Cisco Catalyst IW9167E Heavy Duty Access Point Cisco Ultra-Reliable Wireless Backhaul Software Configuration Guide, 17.11.1

First Published: 2023-03-30

Last Modified: 2024-12-11

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

CONTENTS

CHAPTER 1

Overview of Cisco URWB Catalyst IW9167E Heavy Duty Access Point

The Cisco Catalyst IW9167E Heavy Duty Access Point provides reliable wireless connectivity for mission-critical applications in a state-of-the art platform to deliver a network that is more reliable and secure, with higher throughput, more capacity, and less device interference.The IW9167E is Cisco's first outdoor Wi-Fi 6E ready Access Point supporting tri-radio and tri-band (2.4/5/6 GHz bands).The IW9167E can operate in Cisco Catalyst Wi-Fi (CAPWAP) mode or Cisco Ultra-Reliable Wireless Backhaul (Cisco URWB) mode and Cisco URWB software on IW9167E designed to support the Cisco style parser. This document covers configuration of Cisco URWB mode specific to the IW9167EH Access Point.

Configuring the Access Point for the First Time

This section describes how to configure basic settings on the wireless device for the first time. You can configure all the settings described in this section using the CLI, but it might be simplest to browse to the wireless device web-browser interface to complete the initial configuration and then use the CLI to enter additional settings for a more detailed configuration.

Using the Command-Line Interface

Use Secure Shell (SSH) to access the CLI. SSH provides a secure, remote connection to networking devices. The SSH software package provides secure login sessions by encrypting the entire session. SSH features strong cryptographic authentication, strong encryption, and integrity protection.

Connecting to the Access Point Console Port

To configure the access point locally (without connecting to a wired LAN), connect the computer to the access point's console port using a DB-9 to RJ-45 serial cable and to open the CLI by connecting to the access point's console port, follow these steps:

1. Connect a nine-pin, female DB-9 to RJ-45 serial cable to the RJ-45 serial port on the access point and to the COM port on a computer.

2. Set up a terminal emulator to communicate with the access point. In the terminal emulator, use the following settings:

Parameter	Value
Baud rate	115200 bps
Data	Eight bits
Parity	No
Stop	One stop bit
Flow Control	No

3. There are two available command-prompt modes: standard command prompt (>) and privileged command prompt (#). When logged in for the first time, it directs you to standard command prompt (>) mode to execute unprivileged commands.

   To access privileged command-prompt (#) mode, enter the enable command (abbreviated as en) and enter the enable password (the privilege mode login password is different from the standard login password).

   Use these default credentials to log in:

   - Username: Cisco
   - Password: Cisco

Note Once the initial configuration completes, ensure to remove the serial cable from the access point.

CHAPTER 2

Configuring URWB Operation Mode

Configuring URWB Operation Mode

Catalyst Industrial Wireless access points support multiple wireless technologies, such as Catalyst Wi-Fi (AP), Cisco Ultra-Reliable Wireless Backhaul (URWB), and Workgroup Bridge (WGB). The modes supported vary by specific access point.

The access point OS supports two different software images: Catalyst Wi-Fi (AP) and Unified Industrial Wireless (UIW). Both URWB and WGB are part of the UIW software. The access point mode is determined at boot time based on the mode the access point is configured to operate in.

Determining from CLI

The access point OS supports two different software images: Catalyst Wi-Fi (AP) and UIW. Use the following show command to determine which software is running and look for the indicated platform code:

```
Device# show version
Cisco AP Software, (ap1g6j), C9167, RELEASE SOFTWARE
Technical Support: http://www.cisco.com/techsupport
Copyright (c) 1986-2022 by Cisco Systems, Inc.
Compiled Thu Aug 18 01:01:29 PDT 2022
ROM: Bootstrap program is U-Boot boot loader
BOOTLDR: U-Boot boot loader Version 2022010100
APFC58. 9A16.E464 uptime is 1 days, 3 hours, 58 minutes
Last reload time : Wed Sep 7 11:17:00 UTC 2022
Last reload reason: reload command
```

If the show version displays `ap1g6a` or `ap1g6b`, it means that the access point OS is running. If the show version displays `ap1g6j` or `ap1g6m`, it means the UIW software is running.

To check if the access point is running in URWB mode, use the following CLI command:

```
Device#show iotod-iw status
```

If the command exists, then the access point is running in URWB mode, otherwise the access point is running in WGB mode.

Reset Button Settings

The following reset actions are performed in the URWB mode when the LED turns to blinking red (after the boot loader gets the reset signal). Ensure you to press the device's reset button before the device is powering on.

- If you press the reset button for < 20 seconds, it clears the existing configuration.
- If you press the reset button for > 20 seconds and < 60 seconds, it triggers the factory reset.
- If you press the reset button for > 60 seconds, it does not clear the configuration.

Configuring Image Conversion

To convert a Catalyst IW9167E access point either from Wi-Fi mode (CAPWAP AP) to URWB mode or from URWB mode to Wi-Fi mode (CAPWAP AP), follow these steps:

1. To convert from CAPWAP to URWB mode or from WGB/uWGB to URWB mode, use the following CLI command. The access point then reboots and starts up in URWB mode.

   ```
   configure boot mode urwb
   ```

2. To convert from URWB to CAPWAP mode or from WGB/uWGB to CAPWAP mode, use the following CLI command. The access point then reboots and starts up in CAPWAP mode.

   ```
   configure boot mode capwap
   ```

3. To convert from CAPWAP to WGB/uWGB mode or from URWB to WGB/uWGB mode, use the following CLI command:

   ```
   configure boot mode wgb
   ```

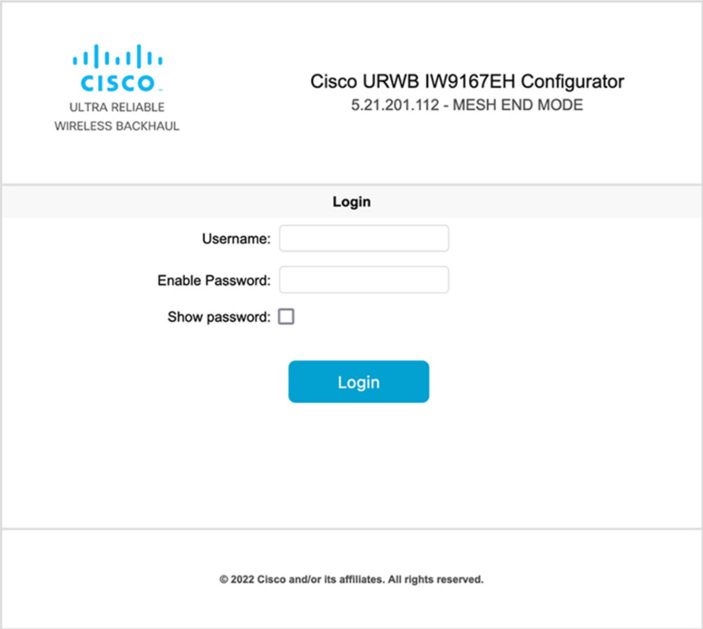
Note Image conversion performs a full factory reset which completely erases the configuration and data.

Instructions to Access the GUI

To access the Web UI (Web User Interface), use the following procedure:

1. To access a Web UI, open the web browser and enter the following URL: https://<IP address of unit>/

   The **IW9167E or IW9165 Configurator** window appears.



ULTRA RELIABLE
WIRELESS BACKHAUL

Cisco URWB IW9167EH Configurator
5.21.201.112 - MESH END MODE

Login

Username:

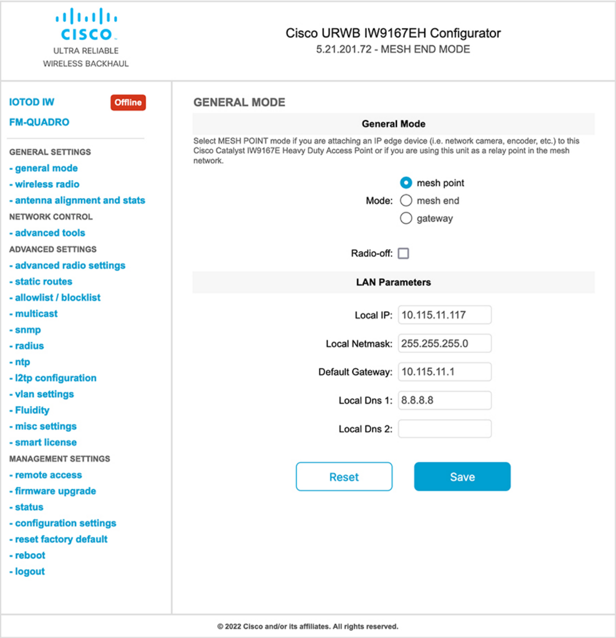
Enable Password:

Show password: □

© 2022 Cisco and/or its affiliates. All rights reserved.

2. To access the configuration page, use the credentials as follows: **Username** and **Enable password**.

3. Once you successfully log into the GUI, the URWB configurator displays:



ULTRA RELIABLE
WIRELESS BACKHAUL

Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

GENERAL MODE

General Mode

Select MESH POINT mode if you are attaching an IP edge device (i.e. network camera, encoder, etc.) to this Cisco Catalyst IW9167E Heavy Duty Access Point or if you are using this unit as a relay point in the mesh network.

Mode: ● mesh point ○ mesh end ○ gateway

Radio-off: □

LAN Parameters

Local IP: 10.115.11.117

Local Netmask: 255.255.255.0

Default Gateway: 10.115.11.1

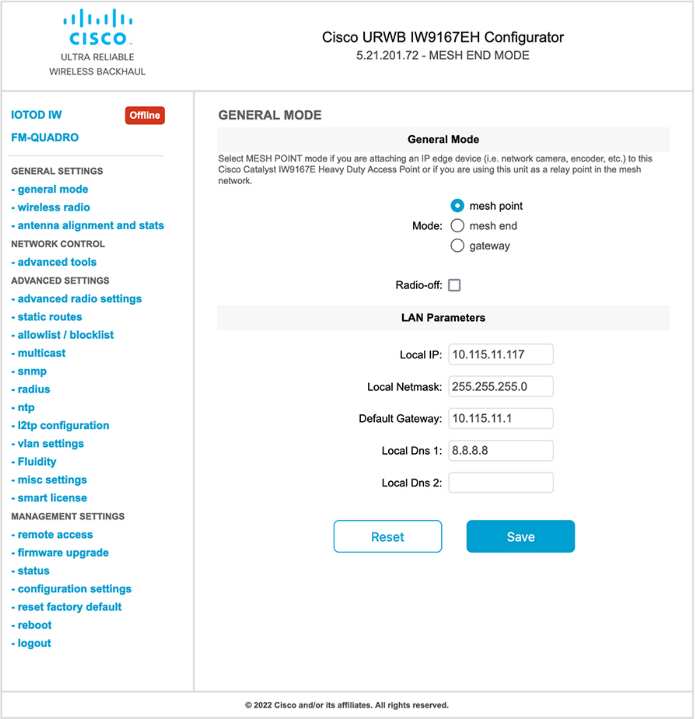
Local Dns 1: 8.8.8.8

Local Dns 2:

© 2022 Cisco and/or its affiliates. All rights reserved.

URWB Catalyst IW9167E Configuration from GUI

The following image shows the configuration of the Catalyst IW9167E configurator:



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

GENERAL MODE

General Mode

Select MESH POINT mode if you are attaching an IP edge device (i.e. network camera, encoder, etc.) to this Cisco Catalyst IW9167E Heavy Duty Access Point or if you are using this unit as a relay point in the mesh network.

Mode: ● mesh point ○ mesh end ○ gateway

Radio-off: □

LAN Parameters

Local IP: 10.115.11.117

Local Netmask: 255.255.255.0

Default Gateway: 10.115.11.1

Local Dns 1: 8.8.8.8

Local Dns 2:

© 2022 Cisco and/or its affiliates. All rights reserved.

Committing CLI Configuration

To save the current or running configuration settings to local storage or memory, type `write` CLI command. The modified value is in the cache configuration file, once the `write` command is entered, re-boot the device to take effect of the current configuration. To make the configuration effective, use the following CLI commands:

```
Device# write
```

or

```
Device# wr
```

write or wr: commit the current configuration settings to memory.

```
Device# reload
```

reload: reload the device.

Example:

```
Device# write
```

```
!!! Please reboot to take effect
```

```
Device# reload
```

Proceed with reload? [confirm]

(enter to confirm)

Configuring IoT OD Online and Offline Mode from CLI

IoT OD is the cloud management portal, and the device is connected to the online cloud through the network. In offline mode the device is configured in local mode using CLI and GUI, and it is not connected to the cloud.

When the device is configured in offline mode, choose following options:

- Configure the device manually using CLI and GUI.
- Configure the device on IoT OD cloud service and select the configuration file exported from IoT OD and upload the configuration file using upload configuration button at the end of IoT OD management page.

To activate or deactivate IoT OD configuration capability, use the following CLI command:

```
Device#configure iotod-iw {offline | online}
```

Online - To set up IoT OD mode to online. The device can be managed from IoT OD cloud server (if it is connected to the network).

Offline - To set up IoT OD mode to offline. The device is disconnected from IoT OD and must be manually configured using the CLI, or offline configurator interface.

