Overriding RRM

Information About Overriding RRM

In some deployments, it is desirable to statically assign channel and transmit power settings to the access points instead of relying on the RRM algorithms provided by Cisco. Typically, this is true in challenging RF environments and non standard deployments but not the more typical carpeted offices.

Note If you choose to statically assign channels and power levels to your access points and/or to disable dynamic channel and power assignment, you should still use automatic RF grouping to avoid spurious rogue device events.

You can disable dynamic channel and power assignment globally for a Cisco WLC, or you can leave dynamic channel and power assignment enabled and statically configure specific access point radios with a channel and power setting. While you can specify a global default transmit power parameter for each network type that applies to all the access point radios on a Cisco WLC, you must set the channel for each access point radio when you disable dynamic channel assignment. You may also want to set the transmit power for each access point instead of leaving the global transmit power in effect.

Prerequisites for Overriding RRM

We recommend that you assign different nonoverlapping channels to access points that are within close proximity to each other. The nonoverlapping channels in the U.S. are 36, 40, 44, 48, 52, 56, 60, 64, 149, 153, 157, and 161 in an 802.11a network and 1, 6, and 11 in an 802.11b/g network.

Statically Assigning Channel and Transmit Power Settings to Access Point Radios

Statically Assigning Channel and Transmit Power Settings (GUI)

Step 1　Choose **Wireless > Access Points > Radios > 802.11a/n/ac** or **802.11b/g/n** to open the 802.11a/n/ac (or 802.11b/g/n) Radios page.
This page shows all the 802.11a/n/ac or 802.11b/g/n access point radios that are joined to the Cisco WLC and their current settings. The Channel text box shows both the primary and extension channels and uses an asterisk to indicate if they are globally assigned.

Step 2　Hover your cursor over the blue drop-down arrow for the access point for which you want to modify the radio configuration and choose **Configure**. The 802.11a/n/ac (or 802.11b/g/n) Cisco APs > Configure page appears.

Step 3　Specify the RF Channel Assignment from the following options:

- **Global**—Choose this to specify a global value.

- **Custom**—Choose this and then select a value from the adjacent drop-down list to specify a custom value.

Step 4　Configure the antenna parameters for this radio as follows:

1　From the Antenna Type drop-down list, choose **Internal** or **External** to specify the type of antennas used with the access point radio.

2　Select and unselect the check boxes in the Antenna text box to enable and disable the use of specific antennas for this access point, where A, B, and C are specific antenna ports. The D antenna appears for the Cisco 3600 Series Access Points. A is the right antenna port, B is the left antenna port, and C is the center antenna port. For example, to enable transmissions from antenna ports A and B and receptions from antenna port C, you would select the following check boxes: Tx: A and B and Rx: C. In 3600 APs, the valid combinations are A, A+B, A+B+C or A+B+C+D. When you select a dual mode antenna, you can only apply single spatial 802.11n stream rates: MCS 0 to 7 data rates. When you select two dual mode antennae, you can apply only the two spatial 802.11n stream rates: MCS 0 to 15 data rates.

3　In the Antenna Gain text box, enter a number to specify an external antenna's ability to direct or focus radio energy over a region of space. High-gain antennas have a more focused radiation pattern in a specific direction. The antenna gain is measured in 0.5 dBi units, and the default value is 7 times 0.5 dBi, or 3.5 dBi.

　　If you have a high-gain antenna, enter a value that is twice the actual dBi value (see *Cisco Aironet Antenna Reference Guide* for antenna dBi values). Otherwise, enter 0. For example, if your antenna has a 4.4-dBi gain, multiply the 4.4 dBi by 2 to get 8.8 and then round down to enter only the whole number (8). The Cisco WLC reduces the actual equivalent isotropic radiated power (EIRP) to make sure that the antenna does not violate your country's regulations.

4　Choose one of the following options from the Diversity drop-down list:

　　Enabled—Enables the antenna connectors on both sides of the access point. This is the default value.

　　Side A or Right—Enables the antenna connector on the right side of the access point.

　　Side B or Left—Enables the antenna connector on the left side of the access point.

Step 5 In the RF Channel Assignment area, choose **Custom** for the Assignment Method under RF Channel Assignment and choose a channel from the drop-down list to assign an RF channel to the access point radio.

Step 6 In the Tx Power Level Assignment area, choose the **Custom** assignment method and choose a transmit power level from the drop-down list to assign a transmit power level to the access point radio.

The transmit power level is assigned an integer value instead of a value in mW or dBm. The integer corresponds to a power level that varies depending on the regulatory domain in which the access points are deployed. The number of available power levels varies based on the access point model. However, power level 1 is always the maximum power level allowed per country code setting, with each successive power level representing 50% of the previous power level. For example, 1 = maximum power level in a particular regulatory domain, 2 = 50% power, 3 = 25% power, 4 = 12.5% power, and so on.

> **Note** See the hardware installation guide for your access point for the maximum transmit power levels supported per regulatory domain. Also, see the data sheet for your access point for the number of power levels supported.

