



GETTING STARTED GUIDE



Cisco Aironet 1552S Outdoor Mesh Access Points INCLUDING LICENSE AND WARRANTY

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1 About this Guide

This guide is designed to familiarize yourself with your Cisco Aironet 1552S Outdoor Mesh Access Point and prepare it for use in your wireless network. Due to the complexity and number of product options available, this guide does not provide detailed mounting and configuration instructions. Those instructions can be found in the following documents:

- *Cisco Mesh Networking Solution Deployment Guide*
- *Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide*

Detailed configuration information can also be found in the Cisco wireless LAN controller documentation for the controller and software release you are using. These and other documents, such as the Cisco Aironet 1552S Data Sheet, are available on Cisco.com.

FCC Safety Compliance Statement

The FCC with its action in ET Docket 96-8 has adopted a safety standard for human exposure to radio frequency (RF) electromagnetic energy emitted by FCC certified equipment. When used with approved Cisco Aironet antennas, Cisco Aironet products meet the uncontrolled environmental limits found in OET-65 and ANSI C95.1, 1991. Proper installation of this radio according to the instructions found in this manual will result in user exposure that is substantially below the FCC recommended limits.

Declaration of Conformity for RF Exposure

This access point product has been found to be compliant to the requirements set forth in CFR 47 Section 1.1307 addressing RF Exposure from radio frequency devices as defined in Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

Use is permitted with antenna gain not exceeding 4 dBi for 802.11 and 14 dBi for the sensor (802.15.4) radio in the 2.4-GHz band, and 7 dBi in the 5-GHz band, as described in filing, with a minimum separation distance of 20 cm between the antenna and all persons during normal operation.

Only antennas provided by Cisco for use with the product should be installed. The use of any other antennas may cause damage to the access points or violate regulatory emission limits and will not be supported by Cisco.

Declaration of Conformity with Regard to the EU Directive 1999/5/EC (R&TTE Directive)

This declaration is only valid for configurations (combinations of software, firmware and hardware) provided and/or supported by Cisco Systems. The use software or firmware not supported/provided by Cisco Systems may result that the equipment is no longer compliant with the regulatory requirements.

General Safety Guidelines

Warnings

Safety warnings appear throughout this guide in procedures that may harm you if performed incorrectly. A warning symbol precedes each warning statement. The warnings below are general warnings that are applicable to the entire guide. Specific warnings are included in the sections to which they apply.

Translated versions of the safety warnings in this guide are provided in the *Safety Warnings for Cisco Aironet 1550 Series Outdoor Mesh Access Points* document that accompanies this guide. The translated warnings are also in Appendix A of the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide*, which is available at cisco.com.



Warning

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

Statement 1071

SAVE THESE INSTRUCTIONS



Warning

This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

Statement 366



Warning

Read the installation instructions before connecting the system to the power source.

Statement 1004

**Warning**

Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

2 Introduction to the Access Point

The Cisco Aironet 1552S Outdoor Mesh Access Point (hereafter called the *access point* or *AP*) is a ruggedized outdoor access designed for service in mesh networks in hazardous locations. It contains an ISA100.11a sensor backbone router to communicate with wireless sensors, and the access point radios provide backhaul service to carry sensor data to your network. The 1552S access point leverages 802.11n and 802.15.4 technology with integrated radio and internal/external antennas.

The 1552S outdoor platform consists of Multiple Input Multiple Output (MIMO) WLAN radios and with integrated spectrum intelligence (CleanAir). CleanAir provides full 11n data rates while detecting, locating, classifying and mitigating radio frequency (RF) interference to provide the best client experience possible. CleanAir technology on the outdoor 11n platform mitigates WiFi and non-WiFi interference on 2.4 GHz radios.

The 1552S access point offers multi-band 2.4-GHz and 5-GHz configurations with an option to configure access and backhaul radios. The radios are called 2.4-GHz MIMO radios and 5-GHz MIMO radios. The 2.4-GHz radios are used primarily for local access and the 5-GHz radios for both local access and wireless backhaul in the mesh mode.

The 1552S access point supports the modularity of the 1520 series and allows flexibility in radio configuration. In addition to full interoperability with 802.11n clients, the 1552S access point interoperates with legacy clients and offers enhanced backhaul performance.

The access point is a standalone unit that can be wall or tower mounted. The access point can also operate as a relay node for other access points not directly connected to a wired network. Intelligent wireless routing is provided by the Adaptive Wireless Path Protocol (AWPP). This enables each access point to identify its neighbors and intelligently choose the optimal path to the wired network by calculating the cost of each path in terms of signal strength and the number of hops required to get to a controller.

The access point is configured, monitored, and operated through a Cisco wireless LAN controller (WLC), referred to as a *controller* in this document. The WLC is described in the appropriate *Cisco Wireless LAN Controller Configuration Guide*. The *Cisco Mesh Networking Solution Deployment Guide* describes how to plan and initially configure the Cisco mesh network, which supports wireless point-to-multipoint mesh deployments. The controllers use a browser-based management system, a

command-line interface (CLI), or the Cisco Network Control System (NCS) network management system to manage the controller and the associated access points. The access point is compliant with Wi-Fi Protected Access 2 (WPA2) and employs hardware-based Advanced Encryption Standard (AES) encryption between wireless nodes to provide end-to-end security.

3 Unpacking the Access Point

Follow these steps to unpack the access point:

-
- Step 1** Open the shipping container and carefully remove the contents.
 - Step 2** Return all packing materials to the shipping container and save it.
 - Step 3** Check each item for damage. If any item is damaged, notify your authorized Cisco sales representative.
-

Package Contents

Each access point package contains the following items:

- One access point
- Three liquid-tight adapters (used only for non-hazardous locations: AC or DC power input and Ethernet backhaul)
- Two-pin DC power connector for 12 VDC power
- Ground lug (Panduit PLCD6-10A-L) and screws with lock washers
- *Cisco Aironet 1550 Series Outdoor Mesh Access Point Mounting Instructions*
- *Translated Safety Warnings for Cisco Aironet 1550 Series Outdoor Mesh Access Points*
- A printed copy of this guide

Optional Equipment

Depending on what you ordered, the following optional equipment may be part of your shipment:

- Three Dual-Band Omnidirectional Antennas (AIR-ANT2547V-N-HZ=)
- Two Single-Band Omnidirectional Antennas (AIR-ANT2450V-N-HZ=)
- Pole mount kit (AIR-ACCPMK1550=)
- Band installation tool for pole mount kit (AIR-BAND-INS-TL=)

- 100BASE-BX10-U rugged SFP (GLC-FE-100BX-URGD=), includes two fiber reels
- 1000BASELX single-mode Rugged SFP (GLC-LX-SM-7GD=)
- 1000BASESX multimode Rugged SFP (GLC-SX-MM-2GD=)
- Third-party lightning arrestors as required by local authorities

4 Configurations

There are two powering options for the 1552S AP. The AP can be ordered with either an AC (100-240 V) power input or 24 V DC or 12 V DC power input, depending on the model. The 802.11n MIMO radios operate in the 2.4 GHz and 5 GHz unlicensed spectrum. The exact channels are set by local regulatory agencies. The 802.15.4 ISA100 radio also operates in the 2.4 GHz spectrum. For more information, see [“Regulatory Domains”](#) below.

