

Configure RRM Parameters on Cisco Mobility Express

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Introduction

This document describes the steps to configure Radio Resource Management (RRM) features such as Transmit Power Control (TPC), Dynamic Channel assignment (DCA) and Coverage Hole Detection (CHD) on the Cisco Mobility Express.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco Mobility Express that runs code 8.5 and higher.
- RRM feature overview. The whitepaper here describes how the various features of RRM such as TPC, DCA, CHD work:

https://www.cisco.com/c/en/us/td/docs/wireless/controller/technotes/8-3/b_RRM_White_Paper/b_RRM_White_Paper_chapter_0100.html

Components Used

The information in this document is based on the Cisco 2802 AP that runs Mobility Express software Release 8.5.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Configure

Basic Radio Parameters

- Enable/Disable radio at the global level

Several RRM related config changes require the 802.11a/b radio to be disabled first. Some of these parameters are changing data rates allowed, disabling 802.11g radio, adding channels to DCA list.

In order to enable the 802.11a or 802.11b radio at the global level, you can use the command **config {802.11a | 802.11b} enable network**.

In order to disable the radio at the global level, use the command **config {802.11a | 802.11b} disable network**.

- Change data rates

You can set the mandatory, supported and disabled data rates for a radio network. Only one data rate can be modified at a time. The commands to do this are:

Mandatory data rate - **config{802.11a | 802.11b} rate mandatory channel_number**

Supported data rate - **config{802.11a | 802.11b}rate supported channel_number**

Disabled data rate - **config{802.11a | 802.11b}rate supportedchannel_number**

- Change country code

In order to change the country code list use the command **config country country1,country2**

For ex:

```
(Mobility_Express) >config country US,IN
```

TPC Parameters

TPC sets the transmit power of each AP to maximize the coverage and minimize co-channel interference. TPC adjusts the Tx power up or down to meet the required coverage level indicated by the TPC Threshold.

In order to configure RRM to do the TPC calculations, you need to set the txPower assignment to global with the command **config {802.11a | 802.11b} txPower global auto**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

You can also trigger RRM to take effect once with the command **config {802.11a | 802.11b} txPower global once**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

You can also specify the maximum and minimum power levels that can be assigned to the AP with the command **config {802.11a | 802.11b} txPower global {max | min} txpower.**

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

The range of values that can be configured for maximum and minimum power are between 30 dBm to -10 dBm. The default values are 30dBm for max power and -10 dBm for minimum power. If you configure a maximum transmit power, RRM does not allow any access point to exceed this transmit power. For example, if you configure a maximum transmit power of 11 dBm, then no access point would transmit above 11 dBm, unless the access point is configured manually.

You can also set the power level of an AP manually with the command **config 802.11a txPower ap ap_name power_level.**

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

Note: If you get the error 'Radio [Slot 1] is not Disabled or Customize is not enabled', this means that the radio is in enabled state on the AP. You can disable the radio only on this AP with the command **config 802.11a/b disable ap_name** and then try to set the power level value. In order to re-enable the radio use the command **config 802.11a/b enable ap_name.**

Note: If you get the error '[Slot 1] Invalid power level specified.' then it would mean that the power level value that has been entered is incorrect. In order to find out the list of power levels allowed for an AP, use the command **show advanced 802.11a txpower.**

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

In this case, the AP AP00A3.8EFA.DC16 allows for only 6 power levels. So if you try to configure power level of 7, you see the error.

In order to configure which TPC version the controller needs to use, you need to use the command **config advanced {802.11a | 802.11b} tpc-version {1 | 2}** where:

- TPCv1: Coverage-optimal—(Default) Offers strong signal coverage and stability with negligent intercell interferences and sticky client syndrome. It is recommended to use TPC v1 always unless there is a specific requirement for which you need to use TPC v2.
- TPCv2: Interference-optimal—For scenarios where voice calls are extensively used. Tx power is dynamically adjusted with the goal of minimum interference. It is suitable for dense networks. In this mode, there can be higher roaming delays and coverage hole incidents.

DCA

DCA dynamically manages channel assignments on a per AP radio basis. It makes decisions with the use of an RSSI based cost metric function which evaluates interference for each available

channel and makes the assignments to minimize co-channel interference. In order to configure the controller to assign the channels to the AP's use the command **config {802.11a | 802.11b} channel global auto**.

You can trigger DCA calculations to happen once with the command **config {802.11a | 802.11b} channel global once**.

In order to disable RRM calculations and set all channels to their default values use the command **config {802.11a | 802.11b} channel global off**.

In order to restart aggressive DCA cycle use the command **config {802.11a | 802.11b} channel global restart**.

You can specify the list of channels that can be used by DCA with the command **config advanced {802.11a | 802.11b} channel {add | delete} channel_number**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

You can enter only one channel number per command. This command is helpful when you know that the clients do not support certain channels because they are legacy devices or they have certain regulatory restrictions.

