmitted packets divided by the number of total packets transmitted.

Examples

This example shows how to display the percentage of packet errors for packets transmitted by the neighbors to a mesh access point:

```
> show mesh per-stats summary ap_12
Neighbor MAC Address 00:0B:85:5F:FA:F0
Total Packets transmitted:              104833
Total Packets transmitted successfully: 104833
Total Packets retried for transmission: 33028
RTS Attempts:                           0
RTS Success:                            0
Neighbor MAC Address:                   00:0B:85:80:ED:D0
Total Packets transmitted:              0
Total Packets transmitted successfully: 0
Total Packets retried for transmission: 0
Neighbor MAC Address:                   00:17:94:FE:C3:5F
Total Packets transmitted:              0
Total Packets transmitted successfully: 0
Total Packets retried for transmission: 0
RTS Attempts:                           0
RTS Success:                            0
```

Related Commands

config mesh linkdata

config mesh range

show mesh stats

show mesh neigh

show mesh config

show mesh public-safety

To display 4.8-GHz public safety settings, use the **show mesh public-safety** command.

show mesh public-safety

Syntax Description

This command has no arguments or keywords.

Command Default

None.

Examples

This example shows how to view 4.8-GHz public safety settings:

```
> show mesh public-safety
Global Public Safety status: disabled
```

Related Commands

config mesh public-safety

config mesh security

show mesh ap

show mesh security-stats

show mesh stats

show mesh queue-stats

To display the number of packets in a client access queue by type for a particular mesh access point, use the **show mesh queue-stats** command.

show mesh queue-stats {*cisco_ap* | **all**}

Note If an AP itself is configured with the **all**keyword, the **all**keyword access points take precedence over the AP that is named **all**.

Syntax Description

cisco_ap	Name of access point for which you want packet queue statistics.
all	Displays all access points.

Command Default

None.

Examples

This example shows how to display packet queue statistics for access point ap417:

```
> show mesh queue-stats ap417
Queue Type Overflows Peak length Average length
---------- --------- ----------- --------------
Silver     0         1           0.000
Gold       0         4           0.004
Platinum   0         4           0.001
Bronze     0         0           0.000
Management 0         0           0.000
```

Related Commands

config mesh client-access

config mesh multicast

show mesh client-access

show mesh config

show mesh stats

show mesh config

show mesh stats

show mgmtuser

show mesh security-stats

To display packet error statistics for a specific access point, use the **show mesh security-stats** command.

show mesh security-stats {*cisco_ap* | **all**}

Syntax Description

cisco_ap	Name of access point for which you want packet error statistics.
all	Displays all access points.

Note If an AP itself is configured with the **all**keyword, the **all**keyword access points take precedence over the AP that is named **all**.

Command Default

None.

Usage Guidelines

This command shows packet error statistics and a count of failures, timeouts, and successes with respect to associations and authentications as well as reassociations and reauthentications for the specified access point and its child.

Examples

This example shows how to display packet error statistics for access point ap417:

```
> show mesh security-stats ap417
AP MAC : 00:0B:85:5F:FA:F0
Packet/Error Statistics:
----------------------------
x Packets 14, Rx Packets 19, Rx Error Packets 0
Parent-Side Statistics:
-------------------------
Unknown Association Requests 0
Invalid Association Requests 0
Unknown Re-Authentication Requests 0
Invalid Re-Authentication Requests 0
Unknown Re-Association Requests 0
Invalid Re-Association Requests 0
Child-Side Statistics:
-------------------------
Association Failures 0
Association Timeouts 0
Association Successes 0
Authentication Failures 0
Authentication Timeouts 0
Authentication Successes 0
Re-Association Failures 0
Re-Association Timeouts 0
Re-Association Successes 0
Re-Authentication Failures 0
Re-Authentication Timeouts 0
Re-Authentication Successes 0
```

Related Commands

config mesh alarm

config mesh linkdata

config mesh linktest

config mesh security

show mesh stats

To display the mesh statistics for a Cisco lightweight access point, use the **show mesh stats** command.

show mesh stats *cisco_ap*

Syntax Description

cisco_ap	Cisco lightweight access point name.

Command Default

None.

Examples

This example shows how to display statistics of an access point:

```
> show mesh stats RAP_AP1
RAP in state Maint
rxNeighReq 759978, rxNeighRsp 568673
txNeighReq 115433, txNeighRsp 759978
rxNeighUpd 8266447 txNeighUpd 693062
tnextchan 0, nextant 0, downAnt 0, downChan 0, curAnts 0
tnextNeigh 0, malformedNeighPackets 244, poorNeighSnr 27901
blacklistPackets 0, insufficientMemory 0
authenticationFailures 0
Parent Changes 1, Neighbor Timeouts 16625
```

Related Commands

config mesh ethernet-bridging vlan-transparent

config mesh linkdata

config mesh linktest

config mesh security

show mesh security-stats

config mesh config

config mesh client-access

show mesh per-stats

show mesh queue-stats

show advanced 802.11 channel

To display the automatic channel assignment configuration and statistics, use the **show advanced 802.11 channel** command.

show advanced 802.11{a | b} channel

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.

Command Default

None.

Examples

This example shows how to display the automatic channel assignment configuration and statistics:

```
> show advanced 802.11a channel
Automatic Channel Assignment
  Channel Assignment Mode..................... AUTO
  Channel Update Interval..................... 600 seconds [startup]
  Anchor time (Hour of the day)............... 0
  Channel Update Contribution................. SNI.
  Channel Assignment Leader................... 00:1a:6d:dd:1e:40
  Last Run.................................... 129 seconds ago
  DCA Sensitivity Level: ..................... STARTUP (5 dB)
  DCA Minimum Energy Limit.................... -95 dBm
Channel Energy Levels
    Minimum..................................... unknown
    Average..................................... unknown
    Maximum..................................... unknown
  Channel Dwell Times
    Minimum..................................... unknown
    Average..................................... unknown
    Maximum..................................... unknown
  Auto-RF Allowed Channel List................ 36,40,44,48,52,56,60,64,149,
    ............................................ 153,157,161
  Auto-RF Unused Channel List................. 100,104,108,112,116,132,136,
    ............................................ 140,165,190,196
  DCA Outdoor AP option....................... Enabled
```

Related Commands

config advanced 802.11 channel add

config advanced 802.11 channel cleanair-event

config advanced 802.11 channel dca anchor-time

config advanced 802.11 channel dca chan-width-11n

config advanced 802.11 channel dca interval

config advanced 802.11 channel dca sensitivity

config advanced 802.11 channel foreign

config advanced 802.11 channel load

Configure Mesh Commands

Use the **configure mesh** commands to configure the mesh access points.

