



Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points

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Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points
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Preface

Audience

This guide is for the networking professional who installs and manages Cisco Aironet access points and bridges.

To use this guide with lightweight access points, you should have experience working with a Cisco Wireless LAN Controller and be familiar with the concepts and terminology of wireless local area networks.

Purpose

This guide provides the channel and maximum power settings you need to install your lightweight access points and bridges in supported regulatory regions.

For hardware information about Cisco Aironet access points and bridges, refer to the product hardware installation guides for your access points and bridges available from the Cisco.com home page at **Technical Support & Documentation**. On the Technical Support & Documentation home page, click **Wireless** and the product are listed under the “Wireless LAN Access” section. Choose the needed product, then click **Install and Upgrade Guides** on the product documentation page.

For information about Cisco Wireless LAN Controllers, refer to the Cisco documentation sets available from the Cisco.com home page at **Technical Support & Documentation**. On the Technical Support & Documentation home page, click **Wireless** and the documentation is listed under the “Wireless LAN Controllers” section.

Organization

This guide is organized into these chapters:

[Chapter 1, “Cisco Aironet 1000 Series Access Points,”](#) lists the 1000 series lightweight access point radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 2, “Cisco Aironet 1100 Series Access Points,”](#) lists the 1100 series lightweight access point radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 3, “Cisco Aironet 1130AG Series Access Points,”](#) lists the 1130AG series lightweight access point radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 4, “Cisco Aironet 1200 Series Access Points,”](#) lists the 1200 series lightweight access point radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 5, “Cisco Aironet 1240AG Series Access Points,”](#) lists the 1240AG series lightweight access point radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 6, “Cisco Aironet 1300 Series Access Points,”](#) lists the 1300 series lightweight outdoor access point/bridge radio channels and the maximum power levels supported by the world’s regulatory domains.

[Chapter 7, “Cisco Aironet 1500 Series Mesh Access Points,”](#) lists the 1500 series lightweight outdoor mesh access point radio channels and the maximum power levels supported by the world’s regulatory domains.

Conventions

This publication uses these conventions to convey instructions and information:

Interactive examples use these conventions:

- Terminal sessions and system displays are in `screen font`.
- Information you enter is in **boldface screen font**.
- Nonprinting characters, such as passwords or tabs, are in angle brackets (< >).

Notes, cautions, and timesavers use these conventions and symbols:

**Tip**

Means the following will help you solve a problem. The tips information might not be troubleshooting or even an action, but could be useful information.

**Note**

Means reader take note. Notes contain helpful suggestions or references to materials not contained in this manual.

**Caution**

Means reader be careful. In this situation, you might do something that could result equipment damage or loss of data.

Related Publications

These documents provide information about the access points and bridges:

- Cisco Aironet 1000 Series Lightweight Access Point Hardware Installation Guide
- Cisco Aironet 1100 Series Access Point Hardware Installation Guide
- Cisco Aironet 1130AG Series Access Point Hardware Installation Guide
- Cisco Aironet 1200 Series Access Point Hardware Installation Guide
- Cisco Aironet 1240AG Series Access Point Hardware Installation Guide
- Cisco Aironet 1300 Series Access Point/Bridge Hardware Installation Guide
- Cisco Aironet 1500 Series Lightweight Outdoor Mesh Access Point Hardware Installation Guide
- Cisco IOS Software Configuration Guide for Cisco Aironet Access Points
- Cisco Wireless LAN Controller Configuration Guide

Click this link to browse to the Cisco Wireless documentation home page:

http://www.cisco.com/en/US/products/hw/wireless/tsd_products_support_category_home.html

To browse to the access point and bridge documentation, click a product listed under “Wireless LAN Access.”

To browse to the Cisco Wireless LAN Controller documentation, click **Cisco 4400 Series Wireless LAN Controllers** or **Cisco 2000 Series Wireless LAN Controllers** listed under “Wireless LAN Controllers.”

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

<http://www.cisco.com/techsupport>

You can access the Cisco website at this URL:

<http://www.cisco.com>

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

Cisco documentation and additional literature are available in the Product Documentation DVD package, which may have shipped with your product. The Product Documentation DVD is updated regularly and may be more current than printed documentation.

The Product Documentation DVD is a comprehensive library of technical product documentation on portable media. The DVD enables you to access multiple versions of hardware and software installation, configuration, and command guides for Cisco products and to view technical documentation in HTML. With the DVD, you have access to the same documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .pdf versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD=) from the Ordering tool or Cisco Marketplace.

Cisco Ordering tool:

<http://www.cisco.com/en/US/partner/ordering/>

Cisco Marketplace:

<http://www.cisco.com/go/marketplace/>

Ordering Documentation

Beginning June 30, 2005, registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

<http://www.cisco.com/go/marketplace/>

Cisco will continue to support documentation orders using the Ordering tool:

- Registered Cisco.com users (Cisco direct customers) can order documentation from the Ordering tool:
<http://www.cisco.com/en/US/partner/ordering/>
- Instructions for ordering documentation using the Ordering tool are at this URL:
http://www.cisco.com/univercd/cc/td/doc/es_inpk/pdi.htm
- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 1 800 553-NETS (6387).

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Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you can perform these tasks:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories and notices for Cisco products is available at this URL:

<http://www.cisco.com/go/psirt>

If you prefer to see advisories and notices as they are updated in real time, you can access a Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed from this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you might have identified a vulnerability in a Cisco product, contact PSIRT:

- Emergencies—security-alert@cisco.com

An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.

- Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532



Tip

We encourage you to use Pretty Good Privacy (PGP) or a compatible product to encrypt any sensitive information that you send to Cisco. PSIRT can work from encrypted information that is compatible with PGP versions 2.x through 8.x.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.htm

The link on this page has the current PGP key ID in use.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support & Documentation website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support & Documentation website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:
<http://www.cisco.com/go/marketplace/>
- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

<http://www.ciscopress.com>

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

<http://www.cisco.com/packet>

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

<http://www.cisco.com/go/iqmagazine>

or view the digital edition at this URL:

<http://ciscoiq.texterity.com/ciscoiq/sample/>

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

<http://www.cisco.com/ipj>

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

<http://www.cisco.com/en/US/products/index.html>

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

<http://www.cisco.com/discuss/networking>

- World-class networking training is available from Cisco. You can view current offerings at this URL:

<http://www.cisco.com/en/US/learning/index.html>



Cisco Aironet 1000 Series Access Points

This chapter lists the IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains for the Cisco Aironet 1000 Series Lightweight Access Point. For additional product hardware information refer to the *Cisco Aironet 1000 Series Lightweight Access Point Hardware Installation Guide*.

