Table 6-11 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –K regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 6-11   *Channels and Maximum Conducted Power in the –K Regulatory Domain with up to 6-dBi Antennas*

Maximum Conducted Power Levels (dBm) in the –K Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas

Channel ID	Freq (MHz)	802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
		Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	8	8	11	8	–	–	8	8	11
40	5200	14	OFF	14	8	8	11	8	–	–	8	8	11
44	5220	14	OFF	14	8	8	11	8	–	–	8	8	11
48	5240	14	OFF	14	8	8	11	8	–	–	8	8	11
5250 to 5350 MHz													
52	5260	17	OFF	17	17	17	20	17	–	–	17	17	20
56	5280	17	OFF	17	17	17	20	17	–	–	17	17	20
60	5300	17	OFF	17	17	17	20	17	–	–	17	17	20
64	5320	17	OFF	17	17	17	20	17	–	–	17	17	20
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	17	–	–	17	17	20
104	5520	17	OFF	17	17	17	20	17	–	–	17	17	20
108	5540	17	OFF	17	17	17	20	17	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	17	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	17	–	–	17	17	20
120	5600	17	OFF	17	17	17	20	17	–	–	17	17	20
124	5620	17	OFF	17	17	17	20	17	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

Table 6-12 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –N regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 6-12   Channels and Maximum Conducted Power in the –N Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –N Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas

Channel ID	Freq (MHz)	802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
		Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	11	11	14	11	–	–	11	11	14
40	5200	14	OFF	14	11	11	14	11	–	–	11	11	14
44	5220	14	OFF	14	11	11	14	11	–	–	11	11	14
48	5240	14	OFF	14	11	11	14	11	–	–	11	11	14
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	11	–	–	11	11	14
64	5320	11	OFF	11	14	14	17	11	–	–	11	11	14
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

Table 6-13 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –P regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 6-13   Channels and Maximum Conducted Power in the –P Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –P Regulatory Domain for the 5-GHz Radio with up to 6-dBi Antennas

Channel ID	Freq (MHz)	802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
		Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	14	OFF	14	11	11	14	11	–	–	11	11	14
40	5200	14	OFF	14	11	11	14	11	–	–	11	11	14
44	5220	14	OFF	14	11	11	14	11	–	–	11	11	14
48	5240	14	OFF	14	11	11	14	11	–	–	11	11	14
5250 to 5350 MHz													
52	5260	14	OFF	14	11	11	14	11	–	–	11	11	14
56	5280	14	OFF	14	11	11	14	11	–	–	11	11	14
60	5300	14	OFF	14	11	11	14	11	–	–	11	11	14
64	5320	14	OFF	14	11	11	14	11	–	–	11	11	14
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	–	–	–	–	–	–	–	–	–	–	–	–
153	5765	–	–	–	–	–	–	–	–	–	–	–	–
157	5785	–	–	–	–	–	–	–	–	–	–	–	–
161	5805	–	–	–	–	–	–	–	–	–	–	–	–
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

Table 6-14 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –S regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 6-14   Channels and Maximum Conducted Power in the –S Regulatory Domain with up to 6-dBi Antennas

Maximum Conducted Power Levels (dBm) in the –S Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas

Channel ID	Freq (MHz)	802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
		Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	17	OFF	17	14	14	17	14	–	–	14	14	17
40	5200	17	OFF	17	14	14	17	14	–	–	14	14	17
44	5220	17	OFF	17	14	14	17	14	–	–	14	14	17
48	5240	17	OFF	17	14	14	17	14	–	–	14	14	17
5250 to 5350 MHz													
52	5260	17	OFF	17	14	14	17	14	–	–	14	14	17
56	5280	17	OFF	17	14	14	17	14	–	–	14	14	17
60	5300	17	OFF	17	14	14	17	14	–	–	14	14	17
64	5320	17	OFF	17	14	14	17	14	–	–	14	14	17
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

Table 6-7 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the –T regulatory domain for a 5-GHz radio with up to 6-dBi antennas.

Table 6-15   ***Channels and Maximum Conducted Power in the –T Regulatory Domain with up to 6-dBi Antennas***

Maximum Conducted Power Levels (dBm) in the –T Regulatory Domain for a 5-GHz Radio with up to 6-dBi Antennas