DCA Parameters

You can specify the time of day when the DCA algorithm is to start. A value between 0 and 23 (inclusive) which represents the hour of the day from 12:00 a.m. to 11:00 p.m. The command for this is **config advanced {802.11a | 802.11b} channel dca anchor-time value**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

The next step is to specify how often DCA algorithm runs. You can specify any of the following values: 1, 2, 3, 4, 6, 8, 12, or 24 hours or 0. Zero is the default value of 10 minutes (or 600 seconds). The command to enable this is **config advanced {802.11a | 802.11b} channel dca interval value**.

You can specify how sensitive the DCA algorithm is to environmental changes such as signal, load, noise, and interference when you determine whether to change channel. The values that can be configured are low, medium and high. Channel sensitivity can be configured with the command **config advanced {802.11a | 802.11b} channel dca sensitivity {low | medium | high}**. Value of high means that the DCA algorithm is highly sensitive to environmental changes.

The table lists the channel sensitivity thresholds for each radio.

Option	2.4-GHz DCA Sensitivity Threshold	5-GHz DCA Sensitivity Threshold
High	5 dB	5 dB
Medium	10 dB	15 dB
Low	20 dB	20 dB

Set Channel Width on AP

You can set the channel width on the 5ghz radio to 20, 40, 80, 160Mhz or best. The default channel width is 20Mhz. In order to change the channel width you first need to disable the radio. Channel width can be changed with the command **config advanced 802.11a channel dca chan-width {20 | 40 | 80|160|best}**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

In order to override the globally configured DCA channel width setting, you can configure an access point's radio mode with the command **config 802.11a chan_width Cisco_AP {20 | 40 | 80| 160| best}**. If you change the static configuration to global on the access point radio, the global DCA configuration overrides the channel width configuration that the access point was previously in use. It can take up to 30 minutes (which depends on how often DCA is configured to run) for the change to take effect.

- 80 sets the channel width for the 802.11ac radios to 80 MHz.
- 160 sets the channel width for the 802.11ac radio to 160 MHz.
- best sets the channel width for the 802.11ac radio to best suitable bandwidth.

Other Parameters

- Enable or disable foreign access point interference avoidance in the channel assignment **config advanced {802.11a | 802.11b} channel foreign {enable | disable}**
- Enable or disable load avoidance in the channel assignment **config advanced {802.11a | 802.11b} channel load {enable | disable}**
- Enable or disable noise avoidance in the channel assignment **config advanced {802.11a | 802.11b} channel noise {enable | disable}**

CHD

Coverage Hole Detection detects coverage holes, and mitigates them (if possible and wise) by increasing the transmit power of the AP which thereby increases the coverage. It can be enabled/disabled using the command: '**config advanced {802.11a | 802.11b} coverage {enable | disable}**'.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

The default value is set to enabled. You can also disable coverage hole detection on a per-WLAN basis using the command: '**config advanced {802.11a | 802.11b} coverage {enable | disable}**'.

Set CHD Parameters

Step 1. Specify the minimum receive signal strength indication (RSSI) value for packets received by the access point with the command **config advanced {802.11a | 802.11b} coverage {data | voice} rssi-threshold rssi**. The value that you enter is used to identify coverage holes (or areas of poor coverage) within your network. If the access point receives a packet in the data or voice queue with an RSSI value below the value you enter here, a potential coverage hole has been detected. The valid range is -90 to -60 dBm, and the default value is -80 dBm for data packets and -75 dBm for voice packets. The access point takes RSSI measurements every 5 seconds and reports them to the Cisco WLC in 90-second intervals.

Step 2. Specify the minimum number of clients on an access point with an RSSI value at or below the data or voice RSSI threshold **config advanced {802.11a | 802.11b} coverage level global clients**. The valid range is 1 to 75, and the default value is 3.

Step 3. Specify the percentage of clients on an access point that experience a low signal level but cannot roam to another access point with the command **config advanced {802.11a | 802.11b} coverage exception global percent**. The valid range is 0 to 100%, and the default value is 25%.

Step 4. Specify the minimum failure count threshold for uplink data or voice packets using the command **config advanced {802.11a | 802.11b} coverage {data | voice} packet-count packets**. The valid range is 1 to 255 packets, and the default value is 10 packets.

Step 5. Specify the failure rate threshold for uplink data or voice packets with the command **config advanced {802.11a | 802.11b} coverage {data | voice} fail-rate percent**. The valid range is 1 to 100%, and the default value is 20%.

Verify

Use this section in order to confirm that your configuration works properly.

Step 1. In order to view all the TPC parameters configured, power level currently used by the AP, you can use the command **show advanced {802.11a | 802.11b} txpower**.

Step 2. In order to view the DCA parameters configured use the command **show advanced {802.11a | 802.11b} channel**.

Step 3. In order to view the current power level and channel used by each AP, use the command **show advanced {802.11a | 802.11b} summary**.

For ex:

```
(Mobility_Express) >config 802.11a txPower global auto
```

Troubleshoot

There is currently no specific troubleshooting information available for this configuration.