The following topic is covered in this appendix:

- [Channels and Maximum Power Levels, page 1-2](#)

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 1-1](#) and [Table 1-2](#) for their regulatory domain.


Note

In [Table 1-1](#) and [Table 1-2](#), 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.

Table 1-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 6.5-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains														
		Americas (-A)					China (-C)					EMEA (-E)				
		CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	CCK 1-11	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54
1	2412	20	17	17	17	17	14	14	14	14	14	14	14	14	14	14
2	2417	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
3	2422	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
4	2427	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
5	2432	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
6	2437	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
7	2442	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
8	2447	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
9	2452	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
10	2457	20	20	20	19	18	14	14	14	14	14	14	14	14	14	14
11	2462	20	17	17	17	17	14	14	14	14	14	14	14	14	14	14
12	2467	–	–	–			14	14	14	14	14	14	14	14	14	14
13	2472	–	–	–			14	14	14	14	14	14	14	14	14	14
14	2484	–	–	–			–	–	–	–	–	–	–	–	–	–

Table 1-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with Up to 6.5-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains															
		Israel (-I)	Japan (-J)	South Korea (-K)	Non-FCC (-N)					Japan (-P)	(-R)	Singapore (-S)	Taiwan (-T)				
		All CCK and OFDM			CCK 1-11	OFDM 9-24	OFDM 36	OFDM 448	OFDM 54	All CCK and OFDM			CCK 1-11	OFDM 9-24	OFDM 36	OFDM 448	OFDM 54
1	2412	14	17	14	20	17	17	17	17	17	14	14	20	17	17	17	17
2	2417	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
3	2422	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
4	2427	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
5	2432	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
6	2437	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
7	2442	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
8	2447	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
9	2452	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
10	2457	14	17	14	20	20	20	19	18	17	14	14	20	20	20	19	18
11	2462	14	17	14	20	17	17	17	17	17	14	14	20	17	17	17	17
12	2467	14	17	14	–	–	–	–	–	17	14	14	–	–	–	–	–
13	2472	14	17	14	–	–	–	–	–	17	14	14	–	–	–	–	–
14	2484	–	17 ¹	–	–	–	–	–	–	17 ¹	–	14	–	–	–	–	–

1. Channel 14 allowed for 802.11b data rates only.

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the outdoor access points support the channels and maximum power levels listed in [Table 1-3](#) and [Table 1-4](#) for their regulatory domain.



Note

In [Table 1-3](#) and [Table 1-4](#), the operating data rates (in Mbps) are shown in the OFDM table cells. For example: OFDM 9-24 indicates OFDM data rates of 9 to 24Mbps.



Note

To obtain the most current maximum power levels for the EMEA (–E) regulatory domain, refer to the EMEA (–E) regulatory document that shipped with your access point.

Table 1-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 6-dBi Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains														
		Americas -A				China -C				EMEA -E				Israel (-I)	Japan (-J)	South Korea (-K)
		OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	All OFDM	All OFDM	All OFDM
UNII-1 (5150-5350 MHz)																
34	5170	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
36	5180	15	15	15	15	-	-	-	-	14.5	14.5	14.5	14.5	15	-	15
38	5190	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
40	5200	17	17	17	17	-	-	-	-	14.5	14.5	14.5	14.5	15	-	15
42	5210	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
44	5220	17	17	17	17	-	-	-	-	14.5	14.5	14.5	14.5	15	-	15
46	5230	-	-	-	-	-	-	-	-	-	-	-	-	-	18	-
48	5240	15	15	15	15	-	-	-	-	14.5	14.5	14.5	14.5	15	-	15
52	5260	20	20	18	17	-	-	-	-	14.5 ¹	14.5 ¹	14.5 ¹	14.5 ¹	15 ¹	-	17 ¹
56	5280	20	20	18	17	-	-	-	-	14.5 ¹	14.5 ¹	14.5 ¹	14.5 ¹	15 ¹	-	17 ¹
60	5300	20	20	18	17	-	-	-	-	14.5 ¹	14.5 ¹	14.5 ¹	14.5 ¹	15 ¹	-	17 ¹
64	5320	17	17	17	17	-	-	-	-	14.5 ¹	14.5 ¹	14.5 ¹	14.5 ¹	15 ¹	-	17 ¹
5470 to 5725 MHz																
100	5500	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
104	5520	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
108	5540	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
112	5560	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
116	5580	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
120	5600	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
124	5620	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	17 ¹
128	5640	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	-
132	5660	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	-
136	5680	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	-
140	5700	-	-	-	-	-	-	-	-	20 ¹	20 ¹	18 ¹	17 ¹	-	-	-
5725 to 5850 MHz																
149	5745	20	19	18	16	19.5	19.5	18	16	-	-	-	-	-	-	16
153	5765	20	19	18	16	19.5	19.5	18	16	-	-	-	-	-	-	16
157	5785	20	19	18	16	19	19	18	16	-	-	-	-	-	-	16
161	5805	20	19	18	16	19	19	18	16	-	-	-	-	-	-	16
165	5825	20	19	18	16	-	-	-	-	-	-	-	-	-	-	-

1. Dynamic frequency selection (DFS) and transmit power control (TPC) required (Uniform spreading not required for the-P regulatory domain)

Table 1-4 Channels and Maximum Conducted Power for IEEE 802.11a Radio with Up to 6-dBi Antennas