Configuring Password (after first login) using CLI

Once the device switches to offline mode (after the initial login), you need to set up new login credential. To configure login credentials using GUI or CLI, the login credentials should follow these criteria:

- The username length must be between 3 to 32 characters long.
- The password length must be between 8 to 32 characters long.
- The password must include the following:
  - At least one uppercase letter
  - At least one lowercase character,
  - At least one digit
  - At least one special character
- The password can contain alphanumeric characters and special characters (ASCII decimal code from 33 to 126), but the following special characters are not allowed:

  " [double quote]

  ' [single quote]

  ? [question mark]
- The password must not contain:
  - Three sequential characters or digits (ABC/ CBA)
  - The same three characters or digits consecutively (AAA) or (666)

- Same as the current or existing password
- Same as or the reverse of the username

Example:

Default credentials:

```
username: Cisco

password: Cisco

enable password: Cisco
```

To reset the credentials, use the following sample credentials:

```
username: demouser

password: DemoP@ssw0rd

enable password: DemoE^aP@ssw0rd
```

Example of configuring password using CLI:

```
Device#configure iotod-iw {offline}

Switching to IOTOD IW Offline mode...

Will switch from Provisioning Mode to IOTOD IW offline Mode, device need to reboot:Y/N?
Y

User access verification.

[Device rebooting...]


User Access Verification:

Username: Cisco

Password: Cisco
```

After first login, reset the credentials:

```
Current Password:Cisco

Current Enable Password:Cisco

New User Name:demouser

New Password:DemoP@ssw0rd

Confirm New Password:DemoP@ssw0rd

New Enable Password:DemoE^aP@ssw0rd

Confirm New Enable Password:DemoE^aP@ssw0rd
```

Once the credentials are changed, re-login:

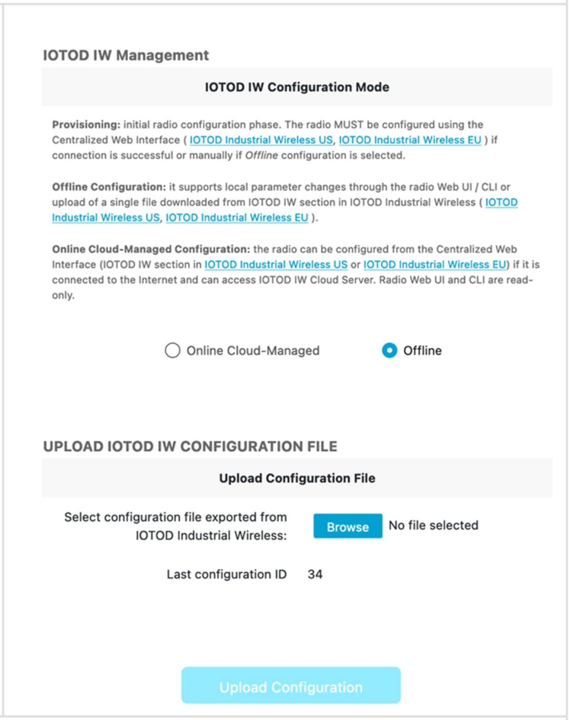
```
User access verification

Username: demouser

Password: DemoP@ssw0rd

Device> enable

Password:DemoE^aP@ssw0rd
```

```
Device#
```

Note In the above example, all passwords are in plain text. This is for demo purposes (sample credential). In the real scenario, they are hidden behind asterisks (*).

Configure IoT OD using GUI

This image shows the configuration of IoT OD:



IOTOD IW Management

IOTOD IW Configuration Mode

Provisioning: initial radio configuration phase. The radio MUST be configured using the Centralized Web Interface (IOTOD Industrial Wireless US, IOTOD Industrial Wireless EU) if connection is successful or manually if *Offline* configuration is selected.

Offline Configuration: it supports local parameter changes through the radio Web UI / CLI or upload of a single file downloaded from IOTOD IW section in IOTOD Industrial Wireless (IOTOD Industrial Wireless US, IOTOD Industrial Wireless EU).

Online Cloud-Managed Configuration: the radio can be configured from the Centralized Web Interface (IOTOD IW section in IOTOD Industrial Wireless US or IOTOD Industrial Wireless EU) if it is connected to the Internet and can access IOTOD IW Cloud Server. Radio Web UI and CLI are read-only.

○ Online Cloud-Managed ● Offline

UPLOAD IOTOD IW CONFIGURATION FILE

Upload Configuration File

Select configuration file exported from IOTOD Industrial Wireless: Browse No file selected

Last configuration ID 34

Upload Configuration

CHAPTER 3

Configuring URWB Radio Mode

Configuring URWB Radio Mode

The wireless interfaces are configured to operate in a specific mode, or you can disable it. Once you configure the Radio mode, the device starts working as a Fluidity or Fixed infrastructure.

The following table shows the configuration of Radio mode on the device:

Table 1: Radio Mode Configuration

Radio Role	Radio Mode	Description
Fixed Infrastructure	Fixed Fluidmax primary Fluidmax secondary	P2P mode (point to point) P2MP (point to multipoint) mode (Fluidmax) and P2MP P2MP mode (Fluidmax) and P2MP
Mobility AP	Fluidity	Mobility mode
Mobility Client	Fluidity	Mobility mode

Following table shows the Fluidity status and it is derived from operating mode of enabled radio interfaces:

Table 2: Operating Mode of Radio Interface

Radio 1 / Radio 2	Fixed Infrastructure	Fluidity
Fixed Infrastructure	Fluidity disabled	Fluidity enabled
Fluidity	Fluidity enabled	Fluidity enabled

Multiple and dual radio interfaces are possible based on the following table:

Table 3: Configuration of Multiple Radio interfaces

Radio 1 / Radio 2	Fixed Infrastructure / Mesh	Mobility AP	Mobility client
Fixed Infrastructure / Mesh	ME/MP relay, P2MP (mesh)	Yes, trailer use case (Mining trailer)	Supported but no specific use case
Mobility AP	Yes, trailer use case (Mining trailer)	Standard Fluidity (multiple clients on each radio)	Not supported, use V2V or Fixed + AP
Mobility client	Supported but no specific use case	Not supported, use V2V or Fixed + AP	Standard Fluidity (multiple clients on each radio)

Configuring Radio-off Mode from CLI

To configure Radio-off mode when both radios (Fluidity and fixed) are disabled, use the following CLI commands and procedure:

Note If you specify radio-off, the device disables all the wireless interfaces.

1. Set the device’s current operating mode. Mode could be mesh end, mesh point or global gateway (L3).

```
Device# configure modeconfig mode {meshpoint | meshend | gateway}
```

2. Set the device’s selected Multi-Protocol Label Switching (MPLS) OSI layer and the possible value of layer is 2 (OSI Layer-2) or 3 (OSI Layer-3).

```
Device# configure modeconfig mode {meshpoint | meshend | gateway}[layer {2|3}]
```

3. To set the radio-off mode.

```
Device# configure modeconfig mode { meshpoint | meshend | gateway } [layer {2|3}] [
radio-off {fluidity | fixed}]
```

4. To end the current configuration, use the following CLI command:

```
Device# (configure modeconfig mode { meshpoint | meshend | gateway } [layer {2|3}] [
radio-off {fluidity | fixed}])# end
```

```
Device# wr
```

Example:

```
Configure modeconfig mode meshend radio-off fluidity
```

```
Configure modeconfig mode meshend radio-off fixed
```

Configuring Radio Mode for URWB from CLI

To configure Radio mode for URWB, use the following CLI commands:

To select the operating function of the wireless interface, use these CLI commands. Device allows mixed Fluidity and fixed infrastructure combinations for different interfaces.

1. Configure the wireless with radio interface number <1 or 2>.

   ```
   Device# configure dot11Radio <interface>
   ```

2. Configure an operating mode for the specified interface.

   ```
   Device# configure dot11Radio <interface> mode {fixed|fluidity|fluidmax}
   ```

   Fluidity - This interface operates the device in Fluidity, either as a mobility infrastructure or as a vehice mode.

   Fixed - This interface operates in fixed infrastructure mode (no Fluidity).

   Fluidmax - This interface operates in Fluidmax P2MP mode. More parameters can be specified to configure the Fluidmax operating features, for example: Primary/Secondary role and cluster ID.

3. Set Fluidmax role for Fluidmax interface mode.

   ```
   Device# configure dot11Radio <interface>mode {fixed|fluidity|fluidmax} {primary |
   secondary}
   ```

   Primary - set Fluidmax role to primary

   Secondary - set Fluidmax role to secondary

4. To end the current configuration, use the following CLI command:

   ```
   Device (configure dot11Radio <interface>mode{fixed|fluidity|fluidmax}) # end
   ```

   ```
   Device# wr
   ```

Note When at least one interface is set to Fluidity mode, the device operates globally in Fluidity mode. If all interfaces are set to fixed, Fluidity is disabled.

Configuring AMPDU from CLI

To configure an aggregated MAC protocol data unit's (ampdu) length and priority, use the following CLI commands:

```
Device# configure dot11radio <interface> ampdu length <length>
```

length: <0-255> integer number – microseconds.

```
Device# configure dot11radio <interface> ampdu priority {enable | disable}
```

enable: enable ampdu tx priority.

disable: disble ampdu tx priority.

```
Device# configure dot11radio <interface> ampdu priority [enable]
```

0: ampdu tx priority for index 0.

1: ampdu tx priority for index 1.

2: ampdu tx priority for index 2.

3: ampdu tx priority for index 3.

4: ampdu tx priority for index 4.

5: ampdu tx priority for index 5.

6: ampdu tx priority for index 6.

7: ampdu tx priority for index 7.

all: ampdu tx priority for all indexes (index 0 to 7)

Configuring Frequency from CLI

To configure an operating frequency, use the following CLI command:

```
Device# configure dot11radio <interface> frequency <frequency>
```

frequency: <0-7125> operating frequency in MHz

Configuring Maximum Modulation Coding Scheme Index from CLI

To configure maximum modulation coding scheme (MCS) index, use the following CLI command:

```
Device# configure dot11radio <interface> mcs <maxmcs>
```

Set maximum MCS index in integer or string AUTO. For AUTO, the background process automatically configures the maxmcs.

Maxmcs values:

< 0-11 > Maximum mcs index 0 to 11.

Word AUTO

Note If High Efficiency mode is disabled, set the MCS index value ranging from zero to nine. If High Efficiency mode is enabled, set the MCS index value as 10 or 11.

Configuring Maximum Number of Spatial Streams Index from CLI

To configure maximum number of spatial streams (NSS) index, use the following CLI command:

```
Device# configure dot11radio <interface> spatial-stream <maxnss>
```

Set maximum spatial stream number in integer or string AUTO. For AUTO, the background process automatically configures the maxnss.

Maxnss values:

< 1-4 > Maximum nss index 1 to 4.

Word AUTO

Note Catalyst IW9165 supports up to two spatial streams and Catalyst IW9167 supports up to four spatial streams. The maximum number of spatial streams configured must be same or less than the number of antennas enabled.

Configuring Rx-SOP Threshold from CLI

To configure receiver start of packet (Rx-SOP) threshold, use the following CLI command:

```
Device# configure dot11radio <interface> rx-sop-threshold
```

<0 - 91> Enter rx-sop- threshold (0: AUTO, VALUE: -VALUE dBi).

Configuring RTS Mode from CLI

To disable ready to send (RTS) mode, use the following CLI command:

```
Device# configure dot11radio <interface> rts <disable>
```

Disable: Disables the RTS protection.

To enable RTS with threshold value, use the following CLI command:

```
Device# configure dot11radio <interface> rts enable <threshold>
```

Threshold: Threshold range <0 - 2346>.

Configuring WMM Mode from CLI

To configure wireless multimedia (WMM) mode, use the following CLI command:

```
Device# configure dot11radio <interface> wmm [bk|be|vi|vo]
```

[bk|be|vi|vo]: Represents the class-of-service (CoS) parameters.

be: Best-effort traffic queue (CS0 and CS3).

bk: Background traffic queue (CS1 and CS2).

vi: Video traffic queue (CS4 and CS5).

vo: Voice traffic queue (CS6 and CS7).

To clear wireless stats counters, use the following CLI command:

```
Device# configure dot11Radio <interface> wifistats <clear>
```

Clear: Clear wireless stats counters.

Configuring NTP from CLI

To configure the NTP server address, use the following CLI command:

```
Device# configure ntp server <string>
```

String - IP address or domain name.

Example:

```
Device# configure ntp server 192.168.216.201
```

To configure the NTP authentication, use the following CLI command:

```
Device# configure ntp authentication none
Device# configure ntp authentication md5 <password> <keyid>
Device# configure ntp authentication sha1 <password> <keyid>
```

none - disable the NTP authentication md5|sha1 - authentication method.

Example:

```
Device# configure ntp authentication md5 test1234 65535
```

Note Optional, the md5 password and keyid should match NTP server's md5 password and keyid.

