Configuring 802.11 Parameters

Configuring the 802.11n Parameters

802.11n Parameters

This section provides instructions for managing 802.11n access points on your network. The 802.11n devices support the 2.4 and 5-GHz bands and offer high throughput data rates.

The 802.11n high throughput rates are available on all the 802.11n access points for the WLANs using WMM with no Layer 2 encryption or with WPA2/AES encryption enabled.

Note Some Cisco 802.11n APs may intermittently emit incorrect beacon frames, which can trigger false wIPS alarms. We recommend that you ignore these alarms. The issue is observed in the following Cisco 802.11n APs: 1140, 1250, 2600, 3500, and 3600.

Configuring the 802.11n Parameters (GUI)

Step 1 Choose **Wireless** > **802.11a/n/ac** or **802.11b/g/n** > **High Throughput** to open the (5 GHz or 2.4 GHz) High Throughput page.

Step 2 Select the **11n Mode** check box to enable 802.11n support on the network. The default value is enabled.

If you want to disable 802.11n mode when both 802.11n and 802.11ac modes are enabled, you must disable the 802.11ac mode first.

Step 3 Select the check boxes of the desired rates to specify the modulation and coding scheme (MCS) rates at which data can be transmitted between the access point and the client. These data rates, which are calculated for a 20-MHz channel width using a short guard interval, are available:

- 0 (7 Mbps)

- 1 (14 Mbps)
- 2 (21 Mbps)
- 3 (29 Mbps)
- 4 (43 Mbps)
- 5 (58 Mbps)
- 6 (65 Mbps)
- 7 (72 Mbps)
- 8 (14 Mbps)
- 9 (29 Mbps)
- 10 (43 Mbps)
- 11 (58 Mbps)
- 12 (87 Mbps)
- 13 (116 Mbps)
- 14 (130 Mbps)
- 15 (144 Mbps)

Any associated clients that support the selected rates may communicate with the access point using those rates. However, the clients are not required to be able to use this rate in order to associate. The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values that are used.

Step 4 Click **Apply**.

Step 5 Use the 802.11n data rates that you configured by enabling WMM on the WLAN as follows:

a) Choose **WLANs** to open the WLANs page.
b) Click the ID number of the WLAN for which you want to configure WMM mode.
c) When the WLANs > Edit page appears, choose the **QoS** tab to open the WLANs > Edit (Qos) page.
d) From the WMM Policy drop-down list, choose **Required** or **Allowed** to require or allow client devices to use WMM. Devices that do not support WMM cannot join the WLAN.

   If you choose **Allowed**, devices that cannot support WMM can join the WLAN but will not benefit from the 802.11n rates.

e) Click **Apply**.

Step 6 Click **Save Configuration**.

Note To determine if an access point supports 802.11n, look at the 11n Supported text box on either the 802.11a/n/ac (or 802.11b/g/n) Cisco APs > Configure page or the 802.11a/n/ac (or 802.11b/g/n) AP Interfaces > Details page.

Configuring the 802.11n Parameters (CLI)

Procedure

- Enable 802.11n support on the network by entering this command:

  config {**802.11a** | **802.11b**} **11nsupport** {**enable** | **disable**}

- Specify the modulation and coding scheme (MCS) rates at which data can be transmitted between the access point and the client by entering this command:

  config {**802.11a** | **802.11b**} **11nsupport mcs tx** {**0-15**} {**enable** | **disable**}

- Use the 802.11n data rates that you configured by enabling WMM on the WLAN as follows:

  config wlan wmm {**allow** | **disable** | **require**} *wlan_id*

  The **require** parameter requires client devices to use WMM. Devices that do not support WMM cannot join the WLAN.

  If set to **allow**, devices that cannot support WMM can join the WLAN but do not benefit from 802.11n rates.

- Specify the aggregation method used for 802.11n packets as follows:
  a) Disable the network by entering this command:

     config {**802.11a** | **802.11b**} **disable network**

  b) Specify the aggregation method entering this command:

     config {**802.11a** | **802.11b**} **11nsupport** {**a-mpdu** | **a-msdu**} **tx priority** {**0-7** | **all**} {**enable** | **disable**}

     Aggregation is the process of grouping packet data frames together rather than transmitting them separately. Two aggregation methods are available: Aggregated MAC Protocol Data Unit (A-MPDU) and Aggregated MAC Service Data Unit (A-MSDU). A-MSDU is performed in hardware and therefore is the default method.

Note For 802.11ac, all packets are A-MPDU. The A-MSDU option does not apply for 802.11ac.

You can specify the aggregation method for various types of traffic from the access point to the clients. This table defines the priority levels (0-7) assigned per traffic type.

