



## **Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide**

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### **Americas Headquarters**

Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
<http://www.cisco.com>  
Tel: 408 526-4000  
800 553-NETS (6387)  
Fax: 408 527-0883

Text Part Number: OL-24247-01

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## Preface

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This section describes the objectives, audience, organization, and conventions of the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Hardware Installation Guide*.

## Objectives

This publication explains the steps for installing the Cisco Aironet 1550 Series Outdoor Mesh Access Point (called the *access point* in this document). The access point is available in model 1552.

The 1552 model is a dual-radio platform that supports dual-band (2.4- and 5-GHz) operation.

## Audience

This publication is for the person installing and configuring an access point for the first time. The installer should be familiar with network structures, terms, and concepts.

  
Warning

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

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Warning

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**This equipment must be installed in restricted access locations in Norway, Finland, and Sweden. Only trained and qualified personnel are allowed to install, replace, or service this equipment as instructed in this installation guide.**

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# Organization

This guide contains the following sections:

Chapter	Title	Description
Chapter 1	<a href="#">Overview</a>	Describes the major components and features of the access point.
Chapter 2	<a href="#">Installing the Access Point</a>	Provides warnings, safety information, and mounting information you need to install your access point.
Chapter 3	<a href="#">Troubleshooting</a>	Provides basic troubleshooting procedures for the access point.
Chapter 4	<a href="#">Installing or Replacing the Backup Battery</a>	Describes the procedures to install or replace the backup battery in the access point.
Appendix A	<a href="#">Translated Safety Warnings</a>	Indicates how to access the document that provides translations of the safety warnings that appear in this publication.
Appendix B	<a href="#">Declarations of Conformity and Regulatory Information</a>	Describes the regulatory conventions to which the access point conforms and provides guidelines for operating access points in Japan.
Appendix C	<a href="#">Channels and Power Levels</a>	Indicates how to access the document that lists the access point radio channels and the maximum power levels supported by the world regulatory domains.
Appendix D	<a href="#">Access Point Specifications</a>	Lists technical specifications for the access point.
Appendix E	<a href="#">Access Point Pinouts</a>	Describes the connector pinouts for the access point.
Appendix F	<a href="#">Configuring DHCP Option 43</a>	Describes the procedure to configure DHCP Option 43.

# Conventions

This publication uses the following conventions:

Convention	Description
<b>boldface font</b>	Commands, command options, and keywords are in boldface.
<i>italic font</i>	Arguments for which you supply values are in italics.
[ ]	Elements in square brackets are optional.
screen font	Terminal sessions and information the system displays are in screen font.
<b>boldface screen font</b>	Information you must enter is in boldface screen font.

Convention	Description
<i>italic screen font</i>	Arguments for which you supply values are in italic screen font.
^	The symbol ^ represents the key labeled Control. For example, the key combination ^D in a screen display means hold down the Control key while you press the D key.
< >	Nonprinting characters, such as passwords, are in angle brackets.

Notes use the following conventions:



**Note**

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

Cautions use the following conventions:



**Caution**

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

Warnings use the following conventions:



**Warning**

**IMPORTANT SAFETY INSTRUCTIONS**

**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**

**Waarschuwing**

**BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

**Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van de standaard praktijken om ongelukken te voorkomen. Gebruik het nummer van de verklaring onderaan de waarschuwing als u een vertaling van de waarschuwing die bij het apparaat wordt geleverd, wilt raadplegen.**

**BEWAAR DEZE INSTRUCTIES**

**Varoitus TÄRKEITÄ TURVALLISUUSOHJEITA**

Tämä varoitusmerkki merkitsee vaaraa. Tilanne voi aiheuttaa ruumiillisia vammoja. Ennen kuin käsittelet laitteistoa, huomioi sähköpiirien käsittelemiseen liittyvät riskit ja tutustu onnettomuuksien yleisiin ehkäisytapoihin. Turvallisuusvaroitusten käännökset löytyvät laitteen mukana toimitettujen käännettyjen turvallisuusvaroitusten joukosta varoitusten lopussa näkyvien lausuntonumeroiden avulla.

**SÄILYTÄ NÄMÄ OHJEET****Attention IMPORTANTES INFORMATIONS DE SÉCURITÉ**

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

**CONSERVEZ CES INFORMATIONS****Warnung WICHTIGE SICHERHEITSHINWEISE**

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

**BEWAHREN SIE DIESE HINWEISE GUT AUF.****Avvertenza IMPORTANTI ISTRUZIONI SULLA SICUREZZA**

Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di intervenire su qualsiasi apparecchiatura, occorre essere al corrente dei pericoli relativi ai circuiti elettrici e conoscere le procedure standard per la prevenzione di incidenti. Utilizzare il numero di istruzione presente alla fine di ciascuna avvertenza per individuare le traduzioni delle avvertenze riportate in questo documento.

**CONSERVARE QUESTE ISTRUZIONI****Advarsel VIKTIGE SIKKERHETSINSTRUKSJONER**

Dette advarselssymbolet betyr fare. Du er i en situasjon som kan føre til skade på person. Før du begynner å arbeide med noe av utstyret, må du være oppmerksom på farene forbundet med elektriske kretser, og kjenne til standardprosedyrer for å forhindre ulykker. Bruk nummeret i slutten av hver advarsel for å finne oversettelsen i de oversatte sikkerhetsadvarslene som fulgte med denne enheten.

**TA VARE PÅ DISSE INSTRUKSJONENE**

**Aviso INSTRUÇÕES IMPORTANTES DE SEGURANÇA**

Este símbolo de aviso significa perigo. Você está em uma situação que poderá ser causadora de lesões corporais. Antes de iniciar a utilização de qualquer equipamento, tenha conhecimento dos perigos envolvidos no manuseio de circuitos elétricos e familiarize-se com as práticas habituais de prevenção de acidentes. Utilize o número da instrução fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham este dispositivo.

**GUARDE ESTAS INSTRUÇÕES****¡Advertencia! INSTRUCCIONES IMPORTANTES DE SEGURIDAD**

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

**GUARDE ESTAS INSTRUCCIONES****Varning! VIKTIGA SÄKERHETSANVISNINGAR**

Denna varningssignal signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanliga förfaranden för att förebygga olyckor. Använd det nummer som finns i slutet av varje varning för att hitta dess översättning i de översatta säkerhetsvarningar som medföljer denna anordning.

**SPARA DESSA ANVISNINGAR****Figyelem FONTOS BIZTONSÁGI ELOÍRÁSOK**

Ez a figyelmeztető jel veszélyre utal. Sérülésveszélyt rejte helyzetben van. Mielőtt bármely berendezésen munkát végezte, legyen figyelemmel az elektromos áramkörök okozta kockázatokra, és ismerkedjen meg a szokásos balesetvédelmi eljárásokkal. A kiadványban szereplő figyelmeztetések fordítása a készülékhez mellékelt biztonsági figyelmeztetések között található; a fordítás az egyes figyelmeztetések végén látható szám alapján kereshető meg.

**ORIZZE MEG EZEKET AZ UTASÍTÁSOKAT!****Предупреждение ВАЖНЫЕ ИНСТРУКЦИИ ПО СОБЛЮДЕНИЮ ТЕХНИКИ БЕЗОПАСНОСТИ**

Этот символ предупреждения обозначает опасность. То есть имеет место ситуация, в которой следует опасаться телесных повреждений. Перед эксплуатацией оборудования выясните, каким опасностям может подвергаться пользователь при использовании электрических цепей, и ознакомьтесь с правилами техники безопасности для предотвращения возможных несчастных случаев. Воспользуйтесь номером заявления, приведенным в конце каждого предупреждения, чтобы найти его переведенный вариант в переводе предупреждений по безопасности, прилагаемом к данному устройству.

**СОХРАНИТЕ ЭТИ ИНСТРУКЦИИ**

**警告** 重要的安全性说明

此警告符号代表危险。您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾提供的声明号码来找到此设备的安全性警告说明的翻译文本。

请保存这些安全性说明

**警告** 安全上の重要な注意事項

「危険」の意味です。人身事故を予防するための注意事項が記述されています。装置の取り扱い作業を行うときは、電気回路の危険性に注意し、一般的な事故防止策に留意してください。警告の各国語版は、各注意事項の番号を基に、装置に付属の「Translated Safety Warnings」を参照してください。

これらの注意事項を保管しておいてください。

**주의** 重要 안전 지침

이 경고 기호는 위험을 나타냅니다. 작업자가 신체 부상을 일으킬 수 있는 위험한 환경에 있습니다. 장비에 작업을 수행하기 전에 전기 회로와 관련된 위험을 숙지하고 표준 작업 관례를 숙지하여 사고를 방지하십시오. 각 경고의 마지막 부분에 있는 경고문 번호를 참조하여 이 장치와 함께 제공되는 번역된 안전 경고문에서 해당 번역문을 찾으십시오.

이 지시 사항을 보관하십시오.

**Aviso** INSTRUÇÕES IMPORTANTES DE SEGURANÇA

**Este símbolo de aviso significa perigo. Você se encontra em uma situação em que há risco de lesões corporais. Antes de trabalhar com qualquer equipamento, esteja ciente dos riscos que envolvem os circuitos elétricos e familiarize-se com as práticas padrão de prevenção de acidentes. Use o número da declaração fornecido ao final de cada aviso para localizar sua tradução nos avisos de segurança traduzidos que acompanham o dispositivo.**

**GUARDE ESTAS INSTRUÇÕES****Advarsel** VIGTIGE SIKKERHEDSANVISNINGER

**Dette advarselssymbol betyder fare. Du befinder dig i en situation med risiko for legemeskade. Før du begynder arbejde på udstyr, skal du være opmærksom på de involverede risici, der er ved elektriske kredsløb, og du skal sætte dig ind i standardprocedurer til undgåelse af ulykker. Brug erklæringsnummeret efter hver advarsel for at finde oversættelsen i de oversatte advarsler, der fulgte med denne enhed.**

**GEM DISSE ANVISNINGER****تحذير****إرشادات الأمان الهامة**

يوضح رمز التحذير هذا وجود خطر. وهذا يعني أنك متواجد في مكان قد ينتج عنه التعرض لإصابات. قبل بدء العمل، احذر مخاطر التعرض للصدمات الكهربائية وكن على علم بالإجراءات القياسية للحيلولة دون وقوع أي حوادث. استخدم رقم البيان الموجود في آخر كل تحذير لتحديد مكان ترجمته داخل تحذيرات الأمان المترجمة التي تأتي مع الجهاز. قم بحفظ هذه الإرشادات

**Upozorenje VAŽNE SIGURNOSNE NAPOMENE**

Ovaj simbol upozorenja predstavlja opasnost. Nalazite se u situaciji koja može prouzročiti tjelesne ozljede. Prije rada s bilo kojim uređajem, morate razumjeti opasnosti vezane uz električne sklopove, te biti upoznati sa standardnim načinima izbjegavanja nesreća. U prevedenim sigurnosnim upozorenjima, priloženima uz uređaj, možete prema broju koji se nalazi uz pojedino upozorenje pronaći i njegov prijevod.

**SAČUVAJTE OVE UPUTE****Upozornění DŮLEŽITÉ BEZPEČNOSTNÍ POKYNY**

Tento upozorňující symbol označuje nebezpečí. Jste v situaci, která by mohla způsobit nebezpečí úrazu. Před prací na jakémkoliv vybavení si uvědomte nebezpečí související s elektrickými obvody a seznamte se se standardními opatřeními pro předcházení úrazům. Podle čísla na konci každého upozornění vyhledejte jeho překlad v přeložených bezpečnostních upozorněních, která jsou přiložena k zařízení.

**USCHOVEJTE TYTO POKYNY****Προειδοποίηση ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ**

Αυτό το προειδοποιητικό σύμβολο σημαίνει κίνδυνο. Βρίσκεστε σε κατάσταση που μπορεί να προκαλέσει τραυματισμό. Πριν εργαστείτε σε οποιοδήποτε εξοπλισμό, να έχετε υπόψη σας τους κινδύνους που σχετίζονται με τα ηλεκτρικά κυκλώματα και να έχετε εξοικειωθεί με τις συνηθισμένες πρακτικές για την αποφυγή ατυχημάτων. Χρησιμοποιήστε τον αριθμό δήλωσης που παρέχεται στο τέλος κάθε προειδοποίησης, για να εντοπίσετε τη μετάφρασή της στις μεταφρασμένες προειδοποιήσεις ασφαλείας που συνοδεύουν τη συσκευή.

**ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ****אזהרה****הוראות בטיחות חשובות**

סימן אזהרה זה מסמל סכנה. אתה נמצא במצב העלול לגרום לפציעה. לפני שתעבוד עם ציוד כלשהו, עליך להיות מודע לסכנות הכרוכות במגעלים חשמליים ולהכיר את הנהלים המקובלים למניעת תאונות. השתמש במספר ההוראה המסופק בסופה של כל אזהרה כדי לאתר את התרגום באזהרות הבטיחות המתורגמות שמצורפות להתקן.

**שמור הוראות אלה****Opomena VAŽNI BEZBEDNOSNI NAPATCTVIJA**

Симболот за предупредување значи опасност. Се наоѓате во ситуација што може да предизвика телесни повреди. Пред да работите со опремата, бидете свесни за ризикот што постои кај електричните кола и треба да ги познавате стандардните постапки за спречување на несреќни случаи. Искористете го бројот на изјавата што се наоѓа на крајот на секое предупредување за да го најдете неговиот период во prevedените безбедносни предупредувања што се испорачани со уредот.

**ЧУВАЈТЕ ГИ ОБИЕ НАПАТСТВИЈА**

**Ostrzeżenie WAŻNE INSTRUKCJE DOTYCZĄCE BEZPIECZEŃSTWA**

Ten symbol ostrzeżenia oznacza niebezpieczeństwo. Zachodzi sytuacja, która może powodować obrażenia ciała. Przed przystąpieniem do prac przy urządzeniach należy zapoznać się z zagrożeniami związanymi z układami elektrycznymi oraz ze standardowymi środkami zapobiegania wypadkom. Na końcu każdego ostrzeżenia podano numer, na podstawie którego można odszukać tłumaczenie tego ostrzeżenia w dołączonym do urządzenia dokumencie z tłumaczeniami ostrzeżeń.

**NINIEJSZE INSTRUKCJE NALEŻY ZACHOWAĆ****Upozornenie DŮLEŽITÉ BEZPEČNOSTNÉ POKYNY**

Tento varovný symbol označuje nebezpečenstvo. Nachádzate sa v situácii s nebezpečenstvom úrazu. Pred prácou na akomkoľvek vybavení si uvedomte nebezpečenstvo súvisiace s elektrickými obvodmi a oboznámte sa so štandardnými opatreniami na predchádzanie úrazom. Podľa čísla na konci každého upozornenia vyhľadajte jeho preklad v preložených bezpečnostných upozorneniach, ktoré sú priložené k zariadeniu.

**USCHOVAJTE SI TENTO NÁVOD**

## Related Documents

These documents provide complete information about the access point:

- *Release Notes for Cisco Wireless LAN Controllers and Lightweight Access Points*
- *Quick Start Guide: Cisco Aironet 1550 Series Lightweight Outdoor Mesh Access Points*
- *Cisco Wireless LAN Controller Configuration Guide*
- *Cisco Aironet 1550 Series Outdoor Mesh Access Point Power Injector Installation Instructions*
- *Cisco Aironet 1550 Series for Hazardous Locations Installation Guide*

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

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

To browse to the access point documentation, click **Cisco Aironet 1550 Series** listed under “Outdoor Wireless.” The documentation can be accessed from the Support box.