Channel ID	Center Frequency (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains										
		Non-FCC (-N)				Japan (-P)	(-R)	Singapore (-S)	Taiwan (-T)			
		OFDM 9-24	OFDM 36	OFDM 48	OFDM 54	OFDM All	OFDM All	OFDM All	OFDM 9-24	OFDM 36	OFDM 48	OFDM 54
UNII-1 (5150-5350 MHz)												
34	5170	-	-	-	-	-	-	-	-	-	-	-
36	5180	15	15	15	15	15	-	15	-	-	-	-
38	5190	-	-	-	-	-	-	-	-	-	-	-
40	5200	17	17	17	17	15	-	15	-	-	-	-
42	5210	-	-	-	-	-	-	-	-	-	-	-
44	5220	17	17	17	17	15	-	15	-	-	-	-
46	5230	-	-	-	-	-	-	-	-	-	-	-
48	5240	15	15	15	15	15	-	15	-	-	-	-
52	5260	20	20	18	17	11 ¹	-	14 ¹	-	-	-	-
56	5280	20	20	18	17	11 ¹	-	14 ¹	15	15	15	15
60	5300	20	20	18	17	11 ¹	-	14 ¹	15	15	15	15
64	5320	17	17	17	17	11 ¹	-	14 ¹	15	15	15	15
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	20	19	18	16	-	-	16	17	17	17	16
153	5765	20	19	18	16	-	-	16	17	17	17	16
157	5785	20	19	18	16	-	-	16	17	17	17	16
161	5805	20	19	18	16	-	-	16	17	17	17	16
165	5825	-	-	-	-	-	-	-	-	-	-	-

1. Dynamic frequency selection (DFS) and transmit power control (TPC) are required (Uniform spreading is not required for the -P regulatory domain).

Special Country Restrictions

Table 1-5 lists special restrictions for wireless operation in some countries.

Table 1-5 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Mexico	2.4	-N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP ¹ .
Russian Federation	5	-E	End user must limit 5 GHz operation to 5150-5250 MHz and 5650 to 5725 MHz.
United States	5	-A	Operation limited to indoor use only from 5150-5250 MHz.

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

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1000 series lightweight access point output power.

The output power on the 1000 series lightweight access points can be changed only using a 2600 series or 4400 series controller, the controllers on a Cisco Wireless Services Module (WiSM), or a Cisco Wireless Control System (WCS).



Note

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



Note

See the *Cisco Wireless LAN Controller Configuration Guide* for more details on how to configure your access point.

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

- Step 1** Open your Internet browser. You must use Microsoft Internet Explorer 6.0.2800 or later.
- 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 displays.
- Step 5** Choose the desired access point from the displayed list and click **Configure** and the radio settings page displays.
- 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 Table 1-1, Table 1-2, Table 1-3, and Table 1-4 lists the access point maximum output power levels supported for its regulatory domain when shipped from the factory.

Table 1-6 lists the controller power settings and the corresponding output power levels for two examples:

- 2.4 GHz (802.11b/g) operation:
 - Non-FCC (-N) regulatory domain
 - Channel 2 using 11 Mbps data rates
- 5 GHz (802.11a) operation:
 - Non-FCC (-N) regulatory domain
 - Channel 36 using 36 Mbps data rates

Table 1-6 Example of Output Power Levels

Controller Tx Power Settings ¹	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	20 ²	15 ³
2	17	12
3	14	9
4	11	6
5	8	3

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 level obtained from Table 1-2.
3. The maximum output power level obtained from Table 1-4.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

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



Cisco Aironet 1100 Series Access Points

This chapter lists the 1100 series lightweight (AIR-LAP1121G) access point IEEE 802.11b (2.4-GHz) and IEEE 802.11g (2.4-GHz) channels and the maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1100 Series Access Point Hardware Installation Guide*.

The following topics are covered in this chapter:

- [Channels, page 2-2](#)
- [Maximum Power Levels, page 2-3](#)
- [Changing the Lightweight Access Point Output Power, page 2-4](#)

Channels

AIR-LAP1121G IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11g 22-MHz-wide channel are shown in [Table 2-2](#).

Table 2-1 Channels for IEEE 802.11g

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	–	–	–	–	X	–



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

IEEE 802.11b (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 2-2](#) indicates the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11b regulatory domain.

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

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)
Americas (-A) (4 watts EIRP maximum)	2.2	100
EMEA (-E) (100 mW EIRP maximum)	2.2	50
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30

IEEE 802.11g (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 2-3](#) shows the maximum power levels allowed with the Cisco integrated antenna for each IEEE 802.11g regulatory domain.

Table 2-3 Maximum Power Levels Per Antenna Gain for IEEE 802.11g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK	OFDM
Americas (-A) (4 watts EIRP maximum)	2.2	100	30
EMEA (-E) (100 mW EIRP maximum)	2.2	50	30
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30	30

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1100 series lightweight access point output power to comply with the maximum power limits imposed by regulatory domains (see the “[Maximum Power Levels](#)” section on page 2-3). 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.

The output power on the AIR-LAP1121G-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-LAP1121G-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).

Table 2-4 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

Table 2-4 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 2-3 for the maximum power levels in the -E regulatory domain.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

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



Cisco Aironet 1130AG Series Access Points

This chapter lists the 1130 series lightweight access point (AIR-LAP1131AG-x-K9) IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1130AG Series Access Point Hardware Installation Guide*.

The following topics are covered in this chapter:

- [Channels and Maximum Power Levels, page 3-2](#)
- [Special Country Restrictions, page 3-4](#)
- [Changing the Lightweight Access Point Output Power, page 3-4](#)

Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band)

When shipped from the factory, the outdoor access points support the channels and maximum power levels listed in [Table 3-1](#) for their regulatory domain.


Note

The B columns indicate IEEE 802.11b data rates and the G columns indicate IEEE 802.11g data rates .

