URWB

Ultra-Reliable Wireless Backhaul Background

Ultra-Reliable Wireless Backhaul (URWB) is a wireless technology developed for mission and business critical applications that demand high reliability, low latency, and robust performance. It operates in the 5 GHz frequency band and is based on the widely adopted IEEE 802.11 standards. Leveraging the 802.11 framework simplifies implementation for Information Technology (IT) and Operational Technology (OT) teams. As a result, URWB enables greater deployment flexibility, reduced infrastructure costs, and accelerated installation when connecting fixed and mobile devices.

URWB is designed for wireless connectivity needs that are an integral part of your network infrastructure, rather than connecting end users like Wi-Fi technology is commonly used for.

URWB provides scalability without compromising reliability, delivering low latency and high availability. These characteristics are essential for mobile device use cases where stable connections and minimal latency are critical to ensuring safety and maintaining operational efficiency.

URWB supports two distinct connectivity models:

- Mobility: Provides seamless and uninterrupted connectivity to moving devices. Commonly used for Autonomous Guided Vehicles (AGV), autonomous mobile robots (AMR), trains, and other mobile devices.
- Fixed infrastructure: Establishes connectivity between radios attached to stationary structures such as poles, towers, or buildings. This architecture is frequently used for wireless backhaul and physical surveillance.

Topologies

URWB supports multiple network configurations, including:

- Fixed Mesh: Multiple nodes are interconnected, allowing data to be routed dynamically through the most efficient path. Ideal for large industrial sites or campuses where redundancy and self-healing capabilities are required.
- Point-to-Multipoint (PTMP): A single central node connects to multiple remote nodes. Common in scenarios like wireless backhaul for several field devices or edge networks connecting to a central hub.
- Mobility: Supports connectivity to moving assets such as vehicles or robots. Essential for use cases requiring continuous, low-latency communication while in motion.

Benefits

- ultra-low latency,
- seamless handoffs, even at high speed (220mph - 350Km/h),
- high-throughput,
- high-availability with ultra-fast failover, and
- supports both fixed and mobile devices.

Limitations and restrictions

The following limitations exist for this release:

- Compatibility- URWB on Cisco Wireless project supports select access points. For complete information on AP devices use case and country support, see the guide "URWB on Cisco Wireless Use Case and Country".
- Mobility architectures extending over Layer 3 networks are not supported. Mobility deployments must be deployed with all Base access points in the same network segment.
- 6 GHz Standard Power is not supported on URWB radios.
- URWB supports up to two radio slots per access point.
- 2.4 GHz radios are not supported.
- SD Access (Wireless Fabric) is not supported.
- URWB supports one wired network port on each access point. LAN ports, on applicable access points, are not supported.
- Throughput on URWB is subject to processing limitations, which varies per access point platform.

Configure URWB using the controller

Create URWB network profile (GUI)

A URWB Network Profile is a configuration framework designed to enable the setup of an Ultra-Reliable Wireless Backhaul (URWB) network for APs. This profile allows APs to form a wireless mesh network with enhanced reliability, performance, and security.

Complete these steps to configure URWB network profile:

Procedure

Step 1 Choose **Configuration** > **Tags & Profiles** > **URWB Network Profile**.

Step 2 Click **Add**.

The **Add URWB Network Profile** page is displayed.

Step 3 In the **General** tab, complete the following:

a) To edit the profile, enable the **URWB Status** check box.
b) Enter the **URWB Network Profile Name**.
c) Enter the description of the profile name.
d) Check the **Strong Network Key** check box, to configure a strong password evaluation for the network key. If you enable strong network key, it means that the network key must contain atleast one uppercase, lowercase alphabets, and digits.
e) Select either **Unencrypted** or **AES** from the **Network Key Type** drop-down list. You can use only **Unencrypted** for configuration.
f) Enter the **Network-Key**.

The network key must be between 8 and 63 characters long. Only uppercase alphabets, lowercase alphabets, digits, or special characters are allowed in the network key.

Step 4 Click the **Mobility** tab and select one of the following **Mobility Roles**:

- Base
- Base Relay
- Client

Step 5 To edit the MPO attributes, click the **MPO** tab.

Note
To edit the MPO attributes, select an option other than **Disabled** in the **Packet Duplication Mode**. MPO is not mandatory to make the system operate.

a) In the **Class of Service** field, enter a value from 0 to 6.

This value indicates the number of packets that need to be duplicated. The default value is 6.

b) In the **Number of Paths** field, enter a value from 1 to 4.

This value indicates the number of independent paths to be established for traffic duplication. The default value is 1.

c) In the **Minimum SNR** field, enter a value from 0 to 96.

This value indicates the minimum SNR for a wireless link to be considered for building a redundant path. The default value is 20.

d) To enable telemetry, check the **Enable Telemetry** check box.

Step 6 Complete the following details in the **Advanced** tab:

Note
You can leave the advanced parameters at their default settings; you do not need to configure them.

a) In the **Ethernet Protocols** area, select the **Allow Ether Types** from the drop-down list.

Select **List** from the **Allow Ether Types** drop-down list to allow only custom Ether values.

b) Check the **Legacy Ethernet** check box to allow Ethernet I frames fowarding.
c) In the **Unicast** area, check the **Unicast Flood** check box to enable unicast flood and enter unicast flood limitation.
d) Check the **Unicast Flood Limitation** check box to flood one packet every 5 seconds.
e) Select the **Multicast** option from the drop-down list.

Step 7 Select the **Multicast** option from the drop-down list.

Step 8 Check the **High Availability Enabled** check box to enable the redundancy support for devices in the same class (coordinator, vehicle devices, and point-to-multi-point base).

Step 9 Click **Apply to Device**.

The URWB network profile is created.