To configure a new password using a GUI or CLI, the password should match the following criteria:

- The password length range is from 8 to 20 characters.
- The following special characters are not allowed:
    - ' (apex)
    - " [double apex]
    - ` [backtick]
    - $ [dollar]
    - = [equal]
    - \ [backslash]
    - # [number sign]
    - whitespace

To enable or disable the NTP service, use the following CLI command:

```
Device# configure ntp { enable|disable }
```

To configure the NTP timezone, use the following CLI command:

```
Device# configure ntp timezone <string>
```

Example:

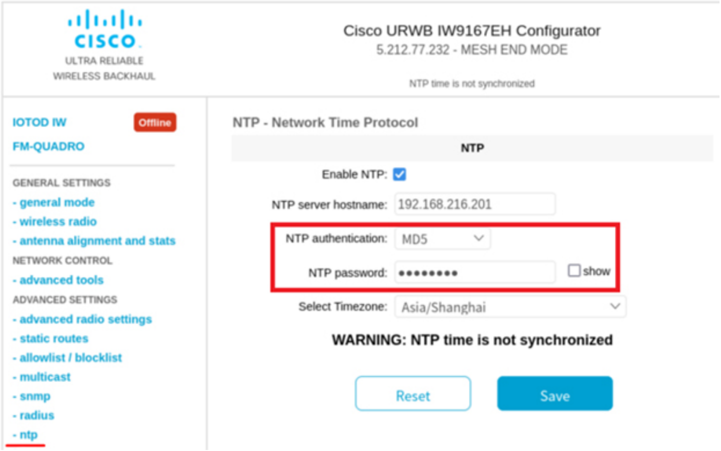
```
Device# configure ntp timezone Asia/Shanghai
```

To validate the NTP configuration and status, use the following show commands:

```
Device# show ntp config
NTP status: enabled
NTP server: 192.168.216.201
authentication: MD5
password: test123
keyid: 5
timezone: Asia/Shanghai

Device# #show ntp (Using this command to check if device can sync up time with NTP server)
Stratum Version Last Received  Delay    Offset  Jitter    NTP server
1          4      9sec ago    1.840ms -0.845ms 0.124ms 192.168.216.201
```

Configuring NTP from GUI

The following image shows the GUI of NTP:



Cisco URWB IW9167EH Configurator
5.212.77.232 - MESH END MODE
NTP time is not synchronized

NTP - Network Time Protocol

NTP

Enable NTP: ☑

NTP server hostname: 192.168.216.201

NTP authentication: MD5

NTP password: •••••••• □ show

Select Timezone: Asia/Shanghai

WARNING: NTP time is not synchronized

Validating Radio Mode for URWB

To validate Radio mode, use the following show commands:

```
Device# show dot11Radio <interface> config
```

Example:

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fluidity
Frequency : 5785 MHz
```

```
Channel : 157
Channel width : 40 MHz

Device# show dot11Radio 2 config
Interface : enabled
Mode : fluidmax secondary
Frequency : 5180 MHz
Channel : 36
Channel width : 40 MHz
```

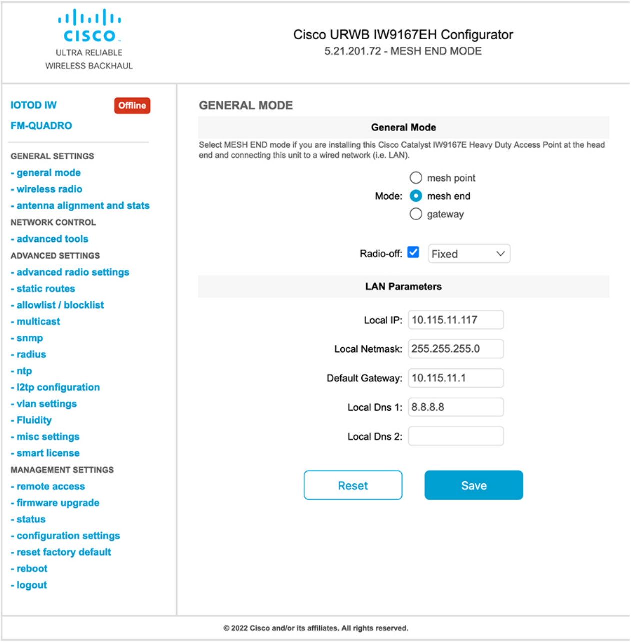
To change the Radio mode of vehicle access point (mobility client) to Fixed or Fluidmax, configure Fluidity role as infrastructure using CLI:

```
Device# configure fluidity id infrastructure
```

.

Configuring Radio-off Mode from GUI

To configure a Radio-off mode, choose fixed or Fluidity mode as shown in the following image. Select a **mesh end** mode if you are installing the Catalyst IW9167E access point at the head end and connecting this device to a wired network such as LAN.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

GENERAL MODE

General Mode

Select MESH END mode if you are installing this Cisco Catalyst IW9167E Heavy Duty Access Point at the head end and connecting this unit to a wired network (i.e. LAN).

Mode: ○ mesh point ● mesh end ○ gateway

Radio-off: ☑ Fixed

LAN Parameters

Local IP: 10.115.11.117
Local Netmask: 255.255.255.0
Default Gateway: 10.115.11.1
Local Dns 1: 8.8.8.8
Local Dns 2:

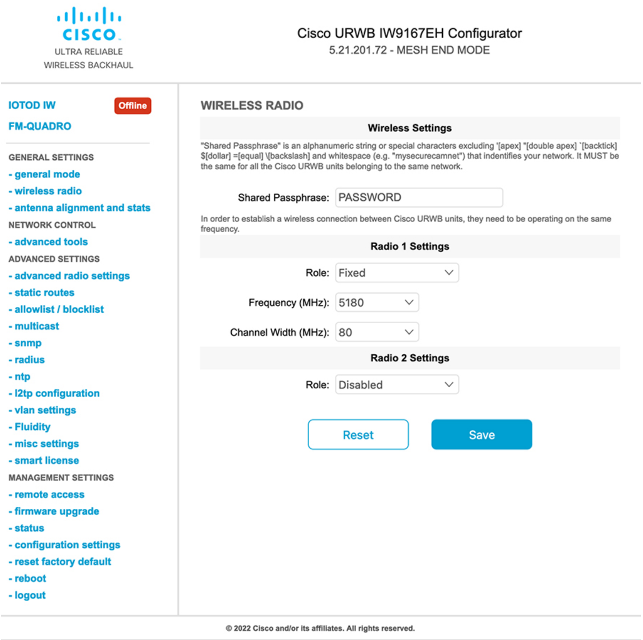
© 2022 Cisco and/or its affiliates. All rights reserved.

Configuring Radio Mode from GUI

To establish a wireless connection the operating frequency should be same between the devices.

To configure a Radio mode using GUI, follow these steps:

1. Set the operating mode for specified radio (Radio1 and Radio2) interface.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: PASSWORD

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Fixed

Frequency (MHz): 5180

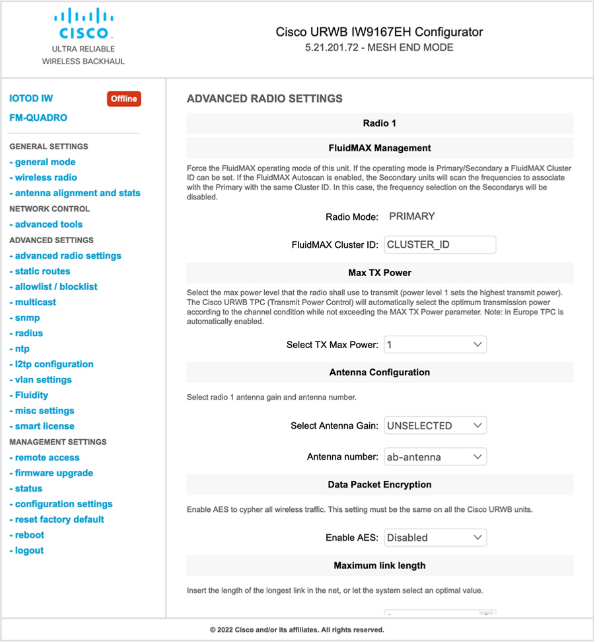
Channel Width (MHz): 80

Radio 2 Settings

Role: Disabled

© 2022 Cisco and/or its affiliates. All rights reserved.

2. In the **WIRELESS RADIO** section, choose Radio 1 Role as **Fluidmax Primary** with FluidMAX Cluster ID. In this scenario, the frequency selection for the Primary is enabled and Secondary is disabled. In the **ADVANCED RADIO SETTINGS** window, go to **Max TX Power** section, and choose power level as 1 from the **Select TX Max Power** drop-down list and URWB transmission power control (TPC) automatically selects the optimum transmission power.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

ADVANCED RADIO SETTINGS

Radio 1

FluidMAX Management

Force the FluidMAX operating mode of this unit. If the operating mode is Primary/Secondary a FluidMAX Cluster ID can be set. If the FluidMAX Autoscan is enabled, the Secondary units will scan the frequencies to associate with the Primary with the same Cluster ID. In this case, the frequency selection on the Secondarys will be disabled.

Radio Mode: PRIMARY

FluidMAX Cluster ID: CLUSTER_ID

Max TX Power

Select the max power level that the radio shall use to transmit (power level 1 sets the highest transmit power). The Cisco URWB TPC (Transmit Power Control) will automatically select the optimum transmission power according to the channel condition while not exceeding the MAX TX Power parameter. Note: in Europe TPC is automatically enabled.

Select TX Max Power: 1

Antenna Configuration

Select radio 1 antenna gain and antenna number.

Select Antenna Gain: UNSELECTED

Antenna number: ab-antenna

Data Packet Encryption

Enable AES to cypher all wireless traffic. This setting must be the same on all the Cisco URWB units.

Enable AES: Disabled

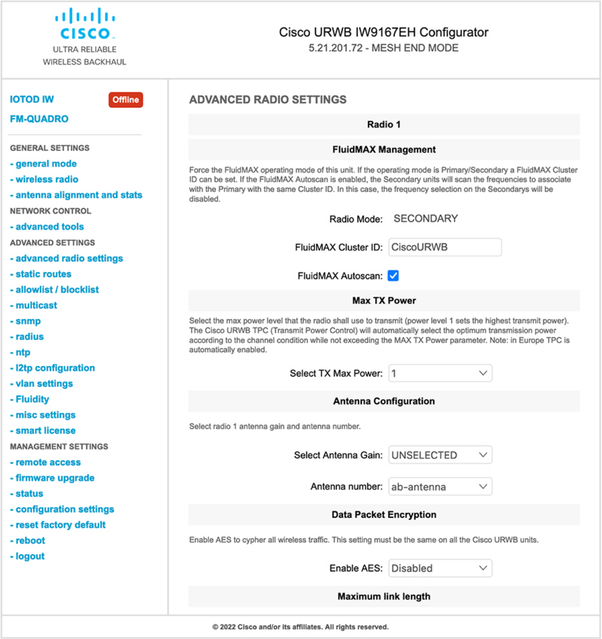
Maximum link length

Insert the length of the longest link in the net, or let the system select an optimal value.

© 2022 Cisco and/or its affiliates. All rights reserved.

Note In Europe TPC is automatically enabled.

3. In the **WIRELESS RADIO** section, choose Radio 1 Role as **Fluidmax Secondary** with FluidMAX Cluster ID. In the **ADVANCED RADIO SETTINGS**, if you check the **FluidMAX Autoscan** check box, the secondary devices scan the frequencies to associate with the Primary with the same Cluster ID. In this case the frequency selection on the Secondary is in disable mode. In the **Max TX Power** section, and choose power level as 1 from the **Select TX Max Power** drop-down list and URWB TPC automatically selects the optimum transmission power.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

ADVANCED RADIO SETTINGS

Radio 1

FluidMAX Management

Force the FluidMAX operating mode of this unit. If the operating mode is Primary/Secondary a FluidMAX Cluster ID can be set. If the FluidMAX Autoscan is enabled, the Secondary units will scan the frequencies to associate with the Primary with the same Cluster ID. In this case, the frequency selection on the Secondarys will be disabled.

Radio Mode: SECONDARY

FluidMAX Cluster ID: CiscoURWB

FluidMAX Autoscan: ☑

Max TX Power

Select the max power level that the radio shall use to transmit (power level 1 sets the highest transmit power). The Cisco URWB TPC (Transmit Power Control) will automatically select the optimum transmission power according to the channel condition while not exceeding the MAX TX Power parameter. Note: in Europe TPC is automatically enabled.

Select TX Max Power: 1

Antenna Configuration

Select radio 1 antenna gain and antenna number.

Select Antenna Gain: UNSELECTED

Antenna number: ab-antenna

Data Packet Encryption

Enable AES to cypher all wireless traffic. This setting must be the same on all the Cisco URWB units.

Enable AES: Disabled

Maximum link length

© 2022 Cisco and/or its affiliates. All rights reserved.

Note In Europe TPC is automatically enabled.

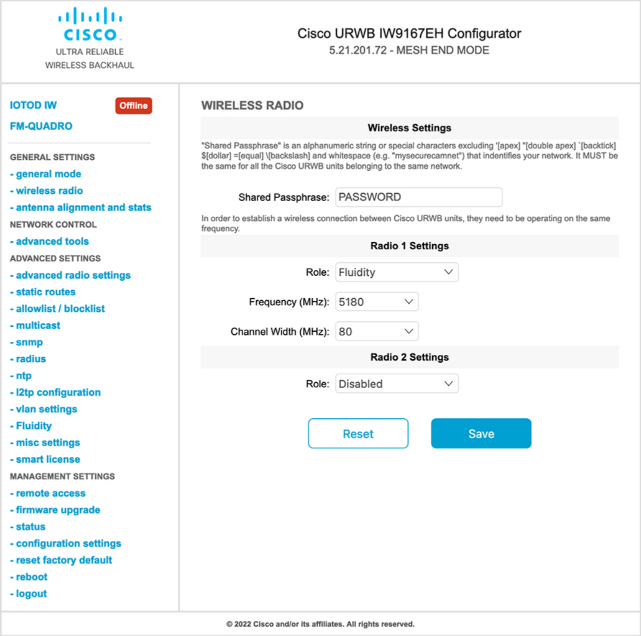
4. In the **Fluidity Settings** section, choose **Unit Role** as **Infrastructure** from the drop-down list, When the device acts as the entry point of the infrastructure for the mobile vehicles or choose unit role as **Infrastructure (wireless relay)** only when it used as a wireless relay agent to other infrastructure unit or choose unit role as a **Vehicle** when it is mobile.

5. Choose network type based on the to the general network architecture:

   a. Choose **Flat** mode from **Network Type** drop-down list, if the network belongs to single layer-2 broadcast domain.

      or

   b. Choose **Multiple subnets** if the network belongs to single layer-3 broadcast domain.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: PASSWORD

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Fluidity

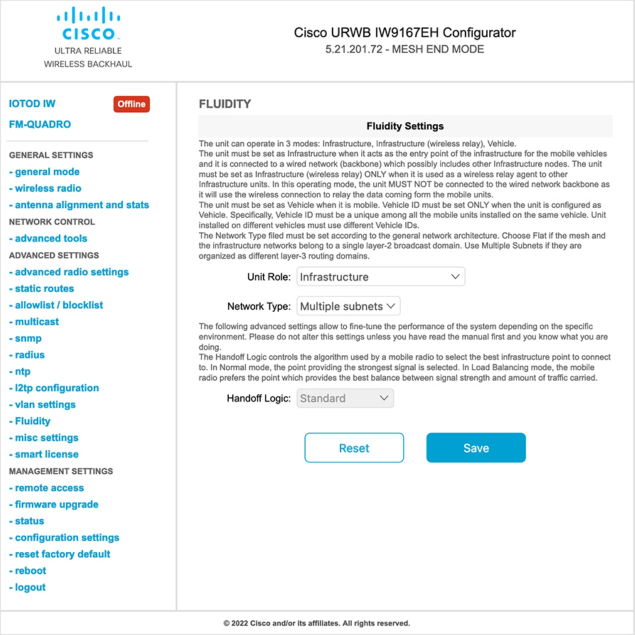
Frequency (MHz): 5180

Channel Width (MHz): 80

Radio 2 Settings

Role: Disabled

© 2022 Cisco and/or its affiliates. All rights reserved.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

Unit Role: Infrastructure

Network Type: Multiple subnets

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard

© 2022 Cisco and/or its affiliates. All rights reserved.

CHAPTER 4

Configuring Radio Antenna Settings

Configuring Radio Antenna Settings

The Catalyst IW9167E supports eight external antennas with eight N-type female connectors to support multiple antenna options. The antenna ports 1, 4, and 5 can support self-identifying antennas (SIA). Radio 1 connects to ports 1 to 4, and Radio 2 connects to ports 5 to 8. For more information on antennas, see Antennas and Radios.

The Catalyst IW9165E supports four external antennas with Reverse-polarity SMA (RP-SMA) (f) connectors. Radio 1 connects to antenna ports 1 and 2, Radio 2 connects to antenna ports 3 and 4, and antenna ports 1 and 3 can support SIA antennas.

The Catalyst IW9165D has a built-in directional antenna and supports two external antennas with N-type (f) connectors. Radio 1 connects to the internal antenna. Radio 2 connects to antenna ports 1 and 3. Antenna port 3 can support SIA antenna.

The following sections describe the CLI commands to manage antenna port and gain on each antenna for different Radio mode:

Configuring Antenna Gain

To configure an antenna gain, use the following CLI command:

Set the maximum antenna gain value in integer or string UNSELECTED.

For UNSELECTED, the background process automatically configures the minimum supported antenna gain.

Note Once the SIA is connected, gain sets automatically without any input.