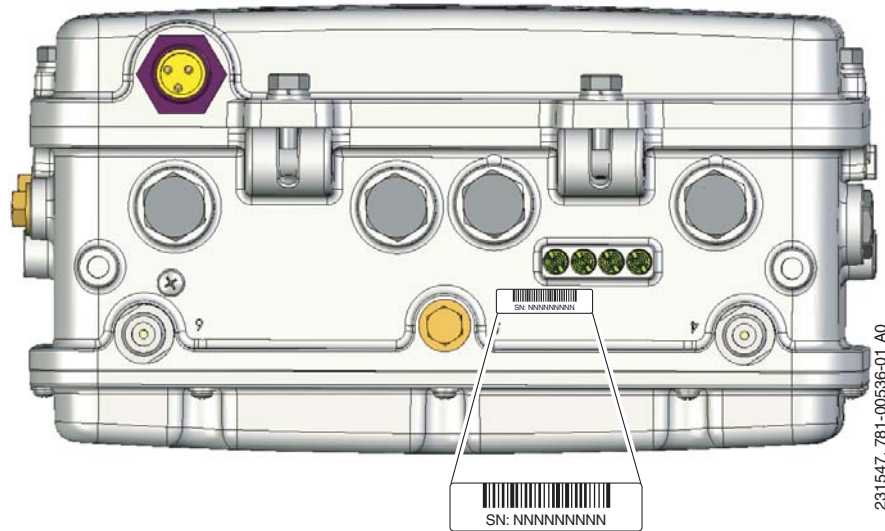
To browse to the Cisco Wireless LAN Controller documentation, click **Standalone Controllers** listed under “Wireless LAN Controllers.” The documentation can be accessed from the Support box.

## Finding the Product Serial Number

The access point serial number is on the bottom of the access point (refer to [Figure 1](#)).



**Figure 1** Location of Serial Number Label



The access point serial number label contains the following information:

- Model number, such as AIR-CAP1552E-x-K9.
- Serial number, such as WCN0636279B (11 alphanumeric digits).
- Access point MAC address, for example 68BDABF54600 (12 hexadecimal digits). It is located under the serial number.
- Cable modem (CM) MAC address for cable configuration, such as 54D46F17377A (12 hexadecimal digits). The CM MAC address is only available on the access point cable configuration. It is located to the right of the MAC address.

You need your product serial number when requesting support from the Cisco Technical Assistance Center.

## Obtaining Documentation, Support, and Security Guidelines

For information on obtaining documentation and support, providing documentation feedback, security guidelines, and recommended aliases and general Cisco documents, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

<http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html>

To view all new wireless documentation, click on **Wireless**.





# CHAPTER 1

## Overview

---

The Cisco Aironet 1550 Series Outdoor Mesh Access Point (hereafter called the *access point* or *AP*) is a modularized wireless outdoor access point designed for use in a mesh network. The access point also supports wireless client access, point-to-point bridging, point-to-multipoint bridging, and point-to-multipoint mesh wireless connectivity.

## About the 1552 Access Point

The 1552 access point supports two radios (2.4-GHz and 5-GHz) and provides client access without the need for a license. The 5-GHz radios are primarily used for backhaul operations to reach a wired network and the 2.4-GHz radio is used for wireless clients. Depending on the radio, the access point can support 1 to 300 Mb/s data rates (for specific data rates, refer to [Appendix D, “Access Point Specifications”](#)).

The 1552 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 1552 access point interoperates with legacy clients and offers enhanced backhaul performance. The 1552 access point can also be configured with an integrated DOCSIS 3.0/Euro DOCSIS 3.0 cable modem.

The access point is a standalone unit that can be cable strand 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 patented 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 (hereafter called a *controller*) as described in the *Cisco Wireless LAN Controller Configuration Guide*. The *Cisco Wireless Mesh Access Points, Design and Deployment Guide, Release 7.3* describes how to plan and initially configure the Cisco mesh network, which supports wireless point-to-point, point-to-multipoint, and mesh deployments. The controllers use a browser-based management system, a command-line interface (CLI), or the Cisco Prime Infrastructure (PI) network management system to manage the controller and the associated access points. The access point supports hardware-based advanced encryption standard (AES) encryption between wireless nodes to provide end-to-end security.

This chapter provides information on the following topics:

- [Hardware Models, page 1-2](#)
- [Hardware Features, page 1-5](#)
- [Network Deployment Examples, page 1-25](#)

# Hardware Models

The model numbers (or part numbers) and configuration for the Cisco Aironet 1552 Outdoor Mesh Access Points are described in [Table 1-1](#). A detailed list of components supported by each 1552 access point model is shown in [Table 1-2](#).

The Cisco Aironet 1552 Series access points includes two additional models, 1552S and 1552H, that are specifically intended for deployment in hazardous locations. For information on these models, refer to the *Cisco Aironet 1550 Series for Hazardous Locations Installation Guide*.

For a detailed description of the declarations of conformity and regulatory information for the 1552 access points refer to [Appendix B, “Declarations of Conformity and Regulatory Information.”](#)

**Table 1-1 1552 Access Point Model Numbers and Descriptions**

Model (or part number)	Configuration
AIR-CAP1552E- <i>x</i> -K9	Two-radio (2.4 GHz and 5 GHz) modular version. This model supports three (3) external dual-band antenna ports. An optional Battery Backup Unit (BBU) and Small Form Factor Pluggable (SFP) fiber module can be ordered with the AP. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.  For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a>
AIR-CAP1552EU- <i>x</i> -K9	Two-radio (2.4 GHz and 5 GHz) modular version. This model supports three (3) 2.4 GHz antenna ports and three (3) 5 GHz antenna ports. An optional Battery Backup Unit (BBU) and Small Form Factor Pluggable (SFP) fiber module can be ordered with the AP. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.  For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a>

**Table 1-1 1552 Access Point Model Numbers and Descriptions (continued)**

Model (or part number)	Configuration
AIR-CAP1552C-x-K9	<p>Two-radio (2.4 GHz and 5 GHz) version with DOCSIS 3.0 or Euro-DOCSIS 3.0 Cable Modem. This is a lightweight, low-profile AP. It supports cable modem backhaul and beamforming, and has an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>
AIR-CAP1552CU-x-K9	<p>Two-radio (2.4 GHz and 5 GHz) version with DOCSIS 3.0 or Euro-DOCSIS 3.0 Cable Modem. This model supports three (3) 2.4 GHz antenna ports and three (3) 5 GHz antenna ports. This is a lightweight, low-profile AP. It supports cable modem backhaul and beamforming, and has an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>
AIR-CAP1552I-x-K9	<p>Two-radio (2.4 GHz and 5 GHz) lightweight, low-profile version. This version consists of 1 AC power supply, Ethernet backhaul, and an integrated 3-element array antenna. Countries (regulatory domains) are represented by the variable <i>x</i> in the product model number.</p> <p>For specific regulatory domains supported by this model, refer to the product data sheet at:  <a href="http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html">http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html</a></p>

**Table 1-2** Components of Each 1552 Access Point Model

	1552E	1552EU	1552C	1552CU	1552I
<b>Antennas</b>	External	External	Integrated	External	Integrated
<b>Fiber SFP</b>	Yes	Yes	-	-	-
<b>PoE-Out Port<sup>1</sup> 802.3af</b> (for example, video)	Yes	Yes	-	-	-
<b>Cable Modem</b> DOCSIS 3.0 Euro DOCSIS 3.0	-	-	Yes	Yes	-
<b>Battery Backup Option</b>	Yes	Yes	-	-	-
<b>Power Options</b>	AC, DC, PoE <sup>2</sup>	AC, DC, PoE <sup>2</sup>	40 to 90 VAC Power over Cable, 12 VDC	40 to 90 VAC Power over Cable, 12 VDC	AC, DC

1. When a 1552E/EU is powered with PoE, the PoE-Out port is not active.
2. PoE-In is not 802.3af; it does not work with a PoE 802.3af-capable Ethernet switch. It requires the dedicated Power Injector (AIR-PWRINJ1500-2=).

## Regulatory Domains

The “-x” in the 1552 model numbers represent the domain. For example, in AIR-CAP1552C-x-K9, the -x represents a regulatory domain for a specific country.

For specific regulatory domains supported by each 1552 access point model, refer to the Wireless LAN Compliance Status at:

[http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product\\_data\\_sheet0900aecd80537b6a.html](http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps5861/product_data_sheet0900aecd80537b6a.html)

To locate the 1552 access point models, click on **802.11abgn Mesh Access Points**.

# Hardware Features

This section describes the hardware features of the 1552 access point models. The following hardware features are described in this section:

- [Connectors, page 1-5](#)
- [Antenna Port Locations, page 1-11](#)
- [Multiple Radio Operation, page 1-12](#)
- [Antenna Configurations, page 1-13](#)
- [Multiple Power Sources, page 1-21](#)
- [Cable Modem \(POC\), page 1-22](#)
- [Ethernet \(PoE\) Ports, page 1-22](#)
- [Fiber Option, page 1-23](#)
- [Metal Enclosure, page 1-24](#)
- [Optional Hardware, page 1-24](#)

## Connectors

[Figure 1-1](#) through [Figure 1-9](#) show the access point connectors for all models. [Figure 1-10](#) and [Figure 1-11](#) show the external antenna Type-N connectors.



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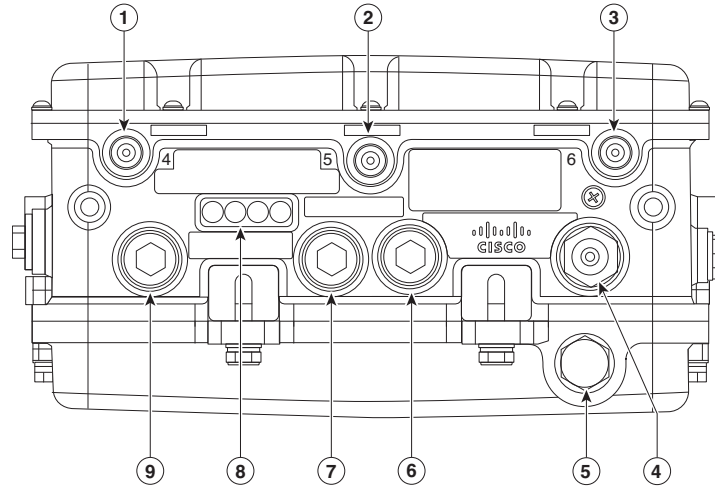
**Note**

The illustrations in this document show all available connections for the access point. Unused connections are capped with a connector plug to ensure the watertight integrity of the access point. Liquid-tight adapters are provided for connector openings, which can be installed before or after deploying the access point.

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## 1552E/1552EU Connectors

**Figure 1-1** Access Point Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9 Bottom Connectors



<b>1</b>	Antenna port 4	<b>6</b>	Fiber port
<b>2</b>	Antenna port 5	<b>7</b>	PoE-out port
<b>3</b>	Antenna port 6	<b>8</b>	LEDs (Status, Up Link, RF1, RF2)
<b>4</b>	Auxiliary cable gland entry (1/2-NPT) for data cable (outdoor cat 5 STP cable)	<b>9</b>	PoE-in port
<b>5</b>	AC power entry port for model AIR-CAP1552E/EU-x-K9 only		

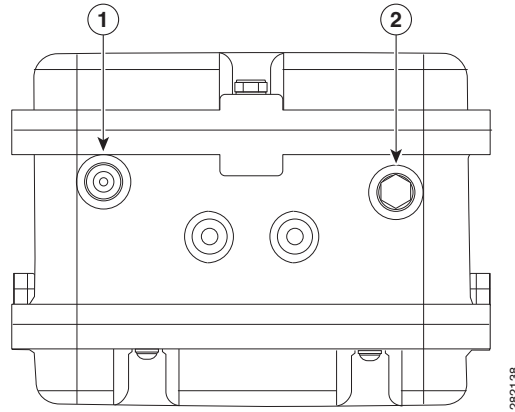


**Note**

Antenna ports 1, 2, and 3 are not shown in [Figure 1-1](#). These ports are located on the top of the access point.

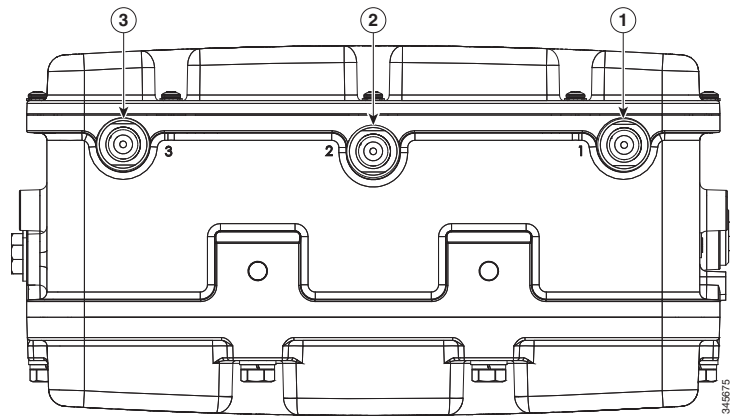


**Figure 1-2 Console Port for Access Point Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9**



<b>1</b>	Console port	<b>2</b>	Not used
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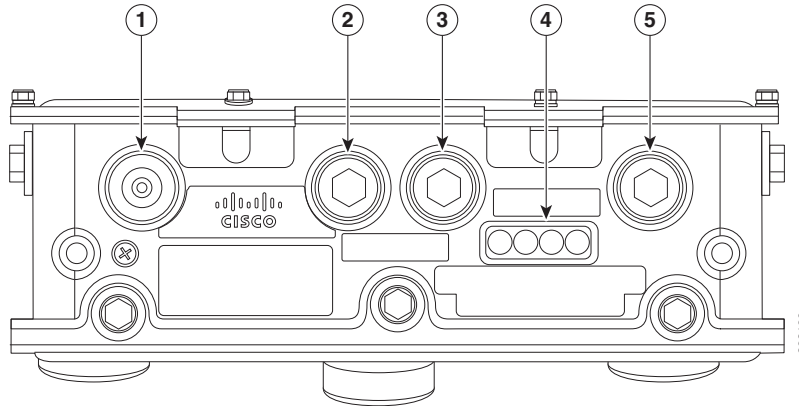
**Figure 1-3 Access Point Model AIR-CAP1552EU-x-K9 Top Connectors**



<b>1</b>	Antenna port 1	<b>3</b>	Antenna port 3
<b>2</b>	Antenna port 2		

## 1552I Connectors

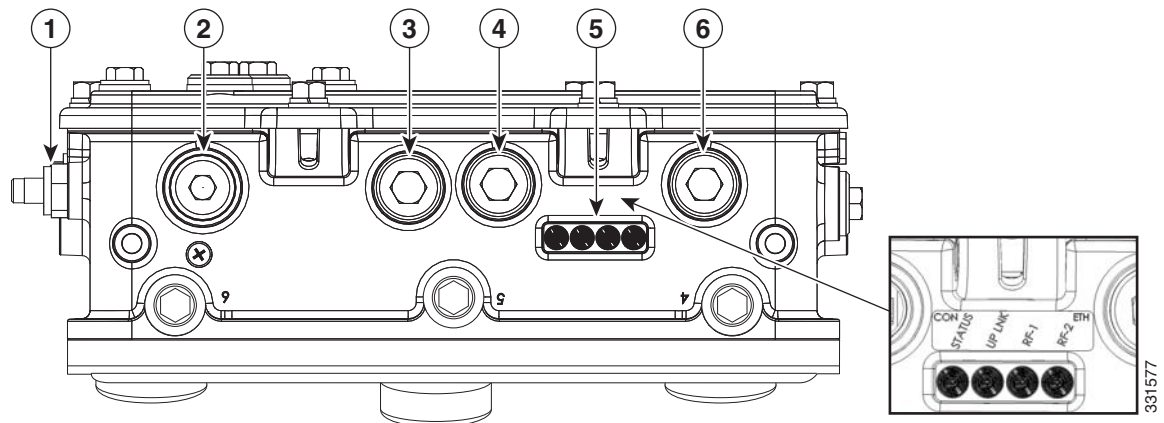
**Figure 1-4** Access Point Model AIR-CAP1552I-x-K9 Bottom Connectors



<b>1</b>	AC Connector	<b>4</b>	LEDs (Status, Up Link, RF1, RF2)
<b>2</b>	Not used	<b>5</b>	Ethernet backhaul connector
<b>3</b>	Console port		