Table 3-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with 4-dBi Integrated Antenna

Channel Id	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																			
		Americas (-A)		China (-C)		EMEA (-E)		Israel (-I)		Japan (-J)		South Korea (-K)		Non-FCC (-N)		Japan (-P)		Singapore (-S)		Taiwan (-T)	
		B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
1	2412	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
2	2417	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
3	2422	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
4	2427	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
5	2432	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
6	2437	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
7	2442	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
8	2447	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
9	2452	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
10	2457	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
11	2462	20	17	14	14	14	14	14	14	14	14	14	14	20	17	14	14	14	14	20	17
12	2467	-	-	14	14	14	14	14	14	14	14	14	14	-	-	14	14	14	14	-	-
13	2472	-	-	14	14	14	14	14	14	14	14	14	14	-	-	14	14	14	14	-	-
14	2484	-	-	-	-	-	-	-	-	14	-	-	-	-	-	14	-	-	-	-	-

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the outdoor access points support the channels and maximum power levels listed in [Table 3-2](#) for their regulatory domain.

Table 3-2 Channels and Maximum Conducted Power for IEEE 802.11a Radio with 4-dBI Integrated Antenna

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains									
		Americas (-A)	China (-C)	EMEA (-E)	Israel (-I)	Japan (-J)	South Korea (-K)	North America (-N)	Japan (-P)	Singapore (-S)	Tiawan (-T)
5150 to 5250 MHz											
34	5170	–	–	–	–	15	–	–	–	–	–
36	5180	15	–	17	17	–	15	15	15	17	–
38	5190	–	–	–	–	15	–	–	–	–	–
40	5200	15	–	17	17	–	15	15	15	17	–
42	5210	–	–	–	–	15	–	–	–	–	–
44	5220	15	–	17	17	–	15	15	15	17	–
46	5230	–	–	–	–	15	–	–	–	–	–
48	5240	15	–	17	17	–	15	15	15	17	–
5250 to 5350 MHz											
52	5260	17	–	17	17 ¹	–	17	17	15	14	–
56	5280	17	–	17	17 ¹	–	17	17	15	14	15
60	5300	17	–	17	17 ¹	–	17	17	15	14	15
64	5320	17	–	17	17 ¹	–	17	17	15	14	15
5450 to 5725 MHz											
100	5500	–	–	17	–	–	17	–	–	–	–
104	5520	–	–	17	–	–	17	–	–	–	–
108	5540	–	–	17	–	–	17	–	–	–	–
112	5560	–	–	17	–	–	17	–	–	–	–
116	5580	–	–	17	–	–	17	–	–	–	–
120	5600	–	–	17	–	–	17	–	–	–	–
124	5620	–	–	17	–	–	17	–	–	–	–
128	5640	–	–	17	–	–	–	–	–	–	–
132	5660	–	–	17	–	–	–	–	–	–	–
136	5680	–	–	17	–	–	–	–	–	–	–
140	5700	–	–	17	–	–	–	–	–	–	–
5725 to 5850 MHz											
149	5745	17	17	–	–	–	17	17	–	17	17
153	5765	17	17	–	–	–	17	17	–	17	17
157	5785	17	17	–	–	–	17	17	–	17	17
161	5805	17	17	–	–	–	17	17	–	17	17
165	5825	–	–	–	–	–	–	–	–	–	–

Special Country Restrictions

Table 3-3 lists special restrictions for wireless operation in some countries.

Table 3-3 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Mexico	2.4	-N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP ¹ .
Russian Federation	5	-E	End user must limit 5 GHz operation to 5650 to 5725 MHz.
United States	2.4	-A	Operation limited to indoor use only from 5150-5250 MHz.

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

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1130AG 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 3-4). 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 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 Radios** or **802.11b/g Radios** and a list of associated access points displays.
- Step 5** Choose the desired access point from the displayed list and click **Configure**. The radio settings page displays.
- 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 3-4 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 and channel 2 using 11 Mbps data rates
- 5 GHz (802.11a) operation:
 - American regulatory domain and channel 149 using 36 Mbps data rates

Table 3-4 Example of Output Power Levels

Controller Tx Power Settings ¹	Radio Output Power	
	802.11b/g (dBm)	802.11a (dBm)
1 (maximum)	20 ²	17 ³
2	17	14
3	14	11
4	11	8
5	8	5
6	5	2
7	2	-1
8	-1	–

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 level obtained from Table 3-1.
3. The maximum output power level obtained from Table 3-2.

- Step 8** Click **Apply**.
- Step 9** Close your Internet browser.

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



Cisco Aironet 1200 Series Access Points

This section lists the 1200 series lightweight access point (models: AIR-LAP1231G and AIR-LAP1232AG) IEEE 802.11g (2.4-GHz) and IEEE 802.11a (5-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 1200 Series Access Point Hardware Installation Guide*.

The following topics are covered in this section:

- [Channels, page 4-2](#)
- [Maximum Power Levels and Antenna Gains, page 4-4](#)
- [Power Conversion Table, page 4-9](#)
- [Changing the Lightweight Access Point Output Power, page 4-10](#)

Channels

IEEE 802.11g (2.4-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11g 22-MHz-wide channel are shown in [Table 4-1](#).

Table 4-1 Channels for IEEE 802.11g

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	–	–	–	–	X	–



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.

IEEE 802.11a (5-GHz Band)

The channel identifiers, channel center frequencies, and regulatory domains of each IEEE 802.11a 20-MHz-wide channel are shown in [Table 4-2](#).

