



CISCO CONFIDENTIAL - Draft 1



Cisco Aironet 1250AG Series Access Point Hardware Installation Guide

June 2006

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The following information is for FCC compliance of Class B devices: The equipment described in this manual generates and may radiate radio-frequency energy. If it is not installed in accordance with Cisco's installation instructions, it may cause interference with radio and television reception. This equipment has been tested and found to comply with the limits for a Class B digital device in accordance with the specifications in part 15 of the FCC rules. These specifications are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation.

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You can determine whether your equipment is causing interference by turning it off. If the interference stops, it was probably caused by the Cisco equipment or one of its peripheral devices. If the equipment causes interference to radio or television reception, try to correct the interference by using one or more of the following measures:

- Turn the television or radio antenna until the interference stops.
- Move the equipment to one side or the other of the television or radio.
- Move the equipment farther away from the television or radio.
- Plug the equipment into an outlet that is on a different circuit from the television or radio. (That is, make certain the equipment and the television or radio are on circuits controlled by different circuit breakers or fuses.)

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Overview

Cisco Aironet 1250AG Series Access Points combine mobility, flexibility, and modularity with the enterprise-class features required by networking professionals. With a management system based on Cisco IOS software, the 1250AG series access point is a Wi-Fi certified, wireless LAN transceiver.

The access point supports two radio modules: a 2.4-GHz radio (IEEE 802.11b/g) and a 5-GHz radio (IEEE 802.11a). The modular design enables support for a future IEEE802.11n radio module once the standard is ratified. This modularity helps customers future proof their access point investments.

You can configure the radios separately, using different settings on each. The access point connects wireless and wired networks or is the center point of a stand-alone wireless network. In large installations, wireless users within radio range of an access point can roam throughout a facility while maintaining seamless, uninterrupted access to the network.

You can configure and monitor the access point using the command-line interface (CLI), the browser-based management system, Simple Network Management Protocol (SNMP), or Cisco Structured Wireless-Aware Network (SWAN).

This chapter provides information on the following topics:

- [Hardware Features, page 1-2](#)
- [Network Configuration Examples, page 1-7](#)

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Hardware Features

Key hardware features of the access point include:

- Dual-radio operation with radio modules (see [page 1-4](#))
- Ethernet port (see [page 1-5](#))
- Console port (see [page 1-5](#))
- LEDs, (see [page 1-5](#))
- Multiple power sources (see [page 1-5](#))
- UL 2043 certification (see [page 1-6](#))
- Anti-theft features (see [page 1-6](#))

Refer to [Appendix C, “Access Point Specifications,”](#) for a list of access point specifications.

[Figure 1-2](#) shows the access point with two radio modules.

Figure 1-1 Access Point with 802.11b/g and 802.11a Radio Modules

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Figure 1-2 illustrates the 2.4-GHz radio module.

Figure 1-2 2.4 GHz Radio Module

1	2.4-GHz antenna connector (left)	3	
2	2.4-GHz antenna connector (right/primary)	5	

Figure 1-3 illustrates the 5-GHz radio module.

Figure 1-3 5-GHz Radio Module

1	5-GHz antenna connector (left)	3	
2	5-GHz antenna connector (right/primary)		

CISCO CONFIDENTIAL - Draft 1**Single or Dual-Radio Operation**

The access point supports single or simultaneous dual radio operation using 2.4-GHz 802.11b/g radio and 5-GHz 802.11a radio modules. Each radio uses dual-diversity integrated antennas. A blank module is supported for single radio access point configurations.

The access point supports upgrading of a radio module with a 802.11n radio module (future availability). The 802.11n radio module will be available when the standard is ratified.

The 5-GHz radio incorporates an Unlicensed National Information Infrastructure (UNII) radio transceiver operating in the UNII 5-GHz frequency bands. The 802.11g radio is called *Radio0* and the 802.11a radio is called *Radio1*.

**Note**

In Cisco IOS Release 12.3(8)JA and later, the access point radios are disabled by default, and there is no default SSID. You must create an SSID and enable the radios before the access point allows wireless associations from other devices.

Antennas Supported

Table 1-1 lists the supported access point antennas.

**Caution**

The access point, the antennas, and the power source (power injector or power module) must be located in an indoor environment.