config mesh alarm

To configure alarm settings for outdoor mesh access points, use the **config mesh alarm** command.

config mesh alarm {**max-hop** | **max-children** | **low-snr** | **high-snr** | **association** | **parent-change count**} *value*

Syntax Description

max-hop	Sets the maximum number of hops before triggering an alarm for traffic over the mesh network. The range is from 1 to 16.
max-children	Sets the maximum number of mesh access points (MAPs) that can be assigned to a mesh router access point (RAP) before triggering an alarm. The range is from 1 to 16.
low-snr	Sets the low-end signal-to-noise ratio (SNR) value before triggering an alarm. The range is from 1 to 30.
high-snr	Sets the high-end SNR value before triggering an alarm. The range is from 1 to 30 (inclusive).
association	Sets the mesh alarm association count value before triggering an alarm. The range is from 1 to 30 (inclusive).
parent-change count	Sets the number of times a MAP can change its RAP association before triggering an alarm. The range is from 1 to 30 (inclusive).
value	Value above or below which an alarm is generated. The valid values vary for each command.

Command Default

See the "Syntax Description" section for command and argument value ranges.

Examples

This example shows how to set the maximum hops threshold to 8:

```
> config mesh alarm max-hop 8
```

This example shows how to set the upper SNR threshold to 25:

> **config mesh alarm high-snr 25**

Related Commands

config mesh client-access

config mesh ethernet-bridging vlan-transparent

config mesh full-sector-dfs

config mesh multicast

config mesh radius-server

config mesh security

config mesh slot-bias

show mesh security-stats

show mesh ap

config mesh slot-bias

show mesh stats

show mgmtuser

config mesh astools

To globally enable or disable the anti-stranding feature for outdoor mesh access points, use the **config mesh astools** command.

config mesh astools {**enable** | **disable**}

Syntax Description

enable	Enables this feature for all outdoor mesh access points.
disable	Disables this feature for all outdoor mesh access points.

Command Default

None.

Examples

This example shows how to enable anti-stranding on all outdoor mesh access points:

```
> config mesh astools enable
```

Related Commands

show mesh astools stats

show mesh config

show mesh security-stats

show mesh ap

config mesh slot-bias

show mesh stats

show mgmtuser

config mesh backhaul rate-adapt

To globally configure the backhaul Tx rate adaptation (universal access) settings for indoor and outdoor mesh access points, use the **config mesh backhaul rate-adapt** command.

config mesh backhaul rate-adapt [**all** | **bronze** | **silver** | **gold** | **platinum**] {**enable** | **disable**}

Syntax Description

all	(Optional) Grants universal access privileges on mesh access points.
bronze	(Optional) Grants background-level client access privileges on mesh access points.
silver	(Optional) Grants best effort-level client access privileges on mesh access points.
gold	(Optional) Grants video-level client access privileges on mesh access points.
platinum	(Optional) Grants voice-level client access privileges on mesh access points.
enable	Enables this backhaul access level for mesh access points.
disable	Disables this backhaul access level for mesh access points.

Command Default

Disabled.

Usage Guidelines

To use this command, mesh backhaul with client access must be enabled by using the **config mesh client-access** command.

Note After this feature is enabled, all mesh access points reboot.

Examples

This example shows how to set the backhaul client access to the best-effort level:

```
> config mesh backhaul rate-adapt silver
```

Related Commands

show mesh config

show mesh ap

show mesh stats

config mesh backhaul slot

To configure the slot radio as a downlink backhaul, use the **config mesh backhaul slot** command.

config mesh backhaul slot *slot_id* {**enable** | **disable**} *cisco_ap*

Syntax Description

slot_id	Slot number between 0 and 2.
enable	Enables the entered slot radio as a downlink backhaul.
disable	Disables the entered slot radio as a downlink backhaul.
cisco_ap	Name of the Root AP of the sector on which the backhaul needs to be enabled or disabled.

Command Default

Disabled.

Usage Guidelines

For 2.4-GHz, only slot 0 and 1 are valid. If slot 0 is enabled, then slot 1 is automatically be disabled. If slot 0 is disabled, then slot 1 is automatically enabled. The **config mesh backhaul slot** command is applicable only to AP1522.

Examples

This example shows how to enable slot 1 as the preferred backhaul for the root AP myrootap1:

```
> config mesh backhaul slot 1 enable myrootap1
```

Related Commands

show mesh config

show mesh ap

show mesh stats

config mesh battery-state

To configure the battery state for Cisco Aironet 1520 series mesh access points, use the **config mesh battery-state** command.

config mesh battery-state {**enable** | **disable**} {**all** | *cisco_ap*}

Syntax Description

enable	Enables the battery-state for 1520 series mesh access points.
disable	Disables the battery-state for 1520 series mesh access points.
all	Applies this command to all mesh access points.
cisco_ap	Specific mesh access point.

Command Default

Disabled.

Examples

This example shows how to set the backhaul client access to the best-effort level:

```
> config mesh battery-state enable all
```

config mesh client-access

To enable or disable client access to the mesh backhaul on indoor and outdoor mesh access points, use the **config mesh client-access** command.

config mesh client-access {**enable** [**extended**] | **disable**}

Syntax Description

enable	Allows wireless client association over the mesh access point backhaul 802.11a radio.
extended	(Optional) Enables client access over both the backhaul radios for 1524 serial backhaul access points.
disable	Restricts the 802.11a radio to backhaul traffic, and allows client association only over the 802.11b/g radio.

Command Default

Disabled.

Usage Guidelines

Backhaul interfaces (802.11a radios) act as primary Ethernet interfaces. Backhauls function as trunks in the network and carry all VLAN traffic between the wireless and wired network. No configuration of primary Ethernet interfaces is required.

When this feature is enabled, Cisco Aironet 1520 series (152x) mesh access points allow wireless client association over the 802.11a radio, which implies that a 152x mesh access point can carry both backhaul traffic and 802.11a client traffic over the same 802.11a radio.

When this feature is disabled, the 152x carries backhaul traffic over the 802.11a radio and allows client association only over the 802.11b/g radio.