The configurations for the 1552S are:

- AIR-CAP1552SA-x-K9 2.4 GHz b/g/n, 5-GHz a/n MIMO, w/Honeywell ISA100.11a, AC-powered Outdoor Mesh AP
- AIR-CAP1552SD-x-K9 2.4 GHz b/g/n, 5-GHz a/n MIMO, w/Honeywell ISA100.11a, DC-powered Outdoor Mesh AP

For information on the regulatory domains (shown above as “x”) see [“Regulatory Domains”](#) below.

Regulatory Domains

The 1550 series supports the following regulatory domains (shown as “x” in the model numbers):

- -A
- -C
- -E
- -K
- -M
- -N
- -Q
- -R
- -S
- -T

For the latest details and accurate listing of country homologation, refer to “Table 3. 802.11abgn Mesh Access Points” on the Wireless-LAN-Compliance-Status page at this URL:

http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aec80537b6a.html#wp9005628

5 Becoming Familiar With the Access Point

The following illustrations show identify the access point connections. Before you begin the installation process, use these illustrations to familiarize yourself with the access point.

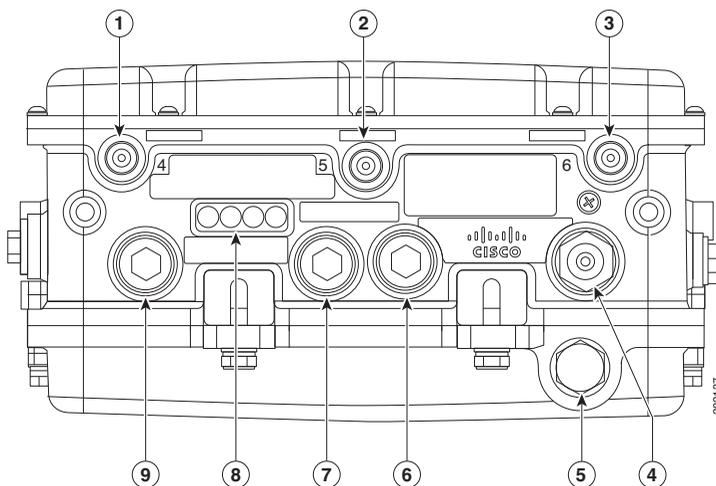


Note

The illustrations show all available connections for the configuration ordered. Unused connections are capped to ensure the watertight integrity of the access point. Liquid tight connectors are provided for all ports, which can be installed prior to or after deploying the access point.

Figure 1 and Figure 2 shows the access point bottom and side connectors for model AIR-CAP1552Sy-x-K9. Figure 3 shows the access point right side connectors for all models.

Figure 1 Access Point Bottom Connectors

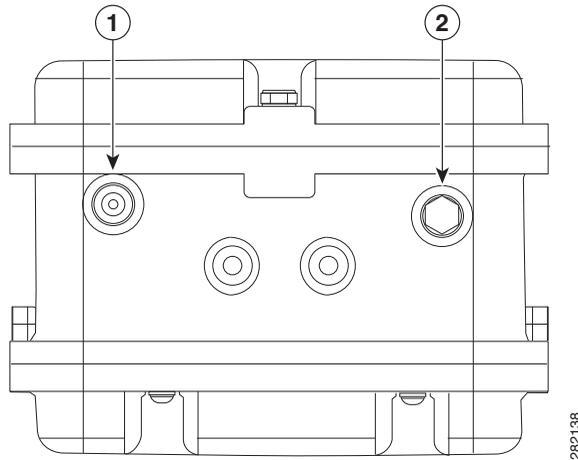


1	Antenna port 4 (ISA100.11a)	6	will not be seen (remove from table)
2	will not be seen (remove from table)	7	PoE-out port
3	Antenna port 6 (ISA100.11a)	8	LEDs (Status, Up Link, RF1, RF2)
4	AC (1552SA) or 24 VDC (1552SD) power input port and fiber backhaul port	9	Ethernet
5	Not used		IR window



Note Antenna ports 1, 2 and 3 are not shown in [Figure 1](#). These ports are for the 802.11n radio antennas.

Figure 2 Access Point Left Side Connectors



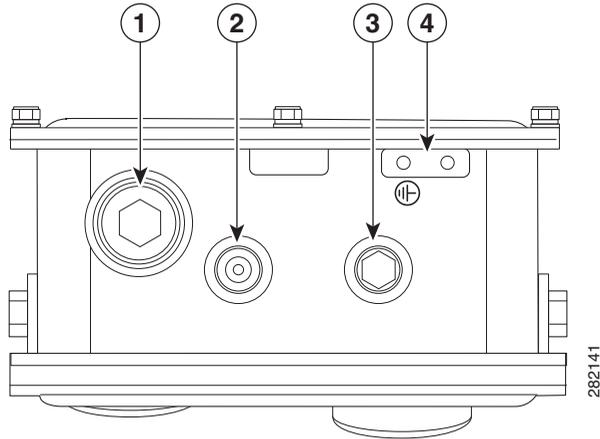
1	Console Port	2	Not used
----------	--------------	----------	----------



Note The console port is used for temporary console access for initial configuration or troubleshooting only. It cannot remain connected during normal use.

Figure 3 shows the access point DC power connector and ground lug.

Figure 3 Access Point DC Power Connector and Ground Lug (All Models)



1	12-VDC power port	3	Bracket mounting nut
2	Bracket mounting hole	4	Ground lug location

Radio Operation

The 1552 access point 802.11b/g/n radio is used primarily for local access and its 802.11a/g/n radio for wireless backhaul in the mesh.

The 2-GHz b/g/n radio operates in 2.4 GHz ISM band. It supports channels 1-11 in US, 1-13 in Europe, and 1-13 in Japan. It has two transmitters with a maximum total output power of 25dBm for 802.11b/g/n operation. Output power is configurable to 5 levels. It has three receivers that enables maximum-ratio combining (MRC).