Table 1-1 Supported Antennas

2.4-GHz Antennas	Gain (dBi)	5-GHz Antennas	Gain (dBi)
AIR-ANT5959 diversity ceiling omnidirectional	2	AIR-ANT5135D-R articulated omnidirectional	3.5
AIR-ANT4941 articulated dipole	2.2	AIR-ANT5145V-R diversity ceiling omnidirectional	4.5
AIR-ANT1728 ceiling omnidirectional	5.2	AIR-ANT5160V-R omnidirectional	6
AIR-ANT2506 mast mount omnidirectional	5.2	AIR-ANT5170P-R diversity wall patch directional	7
AIR-ANT3213 diversity pillar omnidirectional	5.2	AIR-ANT5195P-R wall patch directional	9.5
AIR-ANT1729 wall patch directional	6		
AIR-ANT2460P-R patch directional	6		
AIR-ANT2465P-R diversity patch directional	6.5		
AIR-ANT2012 diversity patch directional	6.5		
AIR-ANT3549 patch directional	9		
AIR-ANT2490P-R patch directional	9		
AIR-ANT2410Y-R yagi directional	10		

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Ethernet Port

The auto-sensing Ethernet port (see Figure TBD) accepts an RJ-45 connector, linking the access point to your 10BASE-T, 100BASE-T, or 1000BASE-T Ethernet LAN. The access point can receive power through the Ethernet cable from a power injector, switch, or power patch panel. The Ethernet MAC address is printed on the label on the back of the access point (refer to the “[Locating the Product Serial Number](#)” section on page -viii).

Console Port

The serial console port provides access to the access point’s command-line interface (CLI) using a terminal emulator program. The port is located on the end of the unit (see [Figure 1-2](#)). Use an RJ-45 to DB-9 serial cable to connect your computer’s COM port to the access point’s serial console port. (Refer to [Appendix E, “Console Cable Pinouts,”](#) for a description of the console port pinouts.) Assign the following port settings to a terminal emulator to open the management system pages: 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

**Note**

After completing your configuration changes, you must remove the serial cable from the access point.

LEDs

The access point has three LEDs (see [Figure 1-2](#)) to indicate Ethernet activity, radio activity, and status indications (refer to the “[Checking the Access Point LEDs](#)” section on page 6-2 for additional information).

- The Status LED provides general operating status and error indications.
- The Ethernet LED signals Ethernet traffic on the wired Ethernet LAN and provides Ethernet error indications.
- The Radio LED signals that wireless packets are being transmitted or received over the radio interface and provides error indications.

Power Sources

The access point can receive power from an external power module or from inline power using the Ethernet cable. The access point supports the IEEE 802.3af inline power standard and Cisco CDP Power Negotiation. Using inline power, you do not need to run a power cord to the access point because power is supplied over the Ethernet cable.

**Warning**

This product must be connected to a Power over Ethernet (PoE) IEEE 802.3af compliant power source or an IEC60950 compliant limited power source. Statement 353

The access point supports the following power sources:

- Power module
- Inline power:
 - Cisco Aironet 1250 Series Power Injector ((AIR-PWRINJ3 or AIR-PWRINJ-FIB)
 - An inline power capable switch, such as the Cisco Catalyst 3550 PWR XL, 3560-48PS, 3570-48PS, 4500 with 802.3AF PoE module, or the 6500 with 802.3AF PoE module

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- Other inline power switches supporting the IEEE 802.3af inline power standard

**Note**

Some switches and patch panels might not provide enough power to operate the access point with both 2.4-GHz and 5-GHz radios. At power-up, if the access point is unable to determine that the power source can supply sufficient power, the access point automatically deactivates both radios to prevent an over-current condition. The access point also activates a Status LED low power error indication and creates an error log entry (refer to the [“Checking the Access Point LEDs”](#) section on page 6-2 and the [“Low Power Condition”](#) section on page 6-5).

UL 2043 Certification

The access point has adequate fire resistance and low smoke-producing characteristics suitable for operation in a building's environmental air space, such as above suspended ceilings, in accordance with Section 300-22(c) of the NEC, and with Sections 2-128, 12-010(3) and 12-100 of the *Canadian Electrical Code*, Part 1, C22.1.

**Caution**

Only the fiber-optic power injector (AIR-PWRINJ-FIB) has been tested to UL 2043 for operation in a building's environmental air space; the AIR-PWRINJ3 power injector and the power module are not tested to UL 2043 and should not be placed in a building's environmental air space, such as above suspended ceilings.