Table 1: Traffic Type Priority Levels

User Priority	Traffic Type
0	Best effort
1	Background
2	Spare
3	Excellent effort
4	Controlled load

User Priority	Traffic Type
5	Video, less than 100-ms latency and jitter
6	Voice, less than 10-ms latency and jitter
7	Network control

You can configure each priority level independently, or you can use the **all** parameter to configure all of the priority levels at once. When you use the **enable** command, the traffic associated with that priority level uses A-MPDU transmission. When you use the **disable** command, the traffic associated with that priority level uses A-MSDU transmission. Configure the priority levels to match the aggregation method used by the clients. By default, A-MPDU is enabled for priority level 0, 4 and 5 and the rest are disabled. By default, A-MSDU is enabled for all priorities except 6 and 7.

c) Reenable the network by entering this command:

config {**802.11a** | **802.11b**} **enable network**

- Configure the 802.11n-5 GHz A-MPDU transmit aggregation scheduler by entering this command:

  config 802.11{**a** | **b**} **11nsupport a-mpdu tx scheduler** {**enable** | **disable** | **timeout rt** *timeout-value*}

  The timeout value is in milliseconds. The valid range is between 1 millisecond to 1000 milliseconds.
- Configure the guard interval for the network by entering this command:
  config 802.11{**a** | **b**} **11nsupport guard_interval** {**any** | **long**}
- Configure the Reduced Interframe Space (RIFS) for the network by entering this command:

  config 802.11{**a** | **b**} **11nsupport rifs rx** {**enable** | **disable**}
- Save your changes by entering this command:
  save config
- View the configuration settings for the 802.11 networks by entering this command:

  show {**802.11a** | **802.11b**}

Configuring 802.11h Parameters

802.11h Parameters

802.11h informs client devices about channel changes and can limit the transmit power of those client devices.

Configuring the 802.11h Parameters (GUI)

Step 1 Disable the 802.11 band as follows:

a) Choose **Wireless > 802.11a/n/ac > Network** to open the **802.11a Global Parameters** page.

b) Unselect the **802.11a Network Status** check box.

c) Click **Apply**.

Step 2 Choose **Wireless > 802.11a/n/ac > DFS (802.11h)** to open the **802.11h Global Parameters** page.

Step 3 In the Power Constraint area, enter the local power constraint. The valid range is between 0 dBm and 30 dBm.

Step 4 In the Channel Switch Announcement area, select the **Channel Announcement** check box if you want the access point to announce when it is switching to a new channel and the new channel number, or unselect this check box to disable the channel announcement. The default value is disabled.

Step 5 If you enabled the channel announcement, the **Channel Quiet Mode** check box appears. Select this check box if you want the access point to stop transmitting on the current channel, or unselect this check box to disable quiet mode. The default value is disabled.

Step 6 Click **Apply**.

Step 7 Reenable the 802.11a band as follows:

a) Choose **Wireless > 802.11a/n/ac > Network** to open the **802.11a Global Parameters** page.
b) Select the **802.11a Network Status** check box.
c) Click **Apply**.

Step 8 Click **Save Configuration**.

Configuring the 802.11h Parameters (CLI)

Step 1 Disable the 802.11a network by entering this command:

config 802.11a disable network

Step 2 Enable or disable an access point to announce when it is switching to a new channel, and the new channel number by entering this command:

config 802.11h channelswitch {**enable** | **disable**} *switch_mode*

Enter either 0 or 1 for the *switch_mode* parameter to specify whether transmissions are restricted until the actual channel switch (0), or are not restricted (1). By default, this feature is in disabled state.

Step 3 Configure a new channel using the 802.11h channel announcement by entering this command:

config 802.11h setchannel channel *channel*

Step 4 Configure the 802.11h power constraint value by entering this command:

config 802.11h powerconstraint *value*

Use increments of 3 dB for the value so that the AP goes down one power level at a time.

Step 5 Reenable the 802.11a network by entering this command:

config 802.11a enable network

Step 6 View the status of the 802.11h parameters by entering this command:

show 802.11h

Information similar to the following appears:

```
Power Constraint................................ 0
```

```
Channel Switch.................................. Disabled
Channel Switch Mode............................. 0
```

Configuring the 802.11ac Parameters

802.11ac Parameters

The 802.11ac radio module for the Cisco Aironet 3600 Series access point provides enterprise-class reliability and wired-network-like performance. It supports three spatial streams and up to 160 MHz-wide channels for a maximum data rate of 2.5 Gbps.