The 5-GHz a/n radio operates in the UNII-2 band (5.25 - 5.35 GHz), UNII-2 Extended/ETSI band (5.47 - 5.725 GHz), and the upper ISM band (5.725 - 5.850 GHz). It has two transmitters with a maximum total output power of 26 dBm for UNII-2 and Extended/ETSI bands for the A-domain. The total maximum output power for the upper ISM band is 28 dBm for A-domain. Power settings will change depending on the regulatory domain. Output power is configurable for 5 power levels in 3-dB steps. Its three receivers enables maximum-ratio combining (MRC).

External Antenna Option



Warning

In order to comply with radio frequency (RF) exposure limits, the antennas for this product should be positioned no less than 20cm from your body or nearby persons.

Statement 339



Warning

Do not locate the antenna near overhead power lines or other electric light or power circuits, or where it can come into contact with such circuits. When installing the antenna, take extreme care not to come into contact with such circuits, because they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54). Statement 1052



Warning

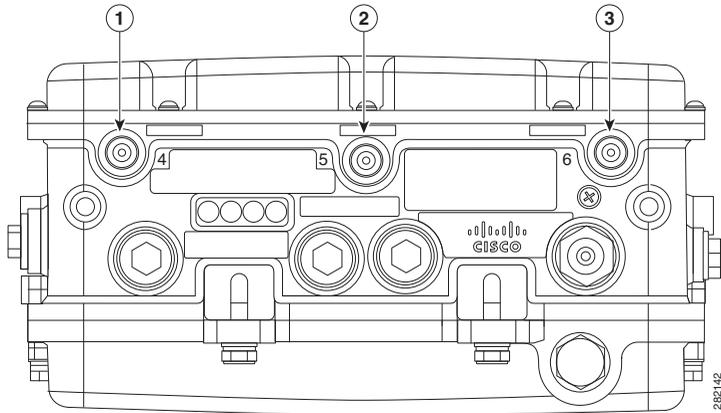
Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Statement 1030

To support the 802.11n radio, the 1552S access points are equipped with three N-type radio frequency (RF) connectors (antenna ports 1, 2, and 3) on the top of the unit for external antennas with multiple input, multiple output (MIMO) operation, as shown in [Figure 4](#). When using the Cisco Aironet AIR-ANT2547V-N-HZ Dual-Band Omnidirectional Antenna, the 2.4- and 5-GHz antennas connect directly to the access point, as shown in [Figure 5](#). The Cisco dual-band omnidirectional antennas use vertical polarization. The antenna has 5-dBi gain at 2.4 GHz and 7-dBi gain at 5 GHz.

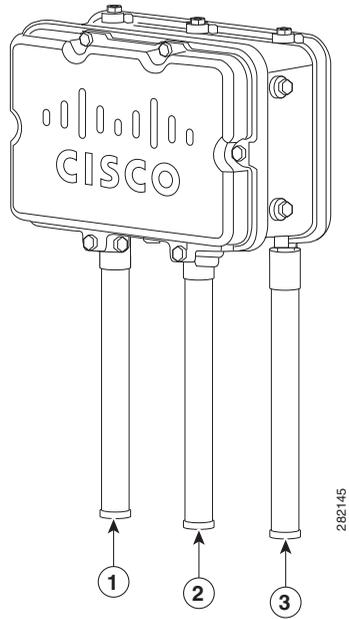
To support the 802.15.4 radio, the 1552S access points are equipped with two N-type radio frequency (RF) connectors (antenna ports 4 and 5) on the bottom of the unit for external antennas with diversity inputs, as shown in [Figure 4](#). When using the Cisco Aironet AIR-ANT2450V-N-HZ 5-dBi Omnidirectional Antenna for Hazardous Locations, the 2.4-GHz antennas connect directly to the access point, as shown in [Figure 5](#). The Cisco 2.4-GHz omnidirectional antennas use vertical polarization and have 5-dBi gain.

Figure 4 Access Point External Antenna Connectors - Model AP-CAP1552Sy-x-K9



1	Antenna port 4 (ISA100.11a)	3	Antenna port 6 (ISA100.11a)
2	will not be seen (remove from table)		

Figure 5 Access Point Dual-Band Omnidirectional Antennas-Installed Only on Models AIR-CAP1552Sy-x-K9



1	Antenna connected to antenna port 4 (Type-N connector) (TX/RX)	3	Antenna connected to antenna port 6 (Type-N connector) (TX/RX)
2	Antenna connected to antenna port 5 (Type-N connector) (RX only)		

Note

The FCC limits the amount of power this device can transmit. Power transmitted is a combination of the amplification of the signal and the antenna gain. The access point has been designed to operate with the Cisco provided antennas.

Power

1	Integrated Low-Profile Dual-Band 2.4/5 GHz Omni Antenna Array Unit - PID AIR-ANT2547V-N	3	Antenna element (TX/RX)
2	Antenna element (RX only)	4	Antenna element (TX/RX)



Warning

Installation of the equipment must comply with local and national electrical codes.

Statement 1074



Warning

This equipment must be externally grounded using a customer-supplied ground wire before power is applied. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 366



Warning

Do not work on the system or connect or disconnect cables during periods of lightning activity. Statement 1001

The access point supports the following power sources:

- AC power—100 to 240 VAC, 47 to 63 Hz (1552SA only)
- 24 VDC power (1552SD only)
- 12 VDC power (1552SA and 1552SD)



Warning

Connect the unit only to DC power source that complies with the Safety Extra-Low Voltage (SELV) requirements in IEC 60950 based safety standards Statement 1033

The access point can be connected to more than one power source. The access point detects available input sources and switches to the preferred power source using the following prioritization:

For AIR-CAP1552SA-x-K9, the powering priority is the following:

1. 100-240 VAC
2. 12 VDC

For AIR-CAP1552SD-x-K9, the powering priority is the following:

1. 24 VDC (19-30 V range)
2. 12 VDC



Warning

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028



Warning

To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. Statement 1023



Caution

When the access point is installed outdoors or in a wet or damp location, the AC branch circuit that is powering the access point should be provided with ground fault protection (GFCI), as required by Article 210 of the National Electrical Code (NEC).



Note

The liquid-tight adapters must be used on all input/output connections to the access point where the installation is a non-hazardous location (and conduit is not used). These liquid-tight adapters are listed in the [“Package Contents” section on page 5](#).

Ethernet (PoE) Ports

The access point supports an Ethernet uplink port and a PoE out port (PoE-Out). The access point Ethernet uplink port uses an RJ-45 connector (with weatherproofing) to link the access point to the 10BASE-T, 100BASE-T, or 1000BASE-T network. The Ethernet cable is used to send and receive Ethernet data. The minimum length of this cable must be not less than 10 feet (3 meters).