Configure URWB network profile (CLI)

Configure the URWB network key in the URWB pofile. The URWB profile is a wireless profile type that contains the URWB configuration parameters. All the APs with the same site-tag are configured with the URWB configurations defined in the URWB profile.

Complete the following steps to create a URWB network profile and configure the URWB network key:

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 (Optional) Configure a strong password evaluation for the network key.

Example:

```
Device(config-wireless-urwb-profile)# strong-network-key
```

If you enable strong network key, it means that the network key must contain at least one uppercase, lowercase alphabets, and digits.

Step 4 Configure a network key for secure communication between the URWB nodes.

Example:

```
Device(config-wireless-urwb-profile)# network-key key {0 | 8}<network-key>
```

Here, **0** indicates that you must enter an unencrypted network key; and **8** indicates an AES encrypted network key.

Note
You can only use type 0 for configuration. If you configure the encryption command (**password encryption aes**) in the configuration mode, the output of the **show running-config** command displays the details of the encrypted network key (8 xxxx).

For more information, see Setting a Private Configuration Key for Password Encryption.

Note
The network key supports all the printable ASCII characters except the following special characters: ~ | ; $ < > & ^ ` ? \ and ".

Step 5 Enable the URWB profile in the wireless URWB profile configuration mode.

Example:

```
Device(config-wireless-urwb-profile)# no shutdown
```

To disable the URWB profile, use the **shutdown** command.

Step 6 Exit the sub-mode.

Example:

```
Device(config-wireless-urwb-profile)# exit
```

The URWB network profile is created and the network key is configured in the wireless profile.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# strong-network-key
Device(config-wireless-urwb-profile)# network-key network-key-type 0 <network-key>
Device(config-wireless-urwb-profile)# no shutdown
Device(config-wireless-urwb-profile)# exit
```

Configure URWB mobility backhaul check (CLI)

Complete the following steps to configure mobility role and backhaul check:

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 Configure URWB mobility role.

Example:

```
Device(config-wireless-urwb-profile)# mobility role {base| base-relay | client}
```

Step 4 Configure URWB mobility backhaul-check when coordinator is unreachable

Example:

```
Device(config-wireless-urwb-profile)# [no] mobility backhaul-check coordinator-down
{handoff-inhibition | relay-switch}
```

This command configures the handoff and handoff-inhibition when coordinator is unreachable. The relay-switch configuration switches to Infrastructure Wireless Relay mode if the coordinator is unreachable.

Use the **no** form of this command to disable URWB mobility backhaul-check with coordinator-down

Step 5 Configure URWB mobility backhaul-check when Ethernet ports are down.

Example:

```
Device(config-wireless-urwb-profile)# [no] mobility backhaul-check eth-down
{handoff-inhibition|relay-switch}
```

This command configures the handoff and handoff-inhibition when when all Ethernet ports are disconnected. The relay-switch configuration switches to Infrastructure Wireless Relay mode if all Ethernet ports are down.

Use the **no** form of this command to disable URWB mobility backhaul-check when Ethernet ports are down.

The URWB mobility role and backhaul check is configured.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# mobility role {base| base-relay | client}
Device(config-wireless-urwb-profile)# [no] mobility backhaul-check coordinator-down
{handoff-inhibition | relay-switch}
Device(config-wireless-urwb-profile)# [no] mobility backhaul-check eth-down
{handoff-inhibition|relay-switch}
```

Configure URWB mobility MPO parameters (CLI)

Complete the following steps to configure URWB mobility MPO parameters.

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 Enable URWB mobility multipath operation (MPO).

Example:

```
Device(config-wireless-urwb-profile)# mobility mpo enable {rx-only | tx-rx}
```

This command enables MPO Receive Only or MPO Bidirectional.

Step 4 Configure URWB mobility MPO traffic CoS.

Example:

```
Device(config-wireless-urwb-profile)# mobility mpo cos cos-value
```

Here, the CoS value is between 0 to 7.

Step 5 Configure URWB mobility MPO maximum paths (maximum number of MPO links).

Example:

```
Device(config-wireless-urwb-profile)# mobility mpo path number of links
```

Here, the number of links are between 1 to 4.

Step 6 Configure URWB mobility MPO RSSI.

Example:

```
Device(config-wireless-urwb-profile)# mobility mpo rssi rssi-value
```

This command configures minimum RSSI to establish MPO redundant links. Here, the RSSI value is between 0 to 96.

Step 7 Configure URWB mobility MPO telemetry.

Example:

```
Device(config-wireless-urwb-profile)# [no] mobility mpo telemetry
```

The URWB mobility MPO parameters are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# [no] mobility mpo enable rx-only
Device(config-wireless-urwb-profile)# mobility mpo path 4
Device(config-wireless-urwb-profile)# mobility mpo rssi 4
Device(config-wireless-urwb-profile)# [no] mobility mpo telemetry
```

Configure URWB mobility scan parameters (CLI)

Before you begin

The mobility scan parameters are strictly connected to the channel list configuration. Together with this parameter, you must also configure the channel list for scanning. To configure the channel list, see the Configure URWB channel list (CLI) section.

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 Configure URWB mobility scan.

Example:

```
Device(config-wireless-urwb-profile)# mobility scan {isolation scan-wait-time 0-65535|
periodic scan-period 0-65535 | rssi-threshold threshold-value 0-96}
Device(config-wireless-urwb-profile)# no mobility scan isolation
Device(config-wireless-urwb-profile)# no mobility scan periodic
```

Use the **no** form of the command to disable isolation and periodic time for scanning.

The URWB mobility scan parameters are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# mobility scan {isolation scan-wait-time 0-65535|
periodic scan-period 0-65535 | rssi-threshold threshold-value 0-96}
Device(config-wireless-urwb-profile)# no mobility scan isolation
Device(config-wireless-urwb-profile)# no mobility scan periodic
```

Configure URWB MPLS parameters (CLI)

Complete the following steps to configure URWB MPLS dataframe packets for a specified device:

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 Configure MPLS Ethernet filter, filtering method.

