



## OFDMA Support for 11ax Access Points

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## OFDMA support for 802.11ax APs

OFDMA support for 802.11ax (Wi-Fi 6) APs is a set of wireless networking capabilities that

- improves performance in dense deployments using both 2.4 GHz and 5 GHz bands
- enables simultaneous data transmissions with technologies such as Orthogonal Frequency-Division Multiple Access (OFDMA) and MU-MIMO (Multi-User, Multiple-Input, Multiple-Output), and
- supports uplink and downlink multi-user operations across multiple client devices.

Cisco Catalyst 9100 series APs support IEEE 802.11ax and are recommended for high-performance environments.

The OFDMA mechanism ensures all users transmit or receive in synchronized time windows, ending simultaneously. This coordination supports independent data streams on the same radio frequencies for increased efficiency.

## Feature history

*Table 1: Feature history for OFDMA support for 802.11ax APs*

Feature Name	Release Information	Feature Description
OFDMA support for 802.11ax APs	Cisco IOS XE 16.12.1	This feature enhances wireless network efficiency and user experience in high-density environments by enabling simultaneous multi-user transmissions with OFDMA and MU-MIMO across both 2.4 GHz and 5 GHz bands.

## Supported modes on 802.11ax APs

The following AP modes are supported:

- Local mode
- FlexConnect mode
- Bridge mode
- FlexConnect+Mesh mode

## Configure 802.11AX (GUI)

Enable 802.11ax features for 5 GHz and 2.4 GHz frequency bands to optimize high throughput wireless performance.

### Procedure

- 
- Step 1** Choose **Configuration > Radio Configurations > High Throughput**.
- Step 2** Click the **5 GHz Band** tab.
- a) Expand the **11ax** section.
  - b) Check the **Enable 11ax** and **Multiple Bssid** check boxes, if required.
  - c) Check either the **Select All** check box to configure all the data rates or select the desired options from the available data rates list.
- Step 3** Click the **2.4 GHz Band** tab.
- a) Expand the **11ax** section.
  - b) Check the **Enable 11ax** and **Multiple Bssid** check boxes, if required.
  - c) Check either the **Select All** check box to configure all the data rates or select the desired options from the available data rates list.
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## Configure channel width (CLI)

Set the 802.11 radio channel width for wireless performance tuning

### Procedure

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**Step 1** Enter the global configuration mode.

**Example:**

```
Device# configure terminal
```

**Step 2** Configure channel width for 802.11 radios as 160.

**Example:**

```
Device(config)# ap dot11 { 24ghz | 5ghz} rrm channel dca chan-width 160
```

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

**Note**

Cisco Catalyst 9115 and C9120 series APs do not support 80+80 channel width. Cisco Catalyst 9117 series APs do not support OFDMA in 160 channel width.

**Step 3** Configure an RF profile and enters RF profile configuration mode.

**Example:**

```
Device(config)# ap dot11 { 24ghz | 5ghz} rf-profile ax-profile
```

**Step 4** Configure the RF profile DCA channel width.

**Example:**

```
Device(config-rf-profile)# channel chan-width 160
```

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## Configure 802.11ax radio parameters (GUI)

Configure high throughput settings and 802.11ax (Wi-Fi 6) radio parameters for the 2.4 GHz and 5 GHz bands on APs using the GUI.

### Procedure

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**Step 1** Choose **Configuration > Radio Configurations > High Throughput > 5 GHz Band > 11ax**.

**Step 2** Check or uncheck the **Enable 11 n** check box.

**Step 3** Check the check boxes for the desired MCS/(data rate) or to select all of them, check the **Select All** check box. Click **Apply**.

**Step 4** Choose **Configuration > Radio Configurations > High Throughput > 2.4 GHz Band > 11ax**.

- Step 5** Check or uncheck the **Enable 11 n** check box.
  - Step 6** Check the check boxes for the desired MCS/(data rate) or to select all of them, check the **Select All** check box. Click **Apply**.
  - Step 7** Choose **Configuration > Wireless > Access Points**. Click the Access Point.
  - Step 8** In the **Edit AP** dialog box, enable the **LED State** toggle button and select the LED brightness level from the **LED Brightness Level** drop-down list.
  - Step 9** Click **Update & Apply to Device**.
- 

## Configure 802.11ax radio parameters (CLI)

Set up and manage 802.11ax radio parameters on your Cisco device using commands.

### Procedure

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- Step 1** Enter the global configuration mode.  
**Example:**  
`Device# configure terminal`
  - Step 2** Enable the 802.11ax 5 Ghz band radio.  
**Example:**  
`Device(config)# ap dot11 {24ghz | 5ghz} dot11ax`  
Use the **no** form of the command to disable the configuration.
  - Step 3** Enable the 802.11ax 5 Ghz band modulation and coding scheme (MCS) transmission rates.  
**Example:**  
`Device(config)# ap dot11 {24ghz | 5ghz} dot11ax mcs tx index 11 spatial-stream 8`
  - Step 4** (Optional) Configure the led brightness level.  
**Example:**  
`Device(config)# ap led-brightness 6`
- 

## Set up the 802.11ax radio parameters (CLI)

Configure advanced wireless radio settings to optimize performance and coverage on Cisco APs supporting 802.11ax.