The access point PoE-Out Ethernet port uses an RJ-45 connector (with weatherproofing) to provide LAN connectivity and IEEE 802.3af power to a peripheral customer device, such as a camera. The Ethernet MAC addresses are printed on a label on the bottom of the access point under the LEDs.

**Tip**

The access point senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

Fiber Option

**Warning**

Class 1 laser product. Statement 1008

The factory-orderable fiber option provides a fiber input and output capability. Fiber data is transmitted and received over a single-strand fiber cable, which is connected to the access point using these small-factor pluggable (SFP) modules:

- 100BASE-BX10-U fiber Rugged SFP module
- 1000BASELX single-mode Rugged SFP module
- 1000BASESX multimode Rugged SFP module

**Note**

SFP modules are not hot-swappable.

One fiber connection is available on the 1552S access point. The fiber connection is shared through the same port as the AC or 24 VDC power (shown on [Figure 1](#)). Client data is passed to the network controller through the fiber connection via a fiber-capable switch. For detailed installation information about the fiber option, see the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide*. Configuration information can be found in the controller configuration guide of the controller you are using.

6 ISA100 Backbone Router and Infrared-based Security

The ISA100.11a standard requires all the devices to be authenticated before joining the network. The Cisco 1552S access point supports authentication key distribution mechanism to the internal Backbone Router (BBR) through the Infrared (IR) port. This mechanism is secure, since it requires the user to be physically located near the device to authenticate it. The key is transmitted to the AP by a provisioning device, typically a handheld Personal Digital Assistant (PDA) with Windows Mobile 5.0 and IR capability.

The authentication keys are generated and managed by the wireless sensor device manager (WDM). The PDA is used to upload the authentication keys from the WDM to the Provisioning Device handheld and to download keys to the BBR using IR media. The keys are encrypted when distributed

over the network. Once a key is deployed to a BBR, it is validated by the WDM before the BBR can join the wireless sensor network. Key deployment is a one-time activity; that is, the devices can rejoin the network after power down or after any other service interruptions without rekeying the device.

Once the BBR is authenticated, it joins the sensor network. The PDA can be used to monitor the status of the authenticated device and the handheld displays status such as Discover, Secure, Joined, or Not Joined. Other BBR parameters can be read and set through the PDA. If the BBR is not joining the network, its parameter data can be read by the PDA and used to aid in troubleshooting.

Table 1 indicates the status of the BBR using the LEDs in the IR window.

Table 1

LED	Description
Power LED (Green)	ON = BBR Board has power OFF = BBR Board has no power
Status LED (Green/Yellow)	BLINK GREEN (1 sec. period): Indicates the overall health and status of the BBR Board. BLINK YELLOW: Indicates that the data is receiving or transmitting data over the IR port.
Comm LED (Green/Yellow)	Indicates Ethernet link activity. <ul style="list-style-type: none"> • STEADY GREEN: The LED is steady when there is a valid Ethernet link but no data activity. • BLINK GREEN: The LED blinks when there is data activity on the Ethernet link. • YELLOW: Unsupported communication mode.

7 Network Deployment Examples

The access point is a wireless device designed for wireless client access and point-to-point bridging, point-to-multipoint bridging, and point-to-multipoint mesh wireless connectivity. The access point provides 5-GHz backhaul capability to link with another access point to reach a wired network connection or to provide repeater operations for other access points.

The access point plays two primary radio roles: a root access point (hereafter called a *RAP*) or a mesh (non-root) access point (hereafter called a *MAP*), which is the default role of all access points. When the access point has a fiber or wired Ethernet connection to the controller (through a switch), the radio role is called a *RAP*. In order to be considered a *RAP*, the access point must be configured as a *RAP*. A *RAP* is a parent node to any bridging or mesh network. A controller can support one or more *RAPs*,

each one parenting the same or different wireless networks. There can be more than one RAP for the same mesh network for redundancy. RAPs and MAPs can support wireless clients on the 2.4-GHz and 5-GHz band. Client access on 5-GHz is called universal client access.

When the access point does not have a wired Ethernet connection to the controller (through a switch), the radio role is called a MAP. The MAPs have a wireless connection (through the backhaul interface) to other MAPs and finally to a RAP which has an Ethernet connection through a switch to the controller. MAPs may also have a wired Ethernet connection to a local LAN and serve as a bridge endpoint for that LAN (using a point-to-point or point-to-multipoint bridge connection).

Wireless Backhaul

The access point supports wireless backhaul capability using the 5-GHz radio to bridge to another access point to reach a wired network connection to a controller as shown in [Figure 6](#). The access point connected to the wired network is considered a RAP in this configuration. The remote access point is considered a MAP and transfers wireless client traffic to the RAP for transfer to the wired network. Control And Provisioning of Wireless Access Points (CAPWAP) control traffic is also transferred over this bridged link.

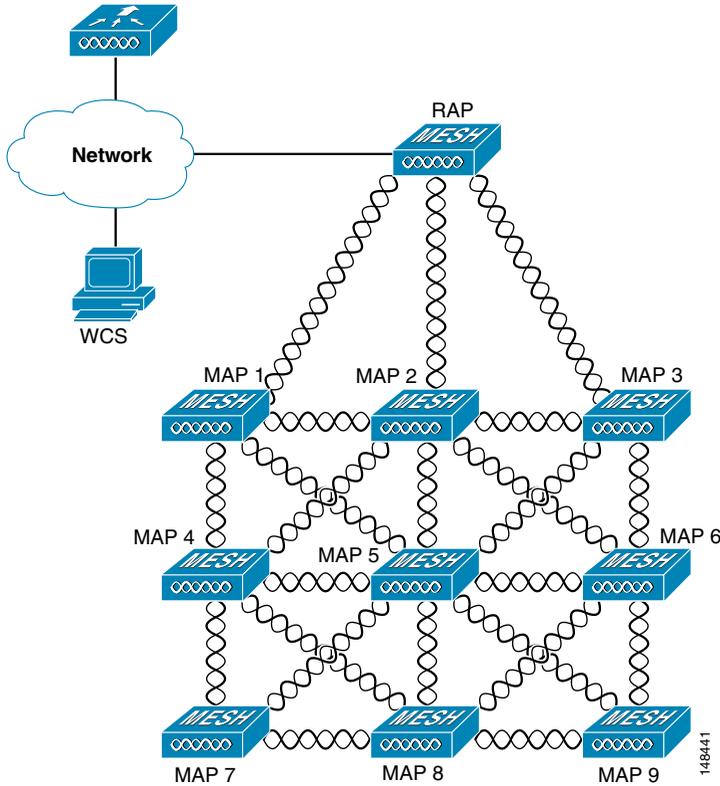
The mesh access points can also be configured for point-to-point and point-to-multipoint bridging.