Example:

```
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethertypes filtering {allow-all
 | use-allow-list}
```

This command allows all ethertypes or uses the configured ethertypes allowed list.

Use the **no** form of the command to disable MPLS ether-filter filtering method.

Step 4 Configure Ethernet filter allow-list and add the Ethernet type value to the allow-list.

Example:

```
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethertypes allow-list add
ether-type-value
```

Here, the value of the Ethernet type is from 0 to 65535.

Use the **no** form of the command to remove ether-type from URWB ether-filter. allow-list .

Step 5 Configure ethernet I frames forwarding.

Example:

```
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethernet-I
```

Here, the value of the Ethernet type is from 0 to 65535.

Use the **no** form of the command to disable ether-filter Ethernet-I frames.

Step 6 Configure high-availability.

Example:

```
Device(config-wireless-urwb-profile)# mpls high-availability
Device(config-wireless-urwb-profile)# [no] mpls high-availability
```

Use the **no** form of the command to disable high-availability.

Step 7 Configure high-availability time out for device failure detection.

Example:

```
Device(config-wireless-urwb-profile)# mpls high-availability timeout timeout-value
```

Here, the *timeout-value* is the high-availability node failure detection timeout. The value is from 0 to 65535 ms.

The URWB MPLS parameters are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethertypes filtering allow-all
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethertypes allow-list add 50
Device(config-wireless-urwb-profile)# [no] mpls ether-filter ethernet-I
Device(config-wireless-urwb-profile)# mpls high-availability
Device(config-wireless-urwb-profile)# mpls high-availability timeout 54
Device(config-wireless-urwb-profile)# [no] mpls high-availability
```

Configure multicast for URWB profile (CLI)

Complete the following steps to configure the multicast settings for URWB profile:

Procedure

Step 1 Enter configuration mode.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a URWB profile.

Example:

```
Device(config)# wireless profile urwb urwb-profile-name
```

This command creates a URWB profile and enters into the wireless URWB profile configuration mode.

Step 3 Configure multicast settings.

Example:

```
Device(config-wireless-urwb-profile)# multicast {all | coordinator-only}
Device(config-wireless-urwb-profile)# [no] multicast
```

This command enables multicast rule to all devices or only to the coordinator device.

Use the **no** form of the command to disable multicast.

The URWB multicast settings are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile urwb urwb-profile-name
Device(config-wireless-urwb-profile)# multicast coordinator-only
Device(config-wireless-urwb-profile)# [no] multicast
```

Create URWB radio profile (GUI)

The URWB wireless radio profile is used to configure a particular radio slot for the URWB backhaul operation. The URWB wireless radio profile, when applied to a radio interface on a device, is relevant only if the device is in the URWB mode.

To set up a backhaul link with URWB, configure the URWB radio profile to a radio interface. Follow these steps to create a URWB radio profile:

Procedure

Step 1 Choose **Configuration** > **Tags & Profiles** > **RF/Radio**.

Step 2 Click the **Radio** tab.

Step 3 Click **Add**.

The **Add Radio Profile** window is displayed.

Step 4 In the **Add Radio Profile** window, click the **General** tab and enter the radio profile name.

Step 5 Click the **URWB** tab.

Step 6 From the **URWB Radio Role** drop-down list, choose one of the options:

- Disabled: Disables the URWB radio role. This is the default value.
- Fixed
- Mobility
- Fixed Point to Multi Point

Step 7 From the **Radio Band** drop-down list, choose one of the radios:

- 5 GHz
- 6 GHz

Step 8 From the **Channel** drop-down list, choose the appropriate channel.

Step 9 From the **Channel width** drop-down list, choose one of the channel widths:

- 20 MHz
- 40 MHz
- 80 MHz
- 160 MHz

Step 10 In the **Encryption** section, choose a type of encryption from the **AES** drop-down list.

- Disabled: Disables the encryption. This is the default value.
- Fixed Key
- Rotating Key: When you choose the Rotating Key encryption, enter the **Key Rotation Timeout** in seconds. The value must be in the range of 1 to 65,535. The default is 15.

Note
Configuring the rotating key can impact mobility performance.

Step 11 In the **Fixed Point to Multi Point** section, configure the following:

a) Check the **Auto Scan** check box to allow clients to perform frequency scanning when the RSSI from the base is below the threshold or when there is no signal.

b) Enter the cluster ID to identify a cluster formed of base(s) and client(s).

Note
Devices with different cluster IDs do not connect in one topology.

c) Enter the tower ID.

Note
Redundant pair of base(s) must be assigned the same unique tower ID.

d) Enter the **RSSI Threshold** to build a path to the base. The range is from 0 to 100. The default is 0.

Step 12 Click **Apply to Device** to save the configuration.

The URWB radio profile has been created.

What to do next

Assign the URWB profiles to the wireless RF tag.

Create RF tags and assign profiles (GUI)

Complete these steps to create RF tags and assign profiles:

Procedure

Step 1 Choose **Configuration** > **Tags & Profiles** > **Tags**, click the **RF** tab, and then click **Add**.

The **Add RF Tag** page is displayed.

Step 2 In the **Add RF Tag** page, enter the name and description of the RF tag.

Step 3 Select the required **6 GHz Band RF Profile**, **5 GHz Band RF Profile**, and **2.4 GHz Band RF Profile** to be associated with the RF tag.

Step 4 Select an appropriate **URWB Network Profile** for the RF tag.

Step 5 Choose the required **6 GHz Radio Profile**, **5 GHz Radio Profile**, and **2.4 GHz Radio Profile** to be associated with the RF tag.