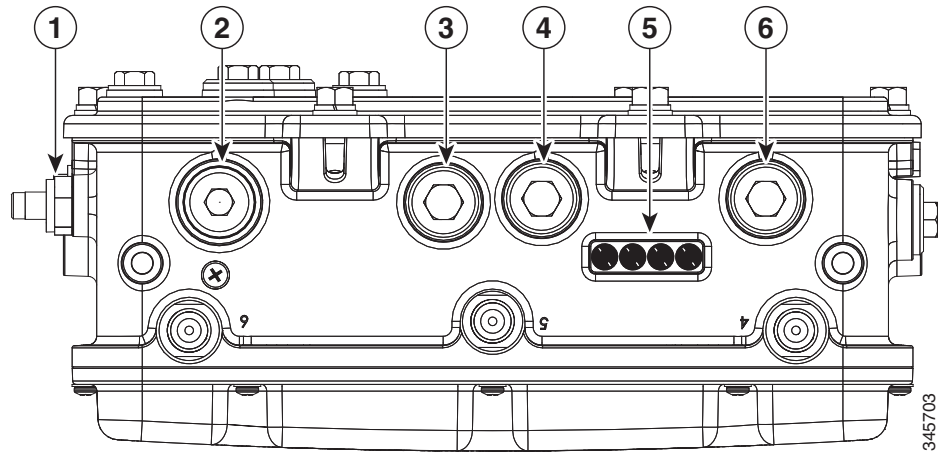
## 1552C/1552CU Connectors

**Figure 1-5** Access Point Model AIR-CAP1552C-x-K9 Bottom/Side Connectors



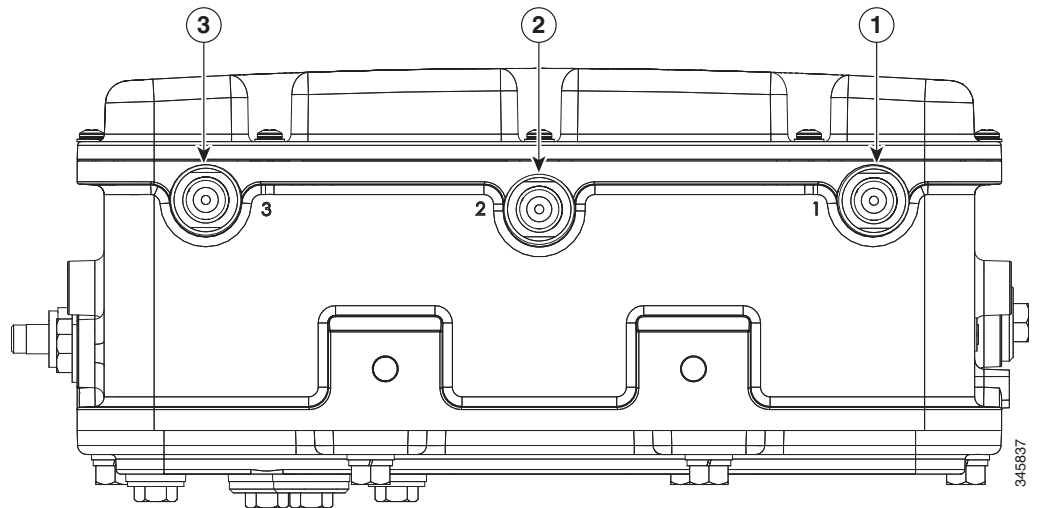
<b>1</b>	F-Connector adapter (splitter) for cable POC (optional)	<b>4</b>	Console port
<b>2</b>	AC power connector (Not used)	<b>5</b>	LEDs (Status, Up Link, RF1, RF2)
<b>3</b>	Not used	<b>6</b>	Not used

**Figure 1-6 Access Point Model AIR-CAP-1552CU-x-K9 Bottom/Side Connectors**



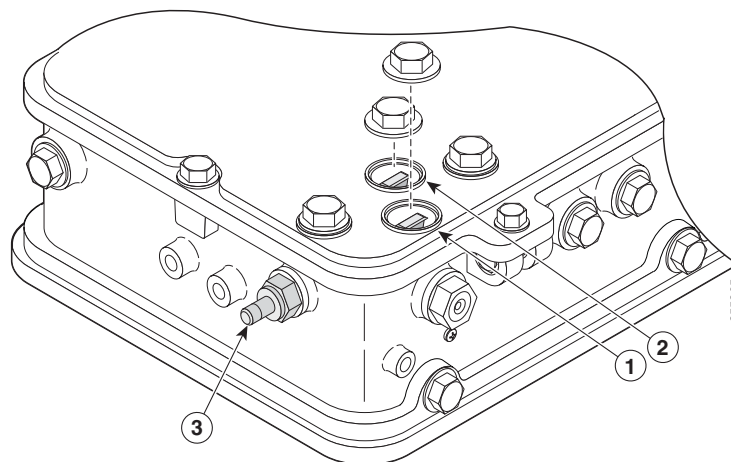
<b>1</b>	F-Connector adapter (splitter) for cable POC (optional)	<b>4</b>	Console port
<b>2</b>	AC power connector (Not used)	<b>5</b>	LEDs (Status, Up Link, RF1, RF2)
<b>3</b>	Not used	<b>6</b>	Not used

**Figure 1-7 Access Point Model AIR-CAP1552CU-x-K9 Top Connectors**



<b>1</b>	Antenna port 1	<b>3</b>	Antenna port 3
<b>2</b>	Antenna port 2		

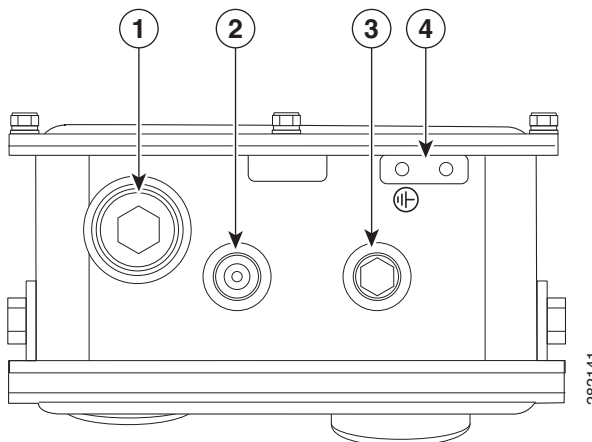
**Figure 1-8 F-Connector Adapter (Splitter) Components (AIR-CAP1552C-x-K9 and AIR-CAP1552CU-x-K9)**



<b>1</b>	RF splitter attenuator (ATTN)	<b>3</b>	F-Connector adapter (splitter) for cable POC (optional)
<b>2</b>	RF splitter shunt (SHUNT) <sup>1</sup>		
<sup>1</sup> Shunt is a 20 amp fuse.			

### Connectors for All Models

**Figure 1-9 Access Point DC Power Connector and Ground Lug (All Models)**

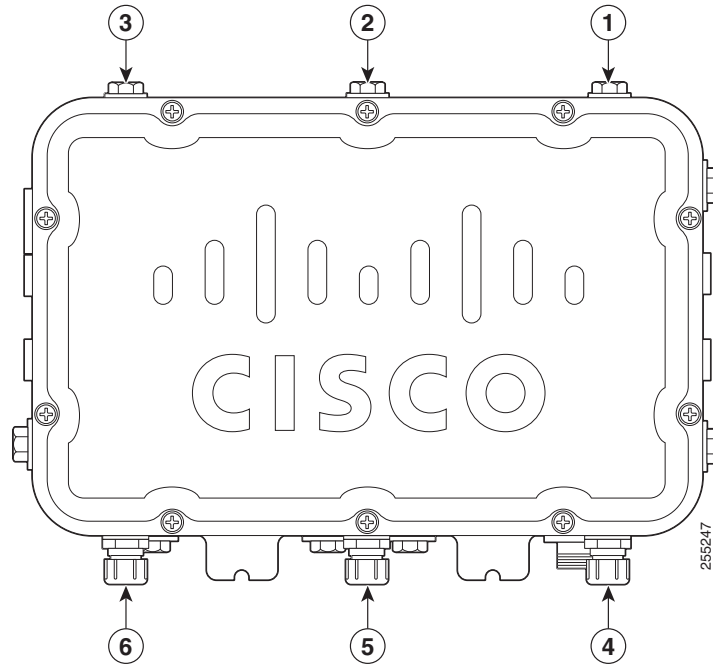


<b>1</b>	DC power port	<b>3</b>	Bracket mounting nut
<b>2</b>	Bracket mounting hole	<b>4</b>	Ground lug location (connection for earth grounding (minimum VD 16 mm,6 AWG))

## Antenna Port Locations

Figure 1-10 shows the antenna port locations for model AIR-CAP1552E-x-K9. The ports used depend on the optional antennas ordered.

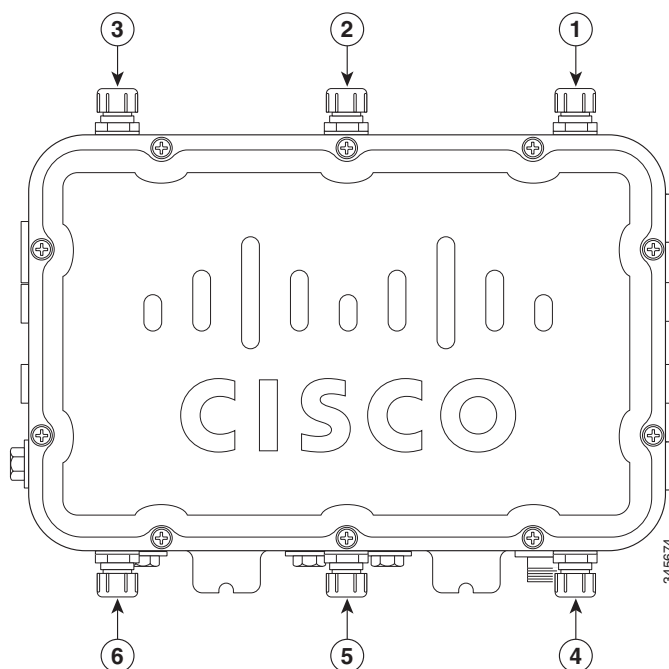
**Figure 1-10** External Antenna Port Locations for Access Point Models AIR-CAP1552E-x-K9



<b>1</b>	Not used	<b>4</b>	Antenna port 4 - Type N connector (with cap)
<b>2</b>	Not used	<b>5</b>	Antenna port 5 - Type N connector (with cap)
<b>3</b>	Not used	<b>6</b>	Antenna port 6 - Type N connector (with cap)

Figure 1-11 shows the antenna port locations for models AIR-CAP1552CU-x-K9 and AIR-CAP1552EU-x-K9. The ports used depend on the optional antennas ordered.

**Figure 1-11 External Antenna Port Locations for Access Point Models AIR-CAP1552CU-x-K9 and AIR-CAP1552EU-x-K9**



<b>1</b>	Antenna port 3 - Type N connector (with cap)	<b>4</b>	Antenna port 6 - Type N connector (with cap)
<b>2</b>	Antenna port 2 - Type N connector (with cap)	<b>5</b>	Antenna port 5 - Type N connector (with cap)
<b>3</b>	Antenna port 1 - Type N connector (with cap)	<b>6</b>	Antenna port 4 - Type N connector (with cap)

## Multiple Radio Operation

The 1552 access point supports simultaneous dual-radio operation using a 2.4-GHz 802.11b/g/n multiple input/multiple output (MIMO) radio and a 5-GHz 802.11a/n MIMO radio. The 2.4 GHz radio supports channels 1 to 11 in US, 1 to 13 in Europe, and 1 to 13 in Japan. It has two transmitters with a maximum total output power of 25 dBm for 802.11b/g/n operation. Output power is configurable to 5 levels. It has three receivers that enable maximum-ratio combining (MRC).

The 5-GHz radio operates in the UNII-2 band (5.25 – 5.35 GHz), UNII-2 Extended/ETSI band (5.47 – 5.725 GHz), upper ISM band (5.725 – 5.850 GHz), and the Extended India Band (5.85 – 5.875 GHz). It has two transmitters with a maximum total output power of 26 dBm for UNII-2 and Extended/ETSI bands. The total maximum output power for the upper ISM band is 28 dBm. Output power is configurable for 5 power levels in 3 dB steps. The three receivers enables maximum-ratio combining (MRC).

## Antenna Configurations

The 1552 access point supports a variety of antennas designed for outdoor use with radios operating in the 2.4-GHz and 5-GHz frequency bands. In addition to an integrated antenna array, the 1552 supports the external antennas listed in the following sections.

Two mounting configurations are available, the cable strand mount and the pole mount (refer to [“Mounting the Access Point” section on page 2-14.](#))

Using an optional antenna mounting bracket kit, the directional antennas AIR-ANT2413P2M-N and AIR-ANT5114P2M-N can be mounted directly on an access point in a strand mount or pole mount environment. The antenna bracket kit contains four bracket sections and fasteners that you can assemble in multiple configurations to position and aim the directional antenna in a range of positions. For more information on mounting the antenna with the optional mounting bracket, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

The AIR-CAP1552E-x-K9 model must always be operated with the three external antennas attached. [Figure 1-10](#) shows the antenna port locations for model 1552E.

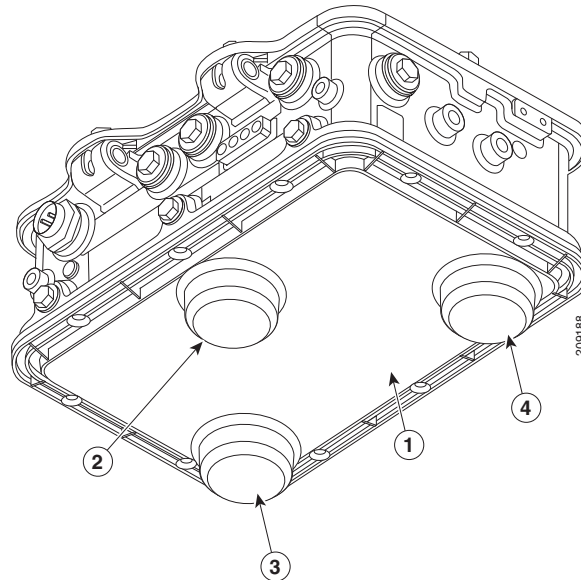
### Low Profile Dual-Band 2.4/5-GHz Omni Antenna Array

The Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array has the following basic features:

- Contains an array of three dual-band omni antennas—The three omni antennas are contained within this single radome, which greatly reduces the antenna’s visual footprint and reduces the possibility of snagging the antenna on the cable bundle, the RF cable, or test cables.
- Operates over both 2.4 GHz and 5 GHz bands—Each of the three omni antennas is a dual-band antenna, covering both the 2.4–2.5 GHz band, and the 5.2–5.9 GHz bands.
- Gain of about 2 dBi at 2.4 GHz, 4 dBi at 5 GHz.
- Cisco Light Gray weatherproof radome for outdoor operation.

[Figure 1-12](#) shows an integrated low-profile dual-band (2.4 GHz and 5 GHz) 3-element array antenna built-in only on models AIR-CAP1552I-x-K9 and AIR-CAP1552C-x-K9.

**Figure 1-12 Cisco Aironet Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array- Built-in Only on Models AIR-CAP1552I-x-K9 and AIR-CAP1552C-x-K9**



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

## Cisco Aironet Dual-Band Omnidirectional Antenna (AIR-ANT2547V-N)

The Dual-Band Omnidirectional Antenna, referred to as a “stick” antenna, is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz and 5-GHz frequency bands (Figure 1-13). Basic operating features of the antenna are:

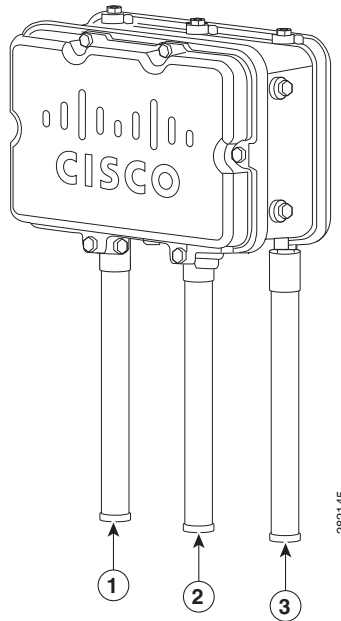
- Omnidirectional colinear array
- Operates in the 2.4 GHz and 5 GHz frequency bands
- Gain:
  - 2400–2483 MHz — 4-dBi
  - 5250–5875 MHz — 7-dBi

The antenna is designed to create an omnidirectional broadcast pattern. To achieve this pattern, mount the access point clear of any obstructions to the sides of the radiating element.