The access point is typically deployed in a mesh network configuration. In a typical mesh deployment, one or more RAPs have a wired network connection through a switch to a controller. Other remote MAPs without wired network connections use the backhaul feature to optimally link to a RAP that is connected to the wired network. In the mesh network, the links between the access points are referred to as the backhaul links.

Intelligent wireless routing is provided by the Adaptive Wireless Path protocol (AWPP). This enables each MAP to identify its neighbors and intelligently choose the optimal path to the RAP with the wired network connection by calculating the cost of each path in terms of signal strength and the number of hops required to get to a controller with signal strength given priority since signal strength determines the data rate available for backhaul.

[Figure 6](#) illustrates a typical mesh configuration using access points.

Figure 6 Typical Mesh Configuration Using Access Points



8 Preparing the Access Point

The access point is a radio device which is susceptible to common causes of interference that can reduce throughput and range. Follow these basic guidelines to ensure the best possible performance:

- For information on planning and initially configuring your Cisco mesh network, refer to the *Cisco Wireless Mesh Access Points, Design and Deployment Guide, Release 7.0*. This document is available on cisco.com at http://www.cisco.com/en/US/docs/wireless/technology/mesh/7.0/design/guide/MeshAP_70.html.
- Do not install the access point in an area where structures, trees, or hills obstruct radio signals to and from the access point.

- You can install the access point at any height, but best throughput is achieved when the access points are mounted at the same height.

**Note**

To perform path loss calculation and to determine how far apart to install access points, consult an RF planning expert.

Site Surveys

Cisco recommends that you perform a site survey before installing the equipment. A site survey reveals problems that can be resolved before the network is operational. Because 802.11a/b/g/n operates in an unlicensed spectrum, there may be sources of interference from other 802.11a wireless devices (especially in multi-tenant buildings) that could degrade your 802.11 signals. A site survey can determine if such interference exists at the time of deployment.

A proper site survey involves temporarily setting up mesh links and taking measurements to determine whether your antenna calculations are accurate. Determine the correct locations and antenna types before you drill holes and route cables and mounting equipment.

**Tip**

When power is not readily available during a site survey, use an unrestricted power supply (UPS) to temporarily power the mesh link.

Consider the following operating and environmental conditions when performing a site survey:

- How far is your wireless link?
- Has a previous site survey been conducted?
- Do you have a clear Fresnel zone between the access points or radio line of sight?
- What is the minimum acceptable data rate within the link?
- Do you have the correct antenna (if more than one antenna is being offered)?
- Do you have access to both of the mesh site locations?
- Do you have the proper permits, if required?
- Are you following the proper safety procedures and practices?
- Have you configured the access points before you go onsite? It is always easier to resolve configurations or device problems first.
- Do you have the proper tools and equipment to complete your survey?

Avoiding Damage to Radios in a Testing Environment

The radios on outdoor units (bridges) have higher transmit power levels than radios on indoor units (access points). When you test radios in a link, you must avoid exceeding the maximum receive input level of the receiver. At levels higher than the normal the operating range and packet error rate (PER) performance of the receiver is degraded. At even higher levels, the receiver can be permanently damaged.

To avoid receiver damage and PER degradation, you can use one of the following techniques:

- Separate the omnidirectional antennas by at least 2 ft (0.6 m) to avoid receiver damage or by at least 25 ft (7.6 m) to avoid PER degradation.
- Reduce the configured transmit power to the minimum level.
- Cable the radios together using a combination of attenuators, combiners, or splitters to achieve a total attenuation of at least 60 dB.

For a radiated test bed, the following equation describes the relationships among transmit power, antenna gain, attenuation, and receiver sensitivity:

$$\text{txpwr} + \text{tx antenna gain} + \text{rx ant gain} - [\text{attenuation due to antenna spacing}] < \text{max rx input level}$$

Where:

txpwr = Radio transmit power level
tx gain = transmitter antenna gain
rx gain = receiver antenna gain

For a conducted test bed, the following equation describes the relationships among transmit power, antenna gain, and receiver sensitivity:

$$\text{txpwr} - [\text{attenuation due to coaxial RF Attenuator components}] < \text{max rx input level} \\ (0 \text{ dbm})$$



Caution

Under no circumstances should you connect the antenna port from one access point to the antenna port of another access point without using an RF attenuator. If you connect antenna ports you must not exceed the maximum survivable receive level of 0 dBm. Never exceed 0 dBm or damage to the access point can occur. Using attenuators, combiners, and splitters having a total of at least 60 dB of attenuation ensures that the receiver is not damaged and PER performance is not degraded.

Before You Begin



Warning

Read the installation instructions before connecting the system to the power source.

Statement 1004

Before you begin the installation process:

- Become familiar with the procedures for mounting the access point.
- Become familiar with the access point connections ([Figure 1 on page 7](#), [Figure 2 on page 8](#), and [Figure 3 on page 9](#)).
- Verify that the switch you are using to connect the controller is configured properly.



Note

For additional installation, mounting and safety information for the outdoor mesh access point, see the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide*, which is available on Cisco.com, and *Safety Warnings for Cisco Aironet 1520 Series Outdoor Mesh Access Points*, which accompanies this guide.

9 Deploying the Access Point



Warning

Do not operate the unit near unshielded blasting caps or in an explosive environment unless the device has been modified to be especially qualified for such use. Statement 364

The access point is deployed on Layer 3 networks. Layer 3 is the default mode for a newly configured wireless LAN controller. This guide assumes that you will be deploying your access point on a Layer 3 network and a DHCP server is available.

Before deploying the access point, make sure the controller to which the access point will associate is properly configured by performing the following operations:

- Make sure that the wireless LAN controller is set to Layer 3 mode
- Verify the wireless LAN controller software version
- Record the access point BVI MAC address
- Enter the access point BVI MAC address to the wireless LAN controller filter list

Verifying the Wireless LAN Controller Mode

Follow these steps to verify that the wireless LAN controller mode is set to Layer 3:

-
- Step 1** Open your web-browser and enter the IP address of your wireless LAN controller. Be sure to precede the IP address with `https://`. A login screen appears.
 - Step 2** Enter your username and password. The default case-sensitive username and password are *admin* and *admin*. The Summary page appears.
 - Step 3** From the top menu bar, click **CONTROLLER**. The Controller General page appears.
 - Step 4** Verify that the CAPWAP Transport Mode is set to Layer 3. If it is not, change it to Layer 3 and click **Apply**.
 - Step 5** Save any changes you made.
 - Step 6** From the menu bar, click **MONITOR** to return to the Monitor Summary page.
-

Verifying the Wireless LAN Controller Software Version

On the Summary page, you can verify the software version that the wireless LAN controller is running. If a version update is necessary, refer to the appropriate controller configuration documentation.