Examples

This example shows how to enable client access extended to allow a wireless client association over the 802.11a radio:

```
> config mesh client-access enable extended
Enabling client access on both backhaul slots
 Same BSSIDs will be used on both slots
 All Mesh AP will be rebooted
 Are you sure you want to start? (y/N)Y
```

This example shows how to restrict a wireless client association to the 802.11b/g radio:

```
> config mesh client-access disable
All Mesh AP will be rebooted
Are you sure you want to start? (Y/N) Y
Backhaul with client access is cancelled.
```

Related Commands

show mesh config

show mesh ap

show mesh stats

show mesh client-access

config mesh ethernet-bridging vlan-transparent

To configure how a mesh access point handles VLAN tags for Ethernet bridged traffic, use the **config mesh ethernet-bridging vlan-transparent** command.

config mesh ethernet-bridging vlan-transparent {**enable** | **disable**}

Syntax Description

enable	Bridges packets as if they are untagged.
disable	Drops all tagged packets.

Command Default

Enabled.

Usage Guidelines

VLAN transparent is enabled as a default to ensure a smooth software upgrade from 4.1.192.xxM releases to release 5.2. Release 4.1.192.xxM does not support VLAN tagging.

Examples

This example shows how to configure Ethernet packets as untagged:

```
> config mesh ethernet-bridging vlan-transparent enable
```

This example shows how to drop tagged Ethernet packets:

```
> config mesh ethernet-bridging vlan-transparent disable
```

Related Commands

show mesh config

show mesh ap

show mesh stats

config mesh client-access

config mesh linkdata

config mesh linktest

config mesh multicast

show mesh client-access

config mesh full-sector-dfs

To globally enable or disable full-sector Dynamic Frequency Selection (DFS) on mesh access points, use the **config mesh full-sector-dfs** command.

config mesh full-sector-dfs {**enable** | **disable**}

Syntax Description

enable	Enables DFS for mesh access points.
disable	Disables DFS for mesh access points.

Command Default

None.

Usage Guidelines

This command instructs the mesh sector to make a coordinated channel change on the detection of a radar signal. For example, if a mesh access point (MAP) detects a radar signal, the MAP will notify the root access point (RAP), and the RAP will initiate a sector change.

All MAPs and the RAP that belong to that sector go to a new channel, which lowers the probability of MAPs stranding when radar is detected on the current backhaul channel, and no other valid parent is available as backup.

Each sector change causes the network to be silent for 60 seconds (as dictated by the DFS standard).

It is expected that after a half hour, the RAP will go back to the previously configured channel, which means that if radar is frequently observed on a RAP's channel, it is important that you configure a different channel for that RAP to exclude the radar affected channel at the controller.

Examples

This example shows to enable full-sector DFS on mesh access points:

```
> config mesh full-sector-dfs enable
```

Related Commands

config mesh battery-state

show mesh ap

show mesh stats

config mesh alarm

config mesh linkdata

config mesh linktest

config mesh client-access

config mesh range

show mesh security-stats

show mgmtuser

config mesh linkdata

To enable external MAC filtering of access points, use the **config mesh linkdata** command.

config mesh linkdata *destination_ap_name*

Syntax Description

destination_ap_name	Destination access point name for MAC address filtering.

Command Default

Disabled.

Usage Guidelin

Note The **config mesh linktest** and **config mesh linkdata** commands are designed to be used together to verify information between a source and a destination access point. To get this information, first execute the **config mesh linktest** command with the access point that you want link data from in the *dest_ap* argument. When the command completes, enter the **config mesh linkdata** command and list the same destination access point, to display the link data will display (see example).

MAC filtering uses the local MAC filter on the controller by default.

When external MAC filter authorization is enabled, if the MAC address is not found in the local MAC filter, then the MAC address in the external RADIUS server is used.

MAC filtering protects your network against rogue mesh access points by preventing access points that are not defined on the external server from joining.

Before employing external authentication within the mesh network, the following configuration is required:

- The RADUIS server to be used as an AAA server must be configured on the controller.
- The controller must also be configured on the RADIUS server.
- The mesh access point configured for external authorization and authentication must be added to the user list of the RADIUS server.

Examples

This example shows how to enable external MAC address filtering on access point AP001d.710d.e300:

```
> config mesh linkdata MAP2-1-1522.7400 AP001d.710d.e300 18 100 1000 30
LinkTest started on source AP, test ID: 0
[00:1D:71:0E:74:00]->[00:1D:71:0D:E3:0F]
Test config:  1000 byte packets at 100  pps for 30 seconds, a-link rate 18 Mb/s
In progress: | || || || || || || || || || || || |
LinkTest complete
Results
=======
txPkts:             2977
txBuffAllocErr:        0
txQFullErrs:           0
Total rx pkts heard at destination:      2977
rx pkts decoded correctly:               2977
  err pkts: Total         0 (PHY 0 + CRC 0 + Unknown 0), TooBig 0, TooSmall 0
  rx lost packets:        0 (incr for each pkt seq missed or out of order)
```

```
  rx dup pkts:            0
  rx out of order:        0
avgSNR:    30, high:   33, low:    3
SNR profile          [0dB...60dB]
           0            6             0            0            0
           0            0             1            2           77
        2888            3             0            0            0
           0            0             0            0            0
    (>60dB)             0
avgNf:    -95, high:  -67, low:  -97
Noise Floor profile [-100dB...-40dB]
           0         2948            19            3            1
           0            0             0            0            0
           3            3             0            0            0
           0            0             0            0            0
    (>-40dB)            0
avgRssi:   64, high:   68, low:   63
RSSI profile         [-100dB...-40dB]
           0            0             0            0            0
           0            0             0            0            0
           0            0             0            0            0
           0            0             0            0            0
    (>-40dB)         2977
Summary PktFailedRate (Total pkts sent/recvd):                        0.000%
Physical layer Error rate (Total pkts with errors/Total pkts heard): 0.000%
```

This example shows how to enable external MAC filtering on access point AP001d.71d.e300:

```
> config mesh linkdata AP001d.710d.e300
[SD:0,0,0(0,0,0), 0,0, 0,0]
[SD:1,105,0(0,0,0),30,704,95,707]
[SD:2,103,0(0,0,0),30,46,95,25]
[SD:3,105,0(0,0,0),30,73,95,29]
[SD:4,82,0(0,0,0),30,39,95,24]
[SD:5,82,0(0,0,0),30,60,95,26]
[SD:6,105,0(0,0,0),30,47,95,23]
[SD:7,103,0(0,0,0),30,51,95,24]
[SD:8,105,0(0,0,0),30,55,95,24]
[SD:9,103,0(0,0,0),30,740,95,749]
[SD:10,105,0(0,0,0),30,39,95,20]
[SD:11,104,0(0,0,0),30,58,95,23]
[SD:12,105,0(0,0,0),30,53,95,24]
[SD:13,103,0(0,0,0),30,64,95,43]
[SD:14,105,0(0,0,0),30,54,95,27]
[SD:15,103,0(0,0,0),31,51,95,24]
[SD:16,105,0(0,0,0),30,59,95,23]
[SD:17,104,0(0,0,0),30,53,95,25]
[SD:18,105,0(0,0,0),30,773,95,777]
[SD:19,103,0(0,0,0),30,745,95,736]
[SD:20,105,0(0,0,0),30,64,95,54]
[SD:21,103,0(0,0,0),30,747,95,751]
[SD:22,105,0(0,0,0),30,55,95,25]
[SD:23,104,0(0,0,0),30,52,95,35]
[SD:24,105,0(0,0,0),30,134,95,23]
[SD:25,103,0(0,0,0),30,110,95,76]
[SD:26,105,0(0,0,0),30,791,95,788]
[SD:27,103,0(0,0,0),30,53,95,23]
[SD:28,105,0(0,0,0),30,128,95,25]
[SD:29,104,0(0,0,0),30,49,95,24]
[SD:30,0,0(0,0,0), 0,0, 0,0]
```