Table 4-2 Channels for IEEE 802.11a for the RM21A and RM22A Radio Modules

Channel ID	Center Frequency (MHz)	Regulatory Domains									
		Americas (-A)	China (-C)	EMEA (-E)	Israel (-I)	Japan (-J)	South Korea (-K)	North America (-N)	Japan (-P)	Singapore (-S)	Taiwan (-T)
5150 to 5250 MHz											
34	5170	-	-	-	-	X	-	-	-	-	-
36	5180	X	-	X	X	-	X	X	X	X	-
38	5190	-	-	-	-	X	-	-	-	-	-
40	5200	X	-	X	X	-	X	X	X	X	-
42	5210	-	-	-	-	X	-	-	-	-	-
44	5220	X	-	X	X	-	X	X	X	X	-
46	5230	-	-	-	-	X	-	-	-	-	-
48	5240	X	-	X	X	-	X	X	X	X	-
5250 to 5350 MHz											
52	5260	X	-	X	X	-	X	X	X	X	-
56	5280	X	-	X	X	-	X	X	X	X	X
60	5300	X	-	X	X	-	X	X	X	X	X
64	5320	X	-	X	X	-	X	X	X	X	X
5470 to 5725 MHz											
100	5500	-	-	X	-	-	X	-	-	-	-
104	5520	-	-	X	-	-	X	-	-	-	-
108	5540	-	-	X	-	-	X	-	-	-	-
112	5560	-	-	X	-	-	X	-	-	-	-
116	5580	-	-	X	-	-	X	-	-	-	-
120	5600	-	-	X	-	-	X	-	-	-	-
124	5620	-	-	X	-	-	X	-	-	-	-
128	5640	-	-	X	-	-	-	-	-	-	-
132	5660	-	-	X	-	-	-	-	-	-	-
136	5680	-	-	X	-	-	-	-	-	-	-
140	5700	-	-	X	-	-	-	-	-	-	-
5725 to 5850 MHz											
149	5745	X	X	-	-	-	X	X	-	X	X
153	5765	X	X	-	-	-	X	X	-	X	X
157	5785	X	X	-	-	-	X	X	-	X	X
161	5805	X	X	-	-	-	X	X	-	X	X
165	5825	-	-	-	-	-	-	-	-	-	-

Maximum Power Levels and Antenna Gains

IEEE 802.11g (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 4-3](#) indicates the maximum power levels and antenna gains allowed for each IEEE 802.11g regulatory domain.

Table 4-3 Maximum Power Levels Per Antenna Gain for IEEE 802.11g

Regulatory Domain	Antenna Gain (dBi)	Maximum Power Level (mW)	
		CCK Modulation	OFDM Modulation
Americas (-A) (4 W EIRP maximum)	2.2	100	30
	5	100	30
	6	100	30
	6.5	100	30
	8.5	100	30
	10	100	30
EMEA (-E) (100 mW EIRP maximum)	2.2	50	30
	5	30	10
	6	30	10
	6.5	20	10
	8.5	10	5
	10	10	5
Israel (-I) (100 mW EIRP maximum)	2.2	50	30
	5	30	10
	6	30	10
	6.5	20	10
	8.5	10	5
	10	10	5
Japan (-J) (10 mW/MHz EIRP maximum)	2.2	30	30
	5	30	30
	6	30	30
	6.5	30	30
	8.5	–	–
	10	–	–

IEEE 802.11a (5-GHz Band)

When shipped from the factory, the RM21A radio modules (with the 5-dBi integrated antenna) support the channels and maximum power levels listed in [Table 4-4](#) for their regulatory domain.

Table 4-4 Maximum Power for RM21A Radio Module with 5-dBi Integrated Antenna

Channel ID	Center Frequency (MHz)	Regulatory Domains									
		Americas (-A)	China (-C)	EMEA (-E)	Israel (-I)	Japan (-J)	South Korea (-K)	Non-FCC (-N)	Japan (-P)	Singapore (-S)	Taiwan (-T)
5150 to 5250 MHz											
34	5170	–	–	–	–	15	–	–	–	–	–
36	5180	15	–	17	17	–	15	15	15	17	–
38	5190	–	–	–	–	15	–	–	–	–	–
40	5200	15	–	17	17	–	15	15	15	17	–
42	5210	–	–	–	–	15	–	–	–	–	–
44	5220	15	–	17	17	–	15	15	15	17	–
46	5230	–	–	–	–	14	–	–	–	–	–
48	5240	15	–	17	17	–	15	15	15	17	–
5250 to 5350 MHz											
52	5260	17	–	17	17 ¹	–	17	17	14	14	–
56	5280	17	–	17	17 ¹	–	17	17	14	14	15
60	5300	17	–	17	17 ¹	–	17	17	14	14	15
64	5320	17	–	17	17 ¹	–	17	17	14	14	15
5470 to 5725 MHz											
100	5500	–	–	17	–	–	17	–	–	–	–
104	5520	–	–	17	–	–	17	–	–	–	–
108	5540	–	–	17	–	–	17	–	–	–	–
112	5560	–	–	17	–	–	17	–	–	–	–
116	5580	–	–	17	–	–	17	–	–	–	–
120	5600	–	–	17	–	–	17	–	–	–	–
124	5620	–	–	17	–	–	17	–	–	–	–
128	5640	–	–	17	–	–	–	–	–	–	–
132	5660	–	–	17	–	–	–	–	–	–	–
136	5680	–	–	17	–	–	–	–	–	–	–
140	5700	–	–	17	–	–	–	–	–	–	–
5725 to 5850 MHz											
149	5745	17	17	–	–	–	17	17	–	17	17
153	5765	17	17	–	–	–	17	17	–	17	17
157	5785	17	17	–	–	–	17	17	–	17	17
161	5805	17	17	–	–	–	17	17	–	17	17
165	5825	–	–	–	–	–	–	–	–	–	–

When shipped from the factory, the RM21A radio modules (with the 9-dBi integrated antenna) support the channels and maximum power levels listed in [Table 4-5](#) for their regulatory domain.

Table 4-5 Maximum Power for RM21A Radio Module with 9-dBi Integrated Antenna

Channel ID	Center Frequency (MHz)	Regulatory Domains									
		Americas (-A)	China (-C)	EMEA (-E)	Israel (-I)	Japan (-J)	South Korea (-K)	North America (-N)	Japan (-P)	Singapore (-S)	Taiwan (-T)
5150 to 5250 MHz											
34	5170	–	–	–	–	11	–	–	–	–	–
36	5180	11	–	14	14	–	15	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–
40	5200	11	–	14	14	–	15	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–
44	5220	11	–	14	14	–	15	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–
48	5240	11	–	14	14	–	15	11	11	14	–
5250 to 5350 MHz											
52	5260	17	–	14	14 ¹	–	17	17	8	11	–
56	5280	17	–	14	14 ¹	–	17	17	8	11	11
60	5300	17	–	14	14 ¹	–	17	17	8	11	11
64	5320	11	–	14	14 ¹	–	17	17	8	11	11
5470 to 5725 MHz											
100	5500	–	–	17	–	–	17	–	–	–	–
104	5520	–	–	17	–	–	17	–	–	–	–
108	5540	–	–	17	–	–	17	–	–	–	–
112	5560	–	–	17	–	–	17	–	–	–	–
116	5580	–	–	17	–	–	17	–	–	–	–
120	5600	–	–	17	–	–	17	–	–	–	–
124	5620	–	–	17	–	–	17	–	–	–	–
128	5640	–	–	17	–	–	–	–	–	–	–
132	5660	–	–	17	–	–	–	–	–	–	–
136	5680	–	–	17	–	–	–	–	–	–	–
140	5700	–	–	17	–	–	–	–	–	–	–
5725 to 5850 MHz											
149	5745	17	17	–	–	–	17	17	–	17	17
153	5765	17	17	–	–	–	17	17	–	17	17
157	5785	14	17	–	–	–	17	14	–	17	14
161	5805	11	17	–	–	–	17	11	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–

When shipped from the factory, the RM22A radio modules support the channels and maximum power levels listed in [Table 4-6](#) for their regulatory domain.