Anti-Theft Features

TBD

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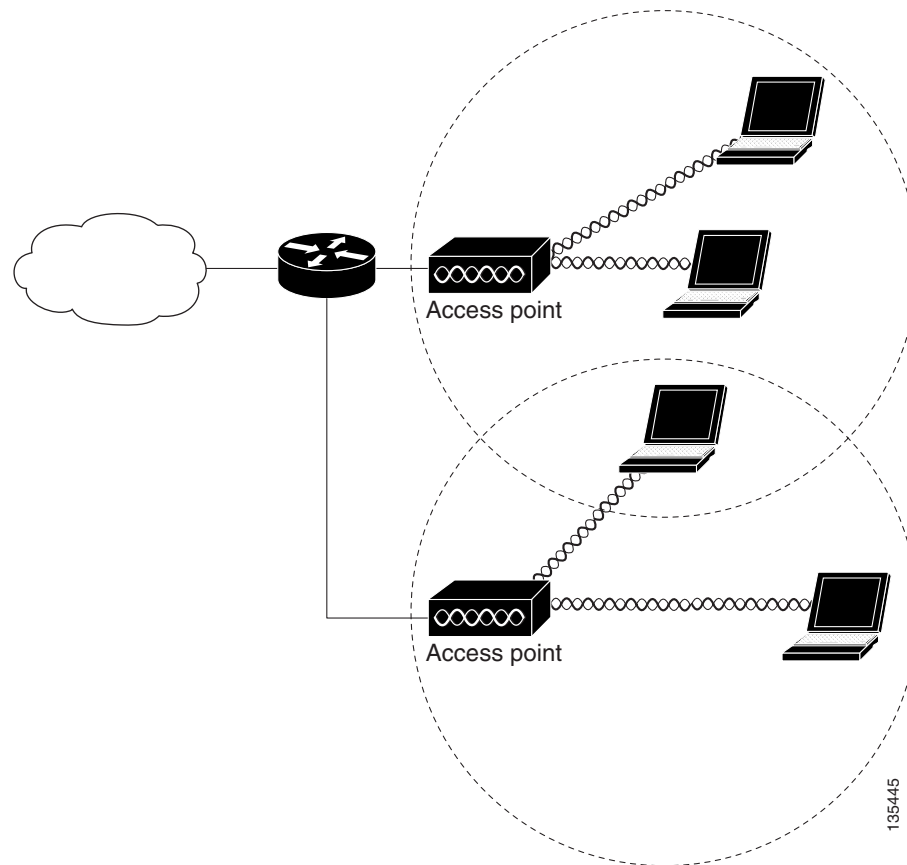
Network Configuration Examples

This section describes the access point's role in three common wireless network configurations. The access point's default configuration is as a root unit connected to a wired LAN or as the central unit in an all-wireless network. The repeater role requires a specific configuration.

Root Unit on a Wired LAN

An access point connected directly to a wired LAN provides a connection point for wireless users. If more than one access point is connected to the LAN, users can roam from one area of a facility to another without losing their connection to the network. [Figure 1-4](#) shows access points acting as root units on a wired LAN.

Figure 1-4 Access Points as Root Units on a Wired LAN



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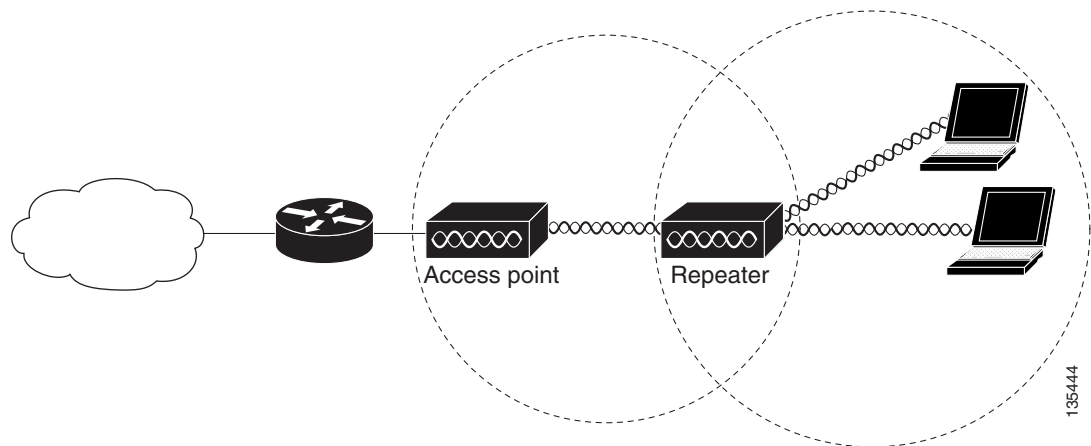
Repeater Unit that Extends Wireless Range

An access point can be configured as a stand-alone repeater to extend the range of your infrastructure or to overcome an obstacle that blocks radio communication. The repeater forwards traffic between wireless users and the wired LAN by sending packets to either another repeater or to an access point connected to the wired LAN. The data is sent through the route that provides the best performance for the client. [Figure 1-5](#) shows an access point acting as a repeater. Consult the *Cisco IOS Software Configuration Guide for Cisco Aironet Access Points* for instructions on setting up an access point as a repeater.