## Procedure

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**Step 1** Enter the privileged EXEC mode.

**Example:**

```
Device# enable
```

**Step 2** Configure the led brightness level.

**Example:**

```
Device# ap name ax-ap led-brightness-level 6
```

**Step 3** Configure the 802.11n - 5 GHz antenna selection.

**Example:**

```
Device# ap name ap1 dot11 {24ghz | 5ghz} dot11n antenna A
```

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

**Step 4** Configure 802.11 channel width.

**Example:**

```
Device# ap name ap1 dot11 {24ghz | 5ghz} channel width 160
```

**Step 5** Configure the advanced 802.11 secondary 80Mhz channel assignment parameters.

**Example:**

```
Device# ap name ap1 dot11 {24ghz | 5ghz} secondary-80 12
```

---

## Configure OFDMA on a WLAN (CLI)

Enable OFDMA and related 802.11ax features on a WLAN interface.



**Note** For Cisco Catalyst 9115 and 9120 series APs, the configuration is applied per radio, not per WLAN. The controller keeps this feature enabled if it is enabled on any WLAN.

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## Procedure

---

**Step 1** Enter the global configuration mode.

**Example:**

```
Device# configure terminal
```

**Step 2** Enter the WLAN configuration mode.

**Example:**

```
Device(config)# wlan wlan1
```

**Step 3** Enable the downlink connection that uses the OFDMA technology.

**Example:**

```
Device(config-wlan)# dot11ax downlink-ofdma
```

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

**Step 4** Enable the uplink connection that uses the OFDMA technology.

**Example:**

```
Device(config-wlan)# dot11ax uplink-ofdma
```

**Step 5** Enable the downlink connection that uses the MUMIMO technology.

**Example:**

```
Device(config-wlan)# dot11ax downlink-mumimo
```

**Step 6** Enable the uplink connection that uses the MUMIMO technology.

**Example:**

```
Device(config-wlan)# dot11ax uplink-mumimo
```

**Step 7** Enable the TWT broadcast support operation.

**Example:**

```
Device (config-wlan)# dot11ax twt-broadcast-support
```

## Verify channel width

To verify the channel width and other channel information, use the commands:

```
Device# show ap dot11 5ghz summary
```

AP Name Txpwr	Mac Address	Slot	Admin State	Oper State	Channel	Width
AP80e0.1d75.6954 1 (*)	80e0.1d7a.7620	1	Enabled	Up	(52) *	160

```
Device# show ap dot11 dual-band summary
```

AP Name Mode	Subband	Radio Mac	Status	Channel	Power Level	Slot ID
kartl28021mi REAP	All	002a.1058.38a0	Enabled	(52) *	(1) *	1

```
Device# show ap name <ap-name> channel
```

```
802.11b/g Current Channel           : 11
Slot ID                             : 0
Allowed Channel List                 : 1,2,3,4,5,6,7,8,9,10,11
802.11a Current Channel ..... 52 (160 MHz)
Slot ID                             : 1
Allowed Channel List                 :
36,40,44,48,52,56,60,64,100,104,108,112,116,132,136,140,149,153,157,161,165
```

```

Device# show ap name <ap-name> config slot <slot-num>
.
.
.
Phy OFDM Parameters
Configuration                : Automatic
Current Channel               : 52
Extension Channel             : No Extension
Channel Width                 : 160 MHz
Allowed Channel List         :
36,40,44,48,52,56,60,64,100,104,108,112,116,132,136,140,149,153,157,161,165
TI Threshold                  : 0

Device# show ap dot11 5ghz channel
.
.
.
DCA Sensitivity Level        : MEDIUM : 15 dB
DCA 802.11n/ac Channel Width : 160 MHz
DCA Minimum Energy Limit    : -95 dBm
.
.
.

Device# show ap rf-profile name <name> detail
.
.
.
Unused Channel List         : 165
DCA Bandwidth               : 160 MHz
DCA Foreign AP Contribution : Enabled
.
.
.

```

## Verify client details

To verify the client information, use the commands:

```

Device# show wireless client mac-address <mac-address> detail

Client MAC Address : a886.ddb2.05e9
Client IPv4 Address : 169.254.175.214
Client IPv6 Addresses : fe80::b510:a381:8099:4747
2001:DB8:300:57:4007:6abb:2c9a:61e2
Client Username: N/A
Voice Client Type   : Unknown
AP MAC Address : c025.5c55.e400
AP Name: APe4c7.22b2.948e
Device Type: N/A
Device Version: N/A
AP slot : 0
Client State : Associated
Policy Profile : default-policy-profile
Flex Profile : default-flex-profile
Wireless LAN Id : 1
Wireless LAN Name: SSS_OPEN
BSSID : c025.5c55.e406
Connected For : 23 seconds
Protocol : 802.11ax - 5 GHz
Channel : 8
Client IIF-ID : 0xa0000001
Association Id : 1

```

## Verify radio configuration

```

Authentication Algorithm : Open System
Client CCX version : No CCX support
Session Timeout : 86400 sec (Remaining time: 86378 sec)
.
.
.