Table 4-6 Maximum Power for the RM22A Radio Module with Up To 9.5-dBi External Antennas

Channel ID	Center Frequency (MHz)	Regulatory Domains									
		Americas (-A)	China (-C)	EMEA (-E) ¹	Israel (-I) ¹	Japan (-J)	South Korea (-K) ²	North America (-N) ³	Japan (-P)	Singapore (-S)	Taiwan (-T)
5150 to 5250 MHz											
34	5170	–	–	–	–	11	–	–	–	–	–
36	5180	11	–	17	17	–	15	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–
40	5200	11	–	17	17	–	15	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–
44	5220	11	–	17	17	–	15	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–
48	5240	11	–	17	17	–	15	11	11	14	–
5250 to 5350 MHz											
52	5260	17	–	17	17	–	17	17	8	11	–
56	5280	17	–	17	17	–	17	17	8	11	11
60	5300	17	–	17	17	–	17	17	8	11	11
64	5320	11	–	17	17	–	17	11	8	11	11
5470 to 5725 MHz											
100	5500	–	–	17	–	–	17	–	–	–	–
104	5520	–	–	17	–	–	17	–	–	–	–
108	5540	–	–	17	–	–	17	–	–	–	–
112	5560	–	–	17	–	–	17	–	–	–	–
116	5580	–	–	17	–	–	17	–	–	–	–
120	5600	–	–	17	–	–	17	–	–	–	–
124	5620	–	–	17	–	–	17	–	–	–	–
128	5640	–	–	17	–	–	–	–	–	–	–
132	5660	–	–	17	–	–	–	–	–	–	–
136	5680	–	–	17	–	–	–	–	–	–	–
140	5700	–	–	17	–	–	–	–	–	–	–
5725 to 5850 MHz											
149	5745	17	17	–	–	–	17	17	–	17	17
153	5765	17	17	–	–	–	17	17	–	17	17
157	5785	14	17	–	–	–	17	14	–	17	14
161	5805	11	17	–	–	–	17	11	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–

- For the –E and –I regulatory domains, see the “Maximum Power Levels in Some Regulatory Domains with External Antennas” section on page 4-8.
- In South Korea, the AIR-RM22A-N-K9 is approved only with antenna gains of 6 dBi or less.
- In Australia and New Zealand, the AIR-RM22A-N-K9 is approved only with antenna gains of 6 dBi or less.

Maximum Power Levels in Some Regulatory Domains with External Antennas


Caution

To avoid exceeding maximum conducted power levels in the EMEA (-E) and Israel (-I) regulatory domains when using an external antenna, you must manually set the access point output power level as shown in [Table 4-7](#). The Israel (-I) regulator domain does not support channels 100 to 140.


Note

For the latest EMEA (-E) regulatory domain information, refer to the EU Directive 1999/5/EC Compliance Information document that ships with this product.

Table 4-7 RM22A Radio Module Maximum Power with External Antennas in the (-E) and (-I) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)				
		4-dBi Antenna	5-dBi Antenna	6-dBi Antenna	7-dBi Antenna	9.5-dBi Antenna
5150 to 5250 MHz						
34	5170	–	–	–	–	–
36	5180	17	17	15	15	11
38	5190	–	–	–	–	–
40	5200	17	17	15	15	11
42	5210	–	–	–	–	–
44	5220	17	17	15	15	11
46	5230	–	–	–	–	–
48	5240	17	17	15	15	11
5250 to 5350 MHz						
52	5260	17	17	15	15	11
56	5280	17	17	15	15	11
60	5300	17	17	15	15	11
64	5320	17	17	15	15	11
5470 to 5725 MHz						
100	5500	17	17	17	17	17
104	5520	17	17	17	17	17
108	5540	17	17	17	17	17
112	5560	17	17	17	17	17
116	5580	17	17	17	17	17
120	5600	17	17	17	17	17
124	5620	17	17	17	17	17
128	5640	17	17	17	17	17
132	5660	17	17	17	17	17
136	5680	17	17	17	17	17
140	5700	17	17	17	17	17
5725 to 5850 MHz						
149	5745	–	–	–	–	–
153	5765	–	–	–	–	–
157	5785	–	–	–	–	–
161	5805	–	–	–	–	–
165	5825	–	–	–	–	–

Special Country Restrictions

Table 4-8 lists special restrictions for wireless operation in some countries.

Table 4-8 Special Country Restrictions for Wireless Operation

Country	Frequency Band (GHz)	Regulatory Domain	Special Limitation and Restrictions
Australia and New Zealand	5	-N	2.4 and 5 GHz external antenna gain limited to 6 dBi, or less
South Korea	2.4 and 5	-K	2.4 and 5 GHz external antenna gain limited to 6 dBi or less.
Mexico	2.4	-N	End user must limit 2.4 GHz operation to 2450 to 2483.5 MHz and 36 dBm EIRP ¹ .
Russian Federation	5	-E	End user must limit 5 GHz operation to 5150 to 5350 and 5650 to 5725 MHz.
United States	2.4	-A	Operation limited to indoor use only from 5150-5250 MHz.

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

Power Conversion Table

You can use Table 4-9 to convert power values from dBm to mW or from mW to dBm.