```
Device# configure dot11radio <interface> antenna gain <gain>
gain:
<1-19> antenna gain in dBi
WORD UNSELECTED
Device# write
```

Configuring Transmit and Receive Antennas

To configure a transmission chain, use the following CLI command:

Note Catalyst IW9165 does not support abcd-antenna mode.

```
Device# configure dot11radio <interface> antenna < A >
configure antenna chains (A) in use as follows
a-antenna - configure dot11 antenna a
ab-antenna - configure dot11 antenna ab
abcd-antenna - configure dot11 antenna abcd
Device# write
```

Configuring Transmission Power

To configure a transmission power, use the following CLI command:

Set the maximum transmission power level. For AUTO, the background process automatically configures the maximum allowed power level one.

Note Eight is the lowest power level and one is the highest power level.

```
Device# configure dot11radio <interface> txpower-level <level>
txpower level:
<1-8> tx power level value
WORD AUTO
Device# write
```

CHAPTER 5

Configure and validate radio channel and bandwidth

Configuring Operating Channel from CLI

To configure operating channel, use the following CLI commands:

1. Configure the wireless device with radio interface number < 1 or 2 >

   ```
   Device# configure dot11Radio <interface>
   ```

2. Set the operating channel id and the valid range is from 1 to 256

   ```
   Device# configure dot11Radio <interface> channel <channel id>
   ```

3. To end the current configuration, use the following CLI command:

   ```
   Device (configure dot11Radio <interface> channel <channel id>)# end
   ```

   Example:

   ```
   Device# configure dot11Radio [1|2] channel <1 to 256>
   ```

Configure channel bandwidth from CLI

1. Configure the wireless device with radio interface number <1 or 2>.

   ```
   Device#configure dot11Radio <interface>
   ```

2. Set channel bandwidth in MHz.

   - Radio 1 supports 20, 40, and 80 MHz bandwidths.
   - Radio 2 supports 20, 40, 80, and 160 MHz bandwidths.

```
Device#configure dot11Radio [1|2] band-width [20|40|80|160]
```

3. Returns to privileged EXEC mode.

```
Device (configure dot11Radio [1|2] band-width [20|40|80|160])#end
```

Validating operating channel and bandwidth from CLI

To validate radio channel and bandwidth, use the following show command:

```
Device# show dot11Radio <interface> config
```

Example:

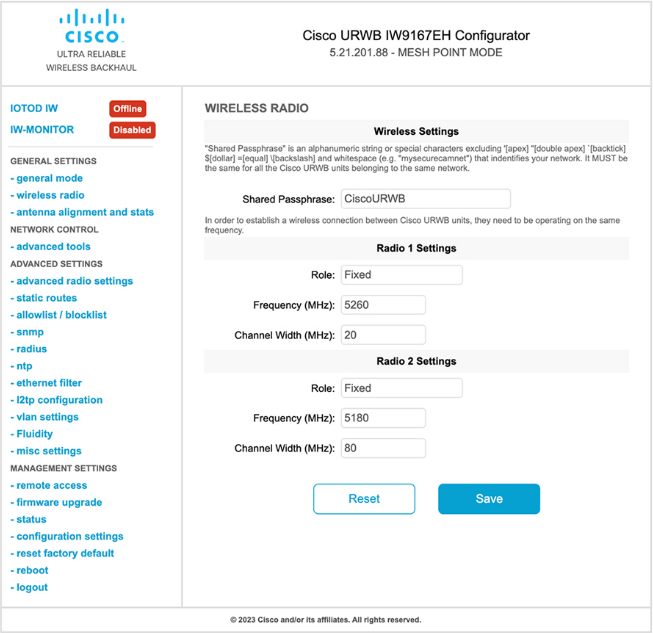
```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fluidmax secondary
Frequency : 5180 MHz
Channel : 36
Channel width : 40 MHz
```

```
Device# show dot11Radio 2 config
Interface : enabled
Mode : fluidity
Frequency : 5785 MHz
Channel : 157
Channel width : 40 MHz
```

Configure radio channel and bandwidth from GUI

To configure Radio channel and bandwidth using GUI, set the operating channel ID, Radio mode as Fluidity or fixed infrastructure and set the Radio frequency range and bandwidth.

Following image shows the configuration of Radio channel and bandwidth:



Cisco URWB IW9167EH Configurator
5.21.201.88 - MESH POINT MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: CiscoURWB

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Fixed

Frequency (MHz): 5260

Channel Width (MHz): 20

Radio 2 Settings

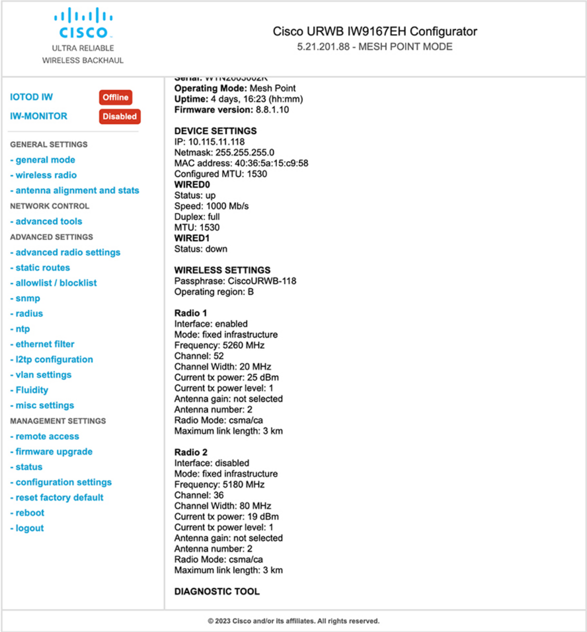
Role: Fixed

Frequency (MHz): 5180

Channel Width (MHz): 80

© 2023 Cisco and/or its affiliates. All rights reserved.

Following image shows the status of Radio channel and bandwidth configuration and specific information of each wireless interface.



Cisco URWB IW9167EH Configurator
5.21.201.88 - MESH POINT MODE

```
Serial: WTN2603002K
Operating Mode: Mesh Point
Uptime: 4 days, 16:23 (hh:mm)
Firmware version: 8.8.1.10

DEVICE SETTINGS
IP: 10.115.11.118
Netmask: 255.255.255.0
MAC address: 40:36:5a:15:c9:58
Configured MTU: 1530
WIRED0
Status: up
Speed: 1000 Mb/s
Duplex: full
MTU: 1530
WIRED1
Status: down

WIRELESS SETTINGS
Passphrase: CiscoURWB-118
Operating region: B

Radio 1
Interface: enabled
Mode: fixed infrastructure
Frequency: 5260 MHz
Channel: 52
Channel Width: 20 MHz
Current tx power: 25 dBm
Current tx power level: 1
Antenna gain: not selected
Antenna number: 2
Radio Mode: csma/ca
Maximum link length: 3 km

Radio 2
Interface: disabled
Mode: fixed infrastructure
Frequency: 5180 MHz
Channel: 36
Channel Width: 80 MHz
Current tx power: 19 dBm
Current tx power level: 1
Antenna gain: not selected
Antenna number: 2
Radio Mode: csma/ca
Maximum link length: 3 km