Related Commands

show mesh config

show mesh ap

show mesh stats

config mesh client-access

config mesh alarm

config mesh linktest

config mesh multicast

show mesh client-access

config mesh ethernet-bridging vlan-transparent

config mesh radius-server

config mesh linktest

To verify client access between mesh access points, use the **config mesh linktest** command.

config mesh linktest *source_ap* {*dest_ap* | *dest_MAC*} *datarate packet_rate packet_size duration*

Syntax Description

source_ap	Source access point.
dest_ap	Destination access point.
dest_MAC	Destination MAC address.
datarate	• Data rate for 802.11a radios. Valid values are 6, 9, 11, 12, 18, 24, 36, 48 and 54 Mbps. • Data rate for 802.11b radios. Valid values are 6, 12, 18, 24, 36, 54, or 100 Mbps. • Data rate for 802.11n radios. Valid values are MCS rates between m0 to m15.
packet_rate	Number of packets per second. Valid range is 1 through 3000, but the recommended default is 100.
packet_size	(Optional) Packet size in bytes. If not specified, packet size defaults to 1500 bytes.
duration	(Optional) Duration of the test in seconds. Valid values are 10-300 seconds, inclusive. If not specified, duration defaults to 30 seconds.

Command Default

100 packets per second, 1500 bytes, 30 second duration.

Usage Guidelines

Note The **config mesh linktest** and **config mesh linkdata** commands are designed to be used together to verify information between a source and a destination access point. To get this information, first enter the **config mesh linktest** command with the access point that you want link data from in the *dest_ap* argument. When the command completes, enter the **config mesh linkdata** command and list the same destination access point, to display the link data.

The following warning message appears when you run a linktest that might oversubscribe the link:

Warning! Data Rate (100 Mbps) is not enough to perform this link test on packet size (2000bytes) and (1000) packets per second. This may cause AP to disconnect or reboot. Are you sure you want to continue?

Examples

This example shows how to verify client access between mesh access points *SB_MAP1* and *SB_RAP2* at *36 Mbps*, *20 fps*, *100 frame size*, and *15* second duration:

```
> config mesh linktest SB_MAP1 SB_RAP1 36 20 100 15
LinkTest started on source AP, test ID: 0
[00:1D:71:0E:85:00]->[00:1D:71:0E:D0:0F]
Test config:  100 byte packets at 20  pps for 15 seconds, a-link rate 36 Mb/s
In progress: | || || || || || |
LinkTest complete
Results
=======
txPkts:              290
txBuffAllocErr:        0
txQFullErrs:           0
Total rx pkts heard at destination:       290
rx pkts decoded correctly:
  err pkts: Total         0 (PHY 0 + CRC 0 + Unknown 0), TooBig 0, TooSmall 0
  rx lost packets:        0 (incr for each pkt seq missed or out of order)
  rx dup pkts:            0
  rx out of order:        0
avgSNR:    37, high:   40, low:    5
SNR profile         [0dB...60dB]
          0            1             0            0            1
          3            0             1            0            2
          8           27           243            4            0
          0            0             0            0            0
    (>60dB)            0
avgNf:    -89, high:  -58, low:  -90
Noise Floor profile [-100dB...-40dB]
          0            0             0          145          126
         11            2             0            1            0
          3            0             1            0            1
          0            0             0            0            0
    (>-40dB)           0
avgRssi:   51, high:   53, low:   50
RSSI profile        [-100dB...-40dB]
          0            0             0            0            0
          0            0             0            0            0
          0            0             0            0            0
          0            7           283            0            0
    (>-40dB)           0
Summary PktFailedRate (Total pkts sent/recvd):                        0.000%
Physical layer Error rate (Total pkts with errors/Total pkts heard): 0.000%
```

The following table lists the output flags displayed for the **config mesh linktest** command.

Table 4: Output Flags for the Config Mesh Linktest Command

Output Flag	Description
txPkts	Number of packets sent by the source.
txBuffAllocErr	Number of linktest buffer allocation errors at the source (expected to be zero).
txQFullErrs	Number of linktest queue full errors at the source (expected to be zero).
Total rx pkts heard at destination	Number of linktest packets received at the destination (expected to be same as or close to the txPkts).
rx pkts decoded correctly	Number of linktest packets received and decoded correctly at the destination (expected to be same as close to txPkts).
err pkts: Total	Packet error statistics for linktest packets with errors.

Output Flag	Description
rx lost packets	Total number of linktest packets not received at the destination.
rx dup pkts	Total number of duplicate linktest packets received at the destination.
rx out of order	Total number of linktest packets received out of order at the destination.
avgNF	Average noise floor.
Noise Floor profile	Noise floor profile in dB and are negative numbers.
avgSNR	Average SNR values.
SNR profile [odb...60dB]	Histogram samples received between 0 to 60 dB. The different colums in the SNR profile is the number of packets falling under the bucket 0-3, 3-6, 6-9, up to 57-60.
avgRSSI	Average RSSI values. The average high and low RSSI values are positive numbers.
RSSI profile [-100dB...-40dB]	The RSSI profile in dB and are negative numbers.

Related Commands

config mesh battery-state

config mesh client-access

config mesh full-sector-dfs

config mesh linkdata

config mesh multicast

config mesh range

show mesh client-access

show mesh config

show mesh security-stats

show mesh stats

config mesh lsc

To configure a locally significant certificate (LSC) on mesh access points, use the **config mesh lsc** command.

config mesh lsc {**enable** | **disable**}

Syntax Description

enable	Enables an LSC on mesh access points.
disable	Disables an LSC on mesh access points.

Command Default

None.