Table 4-9 Power Conversion Table

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

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1200 series access point output power to comply with the maximum power limits imposed by special regulatory and country restrictions (see the “[Maximum Power Levels in Some Regulatory Domains with External Antennas](#)” section on page 4-8 and the “[Special Country Restrictions](#)” section on page 4-9). 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 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 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 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 4-10 lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4-GHz (802.11b/g) operation:
 - EMEA (-E) regulatory domain and channel 2 using 11-Mbps data rates
 - 6-dBi external antenna
- 5-GHz (802.11a) operation:
 - EMEA (-E) regulatory domain and channel 52 using 36-Mbps data rates
 - RM22A with 6-dBi external antenna

Table 4-10 Example of Output Power Levels

Controller Tx Power Settings ¹	Radio Output Power		
	802.11b (mW)	802.11g (mW)	802.11a (dBm)
1 (maximum)	50 ²	30 ²	17 ³
2	25	15	14
3	12	8	11
4	6	4	8
5	3	2	5
6	2	1	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 4-3 and the values converted using Table 4-9.
 3. The maximum output power level of 17 dBi obtained from Table 4-6.
- For 802.11b (CCK) and 802.11g (OFDM) data rates (see Table 4-3 and Table 4-10), the manual controller Tx Power Level setting is 3.
 - For only 802.11b (CCK) data rates (see Table 4-3 and Table 4-10), the manual controller Tx Power Level setting is 2.
 - For 802.11a (see Table 4-7 and Table 4-10), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.

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



Cisco Aironet 1240AG Series Access Points

This chapter lists the 1240AG series lightweight access point (model: AIR-LAP1242AG-x-K9) IEEE 802.11b/g (2.4-GHz) and the IEEE 802.11a (5-GHz) channels and maximum power levels supported by the world's regulatory domains. For additional product hardware information refer to the *Cisco Aironet 1240AG Series Access Point Hardware Installation Guide*.

The following topics are covered in this chapter:

- [Channels and Maximum Power Levels, page 5-2](#)
- [Special Country Restrictions, page 5-6](#)
- [Changing the Lightweight Access Point Output Power, page 5-6](#)

Channels and Maximum Power Levels

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 5-1 indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains in the IEEE 802.11b/g (2.4-GHz band):


Note

Table 5-1 lists the power levels shipped from the factory. The B columns indicate IEEE 802.11b data rates and the G columns indicate IEEE 802.11g data rates. In the -C, -E, -I, -K, and -S regulatory domains, you must manually adjust power levels depending upon the antenna being used (see Table 5-3).

Table 5-1 Channels and Maximum Conducted Power for the 802.11b/g Radio with up to 10-dBi External Antennas

Channel Id	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains																			
		Americas (-A)		China (-C)		EMEA (-E)		Israel (-I)		Japan (-J)		South Korea (-K)		Non-FCC (-N)		Japan (-P)		Singapore (-S)		Taiwan (-T)	
		B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G	B	G
1	2412	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
2	2417	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
3	2422	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
4	2427	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
5	2432	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
6	2437	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
7	2442	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
8	2447	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
9	2452	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
10	2457	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
11	2462	20	17	17	17	17	17	17	17	14	14	17	17	20	17	14	14	17	17	20	17
12	2467	-	-	17	17	17	17	17	17	14	14	17	17	-	-	14	14	17	17	-	-
13	2472	-	-	17	17	17	17	17	17	14	14	17	17	-	-	14	14	17	17	-	-
14	2484	-	-	-	-	-	-	-	-	14	-	-	-	-	-	14	-	-	-	-	-

Table 5-2 indicates the channel identifiers, channel center frequencies, and maximum power levels for each IEEE 802.11a (5-GHz band) allowed by the regulatory domains:

**Note**

Table 5-2 lists the power levels shipped from the factory. In the –E and –I regulatory domains, you must manually adjust power levels depending upon the antenna being used (see Table 5-4).

Table 5-2 Channels and Maximum Conducted Power for IEEE 802.11a Radio with up to 9.5-dBI External Antennas

Channel ID	Center Freq (MHz)	Maximum Conducted Power Levels (dBm) in the Regulatory Domains									
		Americas (–A)	China (–C)	EMEA (–E)	Israel (–I)	Japan (–J)	South Korea (–K)	North America (–N)	Japan (–P)	Singapore (–S)	Taiwan (–T)
5150 to 5250 MHz											
34	5170	–	–	–	–	11	–	–	–	–	–
36	5180	11	–	17	17	–	15	11	11	14	–
38	5190	–	–	–	–	11	–	–	–	–	–
40	5200	11	–	17	17	–	15	11	11	14	–
42	5210	–	–	–	–	11	–	–	–	–	–
44	5220	11	–	17	17	–	15	11	11	14	–
46	5230	–	–	–	–	11	–	–	–	–	–
48	5240	11	–	17	17	–	15	11	11	14	–
5250 to 5350 MHz											
52	5260	17	–	17	17	–	17	17	8	11	–
56	5280	17	–	17	17	–	17	17	8	11	11
60	5300	17	–	17	17	–	17	17	8	11	11
64	5320	11	–	17	17	–	17	11	8	11	11
5450 to 5725 MHz											
100	5500	–	–	17	–	–	17	–	–	–	–
104	5520	–	–	17	–	–	17	–	–	–	–
108	5540	–	–	17	–	–	17	–	–	–	–
112	5560	–	–	17	–	–	17	–	–	–	–
116	5580	–	–	17	–	–	17	–	–	–	–
120	5600	–	–	17	–	–	17	–	–	–	–
124	5620	–	–	17	–	–	17	–	–	–	–
128	5640	–	–	17	–	–	–	–	–	–	–
132	5660	–	–	17	–	–	–	–	–	–	–
136	5680	–	–	17	–	–	–	–	–	–	–
140	5700	–	–	17	–	–	–	–	–	–	–
5725 to 5850 MHz											
149	5745	17	17	–	–	–	17	17	–	17	17
153	5765	17	17	–	–	–	17	17	–	17	17
157	5785	14	17	–	–	–	17	14	–	17	14
161	5805	11	17	–	–	–	17	11	–	17	11
165	5825	–	–	–	–	–	–	–	–	–	–

Maximum Power Levels in Some Regulatory Domains with External Antennas


Caution

To avoid exceeding maximum conducted power levels in the China (-C), EMEA (-E), South Korea (-K), Israel (-I), and Singapore (-S) regulatory domains when using an 802.11b/g radio with 2.2- to 10-dBi external antennas, you must manually set the access point output power level as shown in [Table 5-3](#).