The 802.11ac radio in slot 2 is a subordinate radio for which you can configure specific parameters. Because the 802.11ac is a subordinate radio, it inherits many properties from the main 802.11a/n radio on slot 1. The parameters that you can configure for the 802.11ac radio are as follows:

- Admin status—Interface status of the radio that you can enable or disable. By default, the Admin status is in an enabled state. If you disable 802.11n, the 802.11ac radio is also disabled.
- Channel width—You can choose the RF channel width as 20 MHz, 40 MHz, 80 MHz, or 160 MHz. If you choose the channel width as 160 MHz, you must enable the 802.11ac mode on the **High Throughput** page.

Note The **11ac Supported** field is a nonconfigurable parameter that appears for the 802.11ac subordinate radio in slot 2.

Note When the Cisco Aironet 3600 Series access point with 802.11ac radio module is in unsupported mode such as Monitor and Sniffer, Admin Status and Channel Width will not be configured.

This section provides instructions to manage 802.11ac devices such as the Cisco Aironet 3600 Series Access Points on your network.

Note For the Cisco Aironet 3600 Series APs:

- With default AP group—Only WLAN IDs 1 to 8 are advertised on the 5-GHz radios; there is no limit on the 2.4-GHz radios.
- With user-defined AP group—Only the first 8 WLAN IDs are advertised on the 5-GHz radios regardless of the ID number; there is no limit on the 2.4-GHz radios.

Changing the 802.11n radio channel also changes the 802.11ac channels.

On the Cisco WLC GUI, the 802.11ac clients that are connected to the 802.11n radio are displayed 802.11an clients, and the 802.11ac clients that are connected to the 802.11ac radio are displayed as 802.11ac clients.

Ensure that your WLAN has WMM enabled and open or WPA2/AES for 802.11ac to be supported. Otherwise, the speed of 802.11ac is not available, even on 802.11ac clients.

For more information about the 802.11ac module on the Cisco Aironet 3600 Series access point, see http://www.cisco.com/c/en/us/products/wireless/aironet-3600-series/relevant-interfaces-and-modules.html.

Restrictions for 802.11ac Support

- The 802.11ac module is supported only on the following access points:
  - 1700
  - 1800
  - 2700
  - 2800
  - 3600
  - 3700
  - 3800
- The 802.11ac module is turned off if the built-in 5-GHz radio is turned off.
- You must ensure that the configuration of the channel, power values, and the mode of the 802.11ac module is the same as those of the built-in 5-GHz radio on the AP. Also, the 802.11ac module serves only 802.11ac clients.
- The 802.11ac module main channel cannot be changed individually.
- This 802.11ac support is applicable only to the following controller platforms:
  - Cisco 2504 WLC
  - Cisco 5508 WLC
  - Cisco 5520 WLC
  - Cisco Flex 7510 WLC
  - Cisco 8510 WLC
  - Cisco 8540 WLC
- Controllers do not support High availability for 802.11ac modules. The 802.11ac configuration (802.11ac Data Rates and 802.11ac Global mode) on the controller is not synchronized with the standby controller. This might result in client throughput fluctuations and reassociations when you explicitly disable those configurations on the active controller.

  In addition, the 802.11ac Global mode configuration controls whether the radio module is enabled. If 802.11ac Global mode is enabled on one controller but not on another, the 802.11ac module might be disabled if the access point associates with a controller on which 802.11ac Global mode is disabled.

- When changing AP from static to auto channel assignment, by default AP moves to best possible bandwidth supported by the radio and a valid channel. Channel number and width assignment may be suboptimal until next DCA cycle gets started.
- SSIDs with TKIP and SSIDs with TKIP+AES are not enabled on the 802.11ac radios. Therefore, all the 5-GHz clients are expected to associate with the 802.11n radios.

Configuring the 802.11ac High-Throughput Parameters (GUI)

Step 1 Choose **Wireless** > **802.11a/n/ac** > **High Throughput (802.11n/ac)**.

Step 2 Check the **11ac mode** check box to enable the 802.11ac support on the network.

Note You can modify the 802.11ac status only if the 802.11n mode is enabled.

Step 3 Check the check boxes of the desired rates to specify the Modulation and Coding Scheme (MCS) rates at which data can be transmitted between the access point and the client.

MCS index 8 and 9 are specific to 802.11ac. Enabling MCS data rate with index 9 automatically enables data rate with MCS index 8. You can enable or disable MCS index 8 only when MCS index 9 is disabled.

Step 4 Save the configuration.

Configuring the 802.11ac High-Throughput Parameters (CLI)

Procedure

- Enable or disable 802.11ac support by entering this command:

  config 802.11a 11acSupport {**enable** | **disable**}

- Configure MCS transmit rates by entering this command:

  config 802.11a 11acSupport mcs tx {*rate-8* | *rate-9*} **ss** *spatial-stream-value* {**enable** | **disable**}

Note Enabling MCS data rate with MCS index 9 automatically enables data rate with MCS index 8.