Examples

This example shows how to enable LSC on mesh access points:

```
> config mesh lsc enable
```

Related Commands

config certificate lsc

show certificate lsc

config mesh multicast

To configure multicast mode settings to manage multicast transmissions within the mesh network, use the **config mesh multicast** command.

config mesh multicast {**regular** | **in** | **in-out**}

Syntax Description

regular	Multicasts the video across the entire mesh network and all its segments by bridging-enabled root access points (RAPs) and mesh access points (MAPs).
in	Forwards the multicast video received from the Ethernet by a MAP to the RAP's Ethernet network. No additional forwarding occurs, which ensures that non-LWAPP multicasts received by the RAP are not sent back to the MAP Ethernet networks within the mesh network (their point of origin), and MAP-to-MAP multicasts do not occur because they are filtered out
in-out	Configures the RAP and MAP to multicast, but each in a different manner: If multicast packets are received at a MAP over Ethernet, they are sent to the RAP; however, they are not sent to other MAP Ethernets, and the MAP-to-MAP packets are filtered out of the multicast. If multicast packets are received at a RAP over Ethernet, they are sent to all the MAPs and their respective Ethernet networks. See the Usage Guidelines section for more information.

Command Default

In-out mode.

Usage Guidelines

Multicast for mesh networks cannot be enabled using the controller GUI.

Mesh multicast modes determine how bridging-enabled access points mesh access points (MAPs) and root access points (RAPs) send multicasts among Ethernet LANs within a mesh network. Mesh multicast modes manage non-LWAPP multicast traffic only. LWAPP multicast traffic is governed by a different mechanism.

You can use the controller CLI to configure three mesh multicast modes to manage video camera broadcasts on all mesh access points. When enabled, these modes reduce unnecessary multicast transmissions within the mesh network and conserve backhaul bandwidth.

When using **in-out** mode, it is important to properly partition your network to ensure that a multicast sent by one RAP is not received by another RAP on the same Ethernet segment and then sent back into the network.

Note If 802.11b clients need to receive CAPWAP multicasts, then multicast must be enabled globally on the controller as well as on the mesh network (by using the **config network multicast global** command). If multicast does not need to extend to 802.11b clients beyond the mesh network, you should disable the global multicast parameter.

Examples

This example shows how to multicast video across the entire mesh network and all its segments by bridging-enabled RAPs and MAPs:

```
> config mesh multicast regular
```

Related Commands

config mesh battery-state

config mesh client-access

config mesh linktest

show mesh ap

config network multicast global

show mesh config

show mesh stats

config mesh parent preferred

To configure a preferred parent for a mesh access point, use the **config mesh parent preferred** command.

config mesh parent preferred *cisco_ap* {*mac_address* | **none**}

Syntax Description

cisco_ap	Name of the child access point.
mac_address	MAC address of the preferred parent.
none	Clears the configured parent.

Command Default

None.

Usage Guidelines

A child AP selects the preferred parent based on the following conditions:

- The preferred parent is the best parent.
- The preferred parent has a link SNR of at least 20 dB (other parents, however good, are ignored).
- The preferred parent has a link SNR in the range of 12 dB and 20 dB, but no other parent is significantly better (that is, the SNR is more than 20 percent better). For an SNR lower than 12 dB, the configuration is ignored.
- The preferred parent is not blacklisted.
- The preferred parent is not in silent mode because of dynamic frequency selection (DFS).
- The preferred parent is in the same bridge group name (BGN). If the configured preferred parent is not in the same BGN and no other parent is available, the child joins the parent AP using the default BGN.

Examples

This example shows how to configure a preferred parent with the MAC address 00:21:1b:ea:36:60 for a mesh access point myap1:

```
> config mesh parent preferred myap1 00:21:1b:ea:36:60
```

This example shows how to clear a preferred parent with the MAC address 00:21:1b:ea:36:60 for a mesh access point myap1, by using the keyword none:

```
> config mesh parent preferred myap1 00:21:1b:ea:36:60 none
```

Related Commands

config mesh battery-state

config mesh client-access

config mesh linktest

show mesh ap

config network multicast global

show mesh config

show mesh stats

config mesh public-safety

To enable or disable the 4.9-GHz public safety band for mesh access points, use the **config mesh public-safety** command.

config mesh public-safety {**enable** | **disable**} {**all** | *cisco_ap*}

Syntax Description

enable	Enables the 4.9-GHz public safety band.
disable	Disables the 4.9-GHz public safety band.
all	Applies the command to all mesh access points.
cisco_ap	Specific mesh access point.

Command Default

Disabled.

Usage Guidelines

4.9 GHz is a licensed frequency band restricted to public-safety personnel.

Examples

This example shows how to enable the 4.9-GHz public safety band for all mesh access points:

```
> config mesh public-safety enable all
4.9GHz is a licensed frequency band in -A domain for public-safety usage
 Are you sure you want to continue? (y/N) y
```

Related Commands

config mesh range

config mesh security

show mesh ap

show mesh public-safety

show mesh security-stats

show mesh config

show mesh stats

config mesh radius-server

To enable or disable external authentication for mesh access points, use the **config mesh radius-server** command.

config mesh radius-server *index* {**enable** | **disable**}

Syntax Description

index	RADIUS authentication method. Options are as follows: • Enter **eap** to designate Extensible Authentication Protocol (EAP) for the mesh RADIUS server setting. • Enter **psk** to designate Preshared Keys (PSKs) for the mesh RADIUS server setting.
enable	Enables the external authentication for mesh access points.
disable	Disables the external authentication for mesh access points.

Command Default

EAP is enabled by default.

Examples

This example shows how to enable external authentication for mesh access points:

```
> config mesh radius-server eap enable
```

Related Commands

config mesh alarm

config mesh security

show mesh ap

show mesh security-stats

show mesh stats

config mesh range

To globally set the maximum range between outdoor mesh root access points (RAPs) and mesh access points (MAPs), use the **config mesh range** command.

config mesh range [*distance*]

Syntax Description

distance	(Optional) Maximum operating range (150 to 132000 ft) of the mesh access point.

Command Default

12,000 feet.

Usage Guidelines

After this command is enabled, all outdoor mesh access points reboot. This command does not affect indoor access points.