Step 6 Click **Apply to Device** to save the configuration.

The RF tags are created and profiles are assigned.

Create URWB radio profile (CLI)

Complete the following steps to configure the URWB radio profile:

Procedure

Step 1 Enter configuration mode to start creating a URWB radio profile.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a wireless radio profile.

Example:

```
Device(config)# wireless profile radio urwb-radio-profile-name
```

This command creates a wireless radio profile and enters into the wireless profile radio configuration mode.

Step 3 Configure URWB channel radios in the 5-GHz or 6-GHz bands.

Example:

```
Device(config-wireless-radio-profile)# urwb channel {5ghz | 6ghz} channel
```

The channel range is from 1 to 233.

Step 4 Configure URWB channel width.

Example:

```
Device(config-wireless-radio-profile)# urwb cwidth {160MHz | 20MHz | 40MHz | 80MHz}
```

The valid channel widths are 160MHz, 20MHz, 40MHz, and 80MHz.

Step 5 Configure URWB role of the radio, as fixed, mobility, or point-to-multi-point.

Example:

```
Device(config-wireless-radio-profile)# urwb role {fixed | point-to-multi-point | mobility}
```

Step 6 Exit the sub-mode.

Example:

```
Device(config-wireless-radio-profile)# exit
```

The URWB radio profile is created.

Example

```
Device# configure terminal
Device(config)# wireless profile radio urwb-radio-profile-name
Device(config-wireless-radio-profile)# urwb channel 5ghz 120
Device(config-wireless-radio-profile)# urwb cwidth 160MHz
Device(config-wireless-radio-profile)# urwb role fixed
Device(config-wireless-radio-profile)# exit
```

Configure URWB point-to-multi-point parameters (CLI)

Complete the following steps to configure the URWB fixed point-to-multi-point (PTMP) parameters:

Procedure

Step 1 Enter configuration mode to create a URWB radio profile.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a wireless radio profile.

Example:

```
Device(config)# wireless profile radio urwb-radio-profile-name
```

This command enters into the wireless profile radio configuration mode.

Step 3 Configure URWB PTMP cluster ID to identify a cluster formed of base(s) and client(s).

Example:

```
Device(config-wireless-radio-profile)# urwb ptmp cluster-id cluster-id
```

The maximum length of the cluster ID is 64 characters long.

Note
You must not set the cluster ID as an empty value or with ".

Cluster ID: When more than one point-to-multipoint cluster operates in the same location, each cluster can be logically separated from every other cluster by using a cluster ID value that is unique to that cluster. A Fixed client radio will only communicate wirelessly with a Fixed Base radio that shares the same cluster ID.

Note
This setting is applicable only if the URWB role is set to point-to-multi-point.

Step 4 Enable URWB PTMP autoscan for radio slot.

Example:

```
Device(config-wireless-radio-profile)# [no] urwb ptmp autoscan
```

Use the **no** for of this command to disable URWB PTMP autoscan.

Note
This setting is applicable only if the URWB role is set to point-to-multi-point and if the URWB PTMP role is secondary.

Step 5 Set the URWB PTMP tower ID for radio slot.

Example:

```
Device(config-wireless-radio-profile)# [no] urwb ptmp tower-id tower-id
```

Use the **no** for of this command to disable URWB PTMP tower ID.

Note
This setting is applicable only if URWB role is set to point-to-multi-point and if URWB PTMP role is Fixed Base.

Tower ID: To avoid connectivity issues when multiple towers are serving the same cluster, the **tower-id** parameter can be enabled on Base radios.

All radios mounted on the same tower share the same tower ID. Even if two base radios see each other through a physical link and wirelessly, they know that they are on a different tower and will continue to advertise themselves.

When a client is connected to one tower (Tower 1) and moves close to another one (Tower 2), it automatically connects to a new base on Tower 2. This gives a wider coverage area and continuous connectivity. The same tower design, with different tower IDs, can be replicated to provide more coverage zones.

Step 6 Configure URWB PTMP RSSI threshold for radio slot.

Example:

```
Device(config-wireless-radio-profile)# [no] urwb ptmp rssi-threshold threshold-value
```

Use the **no** form of this command to disable URWB PTMP RSSI threshold.

Note
This setting is appliable only if URWB role is set to point-to-multi-point and if URWB PTMP role is Fixed Client.

The URWB PTMP parameters are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile radio urwb-radio-profile-name
Device(config-wireless-radio-profile)# urwb ptmp cluster-id cluster-id
Device(config-wireless-radio-profile)# [no] urwb ptmp autoscan
Device(config-wireless-radio-profile)# [no] urwb ptmp tower-id tower-id
Device(config-wireless-radio-profile)# [no] urwb ptmp rssi-threshold threshold-value
```

Configure URWB encryption parameters (CLI)

Complete the following steps to configure the URWB encryption parameters:

Procedure

Step 1 Enter configuration mode to create a URWB radio profile.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a wireless radio profile.

Example:

```
Device(config)# wireless profile radio urwb-radio-profile-name
```

This command creates a wireless radio profile and enters into the wireless profile radio configuration mode.

Step 3 Configure AES-based encryption policy with fixed key or rotating key.

Example:

```
Device(config-wireless-radio-profile)# urwb crypto policy {none | fixed-key | rotating-key}
```

Use the **none** command to disable the AES-based encryption.

Step 4 Configure AES-based encryption rotating key timeout.

Example:

```
Device(config-wireless-radio-profile)# urwb crypto rotating-key-timeout timeout
```

Here, the *timeout* range is from 0 to 65535 seconds.

Note
This setting is applicable only if the URWB crypto policy is set to **rotating-key**.

The URWB encryption parameters are configured.

Example