Channel ID	Freq (MHz)	802.11a Single Antenna 6 to 54 Mbps			HT-20 MHz Dual Antennas M0 to M15[1]			Duplicate (2x20 MHz) Dual Antennas 6 Mbps			HT-40 MHz Dual Antennas M0 to M15[1]		
		Tx A	Tx B	Total Power	Tx A	Tx B	Total Power	Tx A	–	–	Tx A	Tx B	Total Power
UNII-1 (5150-5250 MHz)													
36	5180	–	–	–	–	–	–	–	–	–	–	–	–
40	5200	–	–	–	–	–	–	–	–	–	–	–	–
44	5220	–	–	–	–	–	–	–	–	–	–	–	–
48	5240	–	–	–	–	–	–	–	–	–	–	–	–
5250 to 5350 MHz													
52	5260	–	–	–	–	–	–	–	–	–	–	–	–
56	5280	14	OFF	14	11	11	14	–	–	–	–	–	–
60	5300	14	OFF	14	11	11	14	8	–	–	11	11	14
64	5320	14	OFF	14	11	11	14	8	–	–	11	11	14
5470 to 5725 MHz													
100	5500	17	OFF	17	17	17	20	14	–	–	17	17	20
104	5520	17	OFF	17	17	17	20	14	–	–	17	17	20
108	5540	17	OFF	17	17	17	20	14	–	–	17	17	20
112	5560	17	OFF	17	17	17	20	14	–	–	17	17	20
116	5580	17	OFF	17	17	17	20	14	–	–	17	17	20
120	5600	17	OFF	17	17	17	20	14	–	–	17	17	20
124	5620	17	OFF	17	17	17	20	14	–	–	17	17	20
128	5640	17	OFF	17	17	17	20	14	–	–	17	17	20
132	5660	17	OFF	17	17	17	20	14	–	–	17	17	20
136	5680	17	OFF	17	17	17	20	14	–	–	17	17	20
140	5700	17	OFF	17	17	17	20	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	17	OFF	17	17	17	20	17	–	–	17	17	20
153	5765	17	OFF	17	17	17	20	17	–	–	17	17	20
157	5785	17	OFF	17	17	17	20	17	–	–	17	17	20
161	5805	17	OFF	17	17	17	20	17	–	–	17	17	20
165	5825	17	OFF	17	17	17	20	–	–	–	–	–	–

1. M0 to M15 corresponds to the Modulaton and Coding Schemes (MCS0 to MCS15). The MCS settings determine the number of spatial streams, the modulation, the coding rate, and the data rate values.

Special Country Restrictions

Table 6-16 lists special restrictions for wireless operation in some countries.

Table 6-16   Special Country Restrictions for Wireless Operation

Country	Frequency Bands (GHz)	Regulatory Domain	Special Limitation and Restrictions
South Korea	2.4 and 5	–E and –K	Maximum antenna gain limited to 6 dBi.
Mexico	2.4	–A	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP.
Russian Federation	5	–E	End user must limit 5 GHz operation to 5150 to 5350 and 5650 to 5725 MHz.
United States	5	–A	Indoor use only from 5150-5250 MHz.

Changing Lightweight Access Point Output Power

This section provides instructions for changing the 1250 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Special Country Restrictions" section on page 6-17). Follow these instructions to change the output power settings using a controller and your browser:

Note Administrator privileges may be required in order to change access point settings.

Caution To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the access points can be changed only using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

> ✎
>
> **Note** The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a/n Radios** or **802.11b/g/n Radios** and a list of associated access points appears.

Step 5 Choose the desired access point and click **Configure**. The radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7 In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 8), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Table 17 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz) operation in EMEA (–E) regulatory domain:
  - Channel 2 using 11-Mbps data rates with 6-dBi external antenna
- 5 GHz (802.11a) operation:
  - Channel 52 with 6-dBi external antenna

Table 17   Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g/n (dBm)	802.11a/n (dBm)
1 (maximum)	17[2]	17[2]
2	14	14
3	11	11
4	8	8
5	5	5
6	2	2
7	-1	-1
8	–	–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents approximately a 3-dBm reduction in transmit power from the previous power level.

2. The maximum output power levels obtained from Table 6-1 and Table 6-2.

- For 802.11b/g/n (see Table 6-3 and Table 17), the manual controller Tx Power Level setting is 2.
- For 802.11a/n (see Table 6-4 and Table 17), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

Step 9   Close your Internet browser.

Changing Lightweight Access Point Output Power

C H A P T E R 7

Cisco Aironet 1300 Series Access Points

This chapter lists the lightweight access point (model: AIR-LAP1310G) IEEE 802.11b/g 2.4-GHz channels, maximum power levels, and antenna gains supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1300 Series Outdoor Access Point/Bridge Hardware Installation Guide*.

The following topics are covered in this chapter:

Channels

IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11b/g 22-MHz-wide channel are shown in Table 7-1.

Table 7-1   Channels for IEEE 802.11b/g

Channel Identifier	Center Frequency (MHz)	Regulatory Domains					
		Americas (–A)		EMEA (–E)		Japan (–J)	
		CCK	OFDM	CCK	OFDM	CCK	OFDM
1	2412	X	X	X	X	X	X
2	2417	X	X	X	X	X	X
3	2422	X	X	X	X	X	X
4	2427	X	X	X	X	X	X
5	2432	X	X	X	X	X	X
6	2437	X	X	X	X	X	X
7	2442	X	X	X	X	X	X
8	2447	X	X	X	X	X	X
9	2452	X	X	X	X	X	X
10	2457	X	X	X	X	X	X
11	2462	X	X	X	X	X	X
12	2467	–	–	X	X	X	X
13	2472	–	–	X	X	X	X
14	2484	–	–	–	–	–	–

Note Mexico is included in the Americas (–A) regulatory domain; however, channels 1 through 8 are for indoor use only while channels 9 through 11 can be used indoors and outdoors. Users are responsible for ensuring that the channel set configuration is in compliance with the regulatory standards of Mexico.

Maximum Power Levels and Antenna Gains

IEEE 802.11b/g (2.4-GHz Band)

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 7-2 indicates the IEEE 802.11b/g maximum power levels and antenna gains allowed for each regulatory domain.