Recording the Access Point MAC Address

Use a text file to record the MAC address of all the access points you intend to deploy in your network. Having a file of access point MAC addresses will be of considerable value for future testing. While you are compiling the list, you might want to change the name of the access point to something you can easily remember. The name can contain up to 32 characters. The following example, *fisher_street:ea:co* contains the last four HEX characters of the access point MAC address.

Adding the Access Point MAC Address to the Wireless LAN Controller Filter List

The wireless LAN controller maintains an access point authorization MAC address list and responds to discovery requests from access points on that list. To add the access point MAC address (or MAC addresses) to the Wireless LAN controller filter list, follow these steps:

-
- Step 1** If you are not logged onto the wireless LAN controller, log on now. The Summary page appears.
 - Step 2** On the menu bar, click **SECURITY**. The Security RADIUS Authentication Server page appears.
 - Step 3** Under AAA in the left frame, click **MAC Filtering**. The Security MAC Filtering page appears.
 - Step 4** Click **New**. The MAC Filters New page appears.

- Step 5** Enter the MAC address of the access point in the MAC Address field. You can also use the `config macfilter add` command to add a MAC filter entry to the controller.
- Step 6** Select a WLAN ID or **Any WLAN** from the WLAN ID pop-up menu.
- Step 7** Enter a description (32 characters maximum) of the access point in the Description field.
- Step 8** Choose an interface from the Interface Name pop-up menu.
- Step 9** Click **Apply**.
- Step 10** Repeat this process to add other access points to the list.

**Note**

You can also use the controller CLI command `config macfilter add` to add a MAC filter entry on the controller.

- Step 11** On the menu bar, click **Monitor** to return to the Monitor Summary page.
-

Verifying Controller Association

To verify that your access point is associated to the wireless LAN controller, perform these steps:

- Step 1** Log into your controller web interface (https) using a web browser.
 - Step 2** Click **Wireless** and verify that your access point MAC address is listed under Ethernet MAC.
 - Step 3** Log out of the controller and close your web browser.
-

Deployment Notes

Using a DHCP Server in a Layer 3 Mesh Network

To use a DHCP server in a Layer 3 mesh network, make sure the wireless LAN controller is in Layer 3 mode. You must also configure DHCP option 43 on the DHCP server. After the controller is restarted, the access point receives IP addresses from the DHCP server.

Configuring DHCP Option 43

You can use DHCP Option 43 to provide a list of controller IP addresses to the access points, enabling each access point to find and join a controller. This section contains a DHCP Option 43 configuration example on a Microsoft Windows 2003 Enterprise DHCP server for use with Cisco Aironet lightweight access points.

Additional information about Microsoft DHCP Option 43 is available on Cisco.com at the following URL:

http://www.cisco.com/en/US/tech/tk722/tk809/technologies_configuration_example09186a00808714fe.shtml

DHCP Option 43 server implementation information for Cisco IOS is available at cisco.com at the following URL:

<http://www.cisco.com/en/US/docs/wireless/technology/controller/deployment/guide/dep.html#wp1068287>



Note In DHCP Option 43, you should use the IP address of the controller management interface.



Note DHCP Option 43 is limited to one access point type per DHCP pool. You must configure a separate DHCP pool for each access point type.

Cisco Aironet 1000 and 1500 (1505 and 1510) series access points use a comma-separated string format for DHCP Option 43. Other Cisco Aironet access points use the type-length-value (TLV) format for DHCP Option 43. DHCP servers must be programmed to return the option based on the DHCP Vendor Class Identifier (VCI) string (DHCP Option 60) of the access point. The VCI strings for Cisco access points capable of operating in lightweight mode are listed in [Table 2](#):

Table 2 *Lightweight Access Point VCI Strings*

Access Point	Vendor Class Identifier (VCI)
Cisco Aironet 1000 Series	Airespace.AP1200
Cisco Aironet 1100 Series	Cisco AP c1100
Cisco Aironet 1130 Series	Cisco AP c1130
Cisco Aironet 1200 Series	Cisco AP c1200
Cisco Aironet 1240 Series	Cisco AP c1240
Cisco Aironet 1250 Series	Cisco AP c1250

Access Point	Vendor Class Identifier (VCI)
Cisco Aironet 1300 Series	Cisco AP c1300
Cisco Aironet 1500 Series	Cisco AP c1500 ¹
	Cisco AP.OAP1500 ² , Cisco AP.LAP1510 ² , or Cisco AP.LAP1505 ²
	Airespace.AP1200 ³
Cisco Aironet 1520 Series	Cisco AP c1520
Cisco Aironet 1550 Series	Cisco AP c1550

1. For controller release 4.1 or later.
2. For controller release 4.0, the VCI depends on the model.
3. For controller release 3.2.

The format of the TLV block for 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1552 access points are listed below:

- Type: 0xf1 (decimal 241)
- Length: Number of controller IP addresses * 4
- Value: List of WLC management interfaces

Configuring Option 43 for Cisco 1000, 1500, and 1550 Series Access Points

To configure DHCP Option 43 for Cisco 1000, 1500, and 1550 series access points in the embedded Cisco IOS DHCP server, follow these steps:

-
- Step 1** Enter configuration mode at the Cisco IOS CLI.
- Step 2** Create the DHCP pool, including the necessary parameters such as default router and name server. The commands used to create a DHCP pool are as follows:

```
ip dhcp pool pool name
network IP Network Netmask
default-router Default router
dns-server DNS Server
```

Where:

pool name is the name of the DHCP pool, such as AP1000.

IP Network is the network IP address where the controller resides, such as 10.0.15.1

Netmask is the subnet mask, such as 255.255.255.0

Default router is the IP address of the default router, such as 10.0.0.1

DNS Server is the IP address of the DNS server, such as 10.0.10.2

Step 3 Add the Option 60 line using the following syntax:

```
option 60 ascii "VCI string"
```

For the VCI string, use the value from [Table 2](#). The quotation marks must be included.

Step 4 Add the option 43 line using the following syntax:

```
option 43 ascii "Comma Separated IP Address List"
```

For example, if you are configuring Option 43 for Cisco 1000, 1500, or 1550 series access points using the controller IP addresses 10.126.126.2 and 10.127.127.2, add the following line to the DHCP pool in the Cisco IOS CLI:

```
option 43 ascii "10.126.126.2,10.127.127.2"
```

The quotation marks must be included.