For detailed information on this antenna, refer to the *Cisco Aironet Dual-Band Omnidirectional Antenna (AIR-ANT2547V-N)* document. Follow all safety precautions when installing the antennas. For information on safety, refer to “[Safety Precautions](#)” section on page 2-41.



**Figure 1-13** Cisco Aironet Dual-Band Omnidirectional Antenna - Installed Only on Model AIR-CAP1552E-x-K9



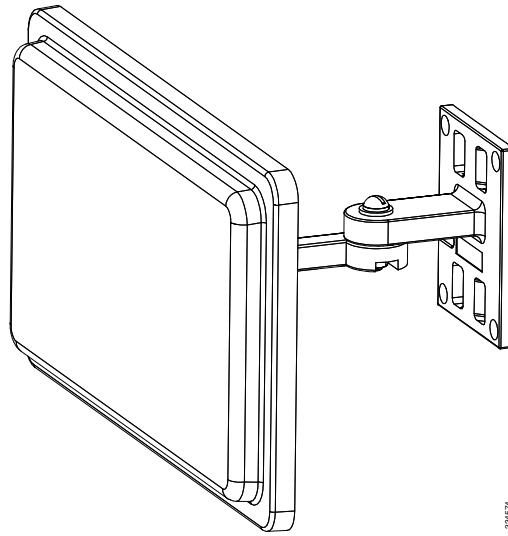
<b>1</b>	Antenna connected to antenna port 4 (Type-N connector) (TX/RX)	<b>3</b>	Antenna connected to antenna port 6 (Type-N connector) (TX/RX)
<b>2</b>	Antenna connected to antenna port 5 (Type-N connector) (RX only)		

### Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna (AIR-ANT2588P3M-N)

The Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in both the 2.4-GHz and 5-GHz frequency bands. This antenna has 8-dBi gain in both bands.

For detailed information on this antenna, refer to the *Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna (AIR-ANT2588P3M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-41](#).

**Figure 1-14** Cisco Aironet 2.4-GHz/5-GHz 8-dBi Directional Antenna - Installed Only on Model AIR-CAP1552E-x-K9



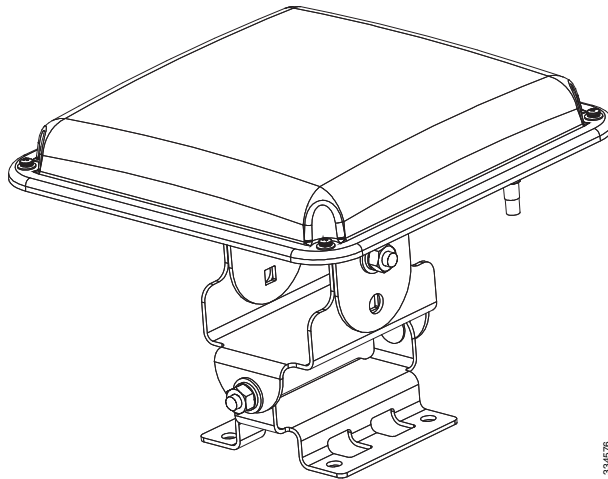
## Cisco Aironet 5-GHz 14-dBi 2-Port Directional Antenna (AIR-ANT5114P2M-N)

The Cisco Aironet 5-GHz 14-dBi 2-Port Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. This antenna has 14-dBi in the 5-GHz band.

This antenna can be installed using the optional directional-antenna mounting kit AIR-CCAMK-1, which allows the antenna to be mounted on the access point and positioned in multiple configurations. For more information, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

For detailed information on this antenna, refer to the *Cisco Aironet 5-GHz 14-dBi Directional Antenna (AIR-ANT5114P2M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-41](#).

**Figure 1-15** Cisco Aironet 5-GHz 14-dBi Directional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



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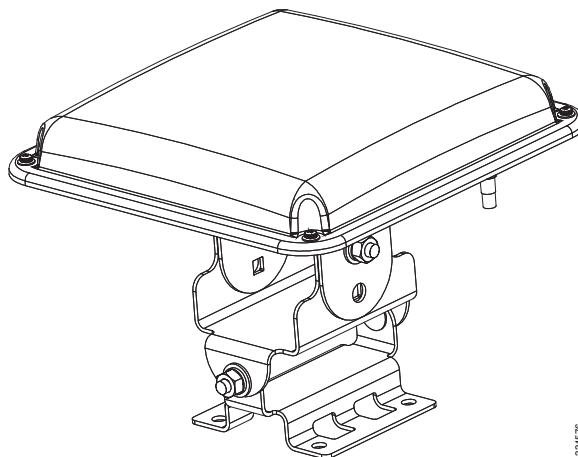
## Cisco Aironet 2.4-GHz 13-dBi 2-Port Directional Antenna (AIR-ANT2413P2M-N)

The Cisco Aironet 2.4-GHz 13-dBi 2-Port Directional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 13-dBi gain in the 2.4-GHz frequency band.

This antenna can be installed using the optional directional-antenna mounting kit AIR-CCAMK-1, which allows the antenna to be mounted on the access point and positioned in multiple configurations. For more information, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

For detailed information on this antenna, refer to the *Cisco Aironet 2.4-GHz 13-dBi Directional Antenna (AIR-ANT2413P2M-N)* document. Follow all safety precautions when installing the antennas, for information on safety, refer to “[Safety Precautions](#)” section on page 2-41.

**Figure 1-16** Cisco Aironet 2.4-GHz 13-dBi Directional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



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## Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna (AIR-ANT2420V-N)

The Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. Basic operating features of the antenna are:

- Operates in the 2.4-GHz frequency band
- Gain: 2 dBi
- Right-angle antenna primarily intended for strand (side) mounting

Follow all safety precautions when installing the antennas, for information on safety, refer to “[Safety Precautions](#)” section on page 2-41.

**Figure 1-17** Cisco Aironet 2.4-GHz 2-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



## Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna (AIR-ANT2450V-N)

The Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 5-dBi gain in the 2.4-GHz frequency band.

For detailed information on this antenna, refer to the bilingual document *Cisco Aironet 5-dBi Omnidirectional Antenna (AIR-ANT2450V-N)-French*. Follow all safety precautions when installing the antennas, for information on safety, refer to “[Safety Precautions](#)” section on page 2-41.

**Figure 1-18** Cisco Aironet 2.4-GHz 5-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9

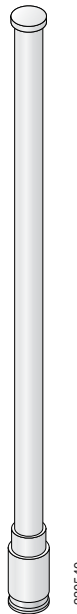


## Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna (AIR-ANT2480V-N)

The Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 2.4-GHz frequency band. This antenna has 8-dBi gain in the 2.4-GHz frequency band.

For detailed information on this antenna, refer to the document *Cisco Aironet 8-dBi Omnidirectional Antenna (AIR-ANT2480V-N)*. Follow all safety precautions when installing the antennas, for information on safety, refer to [“Safety Precautions” section on page 2-41](#).

**Figure 1-19** Cisco Aironet 2.4-GHz 8-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



## Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna (AIR-ANT5140V-N)

The Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. Basic operating features of the antenna are:

- Operates in the 5-GHz frequency band
- Gain: 4 dBi
- Right-angle antenna primarily intended for strand (side) mounting

Follow all safety precautions when installing the antennas, for information on safety, refer to “[Safety Precautions](#)” section on page 2-41.

**Figure 1-20** Cisco Aironet 5-GHz 4-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9



## Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna (AIR-ANT5180V-N)

The Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna is designed for outdoor use with Cisco Aironet Outdoor Access Points with radios operating in the 5-GHz frequency band. This antenna has 8-dBi gain in the 5-GHz frequency band.

For detailed information on this antenna, refer to the document *Cisco Aironet 8-dBi Omnidirectional Antenna (AIR-ANT5180V-N)*. Follow all safety precautions when installing the antennas, for information on safety, refer to “[Safety Precautions](#)” section on page 2-41.

**Figure 1-21 Cisco Aironet 5-GHz 8-dBi Omnidirectional Antenna - Installed Only on Models AIR-CAP1552EU-x-K9 and AIR-CAP1552CU-x-K9**



## Multiple Power Sources

The 1550 series access point supports these power sources:

- AC power—100 to 480 VAC, models 1552E and 1552EU access points, pole-mount configuration
- AC power—100 to 277 VAC, model 1552I access point
- Power-over-Cable (POC)—40 to 90 VAC, quasi-square wave AC, models 1552C and 1552CU (standard power source for the cable modem configuration)
- External 12 VDC
- Power-over-Ethernet (PoE)—56 VDC power injector (AIR-PWRINJ1500-2=), only on models 1552E and 1552EU access points
- Internal 6 ampere-hour battery backup—only for the 1552E and 1552EU access point



### 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 1552 access point can be connected to more than one power source. The access point detects the available power sources and switches to the preferred power source using the following default prioritization:

- AC power or POC power
- External 12-VDC power
- Power injector PoE power
- Internal battery power



### 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**

To provide inline PoE, you must use the 1500 power injector (AIR-PWRINJ1500-2=). Other power injectors, PoE switches, and 802.3af power sources cannot provide adequate power, which can cause the access point to malfunction and cause over-current conditions at the power source.

**Caution**

The 1500 power injector (AIR-PWRINJ1500-2=) must be used in an indoor environment only.

**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**

In the cable configuration, the cable modem is activated only when the access point is powered by POC or external 12 VDC power. When using only PoE power, the cable modem is deactivated.

The following AC power cord options are available:

- 40-ft (12.2-m) power cord for light pole installations in the US and Canada. One end of the power cord is terminated with an access point AC power connector and the other end is terminated with an AC plug (AIR-CORD-R3P-40NA=).
- 40-ft (12.2-m) power cord for use outside the US and Canada. One end of the power cord is terminated with an access point AC power connector and the other end is unterminated. (AIR-CORD-R3P-40UE=).
- 4-ft (1.2-m) streetlight power tap adapter for light pole installations in the US and Canada (AIR-PWR-ST-LT-R3P=).

## Cable Modem (POC)

The access point POC cable modem configuration contains an internal cable modem for connection to the cable network from the pole-mounted cable lines. The access point can be powered using the 40-to 90-VAC (quasi-square wave AC) power provided by the cable network.

The cable modem supports these main features:

- Data Over Cable Service Interface Specifications (DOCSIS)3.0
- Backward compatibility with existing DOCSIS 1.1 and 1.0 networks

## Ethernet (PoE) Ports

The access point supports an Ethernet uplink port (POE-In) and a downlink port (POE-Out). The access point PoE-in port uses an RJ-45 connector (with a liquid tight adapter) to link the access point to the 10/100/1000BASE-T network. The Ethernet cable is used to send and receive Ethernet data and to optionally supply inline 56-VDC power from the power injector.



**Note**

When a 1552E or 1552EU access point is powered by PoE, the PoE-Out port is not active.

The access point PoE-out (10/100/1000BASE-T) port uses an RJ-45 connector to provide LAN connectivity and IEEE 802.3af power to a single peripheral customer device, such as a camera or sensor gateway. The PoE-out port should not be connected to a switch or hub. The Ethernet MAC addresses are printed on the bottom of the access point under the LEDs.

**Note**

The PoE-out port is disabled when the access point is powered by the power injector.

**Tip**

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

**Warning**

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

The Ethernet cable must be a shielded outdoor rated Category 5e (CAT5e) or better cable. The access point senses the Ethernet and power signals and automatically switches internal circuitry to match the cable connections.

**Caution**

To provide inline PoE, you must use the 1500 power injector (AIR-PWRINJ1500-2=). Other power injectors, PoE switches, and 802.3af power sources cannot provide adequate power, which may cause the access point to malfunction and cause possible over-current conditions at the power source.

## 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 SFP modules:

- 100BASE-BX10-U fiber Rugged small-form factor pluggable (SFP) module
- 1000BASELX single-mode Rugged SFP module
- 1000BASESX multimode Rugged SFP module
- EPON ONU Rugged SFP module

**Note**

SFP modules are not hot-swappable.

The access point has one fiber connection, located on the bottom of the unit (shown on [Figure 1-1](#)). Client data is passed to the network controller through the fiber connection via a fiber-capable switch. Configuration information can be found in the controller configuration guide of the controller you are using.

## GPS Option

A GPS module is required to accurately track the location of the AP and report it to the controller, to provide location information for Cisco's AIR-CAP 1552I/C/CU/E/EU/H product line.

For information on routing and securing the cable for the GPS antenna, refer to the *1550 Series GPS Hardware Mounting Guide*.

## Metal Enclosure

The access point uses a metal enclosure that can accommodate both indoor or outdoor operating environments and an industrial temperature operating range of  $-40$  to  $131^{\circ}\text{F}$  ( $-40$  to  $55^{\circ}\text{C}$ ). The access point complies with NEMA 4 and IP67 requirements.

## Optional Hardware

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

- External antennas, depending on which ones you purchased
- Strand mount kit (AIR-ACCSMK1550=)
- Pole mount kit (AIR-ACCPMK1550=)
- Band installation tool for pole mount kit (AIR-BAND-INS-TL=)
- AC power cord, 40 ft. (12.2 m) with North American plug (AIR-CORD-R3P-40NA=)
- AC power cord, 40 ft. (12.2 m) with European unterminated end (AIR-CORD-R3P-40UE=)
- Street light power tap (AIR-PWR-ST-LT-R3P=)
- Power injector (AIR-PWRINJ1500-2=)
- 1000BASELX single-mode Rugged SFP (GLC-LX-SM-RGD=)
- 1000BASESX multimode Rugged SFP (GLC-SX-MM-RGD=)
- EPON ONU Rugged SFP module
- Battery, 6 amp hour (AIR-1520-BATT-6AH)
- FIPS kit (AIRLAP-FIPSKIT=)
- Optional directional-antenna mounting kit (AIR-ACCAMK-1)
- Lightning Arrestor kit (CGR-LA-NM-NF)
- Third-party lightning arrestors as required by local authorities

# 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.

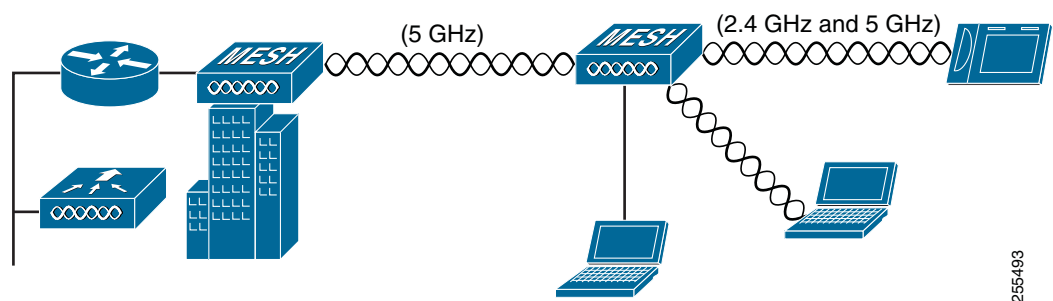
The access point plays two primary radio roles: a root access point (RAP) or a mesh (non-root) access point (MAP), which is the default role of all access points. When the access point has a fiber or wired Ethernet or cable connector connection to the controller (through a switch), the radio role is 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, fiber-optic, or cable connection to the controller, 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 with an Ethernet or cable connection through a switch to the controller. MAPs can 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 (see [Figure 1-22](#)). 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.

**Figure 1-22** Access Point Backhaul Example



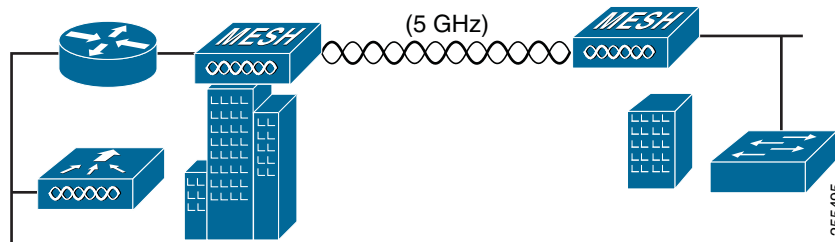
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## Point-to-Point Bridging

The access points can be used to extend a remote network by using the 5 GHz backhaul radio to bridge the two network segments as shown in [Figure 1-23](#). To support Ethernet bridging, you must enable bridging on the controller for each access point. By default this capability is turned-off for all access points.