> **Note**   To meet regulatory restrictions, the external antenna access point/bridge and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

Table 7-2   Maximum Power Levels Per Antenna Gain for IEEE 802.11b/g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK	OFDM
Americas (–A) (4 W EIRP maximum)	2.2 (Omni)	100	30
	5.2 (Omni)	100	30
	9 (Patch)	100	30
	10 (Yagi)	100	30
EMEA (–E) (100 mW EIRP maximum)	2.2 (Omni)	50	30
	5.2 (Omni)	20	20
	9 (Patch)	10	10
	10 (Yagi)	10	10
Japan (-J) (10 mW/MHz EIRP maximum)	2.2 (Omni)	10	10
	5.2 (Omni)	10	10
	9 (Patch)	10	10
	10 (Yagi)	10	10

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1300 series lightweight access point output power to comply with the maximum power limits imposed by regulatory domains (see the "Maximum Power Levels and Antenna Gains" section on page 7-3). Follow these instructions to change the output power settings using your browser:

Note   Administrator privileges may be required in order to change access point settings.

Note   Regulatory domains are set at the factory and cannot be changed by the user.

The output power on the AIR-LAP1310G-x-K9 (where *x* is the regulatory domain) access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

Note   See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to configure your access point using the web-browser interface.

Follow these steps to change the AIR-LAP1310G-x-K9 (where *x* is the regulatory domain) access point's output power to meet local regulations using a controller:

Step 1   Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2   Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3   Enter the username and password and press **Enter**. The controller's summary page appears.

Note   The username and password are case-sensitive.

Step 4   Click **Wireless** > **802.11b/g Radio** and a list of associated access points appears.

Step 5   Choose the desired access point from the displayed list and click **Configure**. The radio settings page appears.

Step 6   Scroll down to the Tx Power Level Assignment field, and click **Custom**. Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7   In the Tx Power Level field, select the appropriate power level setting (1 to 8).

Based on the configured antenna gain, the configured channel, and the configured power level, the actual transmit power at the access point can be reduced so that the specific country regulations are not exceeded.

Table 7-3 lists the controller power settings and the corresponding output power levels for this example:

- 2.4-GHz (802.11b/g) operation:
  - EMEA (–E) regulatory domain and channel 2
  - 5.2-dBi external antenna

Table 7-3   Available Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b (mW)	802.11g (mW)
1 (maximum)[2]	50	30
2	25	15
3	12	8
4	6	4
5	3	2
6	2	1
7	-1	–
8		–

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.

2. See Table 7-2 for the maximum power levels in the –E regulatory domain.

- The manual controller Tx Power Level setting is 3 for 802.11b (CCK) data rates (see Table 7-2).
- The manual controller Tx Power Level setting is 2 for only 802.11g (OFDM) data rates (see Table 7-2).

Step 8   Click **Apply**.

Step 9   Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

Power Conversion Table

You can use Table 7-4 to convert power values from dBm to mW or from mW to dBm.

Table 7-4   *Power Conversion Table*

mW	dBm	mW	dBm	mW	dBm
200	23	40	16	8	9
150	22	30	15	6	8
125	21	25	14	5	7
100	20	20	13	4	6
80	19	15	12	3	5
60	18	12	11	2	2
50	17	10	10	1	–1

<Ch a p t e r> **8**

Cisco Aironet 1500 Series Mesh Access Points

This chapter lists the 1500 series mesh access point IEEE 802.11b/g (2.4-GHz) and IEEE 802.11a (5-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1500 Series Outdoor Mesh Access Point Hardware Installation Guide.*

The AIR-LAP1510 access point model supports both 802.11b/g and 802.11a radios. The AIR-LAP1505 access point model only supports a 802.11b/g radio.

The following topics are covered in this chapter:

■ Channels and Maximum Power Levels

Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the access points support the channels and maximum power levels listed in Table 8-1 for their regulatory domain.

> **Note** In Table 8-1, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

> **Note** The AIR-LAP1505 access point model only supports the –A, –E, and –P regulatory domains.

Table 8-1   Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8-dBi Antennas

| Channel ID | Center Freq (MHz) | Maximum Conducted Power Levels (dBm) in the Regulatory Domains | | | | | | | | | | | | | | |
| | | –A | | | | –C | –E | –K | –N | | | | –S | | | | –P |
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	All	All	All	CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54	All
1	2412	23	19.5	19.5	19.5	14	14	14	23	19.5	19.5	19.5	17	17	16	15	14
2	2417	23.5	21.5	21.5	21	14	14	14	23.5	21.5	21.5	21	17	17	16	15	14
3	2422	24	23	22	21	14	14	14	24	23	22	21	17	17	16	15	14
4	2427	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
5	2432	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
6	2437	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
7	2442	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
8	2447	24	24	22	21	14	14	14	24	24	22	21	17	17	16	15	14
9	2452	24	22.5	22	21	14	14	14	24	22.5	22	21	17	17	16	15	14
10	2457	23.5	21.5	21.5	21	14	14	14	23.5	21.5	21.5	21	17	17	16	15	14
11	2462	23	19.5	19.5	19.5	14	14	14	23	19.5	19.5	19.5	17	17	16	15	14
12	2467	–	–	–	–	14	14	14	–	–	–		17	17	16	15	14
13	2472	–	–	–	–	14	14	14	–	–	–		17	17	16	15	14
14	2484	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	14

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the access points support the channels and maximum power levels listed in Table 8-2 and Table 8-3 for their regulatory domain.