DIAGNOSTIC TOOL
```

© 2023 Cisco and/or its affiliates. All rights reserved.

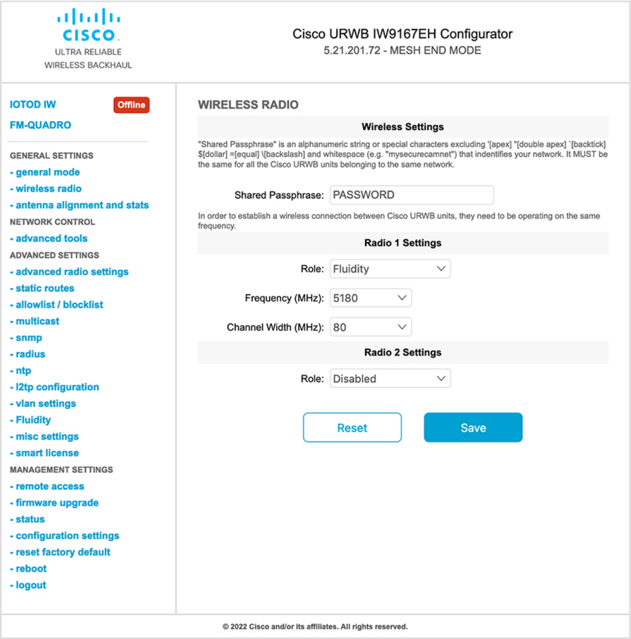
Configure fluidity using GUI

To configure a Fluidity mode using GUI, follow these scenarios:

1. In the **GENERAL SETTINGS**, click **wireless radio**.

The **WIRELESS RADIO** window appears.

2. Choose Radio mode as **Fluidity** from the **Role** drop-down list.



Cisco URWB IW9167EH Configurator

5.21.201.72 - MESH END MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: PASSWORD

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Fluidity

Frequency (MHz): 5180

Channel Width (MHz): 80

Radio 2 Settings

Role: Disabled

© 2022 Cisco and/or its affiliates. All rights reserved.

Once you choose Radio role as **Fluidity**, go to **Fluidity** settings. To go to Fluidity, follow these steps:

1. In the **ADVACED SETTINGS**, click **Fluidity**.

   The **FLUIDITY** window appears.

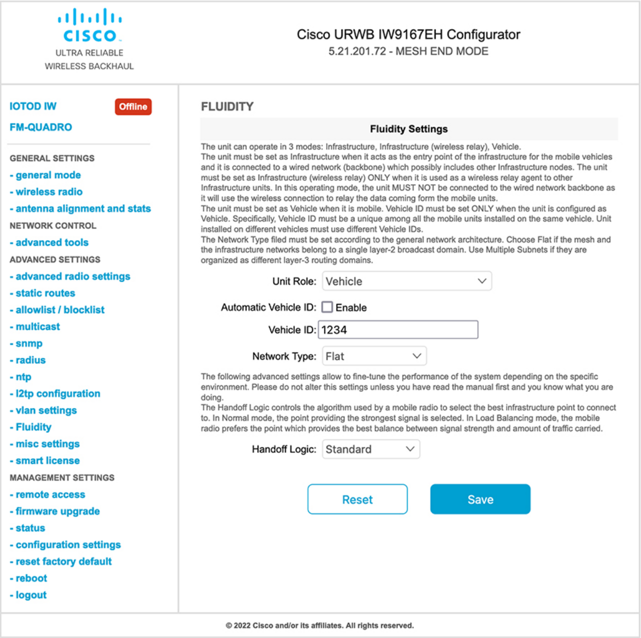
2. In the **Fluidity Settings**, choose **Unit Role** from the drop-down list. Make device role as any one of following mode:

   - Infrastructure
   - Infrastructure (wireless relay)
   - Vehicle

Note

- Vehicle ID must be unique among all the mobile devices installed on the same vehicle.
- If the device installed on different vehicles must use different Vehicles IDs'.

3. Check the **Automatic Vehicle ID** check box to automatically set Vehicle ID for mobile units.



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

Unit Role: Vehicle

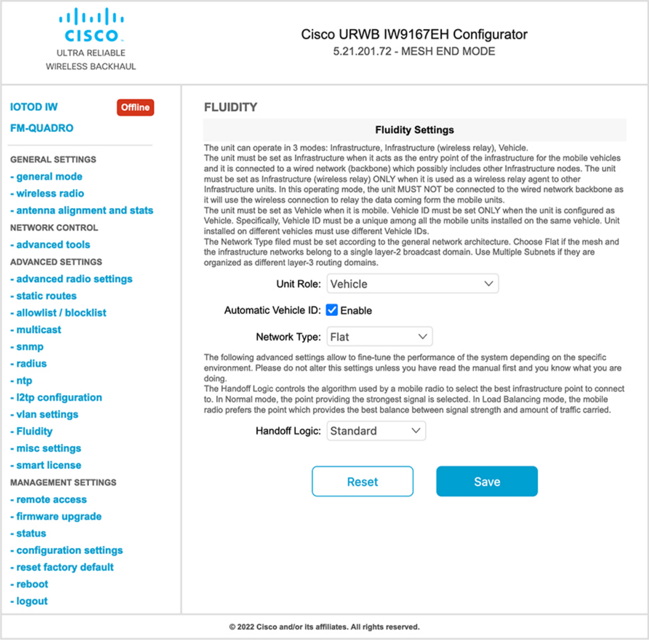
Automatic Vehicle ID: □ Enable

Vehicle ID: 1234

Network Type: Flat

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

Unit Role: Vehicle

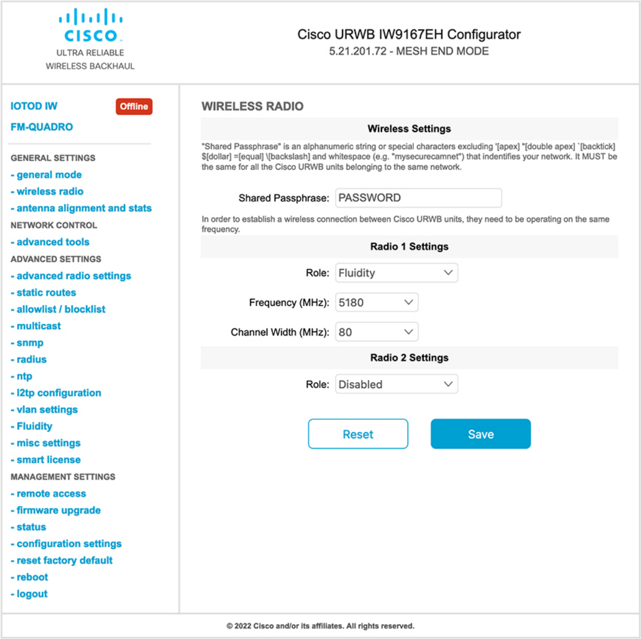
Automatic Vehicle ID: ☑ Enable

Network Type: Flat

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard

Following Fluidity configuration shows wireless interface device role configured as infrastructure mode:



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: PASSWORD

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

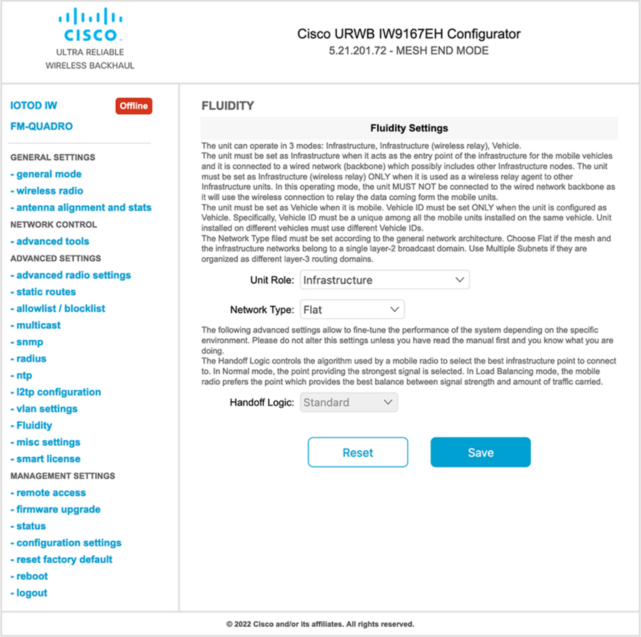
Role: Fluidity

Frequency (MHz): 5180

Channel Width (MHz): 80

Radio 2 Settings

Role: Disabled



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

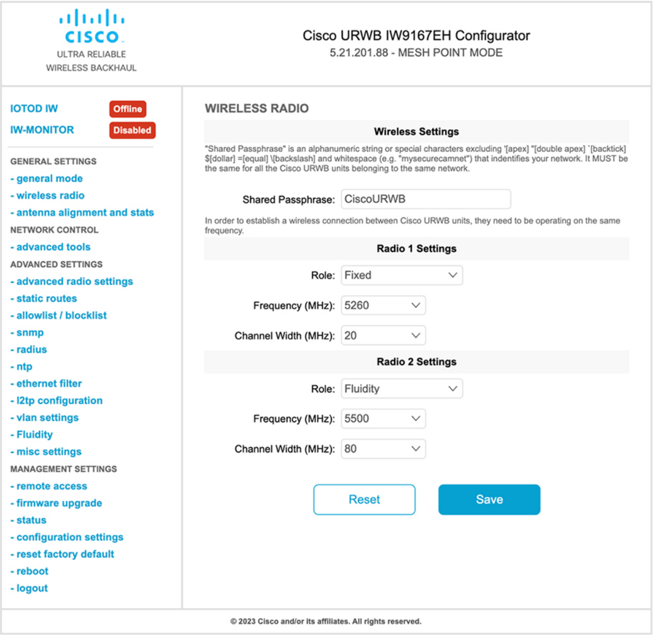
Unit Role: Infrastructure

Network Type: Flat

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard

The following image shows, both radios must be configured as Fluidity for role Vehicle. if one wireless interface is configured in fixed mode and the other one is configured in Fluidity mode then unit role Vehicle cannot be selected.



Cisco URWB IW9167EH Configurator
5.21.201.88 - MESH POINT MODE

WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: CiscoURWB

In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Fixed

Frequency (MHz): 5260

Channel Width (MHz): 20

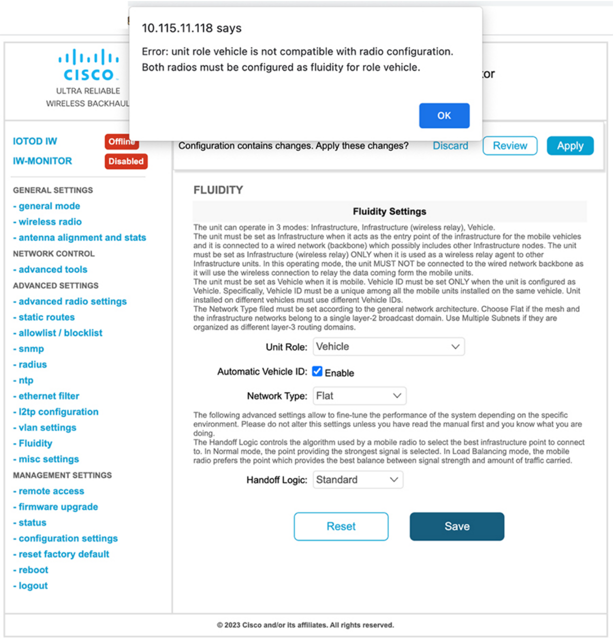
Radio 2 Settings

Role: Fluidity

Frequency (MHz): 5500

Channel Width (MHz): 80

© 2023 Cisco and/or its affiliates. All rights reserved.



10.115.11.118 says

Error: unit role vehicle is not compatible with radio configuration. Both radios must be configured as fluidity for role vehicle.

Configuration contains changes. Apply these changes?

FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

Unit Role: Vehicle

Automatic Vehicle ID: ☑ Enable

Network Type: Flat

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard

© 2023 Cisco and/or its affiliates. All rights reserved.

Configure fluidity using CLI

To enable Fluidity, use the following CLI commands:

Note At least one radio interface should be in Fluidity mode.

```
Device# configure dot11Radio <interface> mode fluidity
```

Example to enable Fluidity for radio 1:

```
configure dot11Radio 1 mode fluidity
```

If the desired Fluidity role is Vehicle both radios should be in Fluidity mode:

```
configure dot11Radio 1 mode fluidity
configure dot11Radio 2 mode fluidity
```

Configuring fluidity role using CLI

To configure Fluidity role (infra or client), use the following CLI commands:

1. Configure the Fluidity role (infrastructure or mobile).

   ```
   Device# configure fluidity id
   ```

2. Configure Fluidity id mode.

   ```
   Device# configure fluidity id {mode}
   Mode is one of the following values
   vehicle-auto - vehicle mode with automatic vehicle ID selection
   vehicle ID - (alphanumeric) vehicle mode with manual ID.
   infrastructure - infrastructure mode
   wireless-relay - wireless infrastructure with no ethernet connection to the backhaul
   ```

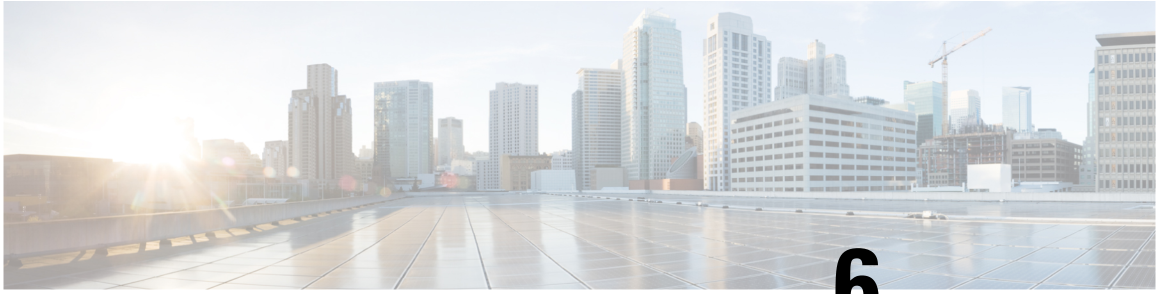
3. To end this configuration, use the following CLI command:

   ```
   Device (configure fluidity id {mode}) # end
   ```

   ```
   Device# wr
   ```

   Example:

   ```
   Device# configure fluidity id [vehicle-auto | infrastructure | vehicle-id |
   wireless-relay]
   ```



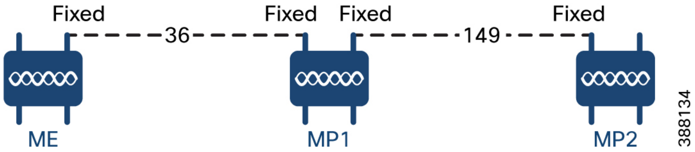
CHAPTER 6

Configuring and Validating of Point-to-Point Relay Topology

Configuring and Validating of Point-to-Point Relay Topology

The following image shows two radio interfaces on a single device (MP1) to implement a point-to-point relay topology:

Figure 1: point to point relay topology



To configure point-to-point relay topology, follow these scenarios:

1. Configure Mesh End (ME), MP1 on channel 36 and MP2 on the default channel 149.
2. Continue from step 1 configuration.
3. Enable the second slot interface on Mesh Point (MP2) again and wait 30 seconds to implement the point-to-point relay topology for two radio interfaces on a single device.

Configuring Point to Point Relay Topology from CLI

To configure a point-to-point relay topology, use the following CLI commands:

1. Configure the wireless device with radio interface number <1 or 2>.

   ```
   Device# configure dot11Radio <interface>
   ```

2. Set wireless interface admin state to enable or disable mode.

```
Device# configure dot11Radio <interface> > {enable | disable}
```

3. Configure an operating mode for the specified interface (fixed or Fluidity or Fluidmax).

   ```
   Device# configure dot11Radio <interface> > [enable | disable] mode { fluidity | fixed |
    fluidmax }
   ```

4. Set the operating channel for the specified interface and the operating channel id valid range is between 1 to 256.

   ```
   Device# configure dot11Radio <interface> > [enable | disable] mode [fluidity | fixed |
   fluidmax] channel <channel id>
   ```

5. To end this configuration, use the following CLI command:

   ```
   Device (configure dot11Radio <interface> > {enable | disable} mode {fluidity | fixed |
   fluidmax} channel <channel id>) #end
   ```

Example:

```
Device#configure dot11Radio <2> {enable | disable} mode {fluidity} channel <36>
```

Example for point-to-point relay topology configuration:

Mesh End (ME) Configuration

```
Device#configure dot11Radio 2 enable
Device#configure dot11Radio 2 mode fixed
Device#configure dot11Radio 2 channel 36
```

Mesh Point (MP1) Configuration

```
Device#configure fluidity id infrastructure
Device#configure dot11Radio 1 enable
Device#configure dot11Radio 1 mode fixed
Device#configure dot11Radio 1 channel 36
Device#configure dot11Radio 2 enable
Device#configure dot11Radio 2 mode fixed
Device#configure dot11Radio 2 channel 149
```

MP2 Configuration

```
Device#configure fluidity id infrastructure
Device#configure dot11Radio 1 enable
Device#configure dot11Radio 1 mode fixed
Device#configure dot11Radio 1 channel 149
```

Validating Point to Point Relay Topology from CLI

To validate point-to-point relay topology configuration, use the following show commands:

```
Device# show dot11Radio <interface> config
```

Mesh End (ME) Statistics

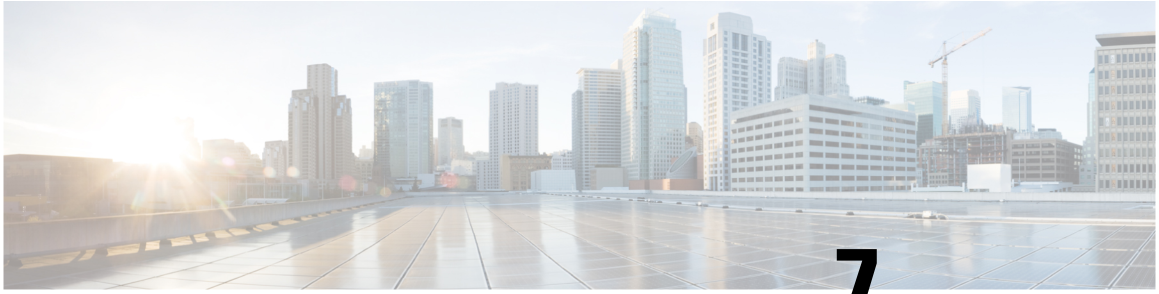
```
Device#show dot11Radio 2 config
Interface : enabled
Mode : fixed infrastructure
Frequency : 5180 MHz
Channel : 36
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
```

Mesh Point (MP1) Statistics

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fixed infrastructure
Frequency : 5180 MHz
Channel : 36
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
Device# show dot11Radio 2 config
Interface : enabled
Mode : fixed infrastructure
Frequency : 5745 MHz
Channel : 149
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
```

MP2 Statistics

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fixed infrastructure
Frequency : 5745 MHz
Channel : 149
……
Passphrase : Cisco
AES encryption : enabled
```



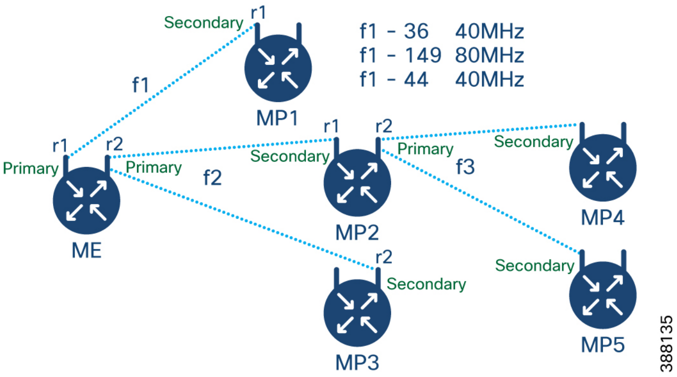
CHAPTER 7

Configure and Validate Fluidmax Topology

Configure and Validate Fluidmax (point to multipoint) Topology

For fixed infrastructure, any wireless interface can be configured to operate in Fluidmax mode to implement point-to-multipoint connections. Each interface uses an independent set of Fluidmax parameters, allowing for great flexibility in the network topologies that can be implemented. As an example, the below image explains two cascaded point-to-multipoint clusters where the ME (Mesh End) node uses both radios in Fluidmax Primary mode to serve several secondary clients (MP1 (Mesh Point), MP2, and MP3) on two different frequencies. For MP2, the first radio operates in Fluidmax secondary mode to connect to the ME, while the second interface is configured as Fluidmax Primary to serve more downstream clients (MP4 and MP5).

Figure 2: Two cascaded Fluidmax Topology



Configuring Point to Multipoint Topology from CLI

To configure a Fluidmax (point to multipoint) Topology use the following commands.

```
Device# configure dot11Radio <interface>
```

Interface - <0-3> Dot11Radio interface number.

```
Device# configure dot11Radio <interface> {enable | disable}
```

Enable or disable - Set wireless interface admin state to enable or disable at runtime

```
Device# configure dot11Radio <interface> mode {fluidity | fixed | fluidmax } { primary |
secondary }
```

Mode - operating mode for the specified interface (Fluidity or fixed or Fluidmax)

Primary | secondary - Fluidity, Fixed and Fluidmax role for the unit, either primary or secondary.

```
Device# configure dot11Radio <interface> channel <channel id>
```

Channel - Set the operating channel id <1 – 256>.

```
Device# configure dot11Radio <interface> band-width <channel bandwidth>
```

Bandwidth - channel bandwidth in MHz and currently supported values are 20, 40, 80, 160.

```
Device#wr
```

Example of point to multipoint (Fluidmax) topology configuration

ME (Mesh End) Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax primary
Device# Configure dot11Radio 1 channel 36
Device# Configure dot11Radio 1 band-width 40
Device# Configure dot11Radio 2 enable
Device# Configure dot11Radio 2 mode fluidmax primary
Device# Configure dot11Radio 2 channel 149
Device# Configure dot11Radio 2 band-width 80
```

MP1 (Mesh point) Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax secondary
Device# Configure dot11Radio 1 channel 36
Device# Configure dot11Radio 1 band-width 40
```

MP2 Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax secondary
Device# Configure dot11Radio 1 channel 149
Device# Configure dot11Radio 1 band-width 80
Device# Configure dot11Radio 2 enable
Device# Configure dot11Radio 2 mode fluidmax primary
Device# Configure dot11Radio 2 channel 44
Device# Configure dot11Radio 2 band-width 40
```

MP3 Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax secondary
Device# Configure dot11Radio 1 channel 149
Device# Configure dot11Radio 1 band-width 80
```

MP4 Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax secondary
Device# Configure dot11Radio 1 channel 44
Device# Configure dot11Radio 1 band-width 40
```

MP5 Configuration

```
Device# Configure dot11Radio 1 enable
Device# Configure dot11Radio 1 mode fluidmax secondary
Device# Configure dot11Radio 1 channel 44
Device# Configure dot11Radio 1 band-width 40
```

Validate Point to Multipoint Topology using CLI

Use this command to validate the point-to-multipoint (Fluidmax) topology configuration.

```
Device# show dot11Radio <interface> config
```

Example:

ME (Mesh End) radio2

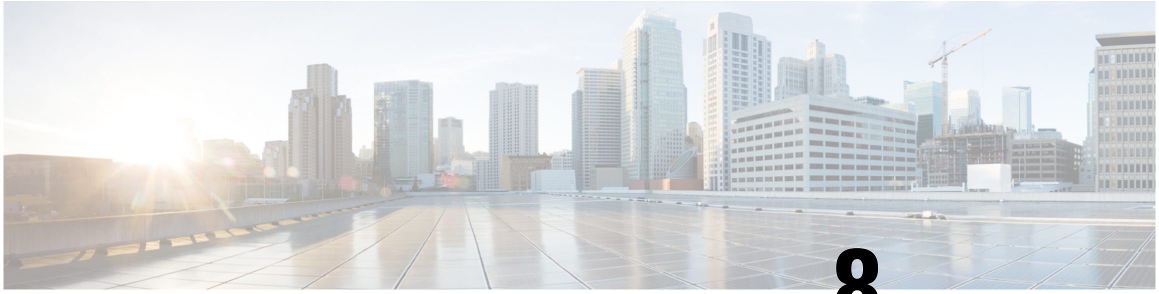
```
Device# show dot11Radio 2 config
Interface : enabled
Mode : fluidmax primary
Frequency : 5745 MHz
Channel : 149
…….
Fluidmax Configuration
Tower ID : disabled
Cluster ID : fluidmesh
Automatic scan : enabled
Automatic scan threshold : disabled
```

MP2 (Mesh Point)

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fluidmax secondary
Frequency : 5745 MHz
Channel : 149
…….
Fluidmax Configuration
Tower ID : disabled
Cluster ID : fluidmesh
Automatic scan : enabled
Automatic scan threshold : disabled
Device# show dot11Radio 2 config
Interface : enabled
Mode : fluidmax primary
Frequency : 5220 MHz
Channel : 44
Channel width : 40
…….
Fluidmax Configuration
Tower ID : 100
Cluster ID : fluidmesh
Automatic scan : enabled
Automatic scan threshold : disabled
```

MP4 radio1

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fluidmax secondary
Frequency : 5220 MHz
Channel : 44
Fluidmax Configuration
Tower ID : disabled
Cluster ID : fluidmesh
Automatic scan : enabled
Automatic scan threshold : disabled
```



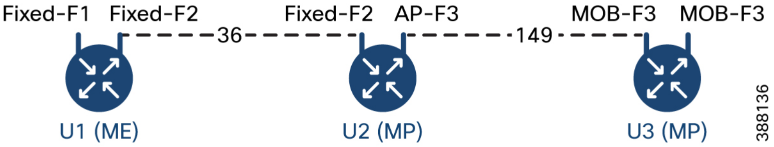
CHAPTER 8

Configuring and Validating Mixed Mode (Fixed infrastructure + Fluidity) Topology

Configuring and Validating Mixed Mode (Fixed Infrastructure + Fluidity) Topology

The mixed mode configuration provides flexibility of configuration on multi-radio device with different frequencies. From the image, U2 is configured with one radio as fixed infrastructure and the second radio as a Fluidity access point to accept vehicle connections simultaneously. Both radio interfaces on U1 configured as fixed infrastructure when U3 has both radio interfaces configured as Fluidity. The wireless interface can also operate in Fluidmax mode without any restriction of the P2MP (Point-to-MultiPoint) role (Primary or Secondary) if fixed infrastructure role is suitable.

Figure 3: Mixed Mode Topologies



Configuring Mixed Mode Topology from CLI

To configure a mixed mode topology, use the following CLI command:

```
Device# configure fluidity id {vehicle-auto | vehicle ID | infrastructure | wireless- relay}
```

Fluidity id – Configure Fluidity role for the device

Vehicle-auto - Vehicle mode with automatic vehicle ID selection

Vehicle ID (alphanumeric) - Vehicle mode with manual ID

Infrastructure - Configure Infrastructure mode for the device

Wireless-relay - Wireless infrastructure with no ethernet connection to the backhaul

```
Device# configure dot11Radio <interface>
```

Interface - <0-3> dot11Radio interface number

```
Device# configure dot11Radio <interface> {enable | disable}
```

Enable or disable - Set wireless interface admin state to enable or disable at runtime

```
Device# configure dot11Radio <interface> mode {fluidity | fixed | fluidmax}
```

Mode - Operating mode for the specified interface (Fluidity or fixed or Fluidmax)

```
Device# configure dot11Radio <interface> channel <channel id>
```

Channel - Set the operating channel id <1 – 256>

```
Device# wr
```

Example:

U1 Configuration

```
Device# configure dot11Radio 2 enable
Device# configure dot11Radio 2 mode fixed
Device# configure dot11Radio 2 channel 36
```

U2 Configuration

```
Device# configure dot11Radio 1 enable
Device# configure dot11Radio 1 mode fixed
Device# configure dot11Radio 1 channel 36
Device# configure dot11Radio 2 enable
Device# configure dot11Radio 2 mode fluidity
Device# configure dot11Radio 2 channel 149
Device# configure fluidity id infrastructure
```

U3 Configuration

```
Device# configure fluidity id vehicle-auto
Device# configure dot11Radio 1 enable
Device# configure dot11Radio 1 mode fluidity
Device# configure dot11Radio 1 channel 149
```

Validating Mixed Mode Topology from CLI

To validate a mixed mode topology, use the following show commands:

```
Device# show dot11Radio <interface>config
```

U1 Statistics:

```
Device# show dot11Radio 2 config
Interface : enabled
Mode : fixed infrastructure
Frequency : 5180 MHz
Channel : 36
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
```

U2 Statistics:

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fixed infrastructure
```

```
Frequency : 5180 MHz
Channel : 36
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
Device# show dot11Radio 2 config
Interface : enabled
Mode : fluidity
Frequency : 5745 MHz
Channel : 149
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
```

U3 Statistics:

```
Device# show dot11Radio 1 config
Interface : enabled
Mode : fluidity
Frequency : 5745 MHz
Channel : 149
……
Passphrase : Cisco
AES encryption : enabled
AES key-control : enabled
```

CHAPTER 9

Configure and Validate Fast Failover

Overview of Fast Failover

Fast failover is a specific type of failover configuration, where the system monitors server health and can quickly switch over when needed.

Fast Failover mechanism:

- Provides hardware redundancy and carrier-grade availability within URWB-based networks.
- In case of hardware failure, Fast Failover allows network to recover again within:
  - less than 30 seconds (varies as per network size) when Fluidmax is used.
  - less than 500 milliseconds when Fluidity is used.

Note Fast Failover is included in all the Network Licenses

Configure and Validate Fast Failover

Note Configure and validate fast failover is applicable for both the Fluidmax and Fluidity modes.

Before you configure the fast failover, use the following pre-conditions:

1. Ensure that both the primary and the backup primary node should have same configuration. This includes the same channel's parameters: frequency, channel width, and mode. If Fluidmax is enabled, ensure that the Cluster ID is the same for both nodes.

2. Enable fast failover on all devices in the network.

Note Fluidmax Fast failover is supported only on MP to MP or ME to ME with Ethernet backhaul.

Configure Fast Failover from CLI

Use this command to configure fast failover.

```
Device# configure modeconfig mode meshpoint
```

Modeconfig – Configure current operating mode of device. Mode could be mesh end(ME), mesh point(MP), or global gateway (L3).

```
Device# configure mpls fastfail status [enable | disable]
```

Mpls - Configure mpls data frame packets for specified device.

Fastfail - Configure the fast failover feature status (enable or disable).

```
Device# configure mpls fastfail timeout <0 – 65535>
```

Fastfail timeout - Set the fast failover timeout for device failure detection.

Use this command to set the preempt delay.

```
Device# configure mpls preempt-delay <0- 65535>
```

By default the preemption delay time is 70 seconds. During this period, the primary device actively gathers updates from the secondary device. This allows it to fully understand the network's current preemption delay status.

Note Radio interface setting must be same on both ME point to Multi point primaries.

Validate Fast Failover from CLI

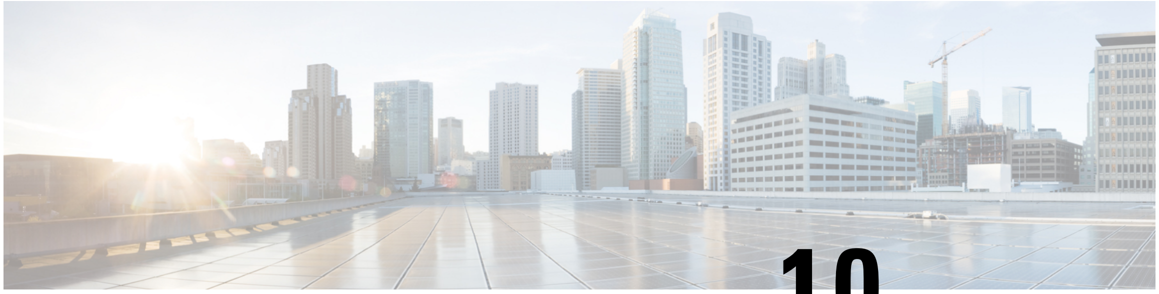
Use this command to validate fast failover.