Configuring Option 43 for Cisco 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1550 Series Access Points

To configure DHCP Option 43 for Cisco 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1550 series access points in the embedded Cisco IOS DHCP server, follow these steps:

Step 1 Enter configuration mode at the Cisco IOS CLI.

Step 2 Create the DHCP pool, including the necessary parameters such as default router and name server. The commands used to create a DHCP pool are as follows:

```
ip dhcp pool pool name
network IP Network Netmask
default-router Default router
dns-server DNS Server
```

Where:

pool name is the name of the DHCP pool, such as AP1550.

IP Network is the network IP address where the controller resides, such as 10.0.15.1

Netmask is the subnet mask, such as 255.255.255.0

Default router is the IP address of the default router, such as 10.0.0.1

DNS Server is the IP address of the DNS server, such as 10.0.10.2

Step 3 Add the Option 60 line using the following syntax:

```
option 60 ascii "VCI string"
```

For the VCI string, use the value from [Table 2](#). The quotation marks must be included.

Step 4 Add the option 43 line using the following syntax:

```
option 43 hex hex string
```

The hex string is assembled by concatenating the TLV values shown below:

Type + *Length* + *Value*

Type is always *f1(hex)*. *Length* is the number of controller management IP addresses times 4 in hex. *Value* is the IP address of the controller listed sequentially in hex.

For example, suppose that there are two controllers with management interface IP addresses, 10.126.126.2 and 10.127.127.2. The type is *f1(hex)*. The length is $2 * 4 = 8 = 08$ (*hex*). The IP addresses translate to *0a7e7e02* and *0a7f7f02*. Assembling the string then yields *f1080a7e7e020a7f7f02*. The resulting Cisco IOS command added to the DHCP scope is listed below:

```
option 43 hex f1080a7e7e020a7f7f02
```

10 Declarations of Conformity and Regulatory Information

This section provides declarations of conformity and regulatory information for Cisco Aironet 1552S Access Points.

Manufacturers Federal Communication Commission Declaration of Conformity Statement



Models

AIR-CAP1552SA-A-K9
AIR-CAP1552SD-A-K9

Certification Numbers

FCC ID: LDK102074P (also contains
LDK102078P)

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:

3. This device may not cause harmful interference, and
4. 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 (including the use of non-Cisco antennas specified for this model) provided not expressly approved by Cisco could void the user's authority to operate this device.



Caution

To meet regulatory restrictions, the access point must be professionally installed.

VCCI Statement for Japan

Warning

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

警告 この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

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 : 03-6434-6500

208697

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: 03-6434-6500

Statement 371—Power Cable and AC Adapter

接続ケーブル、電源コード、ACアダプタ、バッテリーなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外の部品をご使用になると故障や動作不良、火災の原因となります。また、電気用品安全法により、当該法の認定（PSEとコードに表記）でなくUL認定（ULまたはCSAマークがコードに表記）の電源ケーブルは弊社が指定する製品以外の電気機器には使用できないためご注意ください。

English Translation

When installing the product, please use the provided or designated connection cables/power cables/AC adaptors. Using any other cables/adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL-certified cables (that have the “UL” shown on the code) for any other electrical devices than products designated by CISCO. The use of cables that are certified by Electrical Appliance and Material Safety Law (that have “PSE” shown on the code) is not limited to CISCO-designated products.

Industry Canada

Canadian Compliance Statement

AIR-CAP1552SA-A-K9
AIR-CAP1552SD-A-K9

IC: 2461B-102074P (also contains
IC: 2461B-102078P)

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 Access Points are certified to the requirements of RSS-210. 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.

This device has been designed to operate with antennas having a maximum gain of 4 dBi for 802.11 and 14 dBi for the sensor (802.15.4) radio in the 2.4 GHz band and 7 dBi in the 5 GHz band. Antennas having a gain greater than 6 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communication.

European Community, Switzerland, Norway, Iceland, and Liechtenstein

Models:

AIR-CAP1552SA-E-K9

AIR-CAP1552SD-E-K9

Declaration of Conformity with regard to the R&TTE Directive 1999/5/EC & Medical Directive 93/42/EEC

Български [Bulgarian]	Това оборудване отговаря на съществените изисквания и приложими клаузи на Директива 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 olulistele 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 ουσιώδεις 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.

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

The following standards were applied:

EMC—EMC-EN 301.489-1 v1.8.1; EN 301.489-17 v2.1.1

Health & Safety—EN60950-1: 2005; EN 50385: 2002

Radio—EN 300 328 v 1.7.1; EN 301.893 v 1.5.1

The conformity assessment procedure referred to in Article 10.4 and Annex III of Directive 1999/5/EC has been followed.

This device also conforms to the EMC requirements of the Medical Devices Directive 93/42/EEC.



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.

The product carries the CE Mark:



Declaration of Conformity for RF Exposure

This section contains information on compliance with guidelines related to RF exposure.

Generic Discussion on RF Exposure

The Cisco products are designed to comply with the following national and international standards on Human Exposure to Radio Frequencies:

- US 47 Code of Federal Regulations Part 2 Subpart J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers / IEEE C 95.1 (99)
- International Commission on Non Ionizing Radiation Protection (ICNIRP) 98
- Ministry of Health (Canada) Safety Code 6. Limits on Human Exposure to Radio Frequency Fields in the range from 3kHz to 300 GHz
- Australia Radiation Protection Standard

To ensure compliance with various national and international Electromagnetic Field (EMF) standards, the system should only be operated with Cisco approved antennas and accessories.

This Device Meets International Guidelines for Exposure to Radio Waves

The 1550 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) recommended by international guidelines. The guidelines were developed by an independent scientific organization (ICNIRP) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

Separation Distance		
MPE	Distance	Limit
0.79 mW/cm ²	17.79 cm (7 inches)	1.00 mW/cm ²

The World Health Organization has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance than recommended.

This Device Meets FCC Guidelines for Exposure to Radio Waves

The 1550 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in FCC Part 1.1310. The guidelines are based on IEEE ANSI C 95.1 (92) and include a substantial safety margin designed to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

The device has been tested and found compliant with the applicable regulations as part of the radio certification process.

Separation Distance		
MPE	Distance	Limit
0.79 mW/cm ²	17.79 cm (7 inches)	1.00 mW/cm ²

The US Food and Drug Administration has stated that present scientific information does not indicate the need for any special precautions for the use of wireless devices. The FCC recommends that if you are interested in further reducing your exposure then you can easily do so by reorienting antennas away from the user or placing the antennas at a greater separation distance than recommended or lowering the transmitter power output.