Wireless client access is supported; however, if bridging between tall buildings, the 2.4-GHz wireless coverage area may be limited and possibly not suitable for direct wireless client access.

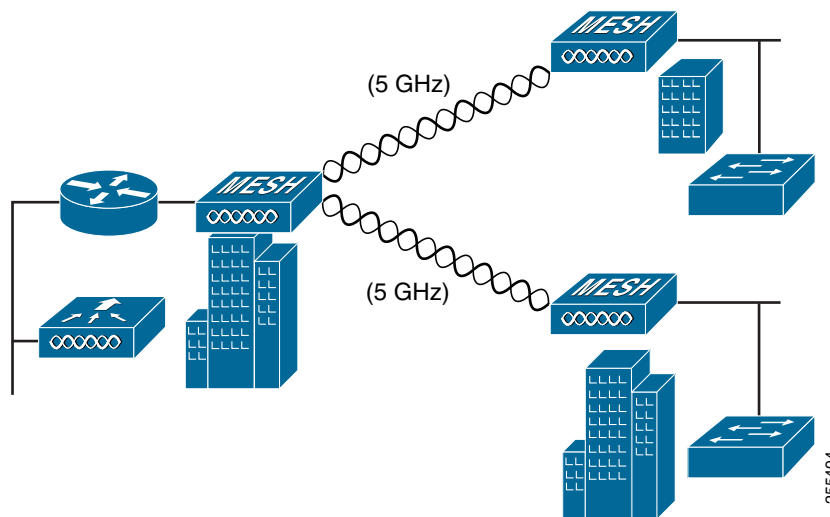
**Figure 1-23** Access Point Point-to-Point Bridging Example



## Point-to-Multipoint Bridging

The access points can be used as a RAP to connect multiple remote MAPs with their associated wired networks. By default this capability is turned-off for all access points. To support Ethernet bridging, you must enable bridging on the controller for each access point. Wireless client access can be provided over the bridging link; however, if bridging between tall buildings, the 2.4-GHz wireless coverage area may be limited and possibly not suitable for direct wireless client access. [Figure 1-24](#) illustrates an example of access point-to-multipoint bridging.

**Figure 1-24** Access Point to Multipoint Bridging Example



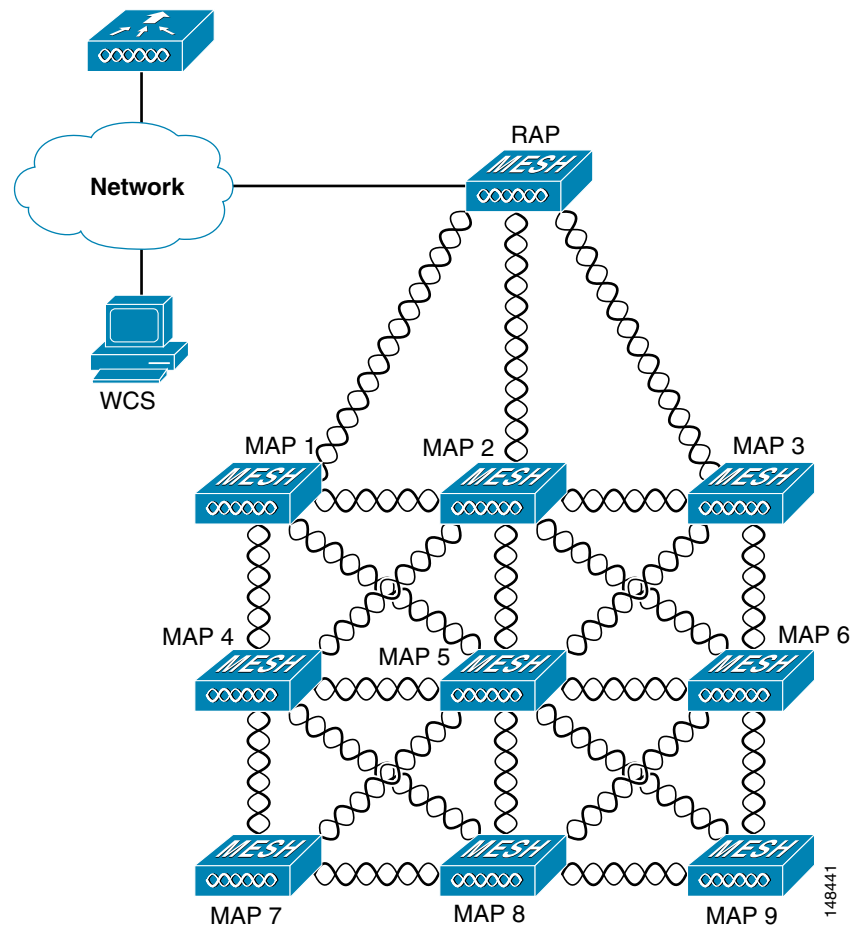
## Point-to-Multipoint Mesh Network

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 1-25 illustrates a typical mesh configuration using MAPs and RAPs.

**Figure 1-25** Typical Mesh Configuration Using Access Points

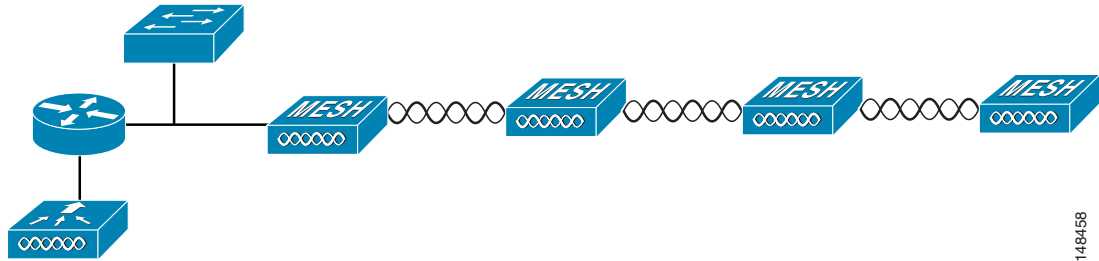


## Layer 3 Network Operation

The access points support Layer 3 network operation. Access points and controllers in Layer 3 configurations use IP addresses and UDP packets, which can be routed through large networks. Layer 3 operation is scalable and recommended by Cisco.

Figure 1-26 illustrates a typical Layer-3 wireless network configuration containing access points and a controller.

**Figure 1-26** Typical Layer 3 Access Point Network Configuration Example



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## CHAPTER 2

# Installing the Access Point

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This chapter describes how to install the 1552 access point and contains the following sections:

- [Unpacking the Access Point, page 2-2](#)
- [Tools and Hardware, page 2-2](#)
- [Warnings, page 2-4](#)
- [Safety Information, page 2-5](#)
- [Avoiding Damage to Radios in a Testing Environment, page 2-7](#)
- [Installation Guidelines, page 2-8](#)
- [Mounting the Access Point, page 2-14](#)
- [Installing Antennas, page 2-36](#)
- [Grounding the Access Point, page 2-41](#)
- [Connecting a Fiber-Optic Cable to the Access Point, page 2-42](#)
- [Powering the Access Point, page 2-45](#)
- [Configuring the Access Point, page 2-60](#)
- [What to Do Next, page 2-63](#)

# Unpacking the Access Point

When you are unpacking the access point, do not remove the foam blocks attached to the antenna connectors. The foam protects the antenna connectors during installation.

To unpack the access point, follow these steps:

- 
- 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** Ensure that all items listed in “[Package Contents](#)” are included in the shipment. If any item is damaged or missing, notify your authorized Cisco sales representative.
- 

## Package Contents

The typical access point package contains the following items:

- Access point
- Cisco product documentation and translated safety warnings
- Three liquid-tight adapters
- Two-pin DC power connector
- Ground lug (Panduit PLCD6-10A-L) and screws with lock washers
- Watertight cable glands for Power-over-Ethernet (PoE) ports (depending on the 1552 access point model, 2 or 3 cable glands are provided)

## Tools and Hardware

The tools and hardware used to install the 1552 access point are described in:

- [Optional Tools and Hardware, page 2-2](#)
- [Optional Tools and Hardware That You Supply, page 2-3](#)
- [Pole Installation Hardware and Tools, page 2-3](#)
- [Cable Strand Installation Hardware and Tools, page 2-4](#)

## Optional Tools and Hardware

The optional tools and hardware that can be obtained from Cisco are:

- Optional power injector (AIR-PWRINJ1500-2=)
- Optional AC power cord
  - 40-ft (12.2-m) power cord with North American plug (AIR-CORD-R3P-40NA=) for light pole installations in the US and Canada
  - AC power cord, 40 ft (12.2 m) with European unterminated end (AIR-CORD-R3P-40UE=) for light pole installations outside of the US and Canada



- 4-ft (1.2-m) streetlight power tap adapter (AIR-PWR-ST-LT-R3P=) for light pole installations in the US and Canada
- Antennas, 2.4/5-GHz (refer to the “[Antenna Configurations](#)” section on page 1-13)
- Optional battery backup unit (AIR-1520-BATT-6AH=)—Used only on models 1552E and 1552EU
- FIPS kit (AIRLAP-FIPSKIT=)
- 1000BASELX single-mode Rugged SFP (GLC-LX-SM-RGD=)
- 1000BASESX multimode Rugged SFP (GLC-SX-MM-RGD=)
- EPON ONU Rugged SFP module
- Optional pole mount kit (AIR-ACCPMK1550=)
- Optional strand mount kit (AIR-ACCSMK1550=)
- Optional banding strap tool (BAND IT) (AIR-BAND-INST-TL=)
- Optional directional-antenna mounting kit (AIR-ACCAMK-1)
- Lightning Arrestor kit (CGR-LA-NM-NF)
- Third-party lightning arrestors as required by local authorities

## Optional Tools and Hardware That You Supply

Tools and materials that are user-supplied are:

- Ground lug crimping tool (Panduit CT-720 with CD-720-1 die)
- 6-AWG copper ground wire
- 13 mm box-end wrench or socket set
- Adjustable wrench, 22 mm socket, or Sealcon S-2200-WR socket wrench
- #8 Torx screwdriver
- Small flat screwdriver for DC power connector
- Optional shielded outdoor-rated Ethernet (CAT5e or better) cable with 0.20 to 0.35 in (0.51 to 0.89 cm) diameter
- Optional Ethernet RJ-45 connector and installation tool
- Optional shielded outdoor-rated DC power cable with 0.20 to 0.35 inch (.051 to 0.89 cm) diameter
- Optional cable F-connector adapter (stinger)
- Optional ground rod, as required by local regulations
- Optional ladder, power lift, rope, or other tools as required

## Pole Installation Hardware and Tools

To install the access point on a vertical or horizontal metal, wood, or fiberglass pole, you need the following additional hardware and tools:

- Pole mount kit (AIR-ACCPMK1550=)
  - Pole clamp bracket
  - Two gusset strap brackets

- One mounting bracket
- Twelve hex bolts (M8 x16)
- One M8 flange nut
- Six M8 flat washers
- Ten M8 split lock washers
- Two stainless steel mounting straps
- Customer banding strap tool (BAND IT)—(AIR-BAND-INST-TL=)
- Customer-supplied 13-mm and box-end wrench or socket set
- Customer-supplied adjustable wrench, 22 mm socket, or Sealcon S-2200-WR socket wrench

## Cable Strand Installation Hardware and Tools

To install the access point on a cable strand, you need the following additional parts:

- Cable strand mount kit (AIR-ACCSMK1550=)
  - Four hex bolts (M8, 0x16mmL)
  - Four M8 split lock washers (0.14 8mmOD, 2mmT)
  - Four M8 flat washers (16.0mmOD, 1.6mmT)
  - Two carriage bolt fasteners (5/16-18 x 1.25 in.)
  - Six hex nuts, serrated flange (5/16-18)
  - Four carriage bolts (5/16 x 5/8LG)
  - Strand mounting brackets—1 left bracket, 1 right bracket, 2 adjustable brackets
  - Four strap clamps
- Customer-supplied 13-mm box-end wrench or socket set
- Customer-supplied adjustable wrench, 22 mm socket, or Sealcon S-2200-WR socket wrench

## Warnings

Translated versions of all safety warnings are available in the safety warning document that shipped with your access point or on Cisco.com. To browse to the document on Cisco.com, refer to [Appendix A, “Translated Safety Warnings”](#) for instructions.



Warning

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### IMPORTANT SAFETY INSTRUCTIONS

**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 is to be installed by trained and qualified personnel, as per these installation instructions. The installer is responsible for obtaining any required local or national safety inspections of the structural integrity of the installation by the local authority/inspection department.**

**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

**Warning**

**The cables specified in this installation guide that are used with the specified liquid-tight adapters provide protection against ingress of moisture for a Type 4/IP67 classified enclosure. If substitute cable are used, the installer must ensure that the size (OD) of the cable meets the acceptable range allowed by the liquid-type adaptor.**

**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**

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

## Safety Information

Follow the guidelines in this section to ensure proper operation and safe use of the access point.

### FCC Safety Compliance Statement

The FCC, with its action in ET Docket 96-8, has adopted a safety standard for human exposure to 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 operation of this radio device according to the instructions in this publication results in user exposure substantially below the FCC recommended limits.

### Safety Precautions

**Warning**

**In order to comply with FCC radio frequency (RF) exposure limits, antennas with less than 8 dBi gain should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons and 20 inches (50 cm) for antennas with up to 13 dBi gain.** Statement 332

**Warning****The AC power supply has double pole/neutral fusing.** Statement 188**Warning****Do not work on the system or connect or disconnect cables during periods of lightning activity.** Statement 1001**Warning****Class 1 laser product.** Statement 1008**Warning****There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.** Statement 1015**Warning****A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022**Warning****To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord.** Statement 1023**Warning****This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028**Warning****Only trained and qualified personnel should be allowed to install, replace, or service this equipment.** Statement 1030**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**Warning****When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046.**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

**Caution**

Before connecting or disconnecting a power cord, you must remove AC power from the power cord using a suitable service disconnect.

For additional important safety instructions for AC power cords, refer to the *AC Power Cords for Cisco Aironet 1550 Series Outdoor Mesh Access Points* document that shipped with your AC power cords.

For safety and to achieve a good installation, please read and follow these safety precautions:

- Select your installation site with safety, as well as performance in mind. Remember: electric power lines and phone lines look alike. For safety, assume that any overhead line can kill.
- Call your electric power company. Tell them your plans, and ask them to come look at your proposed installation.
- Plan your installation carefully and completely before you begin. Successful raising of a mast or tower is largely a matter of coordination. Each person should be assigned to a specific task and should know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
- When installing the access point and antennas, remember:
  - Do not use a metal ladder.
  - Do not work on a wet or windy day.
  - Do dress properly—shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
- Use a rope to lift the access point. If the assembly starts to drop, get away from it and let it fall.
- If any part of the antenna system should come in contact with a power line, do not touch it or try to remove it yourself. Call your local power company. They will remove it safely.

If an accident should occur, call for qualified emergency help immediately.

## 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 high-power radios in a link, you must avoid exceeding the maximum receive input level for the receiver. At levels above the normal operating range, packet error rate (PER) performance 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.

**Note**

These distances assume free space path loss and are conservative estimates. Required separation distances for damage and performance degradation levels in actual deployments are less if conditions are not non-line-of-sight.

- Reduce the configured transmit power to the minimum level.
- Use directional antennas, and keep them away from each other.
- 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:

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

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:

$$\text{txpwr} - [\text{attenuation due to coaxial components}] < \text{max rx input level}$$



#### 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 that PER performance is not degraded.

## Installation Guidelines

Because the access point is a radio device, it 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 7.3*.
- Review the FCC guidelines for installing and operating outdoor wireless LAN devices at [http://www.cisco.com/en/US/partner/prod/collateral/routers/ps272/data\\_sheet\\_c78-647116\\_ps11451\\_Products\\_Data\\_Sheet.html](http://www.cisco.com/en/US/partner/prod/collateral/routers/ps272/data_sheet_c78-647116_ps11451_Products_Data_Sheet.html).
- Perform a site survey before beginning the installation.
- Install the access point in an area where structures, trees, or hills do not obstruct radio signals to and from the access point.
- The access points can be installed at any height, but best throughput is achieved when all the access points are mounted at the same height. We recommend installing the access points no higher than 40 feet to allow support for wireless clients on the ground.