Examples

This example shows how to set the range between an outdoor mesh RAP and a MAP:

```
> config mesh range 300
Command not applicable for indoor mesh. All outdoor Mesh APs will be rebooted
Are you sure you want to start? (y/N) y
```

Related Commands

config mesh astools

config mesh ethernet-bridging vlan-transparent

show mesh ap

config mesh full-sector-dfs

config mesh linkdata

config mesh linktest

show mesh config

show mesh stats

config mesh secondary-backhaul

To configure a secondary backhaul on the mesh network, use the **config mesh secondary-backhaul** command.

config mesh secondary-backhaul {**enable** [**force-same-secondary-channel**] | **disable** [**rll-retransmit** | **rll-transmit**]}

Syntax Description

enable	Enables the secondary backhaul configuration.
force-same-secondary-channel	(Optional) Enables secondary-backhaul mesh capability. Forces all access points rooted at the first hop node to have the same secondary channel and ignores the automatic or manual channel assignments for the mesh access points (MAPs) at the second hop and beyond.
disable	Specifies the secondary backhaul configuration is disabled.
rll-transmit	(Optional) Uses reliable link layer (RLL) at the second hop and beyond.
rll-retransmit	(Optional) Extends the number of RLL retry attempts in an effort to improve reliability.

Command Default

None.

Usage Guidelines

Note The secondary backhaul access feature is not supported by Cisco 1520 and 1524 indoor mesh access points in the 5.2 release.

This command uses a secondary backhaul radio as a temporary path for traffic that cannot be sent on the primary backhaul due to intermittent interference.

Examples

This example shows ho to enable a secondary backhaul radio and force all access points rooted at the first hop node to have the same secondary channel:

```
> config mesh secondary-backhaul enable force-same-secondary-channel
```

Related Commands

config mesh battery-state

config mesh backhaul slot

show mesh client-access

show mesh config

show mesh stats

config mesh security

To configure the security settings for mesh networks, use the **config mesh security** command.

config mesh security {{{**rad-mac-filter** | **force-ext-auth**} {**enable** | **disable**}} | **eap** | **psk**}

Syntax Description

rad-mac-filter	Enables a RADIUS MAC address filter for the mesh security setting.
force-ext-auth	Disables forced external authentication for the mesh security setting.
enable	Enables the setting.
disable	Disables the setting.
eap	Designates the Extensible Authentication Protocol (EAP) for the mesh security setting.
psk	Designates preshared keys (PSKs) for the mesh security setting.

Command Default

EAP.

Examples

This example shows how to configure EAP as the security option for all mesh access points:

```
> config mesh security eap
```

This example shows how to configure PSK as the security option for all mesh access points:

```
> config mesh security psk
```

Related Commands

config mesh alarm

config mesh client-access

show mesh ap

config mesh public-safety

show mesh security-stats

show mesh config

show mesh stats

config mesh radius-server

show mesh client-access

config mesh slot-bias

To enable or disable slot bias for serial backhaul mesh access points, use the **config mesh slot-bias** command.

config mesh slot-bias {**enable** | **disable**}

Syntax Description

enable	Enables slot bias for serial backhaul mesh APs.
disable	Disables slot bias for serial backhaul mesh APs.

Command Default

By default, slot bias is in enabled state.

Usage Guidelines

Follow these guidelines when using this command:

- The **config mesh slot-bias** command is a global command and therefore applicable to all 1524SB APs associated with the same controller.
- Slot bias is applicable only when both slot 1 and slot 2 are available. If a slot radio does not have a channel that is available because of dynamic frequency selection (DFS), the other slot takes up both the uplink and downlink roles.
- If slot 2 is not available because of hardware issues, slot bias functions normally. Corrective action should be taken by disabling the slot bias or fixing the antenna.

Examples

This example shows how to disable slot bias for serial backhaul mesh APs:

```
> config mesh slot-bias disable
```

Related Commands

config mesh alarm

config mesh client-access

show mesh ap

config mesh public-safety

show mesh security-stats

show mesh config

show mesh stats

config mesh radius-server

show mesh client-access

Other Config Commands

This section lists the other **config** commands to configure Mesh access points.

config 802.11-a antenna extAntGain

To configure the external antenna gain for the 4.9-GHz and 5.8-GHz public safety channels on an access point, use the **config 802.11-a antenna extAntGain** commands.

config {**802.11-a49** | **802.11-a58**} **antenna extAntGain** *ant_gain cisco_ap* {**global** | *channel_no*}

Syntax Description

802.11-a49	Specifies the 4.9-GHz public safety channel.
802.11-a58	Specifies the 5.8-GHz public safety channel.
ant_gain	Value in .5-dBi units (for instance, 2.5 dBi = 5).
cisco_ap	Name of the access point to which the command applies.
global	Specifies the antenna gain value to all channels.
channel_no	Antenna gain value for a specific channel.

Command Default

Disabled.

Usage Guidelines

Before you enter the **config 802.11-a antenna extAntGain** command, disable the 802.11 Cisco radio with the **config 802.11-a disable** command.

After you configure the external antenna gain, use the **config 802.11-a enable** command to re-enable the 802.11 Cisco radio.

Examples

This example shows how to configure an *802.11-a49* external antenna gain of *10 dBi* for *AP1*:

```
> config 802.11-a antenna extAntGain 10 AP1
```

Related Commands

config 802.11-a

config 802.11-a channel ap

config 802.11-a txpower ap

show 802.11a

config 802.11-a channel ap

To configure the channel properties for the 4.9-GHz and 5.8-GHz public safety channels on an access point, use the **config 802.11-a channel ap** command.

config {**802.11-a49** | **802.11-a58**} **channel ap** *cisco_ap* {**global** | *channel_no*}

Syntax Description

802.11-a49	Specifies the 4.9-GHz public safety channel.
802.11-a58	Specifies the 5.8-GHz public safety channel.
cisco_ap	Name of the access point to which the command applies.
global	Enables the Dynamic Channel Assignment (DCA) on all 4.9-GHz and 5.8-GHz subband radios.
channel_no	Custom channel for a specific mesh access point. The range is 1 through 26, inclusive, for a 4.9-GHz band and 149 through 165, inclusive, for a 5.8-GHz band.

Command Default

Disabled.

Examples

This example shows how to set the channel properties:

```
> config 802.11-a channel ap
```

Related Commands

config 802.11-a

config 802.11-a antenna extAntGain

config 802.11-a txpower ap

config 802.11 antenna diversity

To configure the diversity option for 802.11 antennas, use the **config 802.11 antenna diversity** command.

config 802.11{**a** | **b**} **antenna diversity** {**enable** | **sideA** | **sideB**} *cisco_ap*

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
enable	Enables the diversity.
sideA	Specifies the diversity between the internal antennas and an external antenna connected to the Cisco lightweight access point left port.
sideB	Specifies the diversity between the internal antennas and an external antenna connected to the Cisco lightweight access point right port.
cisco_ap	Cisco lightweight access point name.

Command Default

None.