✎ **Note**   In Table 8-2 and Table 8-3, the operating data rates (in Mbps) are shown in the OFDM table cells. For example: *OFDM 6-24* indicates 6 to 24 Mbps data rates and *OFDM All* indicates 6 to 54 Mbps data rates.

Table 8-2   Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains												
		−A				−C				−E				−K
		OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM All
(4900 to 5100 MHz)														
–	4920	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4940	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4950	20	20	18	17	–	–	–	–	–	–	–	–	–
–	4960	–	–	–	–	–	–	–	–	–	–	–	–	–
–	4980	20	20	18	17	–	–	–	–	–	–	–	–	–
–	5040	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5060	–	–	–	–	–	–	–	–	–	–	–	–	–
–	5080	–	–	–	–	–	–	–	–	–	–	–	–	–
5470 to 5725 MHz														
100	5500	–	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]	17[1]
104	5520	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
108	5540	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
112	5560	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
116	5580	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
120	5600	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
124	5620	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	17[1]
128	5640	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
132	5660	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
136	5680	–	–	–	–	–	–	–	–	21[1]	21[1]	21[1]	20[1]	–
140	5700	–	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]	–
5725 to 5850 MHz														
149	5745	26	24	23	20	23	23	23	20	–	–	–	–	–
153	5765	26	24	23	20	23	23	23	20	–	–	–	–	–
157	5785	26	24	23	20	23	23	23	20	–	–	–	–	–
161	5805	26	24	23	20	23	23	23	20	–	–	–	–	–
165	5825	26	24	23	20	–	–	–	–	–	–	–	–	–

1. Requires dynamic frequency selection (DFS) and transmit power control (TPC).

Table 8-3   *Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas*

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains											
		−N				−P				−S			
		OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54	OFDM 6-24	OFDM 36	OFDM 48	OFDM 54
(4900 to 5100 MHz)													
–	4920	–	–	–	–	17	17	17	17	–	–	–	–
–	4940	–	–	–	–	20	20	18	17	–	–	–	–
–	4950	–	–	–	–	–	–	–	–	–	–	–	–
–	4960	–	–	–	–	20	20	18	17	–	–	–	–
–	4980	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
–	5040	–	–	–	–	20[2]	20[1]	18[1]	17[1]	–	–	–	–
–	5060	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
–	5080	–	–	–	–	20[1]	20[1]	18[1]	17[1]	–	–	–	–
5470 to 5725 MHz													
100	5500	–	–	–	–	–	–	–	–	–	–	–	–
104	5520	–	–	–	–	–	–	–	–	–	–	–	–
108	5540	–	–	–	–	–	–	–	–	–	–	–	–
112	5560	–	–	–	–	–	–	–	–	–	–	–	–
116	5580	–	–	–	–	–	–	–	–	–	–	–	–
120	5600	–	–	–	–	–	–	–	–	–	–	–	–
124	5620	–	–	–	–	–	–	–	–	–	–	–	–
128	5640	–	–	–	–	–	–	–	–	–	–	–	–
132	5660	–	–	–	–	–	–	–	–	–	–	–	–
136	5680	–	–	–	–	–	–	–	–	–	–	–	–
140	5700	–	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz													
149	5745	26	24	23	20	–	–	–	–	20	20	20	20
153	5765	26	24	23	20	–	–	–	–	20	20	20	20
157	5785	26	24	23	20	–	–	–	–	20	20	20	20
161	5805	26	24	23	20	–	–	–	–	20	20	20	20
165	5825	–	–	–	–	–	–	–	–	–	–	–	–

1. Limited license until 11/2007.

2. Limited license until 11/2007.

Antenna Settings

Maximum Power Levels Allowed in Some Regulatory Domains

An improper combination of power level and antenna gain can result in equivalent isotropic radiated power (EIRP) above the amount allowed per regulatory domain. Table 8-4 indicates the maximum power levels allowed with an 8 dBi external antenna in the –A and –N regulatory domains.

⚠️

Caution   To avoid exceeding maximum conducted power levels in the –A , –N, and –E regulatory domains when using an 8 dBi antennas, you must manually set the access point output power level to not exceed the value shown in Table 8-4 and Table 8-5.

✎

Note   In Table 8-4 and Table 8-5, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *OFDM 9-24* indicates 9 to 24Mbps data rates and *All OFDM* indicates 6 to 54 Mbps data rates.

Table 8-4   *Maximum Power Levels for the 802.11b/g Radio with 8-dBi Antenna (for –A and –N Regulatory Domains)*

Channel ID	Center Frequency (MHz)	Maximum Conducted Average Power Levels in dBm			
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54
1	2412	23	19.5	19.5	19.5
2	2417	23.5	21.5	21.5	21
3	2422	24	23	22	21
4	2427	24	24	22	21
5	2432	24	24	22	21
6	2437	24	24	22	21
7	2442	24	24	22	21
8	2447	24	24	22	21
9	2452	24	22.5	22	21
10	2457	23.5	21.5	21.5	21
11	2462	23	19.5	19.5	19.5
12	2467	–	–	–	–
13	2472	–	–	–	–
14	2484	–	–	–	–

Table 8-5   *Maximum Power Levels for the 802.11b/g Radio with 8-dBi Antenna (for –E Regulatory Domain)*

Channel ID	Center Frequency (MHz)	Maximum Conducted Average Power Levels in dBm			
		CCK 1-11	OFDM 6-36	OFDM 48	OFDM 54
1	2412	12	12	12	12
2	2417	12	12	12	12
3	2422	12	12	12	12
4	2427	12	12	12	12
5	2432	12	12	12	12
6	2437	12	12	12	12
7	2442	12	12	12	12
8	2447	12	12	12	12
9	2452	12	12	12	12
10	2457	12	12	12	12
11	2462	12	12	12	12
12	2467	12	12	12	12
13	2472	12	12	12	12
14	2484	12	12	12	12

Special Country Restrictions

Table 8-6 lists special restrictions for wireless operation in some countries.