#### Note

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

## Site Surveys

Every network application is a unique installation. Before installing multiple access points, you should perform a site survey to determine the optimum use of networking components and to maximize range, coverage, and network performance.

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

- Data rates—Sensitivity and range are inversely proportional to data bit rates. The maximum radio range is achieved at the lowest workable data rate. A decrease in receiver sensitivity occurs as the radio data increases.
- Antenna type and placement—Proper antenna configuration is a critical factor in maximizing radio range. As a general rule, range increases in proportion to antenna height. However, do not place the antenna higher than necessary, because the extra height also increases potential interference from other unlicensed radio systems and decreases the wireless coverage from the ground.
- Physical environment—Clear or open areas provide better radio range than closed or filled areas.
- Obstructions—Physical obstructions such as buildings, trees, or hills can hinder performance of wireless devices. Avoid locating the devices in a location where there is an obstruction between the sending and receiving antennas.

## Before Beginning the Installation

Before you begin the installation process:

- Ensure that a site survey has been performed.
- Ensure that your network infrastructure devices are operational and properly configured.
- Ensure that your controllers are connected to switch trunk ports.
- Ensure that your switch is configured with untagged access ports for connecting your access points.
- Ensure that a DHCP server with Option 43 configured is reachable by your access points, or manually configure the controller information in the access point (for additional information, refer to the “[Configuring DHCP Option 43](#)” section on page F-1).
- Become familiar with the access point installation components (see the “[Becoming Familiar with Access Point Installation Components](#)” section on page 2-9).

## Becoming Familiar with Access Point Installation Components

The access point is designed to be installed in an outdoor environment, such as the exterior roof overhang of a tall building or a streetlight pole. Carefully review the following figures to become familiar with the system components, connectors, indicators, cables, system interconnection, and grounding:

- Components in a typical access point installation (see [Figure 2-1](#))
- Pole mount installation (see [Figure 2-2](#))
- Cable strand mount installation (see [Figure 2-3](#))
- Streetlight power tap installation (see [Figure 2-4](#))

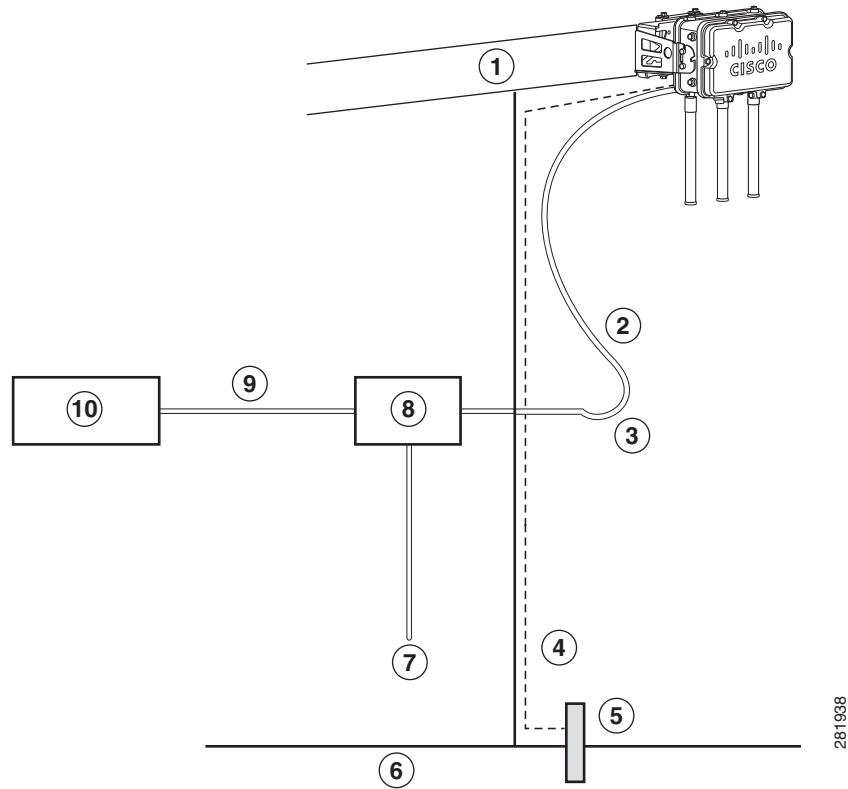


### Note

The illustrations in this document show all available connections for the access point. Unused connections are capped with a connector plug to ensure the watertight integrity of the access point, except for the AC power entry connector on the 1552E access point. Liquid-tight adapters are provided for connector openings, which can be installed before or after deploying the access point.

When not using the AC input connector to power the 1552E (for example when powering using the Cisco power injector), it is important to cover the AC power entry connector. The correct cap is Remke part number 75-0086 (<http://www.remke.com/>).

Figure 2-1 Components in a Typical Access Point Installation



1	Building roof-overhang	6	Ground
2	Shielded outdoor-rated Ethernet (CAT5e or better) cable <sup>1</sup>	7	AC power cord <sup>2</sup>
3	Water drip loop	8	Power injector <sup>3</sup>
4	6-AWG copper grounding wire <sup>1</sup>	9	Shielded Ethernet (CAT5e or better) cable <sup>1</sup>
5	Ground rod <sup>1</sup>	10	Controller (through a switch)

1. User supplied.
2. The safety ground wire in the AC power cord must have a ground path to a grounding rod.
3. The shielded Ethernet cable has a ground path through the power injector and the safety ground wire in the AC power cord.

**Note**

The 1552 access point was designed with consideration for resistance to effects of lightning effects on the access point electronics. The 1552 access point employs lightning arrestor circuitry on the Ethernet and power ports. On the input Ethernet port, Gas Discharge Tubes (GDT) are used for the Power Entry Module (PEM) to mitigate lightning effect. On the AC power, GDTs are also used along with fuses to mitigate high-current condition. For the DC power, a fuse is used to mitigate high current condition.

While not a common practice, the user may want to consider using lightning protection at the antenna ports for added protection. To meet EN/IEC60950-22 (Clause 4.2) requirements, the installer must ensure that additional protection is provided external to this equipment to reduce transient surges from Overvoltage IV to Overvoltage Category II at the AC power input of the access point. The over-voltage and fault-current protection components used to achieve this protection must comply with the IEC 61643



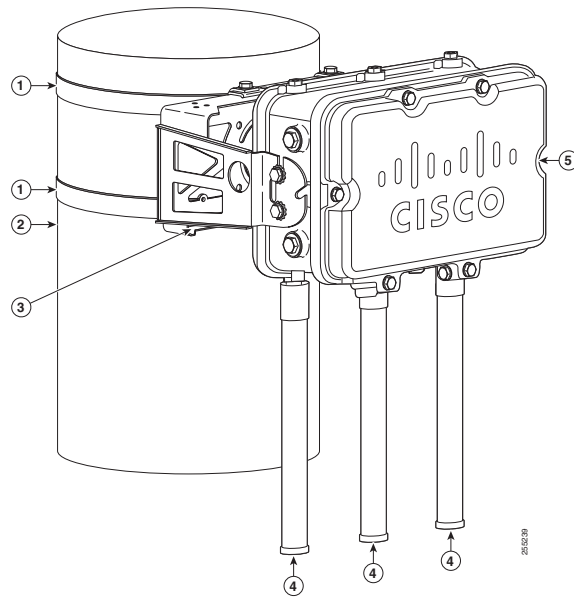
series of standards. To meet CAN/CSA-C22.2 No. 60950-22-07/UL60950-22 requirements, the installer may use alternative components to provide this additional protection. Those components may comply with ANSI/IEEE C62.11, CSA Certification Notice No. 516, CSA C22.2 No. 1, or UL 1449. Suitability of the components for the application must be determined for the intended installation. (For example, some devices are suitable for installation on the load side of the service entrance only, and some are suitable for use with cord-connected equipment only.)



**Warning**

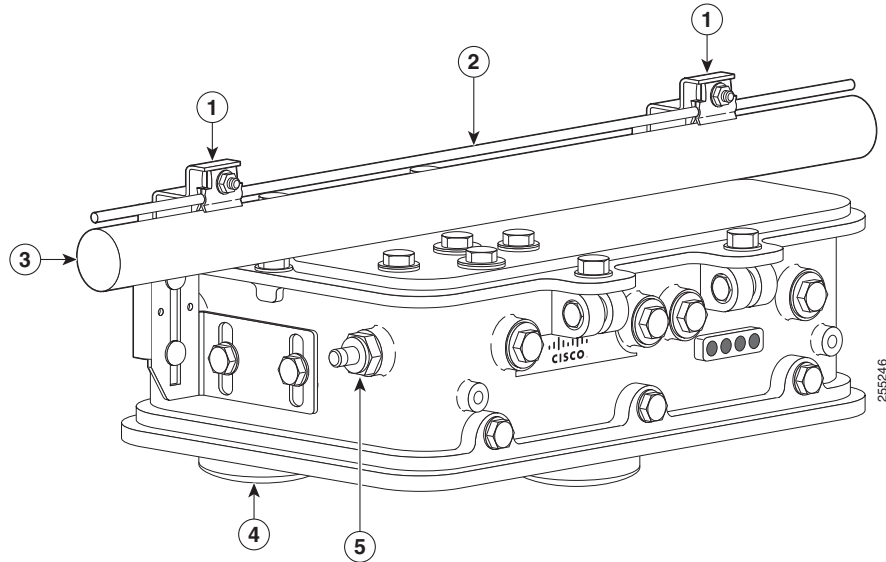
**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

**Figure 2-2 Pole Mount Installation**



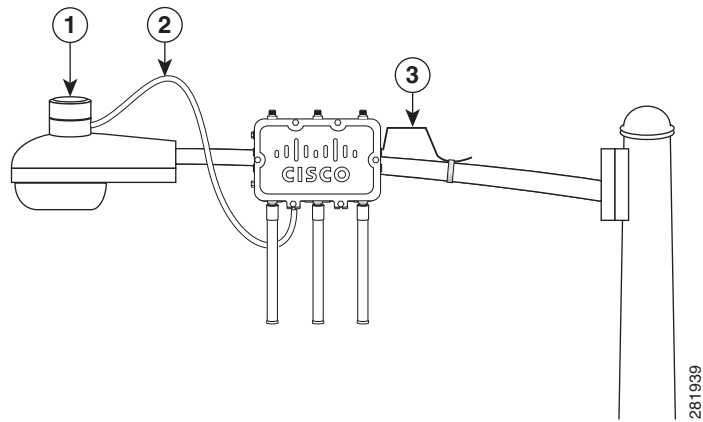
<b>1</b>	Stainless steel mounting straps (part of pole mount kit)	<b>4</b>	Cisco Aironet Dual-Band Omnidirectional Antennas. The dual-band antenna covers both the 2.4 GHz and 5 GHz bands.
<b>2</b>	Pole (wood, metal, or fiberglass) 2 to 16 in. (5.1 to 40.6 cm) diameter	<b>5</b>	1552 series access point model AIR-CAP1552E-x-K9
<b>3</b>	Mounting bracket (part of pole mount kit)		

**Figure 2-3 Cable Strand Mounting Example - Shown on a 1552 Model AIR-CAP1552C-x-K9**



<b>1</b>	Cable Strand Mounting Kit brackets	<b>4</b>	Low-profile dual-band (2.4 GHz and 5 GHz) 3-element array antenna unit
<b>2</b>	Strand support cable	<b>5</b>	F-connector adapter for the POC cable ( <u>only</u> on model AIR-CAP1552C-x-K9)
<b>3</b>	Cable bundle		

**Figure 2-4 Streetlight Power Tap Adapter Installation**



<b>1</b>	Outdoor light control	<b>3</b>	6-AWG copper grounding wire
<b>2</b>	Streetlight power tap adapter		

## Opening the Access Point Hinged Cover

You need to open the access point hinged cover when you are installing fiber-optic SFP module and fiber cable take-up reels.

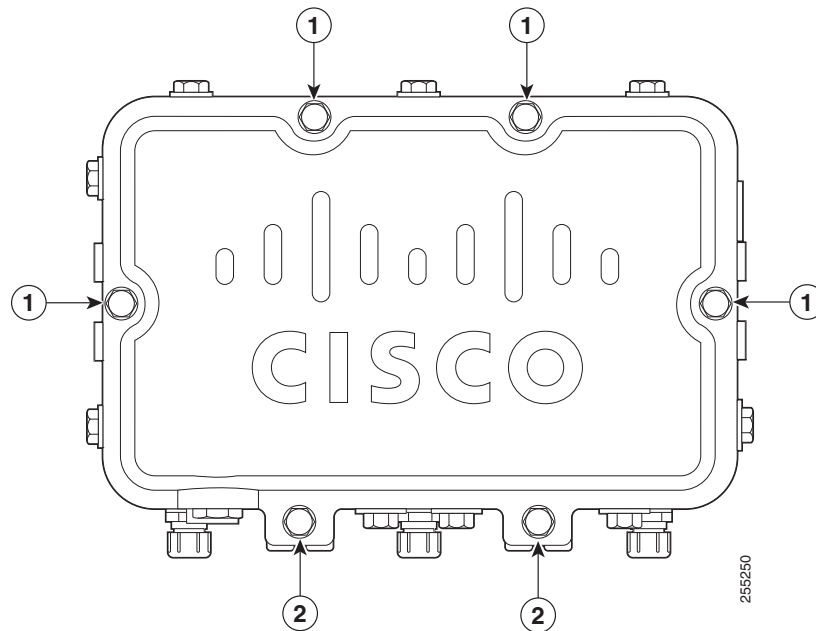
To open the access point hinged cover, follow these steps:

- Step 1** Use 0.5-in (13-mm) box-end wrench or socket set to unscrew and remove the four bolts on the front cover of the unit. Only unscrew the hinge bolts about 2 turns until they are easily turned by hand, do not remove the bolts on the hinge (Figure 2-5).
- Step 2** The cover is hinged on the bottom. Carefully open the cover and remove the cover.



**Note** If the cover does not open easily, carefully loosen the hinge bolts again.

**Figure 2-5** Access Point Front View of Hinged Cover



<b>1</b>	M8 x32 bolts	<b>2</b>	Cover hinge M8 x32 bolts
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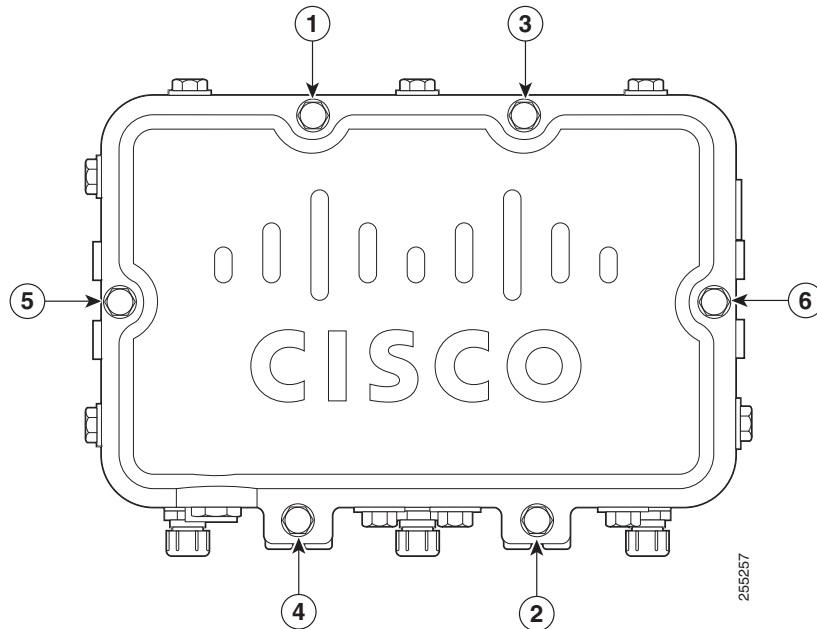
## Closing the Access Point Hinged Cover

To close the access point cover, follow these steps:

- Step 1** When closing the access point cover, be careful not to pinch internal wires.
- Step 2** Carefully position the cover flush with all sides of the access point, then slowly hand-tighten each bolt.