> **Note** If the access point is not operating at full power, the "Due to low PoE, radio is transmitting at degraded power" message appears under the Tx Power Level Assignment section.

Step 7 Choose **Enable** from the Admin Status drop-down list to enable this configuration for the access point.

Step 8 Click **Apply**.

Step 9 Have the Cisco WLC send the access point radio admin state immediately to Cisco Prime Infrastructure as follows:

1 Choose **Wireless > 802.11a/n/ac** or **802.11b/g/n > Network** to open the 802.11a (or 802.11b/g) Global Parameters page.

2 Select the **802.11a** (or **802.11b/g) Network Status** check box.

3 Click **Apply**.

Step 10 Click **Save Configuration**.

Step 11 Repeat this procedure for each access point radio for which you want to assign a static channel and power level.

Statically Assigning Channel and Transmit Power Settings (CLI)

Step 1 Disable the radio of a particular access point on the 802.11a/n/ac or 802.11b/g/n network by entering this command:
config {**802.11a** | **802.11b**} **disable** *Cisco_AP*

Step 2 Configure the channel width for a particular access point by entering this command:
config {**802.11a** | **802.11b**} **chan_width** *Cisco_AP* {**20** | **40** | **80**}

where

- **20** allows the radio to communicate using only 20-MHz channels. Choose this option for legacy 802.11a radios, 20-MHz 802.11n radios, or 40-MHz 802.11n radios that you want to operate using only 20-MHz channels. This is the default value.

- **40** allows 40-MHz 802.11n radios to communicate using two adjacent 20-MHz channels bonded together. The radio uses the primary channel that you choose as well as its extension channel for faster throughput. Each channel has only one extension channel (36 and 40 are a pair, 44 and 48 are a pair, and so on). For example, if you choose

a primary channel of 44, the Cisco WLC would use channel 48 as the extension channel. If you choose a primary channel of 48, the Cisco WLC would use channel 44 as the extension channel.

Note   This parameter can be configured only if the primary channel is statically assigned.

Note   Statically configuring an access point's radio for 20-MHz or 40-MHz or 80-MHz mode overrides the globally configured DCA channel width setting (configured using the **config advanced 802.11a channel dca chan-width-11n** {**20** | **40** | **80**} command). If you ever change the static configuration back to global on the access point radio, the global DCA configuration overrides the channel width configuration that the access point was previously using. It can take up to 30 minutes (depending 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.

Note   Channels 116, 120, 124, and 128 are not available in the U.S. and Canada for 40-MHz channel bonding.

Step 3   Enable or disable the use of specific antennas for a particular access point by entering this command:
config {**802.11a** | **802.11b**} **11nsupport antenna** {**tx** | **rx**} *Cisco_AP* {**A** | **B** | **C**} {**enable** | **disable**}

where A, B, and C are antenna ports. A is the right antenna port, B is the left antenna port, and C is the center antenna port. For example, to enable transmissions from the antenna in access point AP1's antenna port C on the 802.11a network, you would enter this command:

config 802.11a 11nsupport antenna tx AP1 C enable

Note   You cannot enable or disable individual antennas for 802.11ac because the 802.11ac module antennas are internal.

Step 4   Specify the external antenna gain, which is a measure of an external antenna's ability to direct or focus radio energy over a region of space entering this command:
config {**802.11a** | **802.11b**} **antenna extAntGain** *antenna_gain Cisco_AP*

High-gain antennas have a more focused radiation pattern in a specific direction. The antenna gain is measured in 0.5 dBi units, and the default value is 7 times 0.5 dBi, or 3.5 dBi.

If you have a high-gain antenna, enter a value that is twice the actual dBi value (see *Cisco Aironet Antenna Reference Guide* for antenna dBi values). Otherwise, enter 0. For example, if your antenna has a 4.4-dBi gain, multiply the 4.4 dBi by 2 to get 8.8 and then round down to enter only the whole number (8). The Cisco WLC reduces the actual equivalent isotropic radiated power (EIRP) to make sure that the antenna does not violate your country's regulations.

Step 5   Configure beamforming for the 5-GHz radios for all APs or a specific by entering this command:
config 802.11a {**global** | **ap** *ap-name*} {**enable** | **disable**}

Step 6   Specify the channel that a particular access point is to use by entering this command:
config {**802.11a** | **802.11b**} **channel ap** *Cisco_AP channe*l

For example, to configure 802.11a channel 36 as the default channel on AP1, enter the **config 802.11a channel ap AP1 36** command.

The channel you choose is the primary channel (for example, channel 36), which is used for communication by legacy 802.11a radios and 802.11n 20-MHz radios. 802.11n 40-MHz radios use this channel as the primary channel but also use an additional bonded extension channel for faster throughput, if you chose 40 for the channel width.

Note   Changing the operating channel causes the access point radio to reset.

Step 7   Specify the transmit power level that a particular access point is to use by entering this command:
config {**802.11a** | **802.11b**} **txPower ap** *Cisco_AP power_level*

For example, to set the transmit power for 802.11a AP1 to power level 2, enter the **config 802.11a txPower ap AP1 2** command.