Examples

This example shows how to enable antenna diversity for AP01 on an 802.11b network:

```
> config 802.11a antenna diversity enable AP01
```

This example shows how to enable diversity for AP01 on an 802.11a network, using an external antenna connected to the Cisco lightweight access point left port (sideA):

```
> config 802.11a antenna diversity sideA AP01
```

Related Commands

config 802.11 disable

config 802.11 enable

config 802.11 antenna extAntGain

config 802.11 antenna mode

config 802.11 antenna selection

show 802.11a

show 802.11b

config 802.11 antenna extAntGain

To configure external antenna gain for an 802.11 network, use the **config 802.11 antenna extAntGain** command.

config 802.11{**a** | **b**} **antenna extAntGain** *antenna_gain cisco_ap*

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
antenna_gain	Antenna gain in 0.5 dBm units (for example, 2.5 dBm = 5).
cisco_ap	Cisco lightweight access point name.

Command Default

None.

Usage Guidelines

Before you enter the **config 802.11 antenna extAntGain** command, disable the 802.11 Cisco radio with the **config 802.11 disable** command.

After you configure the external antenna gain, use the **config 802.11 enable** command to enable the 802.11 Cisco radio.

Examples

This example shows how to configure an *802.11a* external antenna gain of *0.5 dBm* for *AP1*:

```
> config 802.11 antenna extAntGain 1 AP1
```

Related Commands

config 802.11 disable

config 802.11 enable

config 802.11 antenna mode

config 802.11 antenna selection

show 802.11a

show 802.11b

config 802.11 beamforming

To enable or disable beamforming on the network or on individual radios, enter the **config 802.11 beamforming** command.

config 802.11 {**a** | **b**} **beamforming** {**global** | **ap** *ap_name*} {**enable** | **disable**}

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
global	Specifies all lightweight access points.
ap *ap_name*	Specifies the Cisco access point name.
enable	Enables beamforming.
disable	Disables beamforming.

Command Default

None.

Usage Guidelines

When you enable beamforming on the network, it is automatically enabled for all the radios applicable to that network type.

Follow these guidelines for using beamforming:

- Beamforming is supported only for legacy orthogonal frequency-division multiplexing (OFDM) data rates (6, 9, 12, 18, 24, 36, 48, and 54 mbps).

Note Beamforming is not supported for complementary-code keying (CCK) data rates (1, 2, 5.5, and 11 Mbps).

- Beamforming is supported only on access points that support 802.11n (AP1250 and AP1140).
- Two or more antennas must be enabled for transmission.
- All three antennas must be enabled for reception.
- OFDM rates must be enabled.

  If the antenna configuration restricts operation to a single transmit antenna, or if OFDM rates are disabled, beamforming is not used.

Examples This example shows how to enable beamforming on the 802.11a network:

```
> config 802.11 beamforming global enable
```

Related Commands

show ap config {802.11a | 802.11b}

show 802.11a

config 802.11b beaconperiod

config 802.11a disable

config 802.11a enable

config 802.11 channel

To configure an 802.11 network or a single access point for automatic or manual channel selection, use the **config 802.11 channel** command.

config 802.11 {**a** | **b**} **channel** {**global** [**auto** | **once** | **off**]} | **ap** {*ap_name* [**global** | *channel*]}

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
global	Specifies the 802.11a operating channel that is automatically set by RRM and overrides the existing configuration setting.
auto	(Optional) Specifies that the channel is automatically set by Radio Resource Management (RRM) for the 802.11a radio.
once	(Optional) Specifies that the channel is automatically set once by RRM.
off	(Optional) Specifies that the automatic channel selection by RRM is disabled.
ap_name	Access point name.
channel	Manual channel number to be used by the access point. The supported channels depend on the specific access point used and the regulatory region.

Command Default

None.

Usage Guidelines

When configuring 802.11 channels for a single lightweight access point, enter the **config 802.11 disable** command to disable the 802.11 network. Enter the **config 802.11 channel** command to set automatic channel selection by Radio Resource Management (RRM) or manually set the channel for the 802.11 radio, and enter the **config 802.11 enable** command to enable the 802.11 network.

Note See the Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points document for the channels supported by your access point. The power levels and available channels are defined by the country code setting and are regulated on a country-by-country basis.

Examples

This example shows how to have RRM automatically configure the 802.11a channels for automatic channel configuration based on the availability and interference:

```
> config 802.11a channel global auto
```

This example shows how to configure the 802.11b channels one time based on the availability and interference:

```
> config 802.11b channel global once
```

This example shows how to turn 802.11a automatic channel configuration off:

```
> config 802.11a channel global off
```

This example shows how to configure the 802.11b channels in access point AP01 for automatic channel configuration:

```
> config 802.11b AP01 channel global
```

This example shows how to configure the 802.11a channel 36 in access point AP01 as the default channel:

```
> config 802.11a channel AP01 36
```

Related Commands

show 802.11a

show 802.11a disable

show 802.11a enable

show 802.11b channel

config country

config 802.11 channel ap

To set the operating radio channel for an access point, use the **config 802.11 channel ap** command.

config 802.11{**a** | **b**} **channel ap** *cisco_ap* {**global** | *channel_no*}

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
cisco_ap	Name of the Cisco access point.
global	Enables auto-RF on the designated access point.
channel_no	Default channel from 1 to 26, inclusive.

Command Default

None.

Examples

This example shows how to enable auto-RF for access point AP01 on an 802.11b network:

```
> config 802.11b channel ap AP01 global
```

Related Commands

show 802.11a
show 802.11a disable
show 802.11a enable
config 802.11b channel
config country

config 802.11 disable

To disable radio transmission for an entire 802.11 network or for an individual Cisco radio, use the **config 802.11 disable** command.

config 802.11 {**a** | **b**} **disable** {**network** | *cisco_ap*}

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
network	Disables transmission for the entire 802.11a network.
cisco_ap	Individual Cisco lightweight access point radio.

Command Default

The transmission is enabled for the entire network by default.

Usage Guidelines

Note You must use this command to disable the network before using many config 802.11 commands.

This command can be used any time that the CLI interface is active.

Examples

This example shows how to disable the entire 802.11a network:

```
> config 802.11a disable network
```

This example shows how to disable access point AP01 802.11b transmissions:

```
> config 802.11b disable AP01
```

Related Commands

show sysinfo

show 802.11a

config 802.11a enable

config 802.11b disable

config 802.11b enable

config 802.11a beaconperiod

config advanced 802.11 channel add

To add channel to the 802.11 networks auto RF channel list, use the **config advanced 802.11 channel add** command.

config advanced 802.11 {**a** | **b**} **channel add** *channel_number*

Syntax Description

a	Specifies the 802.11a network.
b	Specifies the 802.11b/g network.
add	Adds a channel to the 802.11 network auto RF channel list.
channel_number	Channel number to add to the 802.11 network auto RF channel list.