Table 8-6   *Special Country Restrictions for Wireless Operation*

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia	5	–N	5 GHz maximum antenna gain limited to 7 dBi.
China	5	–C	5 GHz maximum antenna gain limited to 9.5 dBi.
EU countries	5	–E	5 GHz maximum antenna gain limited to 7 dBi.
Japan	4.9 and 5	–P	License required for operation in the 4.9 and 5 GHz bands.
South Korea	5	–K	5 GHz maximum antenna gain limited to 7 dBi.
	2.4	–E[1]	2.4 GHz maximum antenna gain limited to 6 dBi.
Mexico	2.4	–N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[2].
New Zealand	5	–N	5 GHz maximum antenna gain limited to 7 dBi.
Russian Federation	5	–E	End user must limit 5 GHz operation to 5650 to 5725 MHz.
Singapore	2.4	–S	• Wireless operation is intended for use in confined areas of buildings and localized on-site areas. An IDA license is required for operation over public areas. • Wireless operation is limited to a maximum of 23 dBm EIRP[1].
	5	–S	• Wireless operation is intended for use in confined areas of buildings and localized on-site areas. An IDA license is required for operation over public areas. • 5 GHz maximum antenna gain limited to 9.5 dBi. • An IDA license is required for operation from 30 dBm to 36 dBm EIRP.
United States	4.9	–A	The use of the 4.9-GHz band requires a license and may be used only by qualified Public Safety operators as defined in section 90.20 of the FCC rules.
	2.4	–A and –N	2.4 GHz maximum antenna gain limited to 8 dBi.

1. The LAP1505 access point.

2. EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1500 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Antenna Settings" section on page 8-5). Follow these instructions to change the output power settings using a controller and your browser:

> **Note** Administrator privileges may be required in order to change access point settings.

> **Note** Regulatory domains are set at the factory and cannot be changed by the user.

> **Caution** To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the 1500 series access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

> **Note** See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the 1500 series access point's output power to meet local regulations using a controller:

Step 1 Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2 Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3 Enter the username and password and press **Enter**. The controller's summary page appears.

> **Note** The username and password are case-sensitive.

Step 4 Click **Wireless** > **802.11a Radios** or **802.11b/g Radios** and a list of associated access points appears.

Step 5 Choose the desired access point from the displayed list and click **Configure**. The the radio settings page appears.

Step 6 Scroll down to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7   In the Tx Power Level field, select the appropriate power level setting (1 to 5).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 5), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

> **Note**   The access point supports only two output power levels for the 2.4-GHz radio and three output power levels for the 5-GHz radio.

> **Note**   Table 8-1 and Table 8-2 list the access point maximum output power levels supported for each regulatory domain when the access point is shipped from the factory.

Table 8-7 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4-GHz (802.11b/g) operation:
    - American regulatory domain
    - Channel 3 using 11-Mbps data rates
- 5-GHz (802.11a) operation:
    - American regulatory domain
    - Channel 149 using 36-Mbps data rates

Table 8-7   Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	24[2]	24[3]
2	21	21

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.

2. The maximum output power level obtained from Table 8-1.

3. The maximum output power level obtained from Table 8-2.

Step 8   Click **Apply**.

Step 9   Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.

Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points

C H A P T E R 9

Cisco Aironet 1520 Series Mesh Access Points

This chapter lists the 1520 series mesh access point IEEE 802.11b/g (2.4-GHz) and IEEE 802.11a (5-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1520 Series Outdoor Mesh Access Point Hardware Installation Guide.*

The AIR-LAP1522 access point model supports both 802.11b/g and 802.11a radios. The AIR-LAP1521 access point model only supports a 802.11b/g radio.

The following topics are covered in this chapter:

Channels and Maximum Power Levels

AIR-LAP1521G

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1521G single radio access points support the channels and maximum power levels listed in Table 9-1 for their regulatory domains with up to 5.5 dBi antennas.

Note   In Table 9-1 and Table 9-2, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

Table 9-1   *Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 5.5-dBi Antennas*

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		−A			−E	−P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	25	25	14	14	16
2	2417	28	26	26	14	14	16
3	2422	28	27	27	14	14	16
4	2427	28	27	27	14	14	16
5	2432	28	27	27	14	14	16
6	2437	28	27	27	14	14	16
7	2442	28	27	27	14	14	16
8	2447	28	27	27	14	14	16
9	2452	28	26	26	14	14	16
10	2457	28	26	26	14	14	16
11	2462	28	25	25	14	14	16
12	2467	–	–	–	14	14	16
13	2472	–	–	–	14	14	16
14	2484	–	–	–		14	

Table 9-2 indicates the the AIR-LAP1521G single radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 2.4-GHz radio with up to 8-dBi antennas.