```
Device# show mpls config
Device# show dot11Radio <interface> fluidmax (check Fluidmax Primary ID and working state)
```

Example:

```
Device# show mpls config
layer 2
unicast-fllod
arp-unicast:
reduce-broadcast:
cluster ID
MPLS fast failover: enabled
Node failover timeout: 100 ms
……
MPLS tunnels:
```

```
Idp_id 381877266 debug 0 auto_pw 1
Local_gw 5.21.201.116 global_gw 0.0.0.0 pwlist {}
```



CHAPTER 10

Configuring and Validating High Efficiency (802.11 ax)

Configuring and Validating High Efficiency

When High Efficiency (HE) is enabled, it is backward compatible with 802.11ac. To enable or disable 802.11ax HE, the following list is supported:

- URWB HE supports 20,40, and 80 MHz bandwidth for slot 1
- URWB HE supports 20,40,80, and 160 MHz bandwidth for slot 2
- URWB HE default setting is disabled
- HE negotiation is only supported between the devices with HE enabled

To enable HE mode, use the following CLI command:

```
Device# configure dot11Radio [1|2] high-efficiency enable
```

To configure maxmcs as 11, use the following CLI command:

```
Device# configure dot11Radio [1|2] mcs maxmcs 11 <mcs index in integer or string>
```

Note The default maxmcs is Nine.

To disable HE mode, use the following CLI command:

```
Device# configure dot11Radio [1|2] high-efficiency disable
default maxmcs is 9.
```

To validate HE mode, use the following show command:

```
Device# show dot11Radio 1 config
Maximum tx mcs : 9
High-Efficiency : Enabled
Maximum tx nss : 2
RTS Protection : disabled
guard-interval : 800ns
```

```
Device# show dot11Radio 2 config
Maximum tx mcs : 9
High-Efficiency : Enabled
Maximum tx nss : 2
RTS Protection : disabled
guard-interval : 800ns
```

```
Device# show eng-stats
```

WLAN1 Rx:

```
FC:58:9A:16F8:52 rate 1201 MCS 11/2 HE80/G1(800ns) ssn 48 rssi-48 received
```

WLAN1 Tx:

```
FC:58:9A:16F8:52 rate 1201 MCS 11/2 HE80/G1(800ns) sent 195612 failed 0
```

WLAN2 Rx:

```
FC:58:9A:16F8:13 rate 1201 MCS 11/2 HE80/G1(800ns) ssn 50 rssi-46 received
```

WLAN2 Tx:

```
FC:58:9A:16F8:13 rate 864 MCS 11/2 HE80/G1(800ns) sent 390797 failed 1
```

Configuring Global Gateway from GUI

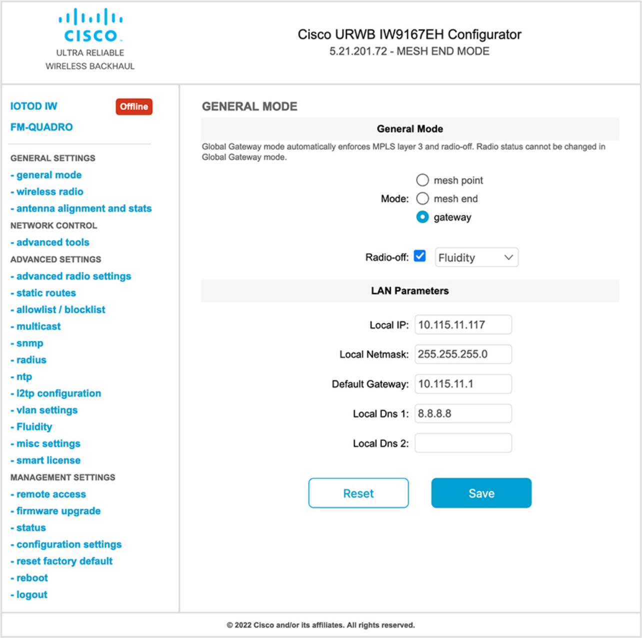
Global gateway mode automatically enforces the MPLS Layer 3. In this mode, Radio-off and Radio status cannot be changed.

1. In the **GENERAL SETTINGS**, click **general mode**.

   The **GENERAL MODE** window appears.

2. Click **gateway** from **Mode**.

Following images shows the GUI configuration of global gateway mode:



Cisco URWB IW9167EH Configurator
5.21.201.72 - MESH END MODE

GENERAL MODE

General Mode

Global Gateway mode automatically enforces MPLS layer 3 and radio-off. Radio status cannot be changed in Global Gateway mode.

Mode: ○ mesh point ○ mesh end ● gateway

Radio-off: ☑ Fluidity

LAN Parameters

Local IP: 10.115.11.117

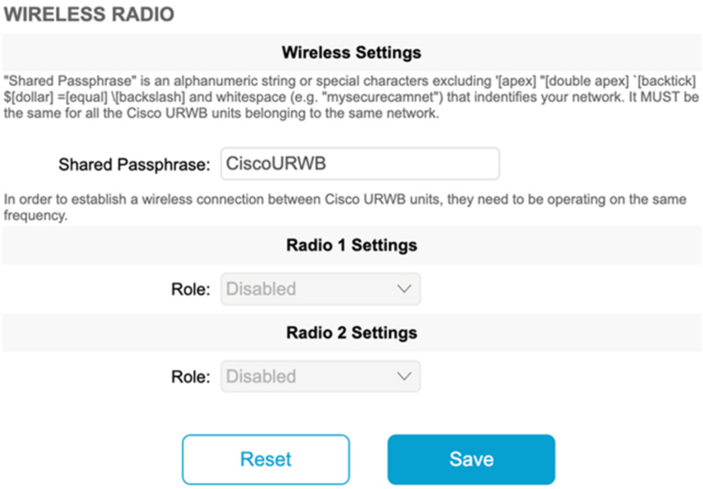
Local Netmask: 255.255.255.0

Default Gateway: 10.115.11.1

Local Dns 1: 8.8.8.8

Local Dns 2:

© 2022 Cisco and/or its affiliates. All rights reserved.



WIRELESS RADIO

Wireless Settings

"Shared Passphrase" is an alphanumeric string or special characters excluding '[apex] "[double apex] `[backtick] $[dollar] =[equal] \[backslash] and whitespace (e.g. "mysecurecamnet") that indentifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase: CiscoURWB

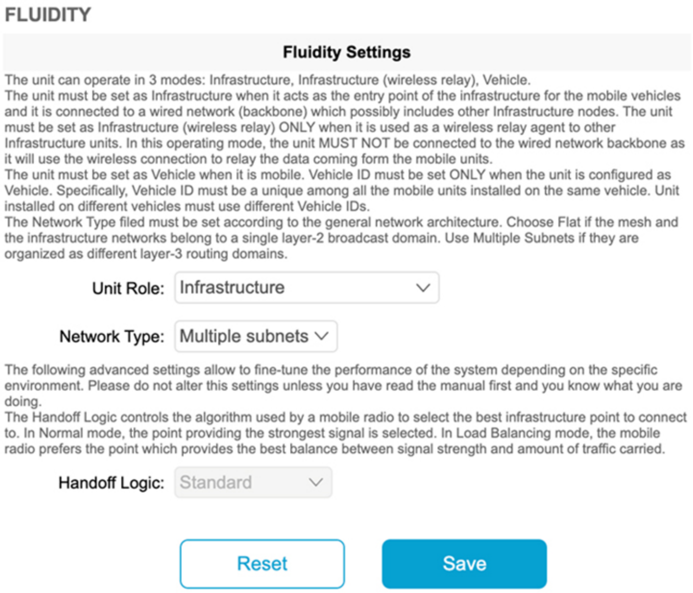
In order to establish a wireless connection between Cisco URWB units, they need to be operating on the same frequency.

Radio 1 Settings

Role: Disabled

Radio 2 Settings

Role: Disabled



FLUIDITY

Fluidity Settings

The unit can operate in 3 modes: Infrastructure, Infrastructure (wireless relay), Vehicle.
The unit must be set as Infrastructure when it acts as the entry point of the infrastructure for the mobile vehicles and it is connected to a wired network (backbone) which possibly includes other Infrastructure nodes. The unit must be set as Infrastructure (wireless relay) ONLY when it is used as a wireless relay agent to other Infrastructure units. In this operating mode, the unit MUST NOT be connected to the wired network backbone as it will use the wireless connection to relay the data coming form the mobile units.
The unit must be set as Vehicle when it is mobile. Vehicle ID must be set ONLY when the unit is configured as Vehicle. Specifically, Vehicle ID must be a unique among all the mobile units installed on the same vehicle. Unit installed on different vehicles must use different Vehicle IDs.
The Network Type filed must be set according to the general network architecture. Choose Flat if the mesh and the infrastructure networks belong to a single layer-2 broadcast domain. Use Multiple Subnets if they are organized as different layer-3 routing domains.

Unit Role: Infrastructure

Network Type: Multiple subnets

The following advanced settings allow to fine-tune the performance of the system depending on the specific environment. Please do not alter this settings unless you have read the manual first and you know what you are doing.
The Handoff Logic controls the algorithm used by a mobile radio to select the best infrastructure point to connect to. In Normal mode, the point providing the strongest signal is selected. In Load Balancing mode, the mobile radio prefers the point which provides the best balance between signal strength and amount of traffic carried.

Handoff Logic: Standard

CHAPTER 11

Configuring Guard Interval for HE (High Efficiency)

Configuring Guard Interval for HE (High Efficiency)

Longer guard intervals improve link reliability for long range outdoor deployments and the feature like guard interval supports URWB stacks.

To configure a guard interval, use the following CLI command:

```
Device# configure dot11Radio [interface] guard-interval [gi]
```

gi - Guard interval values are:

1600 - To configure 1600 ns guard interval (supported only in HE mode)

3200 - To configure 3200 ns guard interval (supported only in HE mode)

400 - To configure 400 ns guard interval (supported in HT and VHT modes)

800 - To configure 800 ns guard interval (default guard interval mode and disable mode in HT, VHT, and HE)

Example:

```
Device# configure dot11Radio 1 high-efficiency enable
```

```
Device# configure dot11Radio 1 guard-interval 1600
```

```
Device# configure dot11Radio 1 guard-interval 3200
```

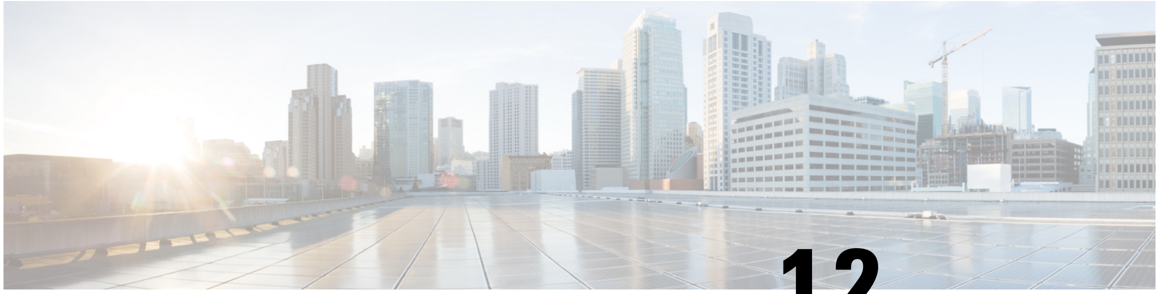
```
Device# wr
```

To validate a guard interval, use the following show commands:

```
Device# show dot11Radio 1 config
Maximum tx mcs: 9
High-efficiency : enabled
Maximum tx nss : 2
RTS protection : disabled
guard-interval : 1600 ns
```

```
Device# show dot11Radio 2 config
Maximum tx mcs: 9
High-efficiency : enabled
```

```
Maximum tx nss : 2
RTS protection : disabled
guard-interval : 3200 ns
```



CHAPTER 12

Configuring Indoor Deployment

Configuring Indoor Deployment

The Catalyst IW9167E and IW9165 support enabling and disabling of indoor deployment using CLI.

Note Before you enable the indoor deployment setting, ensure that the Catalyst IW9167E or IW9165 is set to indoor mode. As you can use the outdoor mode for indoors, but whereas the indoor mode is not suitable for outdoor because 5150–5350 MHz channels are indoor-related countries.

By default, the devices are set to outdoor mode.

To enable indoor deployment, use the following CLI command:

```
Device# configure wireless indoor-deployment enable
```

To disable indoor deployment, use the following CLI command:

```
Device# configure wireless indoor-deployment disable
```

To verify E indoor deployment, use the following show command:

For enabled indoor deployment

```
Device# show Dot11Radio {1|2} config
DFS region : E
DFS radar role : auto
Radar detected : 0
Indoor deployment : enable
```

```
Device# show controllers Dot11Radio {1|2}
Radio info summary:
=====================
Radio : 5.0 GHz
Carrier set : (-Ei) GB
Base radio MAC : FC:58:9A:15:B7:C0
Supported channels:
36 40 44 48 52 56 60 64 100 104 108 112 116 120 124 128 132 136 140
```

For disabled indoor deployment

```
Device# show Dot11Radio {1|2} config
DFS region : E
DFS radar role : auto
Radar detected : 0
Indoor deployment : disable
```