Command Default

None.

Examples

This example shows how to add a channel to the 802.11a network auto RF channel list:

```
> config advanced 802.11 channel add 132
```

Related Commands

show advanced 802.11a channel

config advanced 802.11b channel update

config advanced backup-controller primary

To configure a primary backup controller for a specific controller, use the **config advanced backup-controller primary** command.

config advanced backup-controller primary *backup_controller_name backup_controller_ip_address*

Syntax Description

backup_controller_name	Name of the backup controller.
backup_controller_ip_address	IP address of the backup controller.

Command Default

None.

Usage Guidelines

To delete a primary backup controller entry, enter 0.0.0.0 for the controller IP address.

Examples

This example shows how to configure the primary backup controller:

```
> config advanced backup-controller primary Controller_1 10.10.10.10
```

Related Commands

show advanced backup-controller

config advanced backup-controller secondary

To configure a secondary backup controller for a specific controller, use the **config advanced backup-controller secondary** command.

config advanced backup-controller secondary *backup_controller_name backup_controller_ip_address*

Syntax Description

backup_controller_name	Name of the backup controller.
backup_controller_ip_address	IP address of the backup controller.

Command Default

None.

Usage Guidelines

To delete a secondary backup controller entry, enter 0.0.0.0 for the controller IP address.

Examples

This example shows how to configure a secondary backup controller:

```
> config advanced backup-controller secondary Controller_1 10.10.10.10
```

Related Commands

show advanced backup-controller

config certificate lsc

To configure Locally Significant Certificate (LSC) certificates, use the **config certificate lsc** commands.

config certificate lsc {**enable** | **disable** | **ca-server** *http://url:port/path* | **ca-cert** {**add** | **delete**} | **subject-params** *country state city orgn dept email* | **other-params** *keysize*} | **ap-provision** {**auth-list** {**add** | **delete**} *ap_mac* | **revert-cert** *retries*}

Syntax Description

enable	Enables LSC certificates on the controller.
disable	Disables LSC certificates on the controller.
ca-server	Specifies the Certificate Authority (CA) server settings.
http://url:port/path	Domain name or IP address of the CA server.
ca-cert	Specifies CA certificate database settings.
add	Obtains a CA certificate from the CA server and adds it to the controller's certificate database.
delete	Deletes a CA certificate from the controller's certificate database.
subject-params	Specifies the device certificate settings.
country state city orgn dept email	Country, state, city, organization, department, and email of the certificate authority. **Note** The common name (CN) is generated automatically on the access point using the current MIC/SSC format *Cxxxx-MacAddr*, where *xxxx* is the product number.
other-params	Specifies the device certificate key size settings.
keysize	Value from 384 to 2048 (in bits); the default value is 2048.
ap-provision	Specifies the access point provision list settings.
auth-list	Specifies the provision list authorization settings.
ap_mac	MAC address of access point to be added or deleted from the provision list.
revert-cert	Specifies the number of times the access point attempts to join the controller using an LSC before reverting to the default certificate.
retries	Value from 0 to 255; the default value is 3. **Note** If you set the number of retries to 0 and the access point fails to join the controller using an LSC, the access point does not attempt to join the controller using the default certificate. If you are configuring LSC for the first time, we recommend that you configure a nonzero value.

Command Default The default value of *keysize* is 2048 bits. The default value of *retries* is 3.

Usage Guidelines You can configure only one CA server. To configure a different CA server, delete the configured CA server by using the **config certificate lsc ca-server delete** command, and then configure a different CA server.

If you configure an access point provision list, only the access points in the provision list are provisioned when you enable AP provisioning (in Step 8). If you do not configure an access point provision list, all access points with an MIC or SSC certificate that join the controller are LSC provisioned.

Examples This example shows how to enable the LSC settings:

```
> config certificate lsc enable
```

This example shows how to enable the LSC settings for Certificate Authority (CA) server settings:

```
> config certificate lsc ca-server http://10.0.0.1:8080/caserver
```

This example shows how to add a CA certificate from the CA server and add it to the controller's certificate database:

```
> config certificate lsc ca-cert add
```

This example shows how to configure an LSC certificate with the keysize of 2048 bits:

```
> config certificate lsc keysize 2048
```

Related Commands

config certificate

show certificate compatibility

show certificate lsc

show certificate summary

show local-auth certificates

config lsc mesh

To enable the locally significant certificate (LSC) on mesh access points, use the **config lsc mesh** command.

config lsc mesh {**enable** | **disable**}

Syntax Description

enable	Enables LSC on mesh access points.
disable	Disabes LSC on mesh access points.

Command Default

None.

Examples

This example shows how to enable LSC on mesh access point:

```
> config lsc mesh enable
```

Related Commands

show loginsession

config slot

To configure various slot parameters, use the **config slot** command.

config slot *slot_id* {**enable** | **disable** | **channel ap** | **chan_width** | **txpower ap** | **antenna extAntGain** *antenna_gain* | **rts**} *cisco_ap*

Syntax Description

slot_id	Slot downlink radio to which the channel is assigned.
enable	Enables the slot.
disable	Disables the slot.
channel	Configures the channel for the slot.
ap	Configures one 802.11a Cisco access point.
chan_width	Configures channel width for the slot.
txpower	Configures Tx power for the slot.
antenna	Configures the 802.11a antenna.
extAntGain	Configures the 802.11a external antenna gain.
antenna_gain	External antenna gain value in .5 dBi units (such as 2.5 dBi = 5).
rts	Configures RTS/CTS for an access point.
cisco_ap	Name of the Cisco access point on which the channel is configured.

Command Default

None.

Examples

This example shows how to enable slot 3 for the access point abc:

```
> config slot 3 enable abc
```

This example shows how to configure RTS for the access point abc:

```
> config slot 2 rts abc
```

Related Commands

show mesh ap

show mesh stats

Troubleshooting Mesh AP using Controller Commands

This section describes the controller **debug** commands to troubleshoot Mesh access points.

debug mesh security

To begin debugging mesh security problems, use the **debug mesh security** command.

debug mesh security {**all** | **events** | **errors**} {**enable** | **disable**}

Syntax Description

all	Debugs all mesh security messages.
events	Debugs mesh security event messages.
errors	Debugs mesh security error messages.
enable	Enables debugging of mesh security error messages.
disable	Disables debugging of mesh security error messages.

Command Default

None.

Examples

This example shows how to enable debugging of mesh security error messages:

```
> debug mesh security errors enable
```

Related Commands

config mesh security

show mesh security-stats