**Note**

Non-Cisco client devices might have difficulty communicating with repeater access points.

Figure 1-5 **Access Point as Repeater**

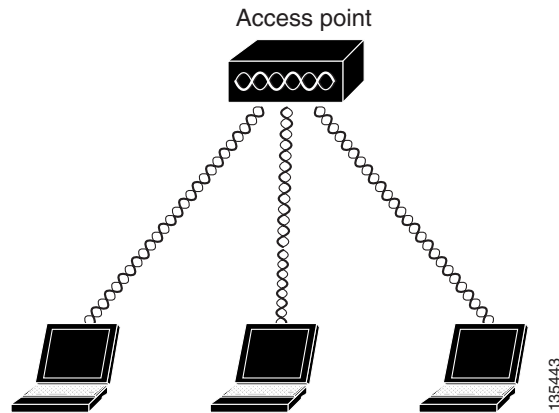


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Central Unit in an All-Wireless Network

In an all-wireless network, an access point acts as a stand-alone root unit. The access point is not attached to a wired LAN; it functions as a hub linking all stations together. The access point serves as the focal point for communications, increasing the communication range of wireless users. [Figure 1-6](#) shows an access point in an all-wireless network.

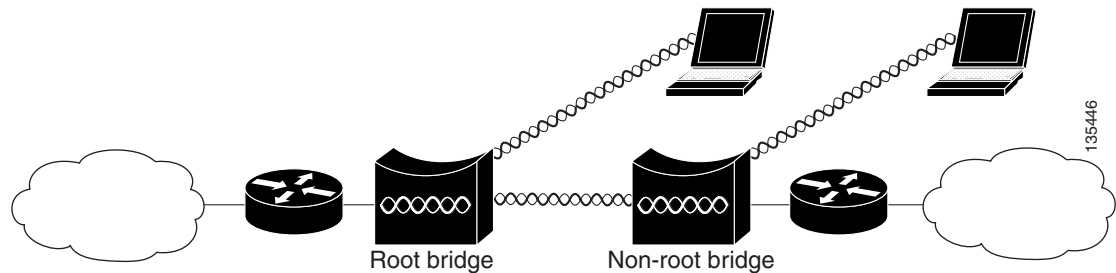
Figure 1-6 Access Point as Central Unit in All-Wireless Network



Bridge Network with Wireless Clients

The access point supports root bridge and non-root bridge roles used to interconnect a remote LAN to the main LAN (see [Figure 1-7](#)). The bridge units can also support wireless clients.

Figure 1-7 Root Bridge and Non-root Bridge with Clients



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Workgroup Bridge Network

The access point supports a workgroup bridge role to interconnect remote Ethernet workstations to the main LAN. The workgroup bridge can communicate with an access point (see [Figure 1-8](#)) or with a bridge (see [Figure 1-9](#)).