```
Device# configure terminal
Device(config)# wireless profile radio urwb-radio-profile-name
Device(config-wireless-radio-profile)# urwb crypto policy {none | fixed-key | rotating-key}
Device(config-wireless-radio-profile)# urwb crypto rotating-key-timeout 120
```

Configure URWB channel list (CLI)

Complete the following steps to configure the URWB channel list for mobility scanning:

Procedure

Step 1 Enter configuration mode to create a URWB radio profile.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name to create a wireless radio profile.

Example:

```
Device(config)# wireless profile radio urwb-radio-profile-name
```

This command creates a wireless radio profile and enters into the wireless profile radio configuration mode.

Step 3 Add channel or channel-width to URWB channel list for radio slot.

Example:

```
Device(config-wireless-radio-profile)# [no] urwb chan-list channel channel cwidth
channel_width
```

Use the **no** for of this command to remove channel or channel-width from the URWB channel list for radio slot.

The URWB channel list is configured for mobility scanning.

Example

```
Device# configure terminal
Device(config)# wireless profile radio urwb-radio-profile-name
Device(config-wireless-radio-profile)# [no] urwb chan-list channel 100 cwidth 40MHz
```

Create RF tags and assign profiles (CLI)

Complete the following steps to map the radio profile to RF tag and radio slot:

Procedure

Step 1 Enter configuration mode to create wireless RF tags.

Example:

```
Device# configure terminal
```

Step 2 Enter a profile name and create a wireless RF tag.

Example:

```
Device(config)# wireless tag rf rf-profile-name
```

This command configures the wireless RF tag and goes into the wireless RF tag profile configuration mode.

Step 3 Configure URWB profile.

Example:

```
Device(config-wireless-rf-tag)# urwb-profile urwb_profile
```

Step 4 Configure the URWB radio profile to the RF tag.

Example:

```
Device(config-wireless-rf-tag)# dot11 5ghz slot1 radio-profile urwb-radio-profile-name
```

Note
Use the `dot11 6ghz <slot> radio-profile radio-profile-name` command to attach radio profile to a 6 GHz radio configuration. For example, `Device(config- wireless-rf-tag)# dot11 6ghz slot3 radio-profile urwb_radio_profile`

Step 5 Exit the sub-mode.

Example:

```
Device(config-wireless-rf-tag)# exit
```

The RF tags are created and assigned to the URWB profiles.

Example

```
Device# configure terminal
Device(config)# wireless tag rf rf-profile-name
Device(config-wireless-rf-tag)# urwb-profile urwb_profile
```

```
Device(config-wireless-rf-tag)# dot11 5ghz slot1 radio-profile urwb-radio-profile-name
Device(config-wireless-rf-tag)# exit
```

Note In the RF tag configuration, if you assign radio profiles on 2 radio slots in 5-GHz band (**dot11 5ghz slot# radio-profile** *profile-name*. Following restrictions apply:

- The channels configured are separated by 100 MHz.
- The channels cannot be in the same UNII2 Ext channels.

What to do next

- Assign the URWB coordinator role to one of the APs.
- Configure URWB DFS parameters.
- Assign the URWB Fixed Base role to the selected APs.

Configure URWB parameters in the privileged EXEC mode

The URWB parameters in the EXEC mode are Fixed Base and Fixed Point-to-Multipoint.

- Fixed Base in a point-to-multipoint topology, is the radio selected by the clients to connect to. Clients only connect to Fixed Base radios.
- If Fixed Point-to-Multipoint is enabled, at least one AP has to be configured as a Fixed Base.

Configure URWB parameters per radio (GUI)

Complete the following steps to configure URWB parameters per radio:

Procedure

Step 1 Choose **Configuration** > **Wireless** > **Access Points**.

Step 2 Click the **5 GHz Radios** section.

Step 3 Select an AP from the list of APs displayed.

The edit page is displayed.

Step 4 In the **URWB** section, use the toggle button to enable or disable the **Fixed Point to Multipoint Base [Config on WLC]** parameter.

Note
Reboot the AP for F**ixed Point to Multipoint Base** configuration on the controller to synchronize with the configuration on the AP.

Step 5 Click **Update & Apply to Device**.

Step 6 Click **All Access Points** and select the required AP.

The **Edit AP**page is displayed.

Step 7 Click the **URWB** tab.

Step 8 In the **URWB Coordinator [Config on WLC]** section, check the **Coordinator** check box to configure the AP as a coordinator.

This option tags a device to the coordinator role. Coordinators are the entry or exit points of the traffic to or from the infrastructure side.

Reboot the AP to synchronize configurations.

Step 9 (Optional) Check the **Wired-Only** coordinator, and select either **Fixed** or **Mobility**.

The **URWB Coordinator [Config on AP]** section displays the coordinator status on the AP.

Step 10 Click **Update & Apply to Device** to save the configuration.

The URWB parameters are configured per radio.

Configure URWB parameters in the privileged EXEC mode (CLI)

Procedure

Step 1 Configure URWB PTMP parameters.

Example:

```
Device# ap name Cisco-AP dot11 5ghz slot slot-number urwb ptmp base
Device# ap name Cisco-AP no dot11 5ghz slot slot-number urwb ptmp base
```

Step 2 Configure URWB DFS parameters.

Example:

```
Device# ap name Cisco-AP dot11 5ghz slot slot-number urwb dfs {auto | primary | secondary}
```

Step 3 Configure URWB coordinator mode.

Example:

```
Device# ap name Cisco-AP urwb mode coordinator
Device# ap name Cisco-AP no urwb mode coordinator
```

Step 4 Configure URWB coordinator radio-off mode.

Example:

```
Device# ap name Cisco-AP urwb mode coordinator radio-off {fixed | mobility}
```

The URWB parameters are configured in the privileged EXEC mode.

Example

