



Configuring Cisco URWB Radio Mode

- [Configuring Cisco URWB Radio Mode, on page 1](#)
- [Configuring Radio-off Mode from CLI, on page 2](#)
- [Configuring Fluidity Role from CLI, on page 3](#)
- [Configuring Radio Mode for Cisco URWB from CLI, on page 3](#)
- [Configuring AMPDU from CLI, on page 4](#)
- [Configuring Frequency from CLI, on page 4](#)
- [Configuring Maximum MCS Index from CLI, on page 5](#)
- [Configuring Maximum NSS \(Number of Spatial Streams\) Index from CLI, on page 5](#)
- [Configuring Rx-SOP Threshold from CLI, on page 5](#)
- [Configuring RTS Mode from CLI, on page 5](#)
- [Configuring WMM Mode from CLI, on page 6](#)
- [Configuring NTP Enhancement from CLI, on page 6](#)
- [Configuring NTP Enhancement from GUI, on page 7](#)
- [Validating Radio Mode for Cisco URWB, on page 8](#)
- [Configuring Radio-off Mode from GUI, on page 8](#)
- [Configuring Radio Mode from GUI, on page 9](#)

Configuring Cisco URWB Radio Mode

Each wireless interface can be configured to operate in a specific mode or disabled. Mode on Radio can be configured on the device will operate as a Fluidity or fixed infrastructure unit as specified by the parameter.

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

Table 1: Radio Mode Configuration

Radio Role	Mode on Radio*	Description
Fixed Infrastructure	fixed	P2P mode (point to point)
	Fluidmax primary	P2MP (point to multipoint) mode (Fluidmax), P2MP, Master
	Fluidmax secondary	P2MP mode (Fluidmax), P2MP
Mobility AP	Fluidity	Mobility Mode

Radio Role	Mode on Radio*	Description
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 can be used according to 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. If radio-off is specified, all the wireless interfaces will be disabled.

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 MPLS (Multi-Protocol Label Switching) OSI layer. 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. Specify radio-off mode.

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

4. End of configuration.

```
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 Fluidity Role from CLI

To configure Fluidity role (infra or client) use the following Fluidity CLI commands and procedure.

1. Configure the Fluidity role (infrastructure or mobile)

```
Device# configure fluidity id
```

2. Configure Fluidity id mode

```
Device# configure fluidity id {mode}
Mode will be 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. End of configuration .

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

```
Device# wr
```

Example:

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

Configuring Radio Mode for Cisco URWB from CLI

To configure Radio mode for Cisco URWB, use the following CLI commands and procedure.

The below CLI commands used to select the operating function of the wireless interface also mixed Fluidity and fixed infrastructure combinations for different interfaces are allowed.

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 will operate in Fluidity mode, either as a mobility infrastructure or a vehicle unit.

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

Fluidmax - This interface will operate in Fluidmax P2MP mode. Additional parameters can be specified to configure the Fluidmax operating features (e.g., Primary/Secondary role, 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. End of configuration.

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

```
Device# wr
```



Note When at least one interface is set to Fluidity mode, the unit will globally operate in Fluidity mode. If all interfaces are set to fixed, Fluidity will be disabled.

Configuring AMPDU from CLI

To configure an ampdu (Aggregated MAC Protocol Data Unit) 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 all

Configuring Frequency from CLI

To configure an operating frequency, use the following CLI commands.

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

frequency: <0-7125> Operating frequency in MHz.

Configuring Maximum MCS Index from CLI

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

Set maximum MCS index in integer or string “AUTO”. For “AUTO”, the background process will automatically configure the maxmcs.

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

maxmcs values:

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

WORD AUTO.



Note The maximum MCS can be set between 0 to 9 if High Efficiency mode is disabled and maximum MCS can be set as 10 and 11 if High Efficiency mode is enabled.

Configuring Maximum NSS (Number of Spatial Streams) Index from CLI

To configure maximum NSS (Number of Spatial Streams) index, use the following CLI commands:

Set maximum spatial stream number in integer or string “AUTO”.

For “AUTO”, the background process will automatically configure the maxnss.

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

maxnss values:

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

WORD AUTO.

Configuring Rx-SOP Threshold from CLI

To configure Rx-SOP (Receiver Start of Packet) threshold, use the following CLI commands.

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

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

Configuring RTS Mode from CLI

To configure RTS (Ready to Send) mode, use the following CLI commands.