Figure 1-8 Workgroup Bridge Communicating with an Access Point

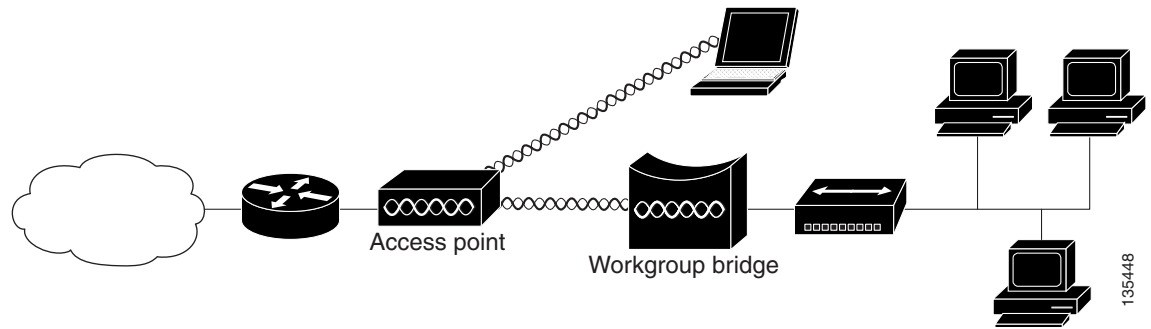
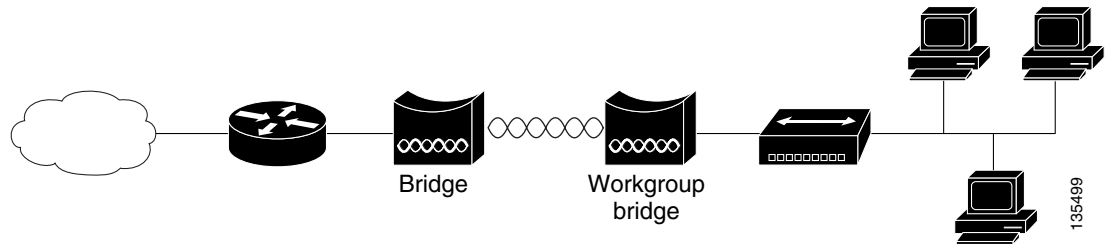


Figure 1-9 Workgroup Bridge Communicating with a Bridge

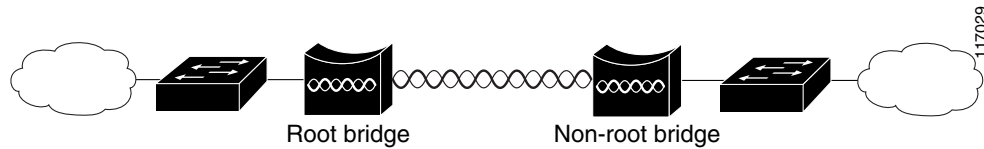


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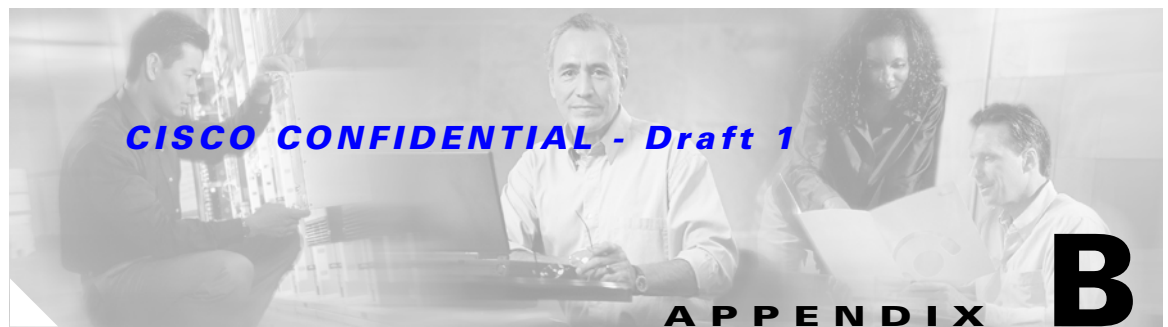
Point-to-Point Bridge Configuration

In a point-to-point bridge configuration, two bridges interconnect two LAN networks using a wireless communication link (see [Figure 1-10](#)). The bridge connected to the main LAN network is classified as a root bridge and the other bridge is classified as a non-root bridge.

Figure 1-10 **Point-to-Point Bridge Configuration**



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Declarations of Conformity and Regulatory Information

This appendix provides declarations of conformity and regulatory information for the Cisco Aironet 1250 Series Access Point and the Cisco Aironet 1250 Series Lightweight Access Point.

This appendix contains the following sections:

- [Manufacturers Federal Communication Commission Declaration of Conformity Statement, page B-2](#)
- [Department of Communications—Canada, page B-3](#)
- [European Community, Switzerland, Norway, Iceland, and Liechtenstein, page B-3](#)
- [Declaration of Conformity for RF Exposure, page B-6](#)
- [Guidelines for Operating Cisco Aironet Access Points in Japan, page B-7](#)
- [Administrative Rules for Cisco Aironet Access Points in Taiwan, page B-8](#)
- [Declaration of Conformity Statements, page B-10](#)
- [Declaration of Conformity Statements for European Union Countries, page B-10](#)

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Manufacturers Federal Communication Commission Declaration of Conformity Statement

**Models**

AIR-RM23A-A-K9

AIR-RM23G-A-K9

Certification Numbers

LDK102059

LDK102060

Manufacturer:

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA

This device complies with Part 15 rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and radiates radio frequency energy, and if not installed and used in accordance with the instructions, may cause harmful interference. However, there is no guarantee that interference will not occur. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician.

