



# Configuring CCX Radio Management Features

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## Information About CCX Radio Management Features

You can configure two parameters that affect client location calculations:

- Radio measurement requests
- Location calibration

These parameters are supported in Cisco Client Extensions (CCX) v2 and later releases and are designed to enhance location accuracy and timeliness for participating CCX clients.

For the location features to operate properly, the access points must be configured for normal, monitor, or FlexConnect mode. However, for FlexConnect mode, the access point must be connected to the Cisco WLC.

## Radio Measurement Requests

When you enable the radio measurements requests feature, lightweight access points issue broadcast radio measurement request messages to clients running CCXv2 or later releases. The access points transmit these messages for every SSID over each enabled radio interface at a configured interval. In the process of performing 802.11 radio measurements, CCX clients send 802.11 broadcast probe requests on all the channels specified in the measurement request. The Cisco Location Appliance uses the uplink measurements based on these requests received at the access points to quickly and accurately calculate the client location. You do not need to specify on which channels the clients are to measure. The Cisco WLC, access point, and client automatically determine which channels to use.

The radio measurement feature enables the Cisco WLC to also obtain information on the radio environment from the client's perspective (rather than from just that of the access point). In this case, the access points issue unicast radio measurement requests to a particular CCXv4 or v5 client. The client then sends various measurement reports back to the access point and onto the Cisco WLC. These reports include information about the radio environment and data used to interpret the location of the clients. To prevent the access points and Cisco WLC from being overwhelmed by radio measurement requests and reports, only two clients per access point and up to 20 clients per Cisco WLC are supported. You can view the status of radio measurement

requests for a particular access point or client as well as radio measurement reports for a particular client from the Cisco WLC CLI.

The Cisco WLC software improves the ability of the mobility services engine to accurately interpret the location of a device through a CCXv4 feature called location-based services. The Cisco WLC issues a path-loss request to a particular CCXv4 or v5 client. If the client chooses to respond, it sends a path-loss measurement report to the Cisco WLC. These reports contain the channel and transmit power of the client.




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**Note** Non-CCX and CCXv1 clients ignore the CCX measurement requests and do not participate in the radio measurement activity.

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## Location Calibration

For CCX clients that need to be tracked more closely (for example, when a client calibration is performed), the Cisco WLC can be configured to command the access point to send unicast measurement requests to these clients at a configured interval and whenever a CCX client roams to a new access point. These unicast requests can be sent out more often to these specific CCX clients than the broadcast measurement requests, which are sent to all clients. When location calibration is configured for non-CCX and CCXv1 clients, the clients are forced to disassociate at a specified interval to generate location measurements.

# Configuring CCX Radio Management

## Configuring CCX Radio Management (GUI)

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- Step 1** Choose **Wireless > 802.11a/n/ac** or **802.11b/g/n > Network** to open the 802.11a/n/ac (or 802.11b/g/n) Global Parameters page.
- Step 2** Under CCX Location Measurement, select the **Mode** check box to globally enable CCX radio management. This parameter causes the access points connected to this Cisco WLC to issue broadcast radio measurement requests to clients running CCX v2 or later releases. The default value is disabled (or unselected).
- Step 3** If you selected the Mode check box in the previous step, enter a value in the Interval text box to specify how often the access points are to issue the broadcast radio measurement requests.  
The range is 60 to 32400 seconds.  
The default is 60 seconds.
- Step 4** Click **Apply**.
- Step 5** Click **Save Configuration**.
- Step 6** Follow the instructions in *Step 2* of the [Configuring CCX Radio Management \(CLI\)](#) section below to enable access point customization.  
**Note** To enable CCX radio management for a particular access point, you must enable access point customization, which can be done only through the Cisco WLC CLI.
- Step 7** If desired, repeat this procedure for the other radio band (802.11a/n/ac or 802.11b/g/n).
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## Configuring CCX Radio Management (CLI)

### Step 1

Globally enable CCX radio management by entering this command:

```
config advanced {802.11a | 802.11b} ccx location-meas global enable interval_seconds
```

The range for the *interval\_seconds* parameter is 60 to 32400 seconds, and the default value is 60 seconds. This command causes all access points connected to this Cisco WLC in the 802.11a or 802.11b/g network to issue broadcast radio measurement requests to clients running CCXv2 or later releases.