This Device Meets the Industry Canada Guidelines for Exposure to Radio Waves

The 1550 series device includes a radio transmitter and receiver. It is designed not to exceed the limits for exposure to radio waves (radio frequency electromagnetic fields) as referenced in Health Canada Safety Code 6. The guidelines include a substantial safety margin designed into the limit to ensure the safety of all persons, regardless of age and health.

As such the systems are designed to be operated as to avoid contact with the antennas by the end user. It is recommended to set the system in a location where the antennas can remain at least a minimum distance as specified from the user in accordance to the regulatory guidelines which are designed to reduce the overall exposure of the user or operator.

Separation Distance		
MPE	Distance	Limit
0.79 mW/cm ²	17.79 cm (7 inches)	1.00 mW/cm ²

Health Canada states that present scientific information does not indicate the need for any special precautions for the use of wireless devices. They recommend that if you are interested in further reducing your exposure you can easily do so by reorienting antennas away from the user, placing the antennas at a greater separation distance than recommended, or lowering the transmitter power output.

Additional Information on RF Exposure

You can find additional information on the subject at the following links:

- Cisco Systems Spread Spectrum Radios and RF Safety white paper at this URL: http://www.cisco.com/warp/public/cc/pd/witc/ao340ap/prodlit/rfhr_wi.htm
- FCC Bulletin 56: Questions and Answers about Biological Effects and Potential Hazards of Radio Frequency Electromagnetic Fields
- FCC Bulletin 65: Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields
- FCC Bulletin 65C (01-01): Evaluating Compliance with the FCC guidelines for Human Exposure to Radio Frequency Electromagnetic Fields: Additional Information for Evaluating Compliance for Mobile and Portable Devices with FCC limits for Human Exposure to Radio Frequency Emission

You can obtain additional information from the following organizations:

- World Health Organization Internal Commission on Non-Ionizing Radiation Protection at this URL: www.who.int/emf

- United Kingdom, National Radiological Protection Board at this URL: www.nrpb.org.uk
- Cellular Telecommunications Association at this URL: www.wow-com.com
- The Mobile Manufacturers Forum at this URL: www.mmfa.org

Administrative Rules for Cisco Aironet Access Points in Taiwan

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

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.

Chinese Translation

低功率射頻電機技術規範

4.7 無線資訊傳輸設備

4.7.6 無線資訊傳輸設備須忍受合法通信之干擾且不得干擾合法通信；如造成干擾，應立即停用，俟無干擾之虞，始得繼續使用。

4.7.7 無線資訊傳輸設備的製造廠商應確保頻率穩定性，如依製造廠商使用手冊上所述正常操作，發射的信號應維持於操作頻帶中。

200139

English Translation

Low-power Radio-frequency Devices Technical Specifications

- 4.7 Unlicensed National Information Infrastructure
- 4.7.6 The U-NII devices shall accept any interference from legal communications and shall not interfere the legal communications. If interference is caused, the user must stop operating the device immediately and can't re-operate it until the harmful interference is clear.
- 4.7.7 Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user manual.

Operation of Cisco Aironet Access Points in Brazil

This section contains special information for operation of Cisco Aironet access points in Brazil.

Access Point Models

AIR-CAP1552SA-N-K9

AIR-CAP1552SD-N-K9

Portuguese Translation

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

English Translation

This equipment operates on a secondary basis and consequently must accept harmful interference, including interference from stations of the same kind. This equipment may not cause harmful interference to systems operating on a primary basis.

Declaration of Conformity Statements

All the Declaration of Conformity statements related to this product can be found at the following location: <http://www.ciscofax.com>

11 In Case of Difficulty

Help is available from Cisco should you experience difficulties; however, before contacting Cisco, look for a solution to your problem in the following places:

- The troubleshooting section of the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Design Guide*
- The Tools and Resources section on the Technical Support and Documentation page on Cisco.com

Follow these steps to contact the Technical Assistance Center on Cisco.com:

-
- Step 1** Open your browser and go to <http://www.cisco.com/>.
- Step 2** Click **Support**. The Support page appears.
- Step 3** Choose the link that best serves your support requirements.



Note Click **My Tech Support** if you are a registered user.

- Step 4** Follow the instructions on the page.
-

12 Cisco 90-Day Limited Hardware Warranty Terms

There are special terms applicable to your hardware warranty and various services that you can use during the warranty period. Your formal Warranty Statement, including the warranties and license agreements applicable to Cisco software, is available on Cisco.com. Follow these steps to access and download the *Cisco Information Packet* and your warranty and license agreements from Cisco.com.

1. Launch your browser, and go to this URL:
http://www.cisco.com/en/US/products/prod_warranties_listing.html
The Warranties and License Agreements page appears.
2. To read the *Cisco Information Packet*, follow these steps:
 - a. Click the **Information Packet Number** field, and make sure that the part number 78-5235-03D0 is highlighted.
 - b. Select the language in which you would like to read the document.
 - c. Click **Go**.

The Cisco Limited Warranty and Software License page from the Information Packet appears.

- d. Read the document online, or click the PDF icon to download and print the document in Adobe Portable Document Format (PDF).



Note

You must have Adobe Acrobat Reader to view and print PDF files. You can download the reader from the Adobe website: <http://www.adobe.com>

- 3. To read translated and localized warranty information about your product, follow these steps:
 - a. Enter this part number in the Warranty Document Number field:
78-5236-01C0
 - b. Select the language in which you would like to view the document.
 - c. Click Go.
The Cisco warranty page appears.
 - d. Read the document online, or click the PDF icon to download and print the document in Adobe Portable Document Format (PDF).

You can also contact the Cisco service and support website for assistance:

<http://www.cisco.com/en/US/support/>

The following are special terms applicable to your hardware warranty.

Duration of Hardware Warranty

Ninety (90) Days

Replacement, Repair, or Refund Policy for Hardware

Cisco or its service center will use commercially reasonable efforts to ship a replacement part within ten (10) working days after receipt of a Return Materials Authorization (RMA) request. Actual delivery times can vary, depending on the customer location.

Cisco reserves the right to refund the purchase price as its exclusive warranty remedy.

To Receive a Return Materials Authorization (RMA) Number

Contact the company from whom you purchased the product. If you purchased the product directly from Cisco, contact your Cisco Sales and Service Representative.

Complete the information below, and keep it for your reference.

Company product purchased from	
Company telephone number	
Product model number	

Product serial number	
Maintenance contract number	

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