Table 5-3 Maximum Power Levels for the 802.11b/g Radio in the (-C), (-E), (-K), (-I), and (-S) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)					
		2.2 dBi Antenna	5.2 dBi Antenna	6.0 dBi Antenna	6.5dBi Antenna	9.0 dBi Antenna	10 dBi Antenna
1	2412	17	14	14	11	11	8
2	2417	17	14	14	11	11	8
3	2422	17	14	14	11	11	8
4	2427	17	14	14	11	11	8
5	2432	17	14	14	11	11	8
6	2437	17	14	14	11	11	8
7	2442	17	14	14	11	11	8
8	2447	17	14	14	11	11	8
9	2452	17	14	14	11	11	8
10	2457	17	14	14	11	11	8
11	2462	17	14	14	11	11	8
12	2467	17	14	14	11	11	8
13	2472	17	14	14	11	11	8
14	2484	-	-	-	-	-	-

**Caution**

To avoid exceeding maximum conducted power levels in the EMEA (-E) and Israel (-I) regulatory domains when using a IEEE 802.11a radio with 6.0- to 9.5-dBi external 5-MHz antennas, you must manually set the access point output power level as shown in [Table 5-4](#).

Table 5-4 Maximum Power Levels for IEEE 802.11a Radio in the EMEA(-E) and Israel (-I) Regulatory Domains

Channel Identifier	Center Frequency (MHz)	Maximum Power Levels (dBm)				
		3.5 dBi Antenna	4.5 dBi Antenna	6.0 dBi Antenna	7.0 dBi Antenna	9.5 dBi Antenna
UNII-1 (5150-5250 MHz)						
34	5170	–	–	–	–	–
36	5180	17	17	15	15	11
38	5190	–	–	–	–	–
40	5200	17	17	15	15	11
42	5210	–	–	–	–	–
44	5220	17	17	15	15	11
46	5230	–	–	–	–	–
48	5240	17	17	15	15	11
5250 to 5350 MHz						
52	5260	17	17	15	15	11
56	5280	17	17	15	15	11
60	5300	17	17	15	15	11
64	5320	17	17	15	15	11
5470 to 5725 MHz						
100	5500	17	17	17	17	17
104	5520	17	17	17	17	17
108	5540	17	17	17	17	17
112	5560	17	17	17	17	17
116	5580	17	17	17	17	17
120	5600	17	17	17	17	17
124	5620	17	17	17	17	17
128	5640	17	17	17	17	17
132	5660	17	17	17	17	17
136	5680	17	17	17	17	17
140	5700	17	17	17	17	17
5725 to 5850 MHz						
149	5745	–	–	–	–	–
153	5765	–	–	–	–	–
157	5785	–	–	–	–	–
161	5805	–	–	–	–	–
165	5825	–	–	–	–	–

Special Country Restrictions

Table 5-5 lists special restrictions for wireless operation in some countries.

Table 5-5 Special Country Restrictions for Wireless Operation

Country	Frequency Bands (GHz)	Regulatory Domain	Special Limitation and Restrictions
South Korea	2.4 and 5	-K	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 ¹ .
Russian Federation	5	-E	End user must limit 5 GHz operation to 5150-5350 and 5650 to 5725 MHz.
United States	5	-A	Indoor use only from 5150-5250 MHz.

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

Changing the Lightweight Access Point Output Power

This section provides instructions for changing the 1100 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 5-6). 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 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 Radios** or **802.11b/g Radios** and a list of associated access points displays.

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 6](#) lists the controller power settings and the corresponding output power levels for these two examples:

- 2.4 GHz (802.11b/g) 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 6 Example of Output Power Levels

Controller Tx Power Settings ¹	Radio Output Power	
	802.11b/g (dBm)	802.11a (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 5-1](#) and [Table 5-2](#).

- For 802.11b/g (see [Table 5-3](#) and [Table 6](#)), the manual controller Tx Power Level setting is 2.
- For 802.11a (see [Table 5-4](#) and [Table 6](#)), the manual controller Tx Power Level setting is 2.

Step 8 Click **Apply**.

Step 9 Close your Internet browser.



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, page 6-2](#)
- [Maximum Power Levels and Antenna Gains, page 6-3](#)
- [Changing the Lightweight Access Point Output Power, page 6-4](#)
- [Power Conversion Table, page 6-6](#)

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 6-1](#).

Table 6-1 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 6-2](#) 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 6-2 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 6-3). 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.

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 6-3 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 6-3 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 6-2 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 6-2).
- The manual controller Tx Power Level setting is 2 for only 802.11g (OFDM) data rates (see Table 6-2).

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 6-4](#) to convert power values from dBm to mW or from mW to dBm.

Table 6-4 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



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, page 7-2](#)
- [Antenna Settings, page 7-5](#)
- [Special Country Restrictions, page 7-7](#)

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 7-1](#) for their regulatory domain.


Note

In [Table 7-1](#), 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 7-1 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 7-2](#) and [Table 7-3](#) for their regulatory domain.


Note

In [Table 7-2](#) and [Table 7-3](#), 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 7-2 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 7-3 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 7-4](#) 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 7-4](#) and [Table 7-5](#).



Note

In [Table 7-4](#) and [Table 7-5](#), 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 7-4 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 7-5 *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 7-6 lists special restrictions for wireless operation in some countries.

Table 7-6 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	<ul style="list-style-type: none"> 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 EIRP¹.
	5	-S	<ul style="list-style-type: none"> 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 7-5). 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.


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 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 7-1](#) and [Table 7-2](#) list the access point maximum output power levels supported for each regulatory domain when the access point is shipped from the factory.

[Table 7-7](#) 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 7-7 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 7-1](#).
3. The maximum output power level obtained from [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*.