Table 9-2   Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		–A			–E	–P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	24	24	12	14	16
2	2417	28	25	25	12	14	16
3	2422	28	26	26	12	14	16
4	2427	28	27	27	12	14	16
5	2432	28	27	27	12	14	16
6	2437	28	27	27	12	14	16
7	2442	28	27	27	12	14	16
8	2447	28	27	26	12	14	16
9	2452	28	26	26	12	14	16
10	2457	28	25	25	12	14	16
11	2462	28	24	24	12	14	16
12	2467	–	–	–	12	14	16
13	2472	–	–	–	12	14	16
14	2484	–	–	–		14	

AIR-LAP1522AG

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the AIR-LAP1522AG dual radio access points support the channels and maximum power levels listed in Table 9-1 for the regulatory domains using the 2.4-GHz radio with up to 5.5 dBi antennas.

Note   In Table 9-1 and Table 9-2, the operating data rates (in Mbps) are shown in the CCK and OFDM table cells. For example: *CCK 1-11* indicates CCK data rates of 1 to 11 Mbps and *All* indicates all CCK and OFDM data rates.

Table 9-3   Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 5.5-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains					
		−A			−E	−P	
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	25	25	14	14	16
2	2417	28	26	26	14	14	16
3	2422	28	27	27	14	14	16
4	2427	28	27	27	14	14	16
5	2432	28	27	27	14	14	16
6	2437	28	27	27	14	14	16
7	2442	28	27	27	14	14	16
8	2447	28	27	27	14	14	16
9	2452	28	26	26	14	14	16
10	2457	28	26	26	14	14	16
11	2462	28	25	25	14	14	16
12	2467	–	–	–	14	14	16
13	2472	–	–	–	14	14	16
14	2484	–	–	–		14	

Table 9-2 indicates the the AIR-LAP1522AG dual radio access point channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for the 2.4-GHz radio with up to 8-dBi antennas.

Table 9-4   Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 8.0-dBi Antennas

| Channel ID | Center Frequency (MHz) | Maximum Conducted Power Levels (dBm) in the Regulatory Domains | | | | | |
| | | –A | | | –E | –P | |
		CCK 1-11	OFDM 6-48	OFDM 54	All	CCK 1-11	OFDM 6-54
1	2412	28	24	24	12	14	16
2	2417	28	25	25	12	14	16
3	2422	28	26	26	12	14	16
4	2427	28	27	27	12	14	16
5	2432	28	27	27	12	14	16
6	2437	28	27	27	12	14	16
7	2442	28	27	27	12	14	16
8	2447	28	27	26	12	14	16
9	2452	28	26	26	12	14	16
10	2457	28	25	25	12	14	16
11	2462	28	24	24	12	14	16
12	2467	–	–	–	12	14	16
13	2472	–	–	–	12	14	16
14	2484	–	–	–		14	

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the AIR-LAP1522AG access points support the channels and maximum power levels listed in Table 9-5 for their regulatory domains with up to 8 dBi antennas.

Note   In Table 9-5, Table 9-6, and Table 9-7, the operating data rates (in Mbps) are shown in the OFDM table cells. For example: *OFDM 6-36* indicates 6 to 36 Mbps data rates.

Table 9-5   Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 8 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																
			−A				−C	−E	−K	−N				−P	−S	−T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																			
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 9-5　　*Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 8 dBi Antennas (continued)*

Channel ID	Center Freq (MHz)	Band-width (MHz)	-A				-C	-E	-K	-N				-P	-S	-T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(5250 to 5350)																			
52	5260	20	–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
56	5280		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
60	5300		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
64	5320		19[1]	19[1]	19[1]	19[1]	–	–	19[1]	–	–	–	–	–	–	–	–	–	–
(5470 fto 5350)																			
100	5500	20	19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
104	5520		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
108	5540		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
112	5560		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
116	5580		19[1]	19[1]	19[1]	19[1]	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
120	5600		–	–	–	–	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
124	5620		–	–	–	–	–	22[1]	19[1]	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
128	5640		–	–	–	–	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
132	5660		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
136	5680		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
140	5700		19[1]	19[1]	19[1]	19[1]	–	22[1]	–	–	–	–	–	–	–	19[1]	19[1]	19[1]	19[1]
5725 to 5850 MHz																			
149	5745	20	28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
153	5765		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
157	5785		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
161	5805		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24
165	5825		28	27	25	24	22	–	–	28	27	25	24	–	22	28	27	25	24

1. Requires dynamic frequency selection (DFS) and transmit power control (TPC).

Table 9-6 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for a 5-GHz radio with up to 14-dBi antennas.