**Caution**

The Part 15 radio device operates on a non-interference basis with other devices operating at this frequency when using the integrated antennas. Any changes or modification to the product not expressly approved by Cisco could void the user's authority to operate this device.

CISCO CONFIDENTIAL - Draft 1**Caution**

Within the 5.15 to 5.25 GHz band (5 GHz radio channels 34 to 48) the U-NII devices are restricted to indoor operations to reduce any potential for harmful interference to co-channel Mobile Satellite System (MSS) operations.

Department of Communications—Canada

Models

AIR-RM23A-A-K9

AIR-RM23G-A-K9

Certification Numbers

2461B-102059

2461B-102060

Canadian Compliance Statement

This Class B Digital apparatus meets all the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte les exigences du Règlement sur le matériel brouilleur du Canada.

This device complies with Class B Limits of Industry Canada. Operation is subject to the following two conditions:

1. This device may not cause harmful interference, and
2. This device must accept any interference received, including interference that may cause undesired operation.

Cisco Aironet 2.4-GHz Access Points are certified to the requirements of RSS-210 for 2.4-GHz spread spectrum devices, and Cisco Aironet 54-Mbps, 5-GHz Access Points are certified to the requirements of RSS-210 for 5-GHz spread spectrum devices. The use of this device in a system operating either partially or completely outdoors may require the user to obtain a license for the system according to the Canadian regulations. For further information, contact your local Industry Canada office.

European Community, Switzerland, Norway, Iceland, and Liechtenstein

Models

AIR-RM23A-E-K9

AIR-RM23G-E-K9

CISCO CONFIDENTIAL - Draft 1**Declaration of Conformity with Regard to the R&TTE Directive 1999/5/EC**

Česky [Czech]:	Toto zařízení je v souladu se základními požadavky a ostatními odpovídajícími ustanoveními Směrnice 1999/5/EC.
Dansk [Danish]:	Dette udstyr er i overensstemmelse med de væsentlige krav og andre relevante bestemmelser i Direktiv 1999/5/EF.
Deutsch [German]:	Dieses Gerät entspricht den grundlegenden Anforderungen und den weiteren entsprechenden Vorgaben der Richtlinie 1999/5/EU.
Eesti [Estonian]:	See seade vastab direktiivi 1999/5/EÜ oluliste nõuetele ja teistele asjakohastele sätetele.
English:	This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
Español [Spanish]:	Este equipo cumple con los requisitos esenciales así como con otras disposiciones de la Directiva 1999/5/CE.
Ελληνική [Greek]:	Αυτός ο εξοπλισμός είναι σε συμμόρφωση με τις ουσιαστικές απαιτήσεις και άλλες σχετικές διατάξεις της Οδηγίας 1999/5/EC.
Français [French]:	Cet appareil est conforme aux exigences essentielles et aux autres dispositions pertinentes de la Directive 1999/5/EC.
Íslenska [Icelandic]:	Þetta tæki er samkvæmt grunnkröfum og öðrum viðeigandi ákvæðum Tilskipunar 1999/5/EC.
Italiano [Italian]:	Questo apparato é conforme ai requisiti essenziali ed agli altri principi sanciti dalla Direttiva 1999/5/CE.
Latviešu [Latvian]:	Šī iekārta atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]:	Šis įrenginys tenkina 1999/5/EB Direktyvos esminius reikalavimus ir kitas šios direktyvos nuostatas.