```

```
Device# show wireless client summary
```

```
Number of Local Clients: 1
```

MAC Address Role	AP Name	WLAN	State	Protocol Method
a886.ddb2.05e9 Local	APe4c7.22b2.948e	1	Run	11ax(5) None

```
Device# show wireless stats client detail
```

```
Total Number of Clients : 1
```

```
Protocol Statistics
```

Protocol	Client Count
802.11b	0
802.11g	0
802.11a	0
802.11n-2.4 GHz	0
802.11n-5 GHz	0
802.11ac	0
<b>80211ax</b>	<b>1</b>

## Verify radio configuration

To verify the radio configuration information, use the commands:

```
Device# show ap dot11 5ghz network
```

```

802.11a Network                : Enabled
.
.
.
802.11ax                        : Enabled
  DynamicFrag                   : Enabled
  MultiBssid                     : Disabled
802.11ax MCS Settings:
  MCS 7, Spatial Streams = 1    : Disabled
  MCS 9, Spatial Streams = 1    : Disabled
  MCS 11, Spatial Streams = 1   : Disabled
  MCS 7, Spatial Streams = 2    : Supported
  MCS 9, Spatial Streams = 2    : Supported
  MCS 11, Spatial Streams = 2   : Supported
  MCS 7, Spatial Streams = 3    : Supported
  MCS 9, Spatial Streams = 3    : Disabled
  MCS 11, Spatial Streams = 3   : Disabled
  MCS 7, Spatial Streams = 4    : Supported
  MCS 9, Spatial Streams = 4    : Supported
  MCS 11, Spatial Streams = 4   : Supported
  MCS 7, Spatial Streams = 5    : Supported
  MCS 9, Spatial Streams = 5    : Supported
  MCS 11, Spatial Streams = 5   : Supported

```

```

MCS 7, Spatial Streams = 6           : Supported
MCS 9, Spatial Streams = 6           : Supported
MCS 11, Spatial Streams = 6          : Supported
MCS 7, Spatial Streams = 7           : Supported
MCS 9, Spatial Streams = 7           : Supported
MCS 11, Spatial Streams = 7          : Supported
MCS 7, Spatial Streams = 8           : Supported
MCS 9, Spatial Streams = 8           : Supported
MCS 11, Spatial Streams = 8          : Supported
Beacon Interval                       : 100
.
.
.
Maximum Number of Clients per AP Radio : 200

Device# show ap dot11 24ghz network

802.11b Network                        : Enabled
.
.
.
802.11axSupport..... Enabled
    dynamicFrag..... Disabled
    multiBssid..... Disabled
802.11ax                               : Enabled
    DynamicFrag       : Enabled
    MultiBssid        : Enabled
802.11ax MCS Settings:
    MCS 7, Spatial Streams = 1         : Supported
    MCS 9, Spatial Streams = 1         : Supported
    MCS 11, Spatial Streams = 1        : Supported
    MCS 7, Spatial Streams = 2         : Supported
    MCS 9, Spatial Streams = 2         : Supported
    MCS 11, Spatial Streams = 2        : Supported
    MCS 7, Spatial Streams = 3         : Supported
    MCS 9, Spatial Streams = 3         : Supported
    MCS 11, Spatial Streams = 3        : Supported
    MCS 7, Spatial Streams = 4         : Disabled
    MCS 9, Spatial Streams = 4         : Disabled
    MCS 11, Spatial Streams = 4        : Disabled
Beacon Interval                       : 100
.
.
.
Maximum Number of Clients per AP Radio : 200

Device# show wlan ID <wlan-id>

WLAN Profile Name      : ax-wlc
=====
Identifier              : 1
Network Name (SSID)    : ax-wlc
Status                  : Enabled
Broadcast SSID         : Enabled
Universal AP Admin     : Disabled
Max Associated Clients per WLAN : 0
Max Associated Clients per AP per WLAN : 0
Max Associated Clients per AP Radio per WLAN : 200
Number of Active Clients : 0
CHD per WLAN           : Enabled
Multicast Interface    : Unconfigured
.
.
.
802.11ac MU-MIMO       : Disabled

```

```
802.11ax paramters
  OFDMA Downlink           : Enabled
  OFDMA Uplink             : Enabled
  MU-MIMO Downlink        : Enabled
  MU-MIMO Uplink          : Enabled
  BSS Color                : Enabled
  Partial BSS Color       : Enabled
  BSS Color Code          : 0
  BSS Target Wake Up Time : Enabled
```

```
Device# show ap led-brightness-level summary
```

AP Name	LED Brightness level
AP00FC.BA01.CC00	Not Supported
AP70DF.2FA2.72EE	8
AP7069.5A74.6678	2
APb838.6159.e184	Not Supported