```
Device# ap name Cisco-AP dot11 5ghz slot slot-number urwb ptmp base
Device# ap name Cisco-AP no dot11 5ghz slot slot-number urwb ptmp base
Device# ap name Cisco-AP dot11 5ghz slot slot-number urwb dfs {auto | primary | secondary}
Device# ap name Cisco-AP urwb mode coordinator
Device# ap name Cisco-AP no urwb mode coordinator
Device# ap name Cisco-AP urwb mode coordinator radio-off fixed
```

Verify URWB details

Verify URWB profile details

To display the profile details specific to a URWB profile, use the following command:

```
Device# show wireless profile urwb detailed urwb-profile
```

Verify details about specific wireless radio profile

To display details about specific wireless radio profile, including the URWB information, use the following command:

```
Device# show wireless profile radio detailed radio_profile_name
```

Verify URWB details for a specific AP

To display the URWB details for a specific AP, use the following command:

```
Device# show ap name ap_name urwb info
```

Verify the configuration status from a URWB AP

To display the configuration status from a URWB AP, use the following command:

```
Device# show ap urwb status
```

Verify URWB details for an AP in a radio band

To display the URWB details for an AP in a radio band, use the following command:

```
Device# show ap name Cisco-AP dot11 band slot slot-id urwb detail
```

URWB telemetry protocol

URWB telemetry protocol

The URWB telemetry protocol feature performs external monitoring of real-time wireless performance. This feature sends pre-defined, structured UDP packets at regular intervals, and these packets contain network metrics. Third-party and custom applications can use telemetry data. An application that receives this data can interpret it live or capture and process it later. The telemetry UDP packets includes:

- signal strength and Link Error Rate,

- latency,
- jitter,
- packet throughput,
- number of transmissions and retransmissions,
- modulation rate,
- details of packet loss,
- operating frequency of each radio, and
- information about the events that record the network.

Configure URWB telemetry protocol using AP CLI

Enable or disable URWB telemetry protocol

Perform this task to manage the URWB telemetry export functionality on the device. Enabling or disabling the protocol ensures the telemetry export aligns with your network management requirements.

Procedure

Use the configure **urwb telemetry export enable** command to enable the URWB telemetry export.

```
Device#configure urwb telemetry export enable
```

Or

Use the **configure urwb telemetry export disable** command to disable the URWB telemetry export.

```
Device#configure urwb telemetry export disable
```

Configure URWB telemetry server

Before you begin

Perform this task to configure the address and port number of the URWB telemetry server, ensuring successful communication between the device and the server.

Procedure

Step 1 Use the **configure urwb telemetry server address** command to configure the server address.

```
Device#configure urwb telemetry server a.b.c.d
```

Step 2 Use the **configure urwb telemetry server address Port number** command to configure port number of telemetry server.

```
Device#configure urwb telemetry server a.b.c.d 30000
```

Example:

```
Device#configure urwb telemetry server a.b.c.d <0-65535>
```

Example:

```
Device#configure urwb telemetry server

  x.x.x.x  IP address of telemetry server (A.B.C.D)

Device#configure urwb telemetry server a.b.c.d

  <0-65535>  Port number of telemetry server (NUM)

  <cr>

Device#configure urwb telemetry server a.b.c.d 9

  <cr>
```

Note
Port number valid range is from 0 to 65535.

Verify telemetry configuration

This task ensures that the telemetry configuration is correctly set up on the device, allowing for proper monitoring and reporting of telemetry data.

Procedure

Use the **show urwb telemetry config** command to view the telemetry configuration.

Example:

```
Device#show urwb telemetry config

Telemetry export: disabled, current (live): disabled

Telemetry server: 0.0.0.0 30000, current (live): 0.0.0.0 30000

Telemetry level: default, current (live): default
```

Monitor URWB network information using Controller (GUI)

Complete these steps to monitor the URWB network information:

Procedure

Step 1 Choose **Monitoring** > **Wireless** > **URWB Monitoring** to view the URWB network statistics.

The **URWB Network Topology** page is displayed.

The **URWB Network Topology** page displays a graphical representation of the network that includes AP nodes. The page also features the **URWB Coordinator** drop-down list.

Note
The **Coordinator** or mesh-end is responsible for collecting and sending the URWB network statistics to the controller.

Step 2 From the **URWB Coordinator** drop-down list, select the coordinator AP Name to view the network topology graph associated with the selected coordinator.

The page features the total number of APs connected, and the type of link used to connect to the AP nodes.

Step 3 Click individual nodes or APs in the graph to view specific details, such as:

- **Mesh ID**
- **AP Name**
- **IP Address**
- **Device Model**
- **AP Role**
- **Connected Devices Count**

Note
The connections or links between APs could be either wired or wireless. Wireless links are represented in blue and wired links are represented in black.

Step 4 Click the wireless link to view the **Uplink** and **Downlink** statistics for the link, such as:

- **Throughput(Mbps)**
- **LER**: Link Error Rate - Measurement of link errors
- **PER**: Packet Error Rate - Percentage of packets with errors
- **RSSI**: Received Signal Strength Indicator
- **MCS | Rate**: Modulation and coding scheme

The refresh interval for monitoring statistics is two seconds

Verify AP URWB information

To display the AP URWB information, use these commands:

Table 1: AP URWB commands and description

Show commands	Description
show ap name *ap-name* **urwb coord-routes**	Displays the URWB coordinator routes.
show ap name *ap-name* **urwb fixed-links**	Displays the URWB fixed links reported by the coordinator AP.
show ap name *ap-name* **urwb mobility-links**	Displays the URWB mobility links reported by the coordinator AP.
show ap name *ap-name* **urwb network**	Displays the URWB network nodes reported by the coordinator AP.
show ap name *ap-name* **wireless-stats**	Displays the URWB wireless link statistics reported by the coordinator AP.

URWB recovery

URWB recovery

The URWB recovery commands are supported on access point (APs) to troubleshoot and restore connectivity when communication with the controller is lost. These commands facilitate the recovery process and ensure that APs can reconnect and resume normal operations.

URWB recovery includes these main features:

- Helps APs troubleshoot connectivity issues.
- Automatically downloads the correct configuration after the connection is restored and eliminates the need for manual intervention.
- Returns the AP to a fully functional state after recovery.

Configure URWB recovery to maintain network efficiency and seamless connectivity.

Prerequisites

- If the device has a CAPWAP connection, the URWB recovery commands are rejected.
- Ensure you have physical access to the AP's console.
- Know the correct alpha-2 country code for the AP's deployment location.

Configure the URWB recovery using AP CLI

Complete these steps to configure the URWB recovery using AP commands.

Procedure

Step 1 Use the **configure urwb recovery conf-reset** command to reset the URWB configuration and disable the URWB mode.

Example:

```
Device#configure urwb recovery conf-reset
```

Warning
In URWB mode, this command erases all configurations and resets the device to factory default settings in CAPWAP mode.

Step 2 Use the **configure urwb country-code** *country-code* command to configure the country code for initial provisioning.

Example:

```
Device#configure urwb recovery country-code US
```

Note
- Enter the correct Alpha-2 country code (for example, US, IN, GB).
- Set the country code before changing the radio slot to ensure correct application of the parameters.
- For WiFi-7 PIDs, the device will prompt you to reload the AP.

Step 3 Use the **configure urwb recovery network-key** *key* command to configure the network-key on the radio interface.

Example:

```
Device#configure urwb recovery network-key 123456789
```

Note
The network-key must contain at least 8 characters and can be up to 64 characters. Special characters such as "~|;$<>&^`?/ and "" are not permitted.

Step 4 Use the **configure urwb recovery dot11Radio** *interface* **role** {**fixed** | **mobility-client**} command to configure the role on the radio interface. It can be either fixed or mobility-client.

Example:

```
Device#configure urwb recovery dot11Radio 1 role fixed
```

Note
If you need to change both the country code and the radio slot role, set the country code first to ensure the correct application of the parameters.

Step 5 Use the **configure urwb recovery dot11Radio** *interface* **band** *band* **channel** *channel* **bandwidth** *bandwidth* command to configure the radio interface settings.

Example:

```
Device#configure urwb recovery dot11Radio 1 band 5ghz channel 36 bandwidth 20
```

- The radio *interface* supports 5 GHz and 6 GHz bands. Set the band ID is correctly before configuration.

- Operating *channel* range is 1 to 256.
- Supported radio *bandwidth* options are 20 MHz, 40 MHz, 80 MHz, and 160 MHz.

Step 6 Use the **configure urwb recovery dot11Radio** *interface* **encryption** {**aes-fixed-key** | **aes-rotating-key** | **disable**} command to assign an encryption to the selected radio interface.

Example:

```
Device#configure urwb recovery dot11Radio 1 encryption aes-fixed-key
```

Step 7 Use the **reload** command to apply the changes.

Example:

```
Device#reload
```

Note
The configuration is saved automatically.

Step 8 Use **configure urwb recovery dot11Radio** *interface* **dual-band** *band* {**5GHz** | **6GHz** | **24GHz**}command to configure the URWB dual-band mode.

Example:

```
Device#configure urwb recovery dot11Radio 1 dual-band 5ghz
```

Step 9 Use **configure urwb recovery dot11Radio** *interface* **dual-radio mode** *mode* {**enable** | **disable**}command to configure the URWB dual-radio mode.

Example:

```
Device#configure urwb recovery dot11Radio 1 dual-radio mode enable
```

Country code behavior on AP models

Country code behavior on WiFi-6 PIDs (IW916x -ROW models)

Note The recovery CLI does not support country code configuration for non-ROW Wi-Fi 6 PIDs.

- Country code configuration is applicable for ROW PIDs.
- The system prevents configuration for non-ROW PIDs.
- The country code you configure determines the valid frequencies and bandwidths allowed in the regulatory domain.

Country code behavior on WiFi-7 PIDs

Note For WiFi-7 PIDs, reboot the AP after configuring the country code through the recovery CLI. This ensures the changes take effect.

- The configured country code is used only for the initial connection.
- After the AP joins the controller, the regulatory configuration received from the controller is automatically applied to the AP.
- If the country code has already been programmed through the controller, this initial configuration step is not necessary.

URWB recovery configuration example

Procedure

Step 1 Use the **configure urwb recovery dot11Radio 1** command to select the radio interface for configuration.

Example:

```
Device#configure urwb recovery dot11Radio 1
```

Step 2 Use the **configure urwb recovery dot11Radio 1 role** *radio-role* command to set the radio role.

Example:

```
Device#configure urwb recovery dot11Radio 1 role ptmp
```

The radio role is set to Point-to-Multipoint (PtMP)

Step 3 Use the **configure urwb recovery dot11Radio 1 role** *radio-role* **cluster-id** *id* command to assign a cluster ID to the radio interface.

Example:

```
Device#configure urwb recovery dot11Radio 1 role ptmp cluster-id test
```

Step 4 Use the **configure urwb recovery dot11Radio 1 band** *band* **channel** *channel* **bandwidth** *bandwidth* command to configure the frequency and channel parameters.

Example:

```
Device#configure urwb recovery dot11Radio 1 band 5ghz channel 36 bandwidth 20
```

Step 5 Use the **reload** command to apply the configuration and restart the access point.

Example:

```
Device#reload
```

The access point restarts and the new recovery settings take effect.

Dynamically Configure URWB Parameters

This feature allows you to adjust certain Ultra-Reliable Wireless Backhaul (URWB) configuration parameters on supported access points (APs) without needing to reboot the device. This makes network management smoother and reduces service interruptions.

Hot-configurable URWB parameters

These URWB parameters can be updated dynamically, without requiring a device reboot.

- Radio frequency and bandwidth
- Radio DFS role
- Radio DFS backup channel list
- Radio crypto and key-control rotation timeout
- Network key
- MPLS ethertype
- MPLS allow Ethernet I
- MPLS ether filter method
- MPLS unicast flood
- MPLS unicast flood limitation
- Mobility role (base / base-relay)
- Mobility scan parameters (idle, after, RSSI threshold)
- Mobility RSSI hysteresis
- Mobility times (warmup, timeout)
- Mobility backhaul checks
- P2MP primary
- P2MP parameters (RSSI threshold, autoscan, cluster ID, tower ID)
- High-availability enablement
- High-availability timeout
- Multicast
- MPO enablement
- MPO fine-tuning parameters (maximum links, minimum RSSI, QoS classification)
- MPO telemetry enablement

Parameters requiring a device reload

These URWB parameters cannot be changed dynamically. The device must be rebooted for the changes to take effect. You can use either the **reload** command or use the **Reload** button in the **URWB** tab of the **Monitoring > Wireless > AP Statistics** page.

- URWB global enablement

- Coordinator mode
- Switch between P2MP base and P2MP client
- Radio role (disabled, fixed, P2MP, mobility)
- Band ID

Note Changing the country code requires a device reload.

Configure URWB parameters using CLI

This task helps you modify hot-configurable URWB parameters and safely apply them to the network device.

Note To prevent partial or inconsistent configurations, changes are first staged, and then explicitly applied.

Before you begin

- Confirm the parameters you intend to update are hot-configurable. See the Hot-configurable URWB parameters section for the supported list of parameters.
- Ensure that the required APs are operating in URWB mode.

Follow these steps to apply configuration changes to URWB parameters:

Procedure

Step 1 Select the AP to which the configuration is to be applied.

Note
When updating configurations in a wireless mesh network, apply the configuration to the remote devices first, and then to the Coordinator AP. This helps prevent loss of connectivity to the rest of the network during the update.

Step 2 After making the required configuration changes, verify that the Config Status field is set to 'Live update required.'

See the View Configuration Update Status Summary section on how to view the summary of the configuration updates.

Step 3 Apply the configuration changes using the **ap name** *ap-name* **urwb apply-running-config** command.

Note
The Config Status field transitions to 'In progress.'

Step 4 After the configuration is successfully applied, confirm that the Config Status field is set to 'Up to date.'

See the View Configuration Update Status Summary section on how to view the summary of the configuration updates.

Configure URWB parameters using GUI

This task helps you modify hot-configurable URWB parameters and apply them to the network device.

Procedure

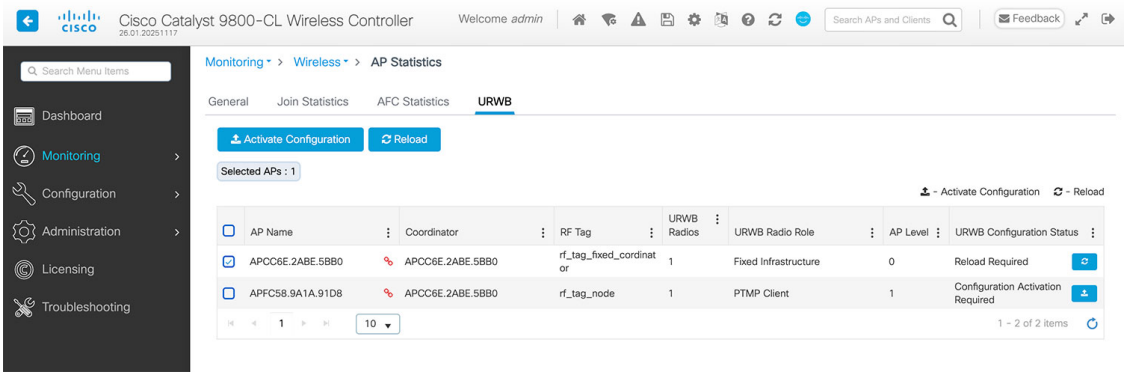
Step 1 Choose **Configuration > Tags & Profiles > URWB Network Profile**.

Step 2 Click the URWB Network Profile name to open the **Edit URWB Network Profile** page.

Step 3 Select the appropriate tab and make the necessary changes.

Step 4 Click **Update and Apply on Device**. The system displays a message confirming successful configuration.

Step 5 Choose **Monitoring > Wireless > AP Statistics**, and select the **URWB** tab.



Step 6 Activate the configuration using one of these methods:

- Click the  buttom displayed on the URWB Configuration Status field of the AP.
- Select the AP and click the 

button on the page.

Step 7 (Optional) Reload the device. Use this option only if URWB parameter changes require a device reboot. Use one of these methods:

- Click the  button displayed on the URWB Configuration Status field of the AP.
- Select the AP name and click the 

button on the page.

View configuration update summary

You can view the summary of the configuration updates status using the command given here.

- show ap urwb status

```
controller# show ap urwb status

*If configuration error is 'Present' please run 'show ap urwb err-status' for details

AP name          Coordinator name Config status Config error RF tag             Radio roles
-----------------------------------------------------------------------------------------------

AP345D.A812.0B6C AP345D.A812.0B6C Up to date                 cm_p2mp_rf_tag_me  PTMP Base

APC828.E536.7920 AP345D.A812.0B6C Up to date              cm_p2mp_rf_tag_mp2 PTMP Secondary
APE4A4.1CD8.1700 AP345D.A812.0B6C Up to date              cm_p2mp_rf_tag_mp1 PTMP Secondary
```