- Step 3** When all bolts are hand-tightened, use a 13-mm closed-end wrench or socket to partially tighten the bolts in the tightening sequence shown in [Figure 2-6](#). Tighten each bolt to 3 to 4 ft lbs (0.34 to 0.45 Nm).
- Step 4** Repeat [Step 3](#) using the same tightening sequence to fully tighten each bolt to 6 to 7 ft lbs (0.68 to 0.79 Nm).

**Figure 2-6** Hinged Cover Bolt Tightening Sequence



1 - 6	Tighten the bolts in the numeric order shown, starting with 1.
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## Mounting the Access Point

This section provides instructions for installing your access points. Personnel installing the access point must understand wireless access points and bridging techniques and grounding methods.



### Caution

All installation methods for mounting an access point on any wall surface is subject to the acceptance of local jurisdiction.

## Installation Options

There are two optional installation kits:

- Strand mount kit—Used for cable strand installations
- Pole mount kit—Used for pole, wall, or streetlight installations

**Warning**

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

**Warning**

**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

**Caution**

To provide inline PoE, you must use the power injector (AIR-PWRINJ1500-2=) specified for the access point. Other power injectors, PoE switches, and 802.3af power sources do not provide adequate power, which might cause the access point to malfunction and cause over-current conditions at the power source. You must ensure that the switch port connected to the access point has PoE turned off.

Refer to these sections for installation details:

- [Access Point Mounting Orientation, page 2-15](#)
- [Installing the Mounting Bracket on a Wall \(All Models\), page 2-15](#)
- [Installing the Mounting Bracket on a Pole \(All Models\), page 2-18](#)
- [Installing 1552E, 1552EU, or 1552I in the Mounting Bracket, page 2-23](#)
- [Installing 1552C or 1552CU in the Mounting Bracket, page 2-26](#)
  - [Cable Strand Mounting the 1552C or 1552CU Access Point, page 2-26](#)
  - [Mounting the 1552C or 1552CU Access Point on a Pole/Wall, page 2-30](#)
  - [Mounting the 1552C or 1552CU Access Point Facing Up in a Vault Application, page 2-33](#)

## Access Point Mounting Orientation

When mounting an access point on a horizontal or vertical surface, you must ensure that the access point is oriented with the LED indicators pointing down (see [Figure 2-2](#), [Figure 2-3](#), and [Figure 2-4](#)). This positioning allows the LEDs to be visible to someone on the ground below the access point.

You must also ensure the access point is mounted with the hinged access cover facing out.

**Note**

Omnidirectional antennas are vertically polarized and should be mounted vertically with the antennas facing down.

## Installing the Mounting Bracket on a Wall (All Models)

The optional pole mount kit contains a mounting bracket for wall mounting. You can use the mounting bracket as a template to mark the positions of the mounting holes for your installation. You then install the mounting plate, and attach the access point when you are ready. [Table 2-1](#) lists the material that you will need to provide in addition to the pole mount kit.

**Table 2-1** *Material Needed to Mount the Mounting Bracket to a Vertical Wall*

Materials Required	In Kit
• Ground lug and screws (provided with access point)	Yes
• Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die ( <a href="http://onlinecatalog.panduit.com">http://onlinecatalog.panduit.com</a> )	No
• Four M8 or 5/16 in. (31 mm) screws	No
• Four wall anchors (specified for wall material)	No
• Drill bit for wall anchors	No
• Electric drill and standard screwdriver	No
• #6-AWG ground wire	No
• Shielded outdoor-rated Ethernet (CAT5e or better) cable	No
• Grounding block	No
• Grounding rod	No
• 13-mm box-end wrench or socket set	No

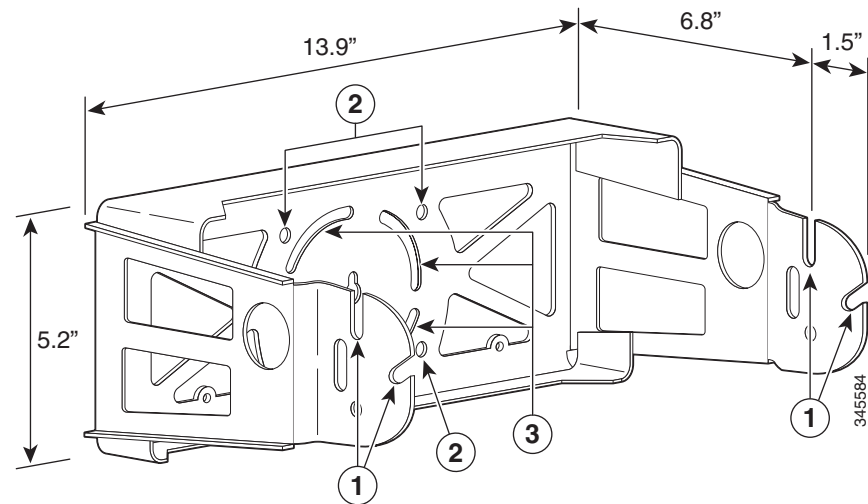
**Caution**

The mounting surface, attaching screws, and optional wall anchors must be able to support a 50-lb (22.7 kg) static weight.

To mount the access point on a vertical wall, follow these instructions:

- Step 1** Use the mounting bracket as a template to mark four screw hole locations on your mounting surface. See [Figure 2-7](#) for the mounting bracket screw hole locations. You can optionally use the individual mounting holes or the mounting slots.

Figure 2-7 Mounting Bracket for Wall Mounting



<b>1</b>	Access point quick mount notches	<b>3</b>	Mounting slots (allows bracket rotation)
<b>2</b>	Mounting holes		

**Step 2** Use four customer-supplied screws and optional screw anchors to attach the mounting plate to the mounting surface.



**Note** If necessary, use suitable screw anchors and an exterior-grade plywood backboard to mount the access point to stucco, cement, or drywall.

**Step 3** Continue with [Installing 1552E, 1552EU, or 1552I in the Mounting Bracket, page 2-23](#) or [Installing 1552C or 1552CU in the Mounting Bracket, page 2-26](#), depending on what you purchased.

## Installing the Mounting Bracket on a Pole (All Models)

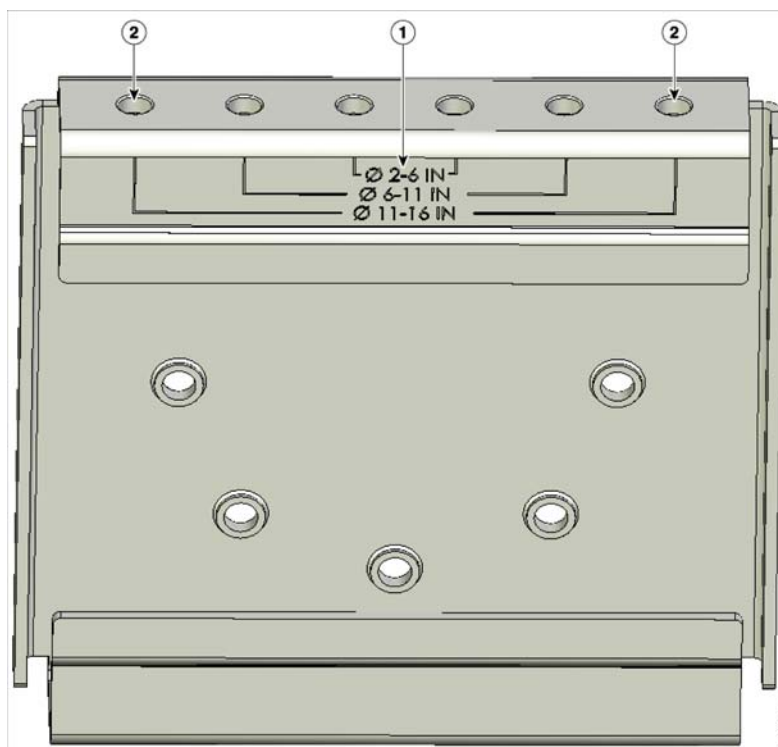
When installing an access point on a vertical pole, mast, or a streetlight pole, you should use the optional Cisco pole mount kit. The kit supports metal, wood, or fiberglass poles from 2 to 16 inches in diameter.

### Assembling the Pole Clamp Bracket and the Mounting Bracket

When installing an access point on a pole, mast, or a streetlight, you should use the optional Cisco pole mount kit. The kit supports metal, wood, or fiberglass poles from 2 to 16 inches in diameter.

The pole mount kit contains several parts that you must assemble prior to mounting on a pole. First you need to assemble two strap brackets on the pole clamp bracket that are positioned for the pole diameter you are using to mount the access point. Figure 2-8 illustrates the pole diameter indicators and bolt holes on the pole clamp bracket.

Figure 2-8 Pole Clamp Bracket Adjustment Hole Locations



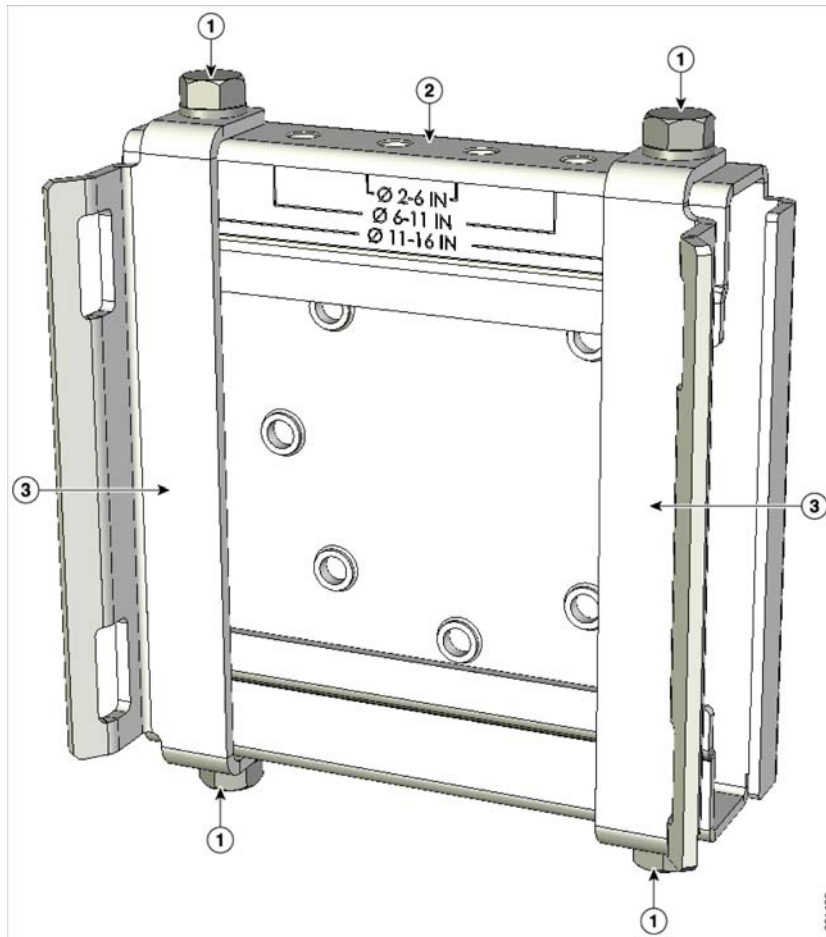
<b>1</b>	Pole size indicators <ul style="list-style-type: none"> <li>• 2 to 6 in.</li> <li>• 6 to 11 in.</li> <li>• 11 to 16 in.</li> </ul>	<b>2</b>	Bolt holes for pole diameters (11 to 16 inches indicated)
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To assemble the pole clamp bracket, follow these steps:



**Step 1** Position the strap brackets on the pole clamp bracket for the pole diameter you are using and secure each strap bracket with two M8 x16 bolts (with lock washers) (see [Figure 2-9](#)). Tighten the bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).

**Figure 2-9** Assembled Pole Clamp Bracket and Strap Brackets



1	M8 x1.25x16 bolts (with lock washers)	3	Strap bracket (shown positioned for 11 to 16 inch diameter pole)
2	Pole clamp bracket		

**Step 2** Screw the M8 nut onto the pole clamp bracket support bolt, and tighten just enough to prevent the bolt from falling off.

**Step 3** Go to the [“Mounting Bracket Assembly on a Pole”](#) section on page 2-20.

## Mounting Bracket Assembly on a Pole

The access point can be installed where power is available, without the need for a wired LAN connection. The access point uses intelligent wireless routing that is based on the Adaptive Wireless Path Protocol (AWPP). AWPP enables a remote access point to dynamically optimize the best route to the wired LAN network using another access point.

The 1552 access point uses the 5-GHz radio for the Mesh backhaul and connections. The 2.4-GHz radio is used for local wireless client access.

To mount your access point on a vertical pole or streetlight pole, you need to install two metal bands around the pole to support the access point. This process requires extra tools and material not provided in the pole mount kit (see [Table 2-2](#)).

**Table 2-2** Material Needed to Mount Access Point on a Pole

Mounting Method	Materials Required	In Kit
Vertical or streetlight pole	• Two 0.75-in (1.9 cm) stainless steel bands	Yes
	• Banding strap tool (BAND IT) (Cisco AIR-BAND-INST-TL=)	No
	• Ground lug (provided with access point)	Yes
	• Crimping tool for ground lug, Panduit CT-720 with CD-720-1 die ( <a href="http://onlinecatalog.panduit.com">http://onlinecatalog.panduit.com</a> )	No
	• #6 AWG ground wire	No

To mount the access point onto a vertical pole or streetlight pole, follow these steps:

- Step 1** Select a mounting location on the pole to mount the access point. You can attach the access point to any pole from 2 to 16 inch (5.1 to 40.6 cm) in diameter.



**Note** If you will be using a streetlight power tap adapter, position the access point within 3 ft (1 m) of the outdoor light control.

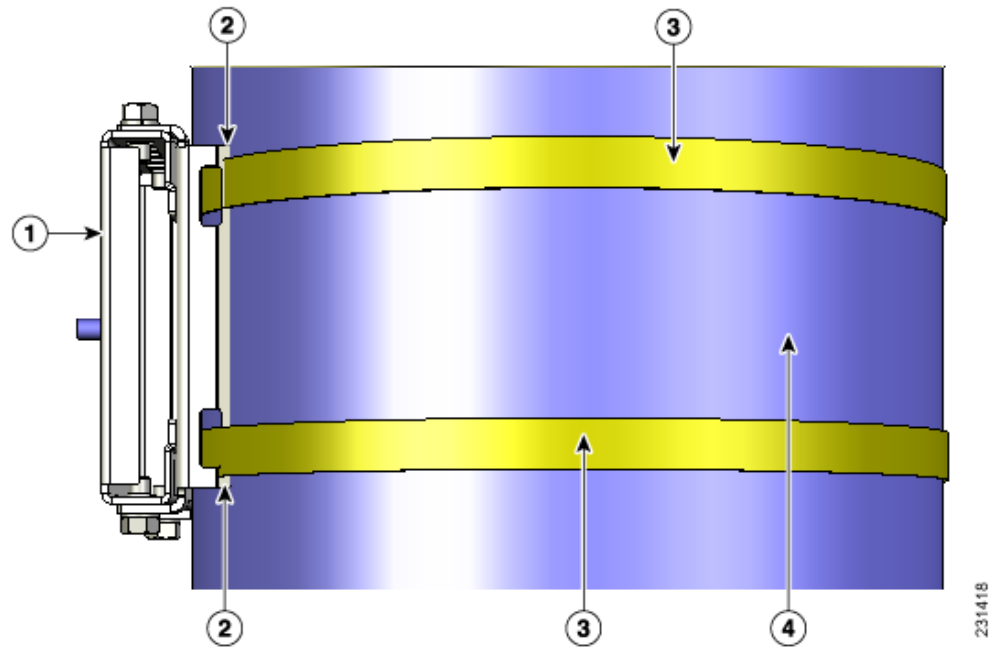
- Step 2** For poles larger than 3.5 inch (8.9 cm), mount the pole clamp bracket assembly to a pole (see [Figure 2-10](#)) using two metal straps. Following the instructions provided with the banding strap tool (BAND IT) (AIR-BAND-INST-TL=), loop each metal strap twice through the slots on the strap bracket.