```
Device# show controllers Dot11Radio {1|2}
Radio info summary:
=====================
Radio : 5.0 GHz
Carrier set : (-E) GB
Base radio MAC : FC:58:9A:15:B7:C0
Supported channels:
100 104 108 112 116 120 124 128 132 136 140
```

CHAPTER 13

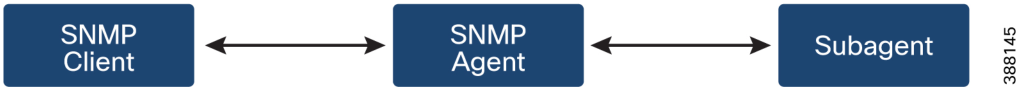
Configuring and Validating SNMP

Configuring and Validating SNMP

Simple network management protocol (SNMP) applications are used in URWB software for network management functionalities.

The SNMP client sends a request to the SNMP agent. The SNMP agent passes the request to the subagent. The subagent responds to the SNMP agent. The SNMP agent creates an SNMP response packet and sends it to the remote network management station that initiates the request.

Figure 4: SNMP Process



Configuring SNMP from CLI

To configure SNMP, use the following CLI commands:

Note

- SNMP CLI logic modified for SNMP configuration, before enabling the SNMP feature using CLI, you must configure all SNMP parameters.
- Disabling the SNMP feature automatically removes all related configurations.

To enable or disable SNMP functionality, use the following CLI command:

```
Device#configure snmp [enable | disable]
```

To specify the SNMP protocol version, use the following CLI command:

```
Device#configure snmp version {v2c | v3}
```

To specify the SNMP v2c community ID number (SNMP v2c only), use the following CLI command:

```
Device#configure snmp v2c community-id <length 1-64>
```

To specify the SNMP v3 username (SNMP v3 only), use the following CLI command:

```
Device#configure snmp v3 username <length 32>
```

To specify the SNMP v3 user password (SNMP v3 only), use the following CLI command:

```
Device#configure snmp v3 password <length 8-64>
```

To specify the SNMP v3 authentication protocol (SNMP v3 only), use the following CLI command:

```
Device#configure snmp auth-method <md5|sha>
```

To specify the SNMP v3 encryption protocol (SNMP v3 only), use the following CLI command:

```
Device#configure snmp encryption {des | aes | none}
```

Possible encryption values are des or aes. Alternatively, enter none if a v3 encryption protocol is not needed.

To specify the SNMP v3 encryption passphrase (SNMP v3 only), use the following CLI command:

```
Device#configure snmp secret <length 8-64>
```

To specify the SNMP periodic trap settings, use the following CLI command:

```
Device#configure snmp periodic-trap {enable | disable}
```

To specify the notification trap period for periodic SNMP traps, use the following CLI command:

```
Device#configure snmp trap-period <1-2147483647>
```

Notification value trap period measured in minutes.

To enable or disable SNMP event traps, use the following CLI command:

```
Device#configure snmp event-trap {enable | disable}
```

To specify the SNMP NMS hostname or IP address, use the following CLI command:

```
Device#configure snmp nms-hostname {hostname |Ip Address}
```

To disable SNMP configuration, use the following CLI command:

```
Device#configure snmp disabled
```

Once you disable SNMP, it clears all the sensitive information including credentials. You have to re-specify all the valid values again to enable SNMP.

Example of SNMP configuration:

CLI for SNMP v2:

```
Device#configure snmp v2 community-id <length 1-64>
Device#configure snmp nms-hostname hostname/Ip Address
Device#configure snmp trap-period <1-2147483647>
Device#configure snmp periodic-trap enable/disable
Device#configure snmp event-trap enable/disable
Device#configure snmp version v2c
Device#configure snmp enabled
```

CLI for SNMP v3:

```
Device #configure snmp nms-hostname hostname/Ip Address
Device#configure snmp trap-period <1-2147483647>
Device#configure snmp v3 username <length 32>
Device#configure snmp v3 password <length 8-64>
Device#configure snmp auth-method <md5|sha>
Device#configure snmp encryption <aes|des|none>
Device#configure snmp secret <length 8-64>
Device#configure snmp periodic-trap enable/disable
Device#configure snmp event-trap enable/disable
Device#configure snmp version v3
Device#configure snmp enabled
```

Validating SNMP from CLI

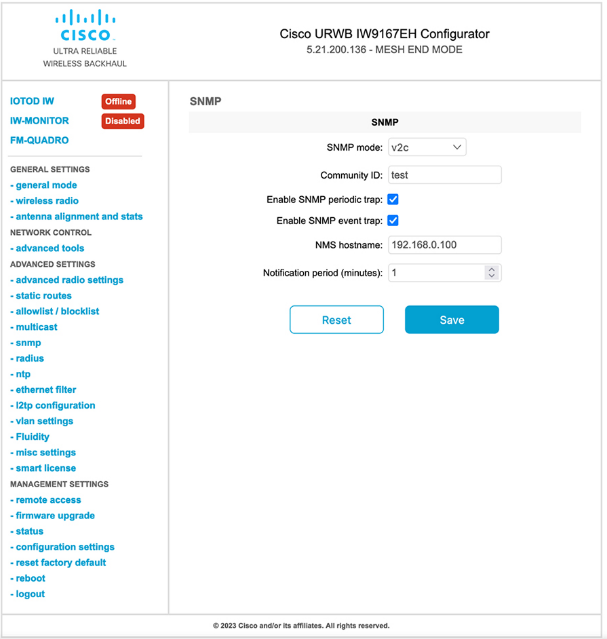
To validate the SNMP, use the following show command:

```
Device# show snmp
SNMP: enabled
Version: v3
Username: username
Password: password
Authentication method: SHA
Encryption: AES
Encryption Passphrase: passphrase
Engine ID: 0x8000000903c0f87fe5f314
Periodic Trap: enabled
Notification Period (minutes): 5
Event Trap: enabled
NMS hostname: 192.168.116.11
Device# show snmp
SNMP: enabled
Version: v2c
Community ID: test
Periodic Trap: enabled
Notification Period (minutes): 5
Event Trap: enabled
NMS hostname: 192.168.116.11
Device# show system status snmpd
Service Status
Service Name : snmpd
Loaded : loaded
Active : active (running)
Main ProcessID : 6437
Running Since : Mon 2022-09-19 14:45:27 UTC; 3h 34min ago
Service Restart : 0
```

Configuring SNMP from GUI

The following images shows the configuration of SNMP from GUI

GUI for SNMP v2:



Cisco URWB IW9167EH Configurator
5.21.200.136 - MESH END MODE

SNMP

SNMP

SNMP mode: v2c

Community ID: test

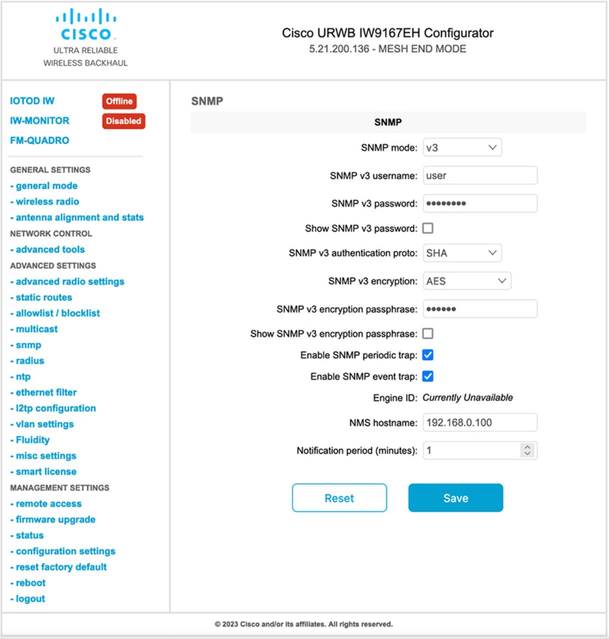
Enable SNMP periodic trap: ☑

Enable SNMP event trap: ☑

NMS hostname: 192.168.0.100

Notification period (minutes): 1

GUI for SNMP v3:



Cisco URWB IW9167EH Configurator
5.21.200.136 - MESH END MODE

SNMP

SNMP

SNMP mode: v3

SNMP v3 username: user

SNMP v3 password: ••••••••

Show SNMP v3 password: □

SNMP v3 authentication proto: SHA

SNMP v3 encryption: AES

SNMP v3 encryption passphrase: ••••••

Show SNMP v3 encryption passphrase: □

Enable SNMP periodic trap: ☑

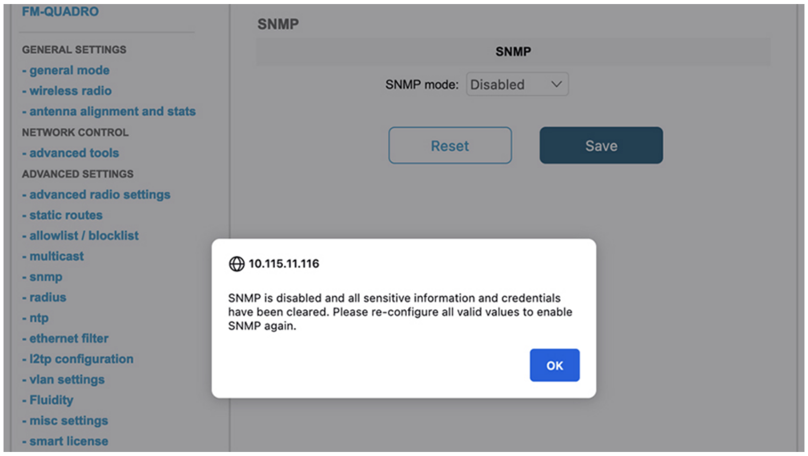
Enable SNMP event trap: ☑

Engine ID: *Currently Unavailable*

NMS hostname: 192.168.0.100

Notification period (minutes): 1

Disable SNMP via GUI



SNMP mode: Disabled

SNMP is disabled and all sensitive information and credentials have been cleared. Please re-configure all valid values to enable SNMP again.

CHAPTER 14

Configuring and Validating Key Controller (Wireless Security)

Configuring and Validating Key Controller (Wireless Security)

To support wireless security to standard Wi-Fi Protected Access (WPA) protocols, a key rotation strategy is implemented for Catalyst IW9167E. The key controller protocol is a packet exchange between two devices, in which different stages of the process correspond to different states of each device. The algorithm flow is controlled by a set of timers scheduled periodically to generate new Pairwise Transient Key/Group Transient Key for packet encryption. The more frequently keys are updated, the lesser amount of information is leaked in the event of an attack.

Configuring Key Controller from CLI

To configure a key controller, use the following CLI commands:

1. To enable Advanced Encryption Standard (AES) on Radio, use the following CLI command:

   ```
   Device# configure dot11Radio <interface> crypto aes enable
   ```

2. To enable key controller, use the following CLI command:

   ```
   Device #configure dot11Radio <interface> crypto key-control enable
   ```

3. To enable key rotation, use the following CLI command:

   ```
   Device# configure dot11Radio <interface> crypto key-control key-rotation enable
   ```

4. To set key rotation timer, use the following CLI command:

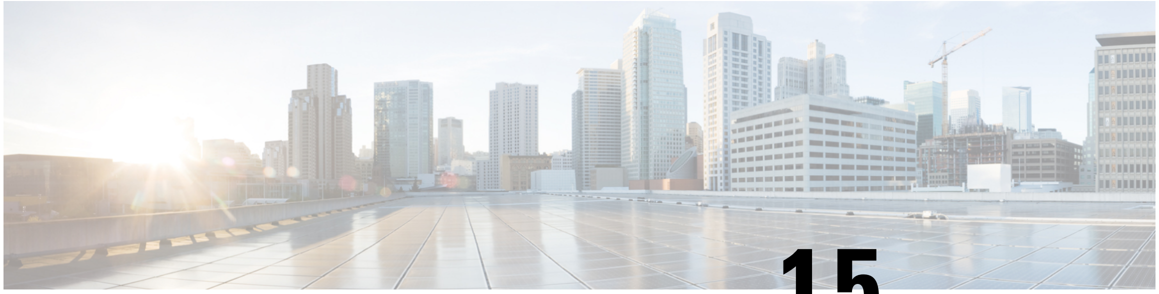
   ```
   Device# configure dot11Radio <interface> crypto key-control key-rotation 3600
   ```

Note By default, AES mode is disabled. Configuration should be same on all devices.

Validating Key Controller from CLI

To validate a key controller, use the following show command:

```
Device# show dot11Radio X crypto
AES encryption: enabled
AES key-control: enabled
Key rotation: enabled
Key rotation timeout: 3600(second)
```



CHAPTER 15

Smart Licensing

Smart Licensing Support

The Smart Licensing chapter is replaced by a new standalone guide called Smart Licensing on the Cisco Ultra-Reliable Wireless Backhaul for Catalyst IW Access Points. This guide contains updated information related Smart licensing for access point running in URWB mode.

THE SPECIFICATIONS AND INFORMATION REGARDING THE PRODUCTS IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE. ALL STATEMENTS, INFORMATION, AND RECOMMENDATIONS IN THIS MANUAL ARE BELIEVED TO BE ACCURATE BUT ARE PRESENTED WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. USERS MUST TAKE FULL RESPONSIBILITY FOR THEIR APPLICATION OF ANY PRODUCTS.

THE SOFTWARE LICENSE AND LIMITED WARRANTY FOR THE ACCOMPANYING PRODUCT ARE SET FORTH IN THE INFORMATION PACKET THAT SHIPPED WITH THE PRODUCT AND ARE INCORPORATED HEREIN BY THIS REFERENCE. IF YOU ARE UNABLE TO LOCATE THE SOFTWARE LICENSE OR LIMITED WARRANTY, CONTACT YOUR CISCO REPRESENTATIVE FOR A COPY.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses and phone numbers are listed on the Cisco website at www.cisco.com/go/offices.