Table 9-6   Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 14 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																
			−A				−C	−E	−K	−N				−P	−S	−T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																			
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	17	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
16	5080		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 9-6   *Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 14 dBi Antennas (continued)*

Channel ID	Center Freq (MHz)	Band-width (MHz)	−A OFDM 6-18	−A OFDM 24-36	−A OFDM 48	−A OFDM 54	−C All	−E All	−K All	−N OFDM 6-18	−N OFDM 24-36	−N OFDM 48	−N OFDM 54	−P All	−S All	−T OFDM 6-18	−T OFDM 24-36	−T OFDM 48	−T OFDM 54
									Maximum Conducted Power Levels (dBm) in the Regulatory Domains									
(5250 to 5350)																			
52	5260	20	–	–	–	–	–	–		–		–	–	–	–	–	–	–	–
56	5280		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
60	5300		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
64	5320		13[1]	13[1]	13[1]	13[1]	–	–	–	–		–	–	–	–	–	–	–	–
(5470 fto 5350)																			
100	5500	20	13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
104	5520		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
108	5540		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
112	5560		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
116	5580		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
120	5600		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
124	5620		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
128	5640		–	–	–	–	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
132	5660		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
136	5680		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
140	5700		13[1]	13[1]	13[1]	13[1]	–	16[1]	–	–		–	–	–	–	13[1]	13[1]	13[1]	13[1]
5725 to 5850 MHz																			
149	5745	20	28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
153	5765		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
157	5785		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
161	5805		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
165	5825		28	27	25	24	–	–	–	28	27	25	24	–	–	28	27	25	24

1.   Requires DFS and TPC.

Table 9-7 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains for a 5-GHz radio with up to 17-dBi antennas.

Table 9-7   Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas

Channel ID	Center Freq (MHz)	Band-width (MHz)	−A OFDM 6-18	−A OFDM 24-36	−A OFDM 48	−A OFDM 54	−C All	−E All	−K All	−N OFDM 6-18	−N OFDM 24-36	−N OFDM 48	−N OFDM 54	−P All	−S All	−T OFDM 6-18	−T OFDM 24-36	−T OFDM 48	−T OFDM 54
									(4900 to 5100 MHz)										
1	4942.5	5	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
20	4950		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
23	4965		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		20	20	20	20	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		20	20	20	20	–	–	–	–	–	–	–	20	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	20	–	–	–	–	–
–	–		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 9-7   *Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 17 dBi Antennas (continued)*

Channel ID	Center Freq (MHz)	Band-width (MHz)	−A OFDM 6-18	−A OFDM 24-36	−A OFDM 48	−A OFDM 54	−C All	−E All	−K All	−N OFDM 6-18	−N OFDM 24-36	−N OFDM 48	−N OFDM 54	−P All	−S All	−T OFDM 6-18	−T OFDM 24-36	−T OFDM 48	−T OFDM 54
over Maximum Conducted Power Levels (dBm) in the Regulatory Domains																		
(5250 to 5350)																		
52	5260	20	–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
56	5280		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
60	5300		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
64	5320		–	–	–	–	–	–		–	–	–	–	–	–	–	–	–	–
(5470 fto 5350)																		
100	5500	20	–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
104	5520		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
108	5540		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
112	5560		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
116	5580		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
120	5600		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
124	5620		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
128	5640		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
132	5660		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
136	5680		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
140	5700		–	–	–	–	–	10[1]	–	–	–	–	–	–	–	–	–	–	–
5725 to 5850 MHz																		
149	5745	20	28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
153	5765		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
157	5785		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
161	5805		28	27	25	24	–	–	20	28	27	25	24	–	–	28	27	25	24
165	5825		28	27	25	24	–	–	–	28	27	25	24	–	–	28	27	25	24

1.   Requires DFS and TPC.

Minimum 5-GHz Radio Power Levels

Table 9-8 lists the minimum power levels supported by the 5-GHz radio for the various channels and regulatory domains.

Note When the minimum radio power level is reached with a controller power setting (1 to 5), changing the controller power setting to a lower value does not result in a lower radio output power level. For example, if the minimum radio power level corresponds to controller level 3, then levels 4 and 5 also correspond to the same power level.

Table 9-8   5-GHz Radio Minimum Power Levels

Channel ID	Center Freq (MHz)	Band-width (MHz)	Minimum Radio Power Levels (dBm) in the Regulatory Domains															
			−A				−C	−E	−K	−N				−P	−S	−T			
			OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54	All	All	OFDM 6-18	OFDM 24-36	OFDM 48	OFDM 54
(4900 to 5100 MHz)																			
1	4942.5	5	8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
2	4947.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
3	4952.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
4	4957.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
5	4962.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
6	4967.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
7	4972.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
8	4977.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
9	4982.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
10	4987.5		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
11	4945	10	8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
12	5950		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
13	4955		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
14	4960		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
15	4965		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
16	4970		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
17	5975		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
18	4980		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
19	4985		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
184	4920	20	–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
188	4940		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
20	4950		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
21	4955		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
22/192	4960		8	8	8	8	–	–	–	–	–	–	–	8	–	–	–	–	–
23	4965		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
24	4970		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
25	5975		8	8	8	8	–	–	–	–	–	–	–	–	–	–	–	–	–
26/196	4980		8	8	8	8	–	–	–	–	–	–	–	8	–	–	–	–	–
8	5040		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
12	5060		–	–	–	–	–	–	–	–	–	–	–	8	–	–	–	–	–
16	5080		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Table 9-8   *5-GHz Radio Minimum Power Levels (continued)*