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Nederlands [Dutch]:	Dit apparaat voldoet aan de essentiële eisen en andere van toepassing zijnde bepalingen van de Richtlijn 1999/5/EC.
Malti [Maltese]:	Dan l-apparat huwa konformi mal-htigiet essenzjali u l-provedimenti l-oħra rilevanti tad-Direttiva 1999/5/EC.
Magyar [Hungarian]:	Ez a készülék teljesíti az alapvető követelményeket és más 1999/5/EK irányelvben meghatározott vonatkozó rendelkezéseket.
Norsk [Norwegian]:	Dette utstyret er i samsvar med de grunnleggende krav og andre relevante bestemmelser i EU-direktiv 1999/5/EF.
Polski [Polish]:	Urządzenie jest zgodne z ogólnymi wymaganiami oraz szczególnymi warunkami określonymi Dyrektywą UE: 1999/5/EC.
Português [Portuguese]:	Este equipamento está em conformidade com os requisitos essenciais e outras provisões relevantes da Directiva 1999/5/EC.
Română [Romanian]:	Acest echipament este în conformitate cu cerințele esențiale și cu alte prevederi relevante ale Directivei 1999/5/EC.
Slovensko [Slovenian]:	Ta naprava je skladna z bistvenimi zahtevami in ostalimi relevantnimi pogoji Direktive 1999/5/EC.
Slovensky [Slovak]:	Toto zariadenie je v zhode so základnými požiadavkami a inými príslušnými nariadeniami direktív: 1999/5/EC.
Suomi [Finnish]:	Tämä laite täyttää direktiivin 1999/5/EY olennaiset vaatimukset ja on siinä asetettujen muiden laitetta koskevien määräysten mukainen.
Svenska [Swedish]:	Denna utrustning är i överensstämmelse med de väsentliga kraven och andra relevanta bestämmelser i Direktiv 1999/5/EC.

142730

For 2.4 GHz radios, the following standards were applied:

- Radio: EN 300.328-1, EN 300.328-2
- EMC: EN 301.489-1, EN 301.489-17
- Safety: EN 60950



Note

This equipment is intended to be used in all EU and EFTA countries. Outdoor use may be restricted to certain frequencies and/or may require a license for operation. For more details, contact Cisco Corporate Compliance.

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For 54 Mbps, 5 GHz access points, the following standards were applied:

- Radio: EN 301.893
- EMC: EN 301.489-1, EN 301.489-17
- Safety: EN 60950

The following CE mark is affixed to the access point with a 2.4 GHz radio and a 54 Mbps, 5 GHz radio:



Declaration of Conformity for RF Exposure

The radio has been found to be compliant to the requirements set forth in CFR 47 Sections 2.1091, and 15.247 (b) (4) addressing RF Exposure from radio frequency devices as defined in Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields. The equipment should be installed more than 20 cm (7.9 in.) from your body or nearby persons.

The access point must be installed to maintain a minimum 20 cm (7.9 in.) co-located separation distance from other FCC approved indoor/outdoor antennas used with the access point. Any antennas or transmitters not approved by the FCC cannot be co-located with the access point. The access point's co-located 2.4 GHz and 5 GHz integrated antennas support a minimum separation distance of 8 cm (3.2 in.) and are compliant with the applicable FCC RF exposure limit when transmitting simultaneously.

**Note**

Dual antennas used for diversity operation are not considered co-located.

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Guidelines for Operating Cisco Aironet Access Points in Japan

This section provides guidelines for avoiding interference when operating Cisco Aironet access points in Japan. These guidelines are provided in both Japanese and English.

Japanese Translation

この機器の使用周波数帯では、電子レンジ等の産業・科学・医療用機器のほか工場の製造ライン等で使用されている移動体識別用の構内無線局（免許を要する無線局）及び特定小電力無線局（免許を要しない無線局）が運用されています。

- 1 この機器を使用する前に、近くで移動体識別用の構内無線局及び特定小電力無線局が運用されていないことを確認して下さい。
- 2 万一、この機器から移動体識別用の構内無線局に対して電波干渉の事例が発生した場合には、速やかに使用周波数を変更するか又は電波の発射を停止した上、下記連絡先にご連絡頂き、混信回避のための処置等(例えば、パーティションの設置など)についてご相談して下さい。
- 3 その他、この機器から移動体識別用の特定小電力無線局に対して電波干渉の事例が発生した場合など何かお困りのことが起きたときは、次の連絡先へお問い合わせ下さい。

連絡先 : 03-5549-6500

43768

English Translation

This equipment operates in the same frequency bandwidth as industrial, scientific, and medical devices such as microwave ovens and mobile object identification (RF-ID) systems (licensed premises radio stations and unlicensed specified low-power radio stations) used in factory production lines.

1. Before using this equipment, make sure that no premises radio stations or specified low-power radio stations of RF-ID are used in the vicinity.
2. If this equipment causes RF interference to a premises radio station of RF-ID, promptly change the frequency or stop using the device; contact the number below and ask for recommendations on avoiding radio interference, such as setting partitions.
3. If this equipment causes RF interference to a specified low-power radio station of RF-ID, contact the number below.

Contact Number: 03-5549-6500

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Administrative Rules for Cisco Aironet Access Points in Taiwan

This section provides administrative rules for operating Cisco Aironet access points in Taiwan. The rules are provided in both Chinese and English.