### Step 2

Enable access point customization by entering these commands:

- **config advanced** {802.11a | 802.11b} **ccx customize** *Cisco\_AP* {on | off}

This command enables or disables CCX radio management features for a particular access point in the 802.11a or 802.11b/g network.

- **config advanced** {802.11a | 802.11b} **ccx location-meas ap** *Cisco\_AP* **enable** *interval\_seconds*

The range for the *interval\_seconds* parameter is 60 to 32400 seconds, and the default value is 60 seconds. This command causes a particular access point in the 802.11a or 802.11b/g network to issue broadcast radio measurement requests to clients running CCXv2 or higher.

### Step 3

Save your settings by entering this command:

```
save config
```

## Viewing CCX Radio Management Information (CLI)

- To see the CCX broadcast location measurement request configuration for all access points connected to this Cisco WLC in the 802.11a or 802.11b/g network, enter this command:

```
show advanced {802.11a | 802.11b} ccx global
```

- To see the CCX broadcast location measurement request configuration for a particular access point in the 802.11a or 802.11b/g network, enter this command:

```
show advanced {802.11a | 802.11b} ccx ap Cisco_AP
```

- To see the status of radio measurement requests for a particular access point, enter this command:

```
show ap ccx rm Cisco_AP status
```

Information similar to the following appears:

A Radio

```
Beacon Request..... Enabled
Channel Load Request..... Enabled
Frame Request..... Disabled
Noise Histogram Request..... Disabled
```

```

Path Loss Request..... Disabled
Interval..... 60
Iteration..... 5

```

#### B Radio

```

Beacon Request..... Disabled
Channel Load Request..... Enabled
Frame Request..... Disabled
Noise Histogram Request..... Enabled
Path Loss Request..... Disabled
Interval..... 60
Iteration..... 5

```

- To see the status of radio measurement requests for a particular client, enter this command:

**show client ccx rm *client\_mac* status**

Information similar to the following appears:

```

Client Mac Address..... 00:40:96:ae:53:b4
Beacon Request..... Enabled
Channel Load Request..... Disabled
Frame Request..... Disabled
Noise Histogram Request..... Disabled
Path Loss Request..... Disabled
Interval..... 5
Iteration..... 3

```

- To see radio measurement reports for a particular client, enter these commands:

**show client ccx rm *client\_mac* report beacon**—Shows the beacon report for the specified client.

**show client ccx rm *client\_mac* report chan-load**—Shows the channel-load report for the specified client.

**show client ccx rm *client\_mac* report noise-hist**—Shows the noise-histogram report for the specified client.

**show client ccx rm *client\_mac* report frame**—Shows the frame report for the specified client.

- To see the clients configured for location calibration, enter this command:

**show client location-calibration summary**

- To see the RSSI reported for both antennas on each access point that heard the client, enter this command:

**show client detail *client\_mac***

## Debugging CCX Radio Management Issues (CLI)

- Debug CCX broadcast measurement request activity by entering this command:

**debug airewave-director message {enable | disable}**

- Debug client location calibration activity by entering this command:

**debug ccxrm [all | error | warning | message | packet | detail {enable | disable}]**

- The CCX radio measurement report packets are encapsulated in Internet Access Point Protocol (IAPP) packets. Therefore, if the previous **debug ccxrm** command does not provide any debugs, enter this command to provide debugs at the IAPP level:

**debug iapp error {enable | disable}**

- Debug the output for forwarded probes and their included RSSI for both antennas by entering this command:

```
debug dot11 load-balancing
```