Channel ID	Center Freq (MHz)	Band-width (MHz)	−A OFDM 6-18	−A OFDM 24-36	−A OFDM 48	−A OFDM 54	−C All	−E All	−K All	−N OFDM 6-18	−N OFDM 24-36	−N OFDM 48	−N OFDM 54	−P All	−S All	−T OFDM 6-18	−T OFDM 24-36	−T OFDM 48	−T OFDM 54
(5250 to 5350)																			
52	5260	20	–	–	–	–	–	–	–	–		–	–	–	–	–	–	–	–
56	5280		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
60	5300		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
64	5320		10	10	10	10	–	–	10	–		–	–	–	–	–	–	–	–
(5470 fto 5350)																			
100	5500	20	10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
104	5520		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
108	5540		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
112	5560		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
116	5580		10	10	10	10	–	10	10	–		–	–	–	–	10	10	10	10
120	5600		–	–	–	–	–	10	10	–		–	–	–	–	10	10	10	10
124	5620		–	–	–	–	–	10	10	–		–	–	–	–	10	10	10	10
128	5640		–	–	–	–	–	10	–	–		–	–	–	–	10	10	10	10
132	5660		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
136	5680		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
140	5700		10	10	10	10	–	10	–	–		–	–	–	–	10	10	10	10
5725 to 5850 MHz																			
149	5745	20	16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
153	5765		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
157	5785		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
161	5805		16	16	16	16	16	–	17	16	16	16	16	–	16	16	16	16	16
165	5825		16	16	16	16	16	–	–	16	16	16	16	–	16	16	16	16	16

Special Country Restrictions

Table 9-9 lists special restrictions for wireless operation in some countries.

Table 9-9   *Special Country Restrictions for Wireless Operation*

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia	5	−N	5 GHz maximum antenna gain limited to 8 dBi.
Mexico	2.4	−N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP[1].
New Zealand	5	−N	5 GHz maximum antenna gain limited to 8 dBi.
United States	4.9	−A	The use of the 4.9-GHz band requires a license and may be used only by qualified public safety operators as defined in section 90.20 of the FCC rules.

1.   EIRP (dBm) = maximum output power (dBm) + antenna gain (dBi)

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1520 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the "Minimum 5-GHz Radio Power Levels" section on page 9-12). Follow these instructions to change the output power settings using a controller and your browser:

> **Note**   Administrator privileges may be required in order to change access point settings.

> **Caution**   To meet regulatory restrictions, the access point and the external antenna must be professionally installed. The network administration or other IT professional responsible for installing and configuring the unit is a suitable professional installer. Following installation, access to the unit should be password-protected by the network administrator to maintain regulatory compliance.

The output power on the 1520 series access points can be changed only by using a Cisco wireless LAN controller (2600 series or 4400 series), the controllers on a Cisco Wireless Services Module (WiSM), or using Cisco Wireless Control System (WCS).

> **Note**   See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to to configure your access point using the web-browser interface.

Follow these steps to change the 1520 series access point's output power to meet local regulations using a controller:

Step 1   Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or a later release.

Step 2   Enter **https://IP address** (where *IP address* is the controller's IP address) in the browser address line and press **Enter**. A user login screen appears.

Step 3   Enter the username and password and press **Enter**. The controller's summary page appears.

> **Note**   The username and password are case-sensitive.

Step 4   Click **Wireless** and choose **802.11a/n** or **802.11b/g/n** under Access Points / Radios . A list of associated access points appears.

Step 5   Choose the desired access point from the displayed list and click **Configure** from the drop down arrow. The the radio configuration page appears.

Step 6   Scroll to the Tx Power Level Assignment field, and click **Custom**.

Custom indicates that the radio output power is manually controlled by the Tx Power Configuration setting field.

Step 7   In the Tx Power Level field, select the appropriate power level setting (1 to 5).

Based on the operating channel, the regulatory domain, and the controller power level setting (1 to 5), the actual transmit power at the access point can be reduced to comply with special regulatory or country restrictions.

Note   Table 9-1 and Table 9-5 list the access point maximum output power levels supported for each regulatory domain when the access point is shipped from the factory.

Table 9-10 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4-GHz (802.11b/g) operation:
  - The –E regulatory domain.
  - Channel 3 using 11-Mbps data rates
  - 8 dBi antennas
- 5-GHz (802.11a) operation:
  - The –A regulatory domain
  - Channel 149 using 48-Mbps data rates
  - 17 dBi antennas

Table 9-10   Example of Output Power Levels

Controller Tx Power Settings[1]	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	14[2]	25[3]
2	11	22
3	8	19
4	5	16
5	2	16[4]

1. The Tx Power Level setting of 1 represents the maximum conducted power setting for the access point. Each subsequent controller power level (such as 2, 3, 4, etc.) represents an approximate 3-dBm reduction in transmit power from the previous power level.
2. The maximum output power level obtained from Table 9-1.
3. The maximum output power level obtained from Table 9-5.
4. The minimum radio output power level obtained from Table 9-8

- For this example with 8 dBi antennas, the maximum power allowed for the 2.4-GHz radio is 12 dBi from Table 9-4. This corresponds to a maximum controller power setting of level 2.
- For this example with 17 dBi antennas, the maximum power (Table 9-7) allowed for the 5-GHz radio is 24 dBi, which corresponds to a maximum controller power setting of level 1.

Step 8   Click **Apply**.

Step 9   Close your Internet browser.

For additional configuration information, refer to the *Cisco Wireless LAN Controller Configuration Guide*.