To disable RTS, use the following CLI command.

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

disable: disable rts protection.

To enable RTS with threshold value, use the following CLI commands.

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

threshold: threshold range <0 - 2346>.

Configuring WMM Mode from CLI

To configure a WMM mode (wireless multimedia), use the following CLI commands.

```
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 Enhancement from CLI

To configure a NTP (Network Time Protocol) 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 a 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 NTP authentication md5|sha1 - authentication method.

Example:

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



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

password must be between 8 and 20 characters.

The following special characters are not allowed: ' [apex] " [double apex] ` [backtick] \$ [dollar] = [equal] \ [backslash] # [number sign] and whitespace

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

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

To configure NTP timezone, use the following CLI command.

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

Example:

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

To validate 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 Enhancement from GUI

The following image shows the Web UI of NTP enhancement.

The screenshot displays the Cisco URWB IW9167EH Configurator interface. The main heading is "Cisco URWB IW9167EH Configurator" with the IP address "5.212.77.232 - MESH END MODE". A status message indicates "NTP time is not synchronized". The left sidebar shows navigation options under "IOTOD IW" and "FM-QUADRO", with "ntp" selected under "ADVANCED SETTINGS". The main content area is titled "NTP - Network Time Protocol" and contains the following configuration fields:

- Enable NTP:**
- NTP server hostname:** 192.168.216.201
- NTP authentication:** MD5 (selected from a dropdown menu)
- NTP password:** [masked with dots] (with a "show" checkbox)
- Select Timezone:** Asia/Shanghai (selected from a dropdown menu)

A warning message states "WARNING: NTP time is not synchronized". At the bottom, there are "Reset" and "Save" buttons.

Validating Radio Mode for Cisco 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
```

If need to change radio mode of vehicle AP (mobility client) to fixed or fluidmax, need to configure fluidity role as infrastructure by CLI “configure fluidity id infrastructure”.

Configuring Radio-off Mode from GUI

To configure a Radio-off mode, choose a fixed or fluidity mode as shown in the below image. Select a mesh end mode if you are installing the Cisco IOT IW9167E Heavy Duty Access Point at the head end and connecting this unit to a wired network such as LAN.

The screenshot displays the Cisco URWB IW9167EH Configurator interface. The top header shows the Cisco logo and the text 'ULTRA RELIABLE WIRELESS BACKHAUL'. The main title is 'Cisco URWB IW9167EH Configurator' with the IP address '5.21.201.72 - MESH END MODE'. The interface is divided into a left sidebar and a main configuration area.

Left Sidebar:

- IOTOD IW (Offline)
- FM-QUADRO
- GENERAL SETTINGS
 - general mode
 - wireless radio
 - antenna alignment and stats
- NETWORK CONTROL
 - advanced tools
- ADVANCED SETTINGS
 - advanced radio settings
 - static routes
 - allowlist / blocklist
 - multicast
 - snmp
 - radius
 - ntp
 - I2tp configuration
 - vlan settings
 - Fluidity
 - misc settings
 - smart license
- MANAGEMENT SETTINGS
 - remote access
 - firmware upgrade
 - status
 - configuration settings
 - reset factory default
 - reboot
 - logout

Main Configuration Area (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:

Buttons: Reset, Save

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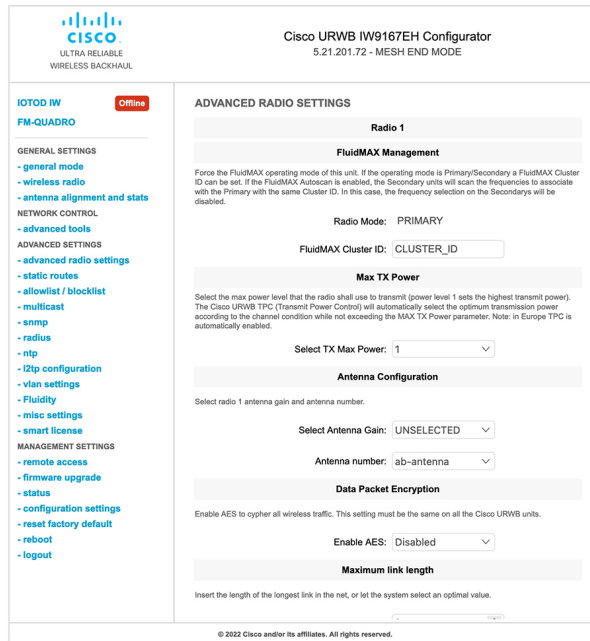
Configuring Radio Mode from GUI

To configure a radio mode from GUI, use the following procedures.