The transmit power level is assigned an integer value instead of a value in mW or dBm. The integer corresponds to a power level that varies depending on the regulatory domain in which the access points are deployed. The number of available power levels varies based on the access point model. However, power level 1 is always the maximum power level allowed per country code setting, with each successive power level representing 50% of the previous power level. For example, 1 = maximum power level in a particular regulatory domain, 2 = 50% power, 3 = 25% power, 4 = 12.5% power, and so on.

In certain cases, Cisco access points support only 7 power levels for certain channels, so that the Cisco Wireless Controller considers the 7th and 8th power levels as the same. If the 8th power level is configured on those channels, the configuration would fail since the controller considers the 7th power level as the lowest acceptable valid power level. These power values are derived based on the regulatory compliance limits and minimum hardware limitation which varies across different Cisco access points. For example, Cisco 3500, 1140, and 1250 series access points allow the configuration of last power levels because those access points report the "per path power" to the controller, whereas all next generation acess points such as Cisco 3700, 3600, 2600, and 1600 series access points report "total power value" to the controller, thereby decreasing the allowed power levels for newer generation products. For example, if the last power level in the 3600E access point has a power value of 4dbm (total power), then it actually means the power value is -2dbm (per path).

Note See the hardware installation guide for your access point for the maximum transmit power levels supported per regulatory domain. Also, see data sheet for your access point for the number of power levels supported.

Step 8 Save your settings by entering this command:
save config

Step 9 Repeat *Step 2* through *Step 7* for each access point radio for which you want to assign a static channel and power level.

Step 10 Reenable the access point radio by entering this command:
config {**802.11a** | **802.11b**} **enable** *Cisco_AP*

Step 11 Have the Cisco WLC send the access point radio admin state immediately to WCS by entering this command:
config {**802.11a** | **802.11b**} **enable network**

Step 12 Save your changes by entering this command:
save config

Step 13 See the configuration of a particular access point by entering this command:
show ap config {**802.11a** | **802.11b**} *Cisco_AP*

Information similar to the following appears:

```
Cisco AP Identifier.............................. 7
Cisco AP Name................................... AP1
...
Tx Power
Num Of Supported Power Levels ............. 8
     Tx Power Level 1 .......................... 20 dBm
     Tx Power Level 2 .......................... 17 dBm
     Tx Power Level 3 .......................... 14 dBm
     Tx Power Level 4 .......................... 11 dBm
     Tx Power Level 5 .......................... 8 dBm
     Tx Power Level 6 .......................... 5 dBm
     Tx Power Level 7 .......................... 2 dBm
     Tx Power Level 8 .......................... -1 dBm
     Tx Power Configuration .................... CUSTOMIZED
     Current Tx Power Level .................... 1
```

```
Phy OFDM parameters
      Configuration ............................ CUSTOMIZED
      Current Channel .......................... 36
      Extension Channel ........................ 40
      Channel Width............................. 40 Mhz
      Allowed Channel List...................... 36,44,52,60,100,108,116,132,
         ....................................... 149,157
      TI Threshold ............................. -50
      Antenna Type.............................. EXTERNAL_ANTENNA
      External Antenna Gain (in .5 dBi units).... 7
      Diversity................................. DIVERSITY_ENABLED

802.11n Antennas
       Tx
        A........................................ ENABLED
        B........................................ ENABLED
       Rx
        A........................................ DISABLED
        B........................................ DISABLED
        C................................... ENABLED
```

Disabling Dynamic Channel and Power Assignment Globally for a Cisco Wireless LAN Controller

Disabling Dynamic Channel and Power Assignment (GUI)

Step 1   Choose **Wireless** > **802.11a/n/ac** or **802.11b/g/n** > **RRM** > **Auto RF** to open the 802.11a/n/ac (or 802.11b/g/n) Global Parameters > Auto RF page.

Step 2   Disable dynamic channel assignment by choosing **OFF** under RF Channel Assignment.

Step 3   Disable dynamic power assignment by choosing **Fixed** under Tx Power Level Assignment and choosing a default transmit power level from the drop-down list.

Step 4   Click **Apply**.

Step 5   Click **Save Configuration**.

Step 6   If you are overriding the default channel and power settings on a per radio basis, assign static channel and power settings to each of the access point radios that are joined to the Cisco WLC.

Step 7   (Optional) Repeat this procedure for the network type that you did not select (802.11a/n/ac or 802.11b/g/n).

Disabling Dynamic Channel and Power Assignment (CLI)

Step 1 Disable the 802.11a or 802.11b/g network by entering this command:
config {**802.11a** | **802.11b**} **disable network**

Step 2 Disable RRM for all 802.11a or 802.11b/g radios and set all channels to the default value by entering this command:
config {**802.11a** | **802.11b**} **channel global off**

Step 3 Enable the 802.11a or 802.11b/g network by entering this command:
config {**802.11a** | **802.11b**} **enable network**

Note To enable the 802.11g network, enter the **config 802.11b 11gSupport enable** command after the **config 802.11b enable network** command.

Step 4 Save your changes by entering this command:
save config