Access Points with IEEE 802.11a Radios

Chinese Translation

本設備限於室內使用

English Translation

This equipment is limited for indoor use.

CISCO CONFIDENTIAL - Draft 1**All Access Points****Chinese Translation****低功率電波輻射性電機管理辦法**

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信法規定作業之無線電信。

低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

127048

English Translation**Administrative Rules for Low-power Radio-Frequency Devices****Article 12**

For those low-power radio-frequency devices that have already received a type-approval, companies, business units or users should not change its frequencies, increase its power or change its original features and functions.

Article 14

The operation of the low-power radio-frequency devices is subject to the conditions that no harmful interference is caused to aviation safety and authorized radio station; and if interference is caused, the user must stop operating the device immediately and can't re-operate it until the harmful interference is clear.

The authorized radio station means a radio-communication service operating in accordance with the Communication Act.

The operation of the low-power radio-frequency devices is subject to the interference caused by the operation of an authorized radio station, by another intentional or unintentional radiator, by industrial, scientific and medical (ISM) equipment, or by an incidental radiator.

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Declaration of Conformity Statements

All the Declaration of Conformity statements related to this product can be found at the following URL:

<http://www.ciscofax.com>

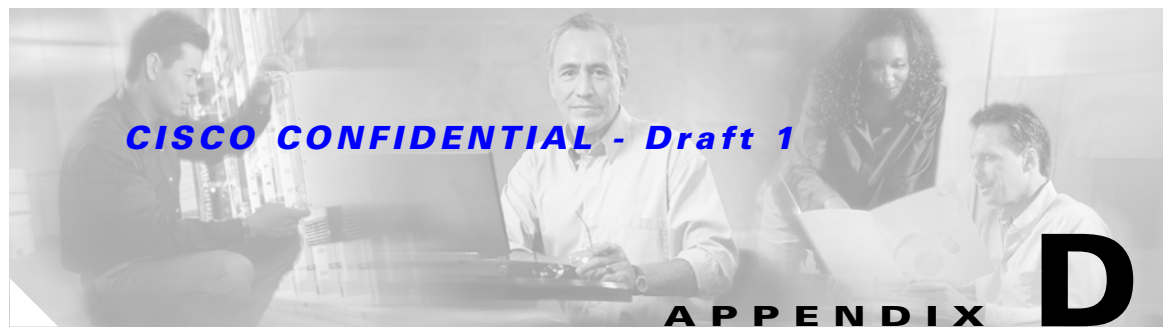
Declaration of Conformity Statements for European Union Countries

The Declaration of Conformity statement for the European Union countries is listed below:

----- TBD-----

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Channels and Power Levels

This appendix 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.

The following topic is covered in this appendix:

- [Channels and Maximum Power Levels, page D-2](#)
- [External Antenna Settings, page D-5](#)

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Channels and Maximum Power Levels

IEEE 802.11b/g (2.4-GHz Band) on Single Radio Models

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 1](#) indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains:

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

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

1. Indicates the power level settings shipped from the factory. You might need to reset the maximum power levels used with your external antenna (see [Table D-4](#)).

CISCO CONFIDENTIAL - Draft 1**IEEE 802.11b/g (2.4-GHz Band) on Dual Radio Models**

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 D-2](#) indicates the channel identifiers, channel center frequencies, and maximum power levels for each channel allowed by the regulatory domains:

Table D-2 Channels and Maximum Conducted Power for the 802.11b/g Radio with up to 10 dBi Antennas

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

IEEE 802.11a (5-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 D-3](#) indicates the channel identifiers, channel center frequencies, and maximum power levels for each IEEE 802.11a 20-MHz-wide channel allowed by the regulatory domains:

CISCO CONFIDENTIAL - Draft 1**Table D-3 Channels and Maximum Conducted Power for IEEE 802.11a Radio with up to 9.5 dBi Antennas**

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

1. Indicates the power level settings shipped from the factory. You might need to reset the maximum power levels used with your external antennas (see [Table D-5](#)).
2. Indicated frequencies require DFS (Uniform spreading not required for the -P domain)

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External Antenna Settings

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 D-4](#).

Table D-4 Maximum Power Levels for the 802.11b/g Radio in the (–C), (–E), (–K), (–I), and (–S) Regulatory Domains

Channel ID	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	–	–	–	–	–	–

CISCO CONFIDENTIAL - Draft 1**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 D-5](#).

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

Channel ID	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	—	—	—	—	—