1. To establish a wireless connection the operating frequency should be same between Cisco URWB units. To configure a Radio mode from GUI, set the operating mode for specified radio (Radio1 and Radio2) interface as below diagram.

The screenshot displays the Cisco URWB IW9167EH Configurator interface. The top header shows the Cisco logo and the text 'Cisco URWB IW9167EH Configurator 5.21.2017.72 - MESH END MODE'. The left sidebar contains a navigation menu with categories: 'GENERAL SETTINGS' (including general mode, wireless radio, antenna alignment and status), 'NETWORK CONTROL', 'ADVANCED SETTINGS' (including advanced radio settings, static routes, allowlist/blocklist, multicast, snmp, radius, ntp, i2tp configuration, vian settings, Fluidity, misc settings, smart license), and 'MANAGEMENT SETTINGS' (including remote access, firmware upgrade, status, configuration settings, reset factory default, reboot, and logout). The main content area is titled 'WIRELESS RADIO' and features a 'Wireless Settings' section with a 'Shared Passphrase' field containing 'PASSWORD'. Below this is a note about shared passphrases. The 'Radio 1 Settings' section includes a 'Role' dropdown set to 'Fixed', a 'Frequency (MHz)' dropdown set to '5180', and a 'Channel Width (MHz)' dropdown set to '80'. The 'Radio 2 Settings' section includes a 'Role' dropdown set to 'Disabled'. At the bottom of the settings area are 'Reset' and 'Save' buttons. A copyright notice '© 2022 Cisco and/or its affiliates. All rights reserved.' is visible at the very bottom of the page.

2. Set Radio 1 operating mode(role) as a Fluidmax Primary with FluidMAX Cluster ID. In this case the frequency selection on the Primary will be enabled and Secondary will be disabled. Select the maximum power level (power level 1 sets the highest transmit power) and Cisco URWB transmission power control (TPC) will automatically select 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 Secondaries 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

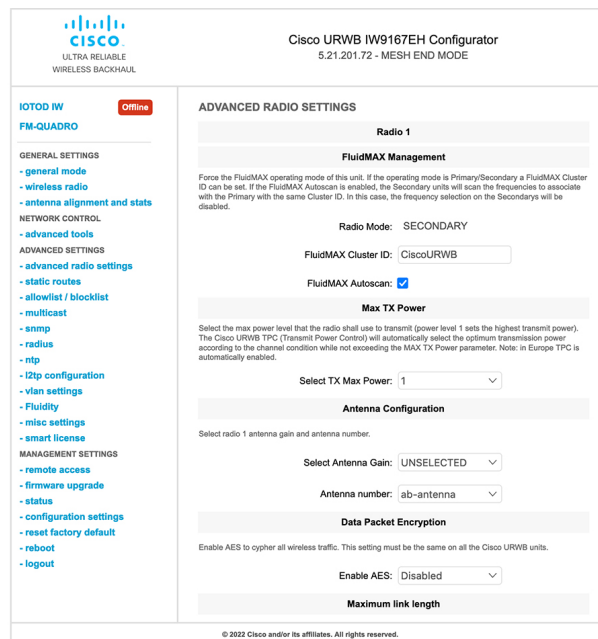
Insert the length of the longest link in the net, or let the system select an optimal value.

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Note In Europe TPC is automatically enabled.

- Set Radio 1 operating mode(role) as a Fluidmax Secondary with FluidMAX Cluster ID. 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 Secondary will be disabled. Select the maximum power level (power level 1 sets the highest transmit power) and Cisco URWB transmission power control (TPC) will automatically select 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 Secondaries 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

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

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Note In Europe TPC is automatically enabled.

- Choose unit role as Infrastructure when it 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. Choose network type set according to the general network architecture and choose flat mode if the network belongs single layer-2 broadcast domain or choose multiple subnets if the network belongs 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. "myssecurecam1") that identifies your network. It MUST be the same for all the Cisco URWB units belonging to the same network.

Shared Passphrase:

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

Radio 1 Settings

Role:

Frequency (MHz):

Channel Width (MHz):

Radio 2 Settings

Role:

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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 from 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 field 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:

Network Type:

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:

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