**Caution**

Do not place the metal straps in the large open area between the pole clamp bracket and the strap brackets, because this does not properly secure the access point.

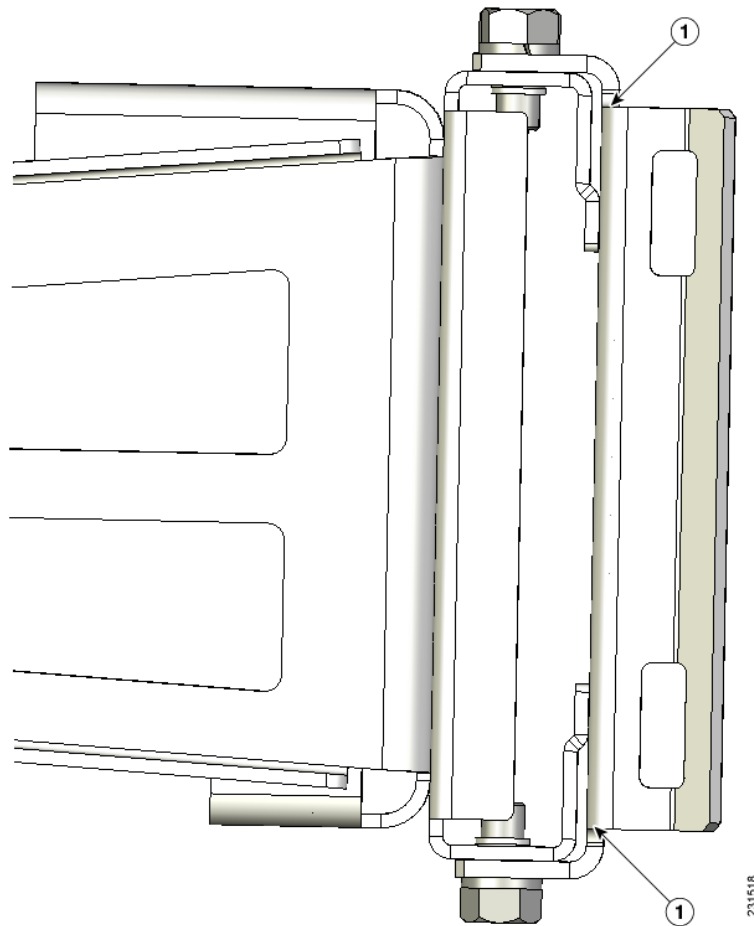
**Figure 2-10** Clamp Bracket Assembly Mounted on Poles Larger than 3.5 inch (8.9 cm)



<b>1</b>	Pole clamp bracket	<b>3</b>	Metal mounting strap
<b>2</b>	Strap slot in strap bracket	<b>4</b>	Pole

**Step 3** For pole diameters of 3.5 inch (8.9 cm) or less, mount the pole clamp bracket assembly to a pole using two metal straps looped through the space between the pole clamp bracket and the strap brackets (see [Figure 2-11](#)) to provide maximum holding strength for extreme environments. Following the instructions provided with the banding strap tool (BAND IT) (AIR-BAND-INST-TL=), loop each metal strap twice.

**Figure 2-11** Metal Strap Open Space for 3.5 inch (8.9 cm) and Smaller Poles



<b>1</b>	Metal strap open space
----------	------------------------

**Caution**

Do not place the metal straps in the large open area between the pole clamp bracket and the strap brackets because this does not properly secure the access point.

**Step 4** Position the pole clamp bracket on the pole as needed before tightening the metal bands.

**Note**

When the metal bands are tightened to the full tension, the pole clamp bracket cannot be adjusted unless the metal bands are cut or disassembled.

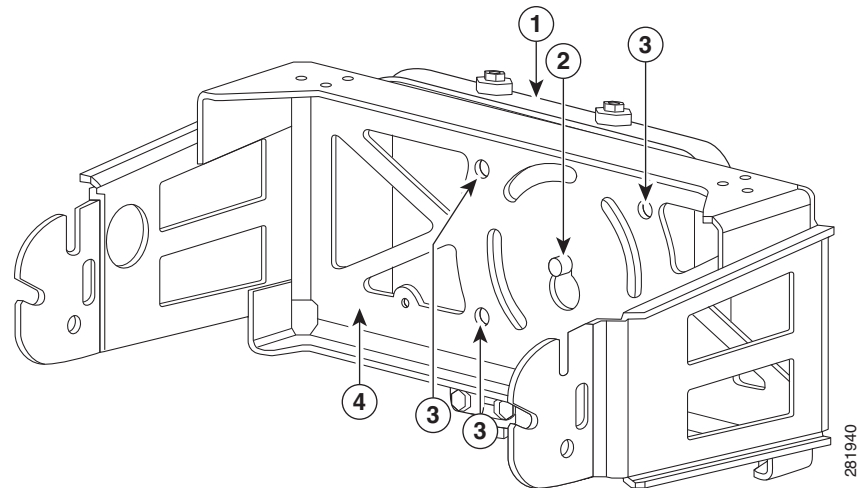
**Step 5** Tighten the metal bands using the banding strap tool (BAND IT) (Cisco AIR-BAND-INST-TL=) by following the operating instructions in the box with the tool. Ensure that the metal bands are as tight as possible.

**Step 6** Place the mounting bracket onto the pole clamp bracket support bolt (see [Figure 2-12](#)).

**Step 7** For vertical poles, position the mounting bracket as shown in [Figure 2-12](#). For horizontal streetlight poles, rotate the mounting bracket 90° from the position shown in [Figure 2-12](#).

**Step 8** Install four M8 x16 bolts (with flat and lock washers) into the bolt holes.

**Figure 2-12** Screw Hole Locations on the Mounting Bracket and Pole Clamp Bracket Assembly



<b>1</b>	Pole clamp bracket assembly	<b>3</b>	Bolt holes
<b>2</b>	Access point support bolt (M8 flange nut not shown)	<b>4</b>	Mounting bracket

**Step 9** Hand-tighten the bolts and the nut (do not overtighten).

**Step 10** Adjust the top edge of the mounting bracket until it is horizontal and tighten the bolts and the flange nut (see [Figure 2-12](#)) to 13 to 15 ft lbs (17.6 to 20.3 Nm).



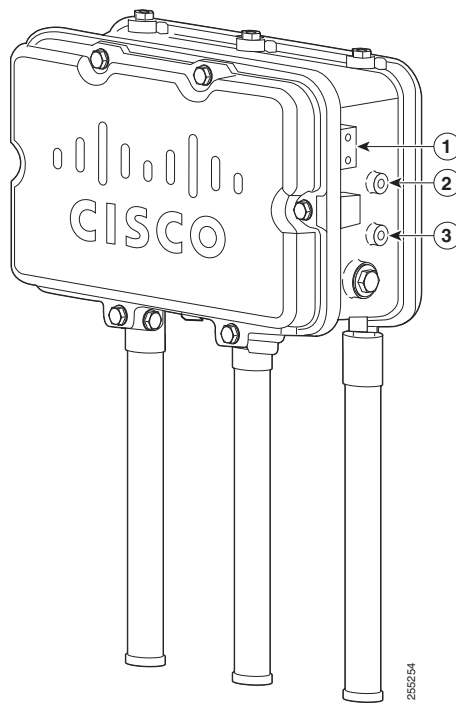
**Note** The mounting bracket can be adjusted up to 45° to compensate for tilted horizontal streetlight poles.

**Step 11** Continue with [Installing 1552E, 1552EU, or 1552I in the Mounting Bracket, page 2-23](#) or [Installing 1552C or 1552CU in the Mounting Bracket, page 2-26](#), depending on what you purchased.

## Installing 1552E, 1552EU, or 1552I in the Mounting Bracket

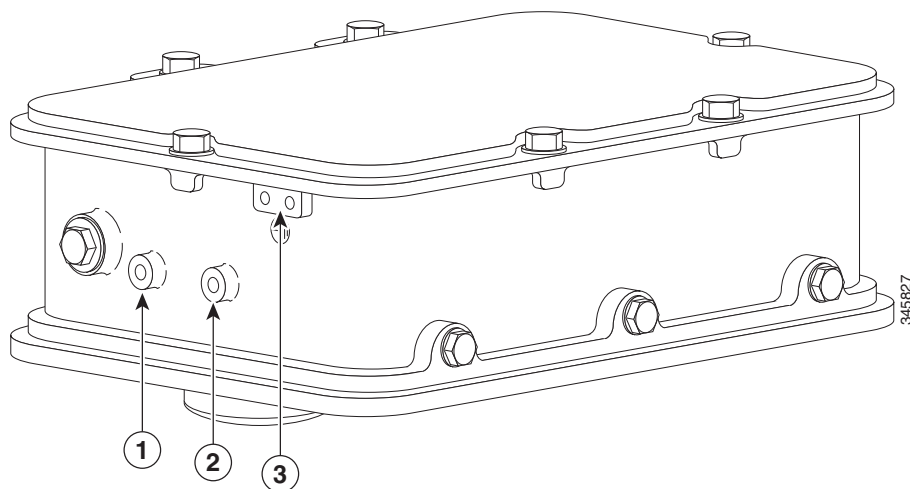
**Step 1** Screw a M8 x16 bolt (without a flat or lock washer) in the top support bolt hole on each side of the access point (see [Figure 2-13](#) or [Figure 2-14](#), depending on what you purchased). These bolts are supplied with pole mount kit. Do not screw the bolt all the way in. Leave a gap of approximately 0.25 inch (0.635 cm).

**Figure 2-13** Location of Access Point Top Support Bolt Hole on 1552E/1552EU



<b>1</b>	Ground lug screw holes location	<b>3</b>	Second M8 x16 bolt hole location
<b>2</b>	M8 x16 bolt hole (top support bolt hole)		

**Figure 2-14** Location of Access Point Top Support Bolt Hole on 1552I



<b>1</b>	M8 x16 bolt hole	<b>3</b>	Ground lug location
<b>2</b>	M8 x16 bolt hole (top support bolt hole)		

**Step 2** Position the two bolts on the access point into the appropriate quick mount notches on each side of the mounting bracket (see [Figure 2-15](#) for the 1552E/1552EU model or [Figure 2-16](#) for the 1552I model).

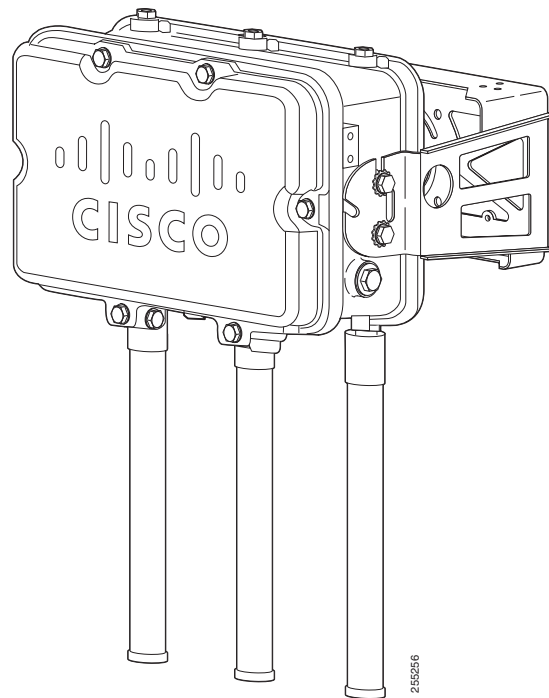


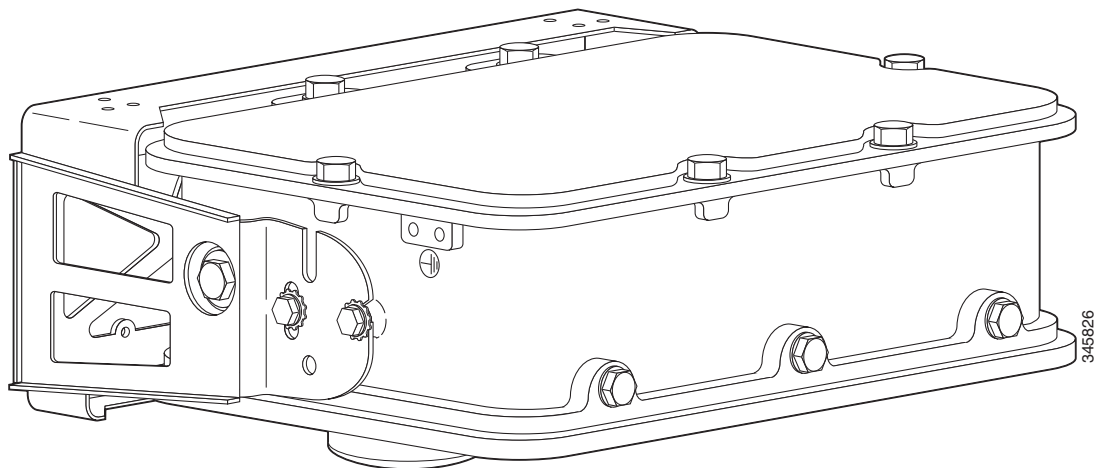
**Note** For the 1552E/1552EU model, ensure that the hinged door is facing out. The 1552E/1552EU access point should be positioned with the LEDs on the bottom to allow viewing from the ground and with the hinged cover facing out.



**Note** For the 1552I model, ensure that the access point is positioned with the LEDs facing inward toward the mounting bracket.

**Figure 2-15** Access Point 1552E/1552EU Hanging in Mounting Bracket



**Figure 2-16** Access Point 1552I Hanging in Mounting Bracket

- Step 3** Screw a M8 x16 bolt (with flat and lock washers) into the second bolt hole on each side of the access point (see [Figure 2-15](#)).
- Step 4** Depending on what you purchased, ensure that the front of the 1552E/EU access point is vertical, or that the 1552I access point is horizontal, and tighten the four bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).
- Step 5** For the 1552E/EU model continue with [Installing Antennas, page 2-36](#). For the 1552I model continue with [Grounding the Access Point, page 2-41](#) and [Powering the Access Point, page 2-45](#).

## Installing 1552C or 1552CU in the Mounting Bracket

There are three different options for mounting the 1552C or 1552CU access point:

- [Cable Strand Mounting the 1552C or 1552CU Access Point, page 2-26](#)
- [Mounting the 1552C or 1552CU Access Point on a Pole/Wall, page 2-30](#)
- [Mounting the 1552C or 1552CU Access Point Facing Up in a Vault Application, page 2-33](#)

### Cable Strand Mounting the 1552C or 1552CU Access Point

When mounting the access point on a cable strand, you must use the optional strand mount kit. The kit contains several parts that you should assemble before mounting on a cable strand. To install the access point to a cable strand, you need to perform these operations:

- Assemble cable brackets; attach cable clamps to the clamp bracket.
- Attach the strand brackets to the access point.
- Attach the clamp bracket to the fiber or cable strand.
- Attach a ground wire.
- Connect cables and power to the access point.

**Note**

The access point must be installed on a cable strand by a professional cable installer.



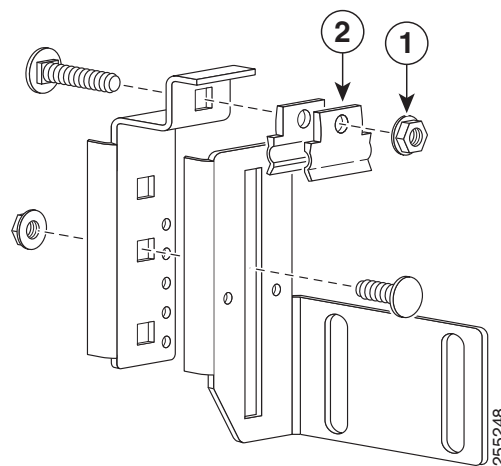
**Note**

The 1552C and 1552CU access points can be installed using the pole mount kit in special circumstances. Refer to “Mounting the 1552C or 1552CU Access Point on a Pole/Wall” section on page 2-30 or “Mounting the 1552C or 1552CU Access Point Facing Up in a Vault Application” section on page 2-33 for installation instructions.

To mount the access point, follow these steps:

- Step 1** Assemble the cable clamps to the clamp bracket on both cable brackets (Figure 2-17). You should only hand-tighten the nuts sufficiently to prevent them from falling off.

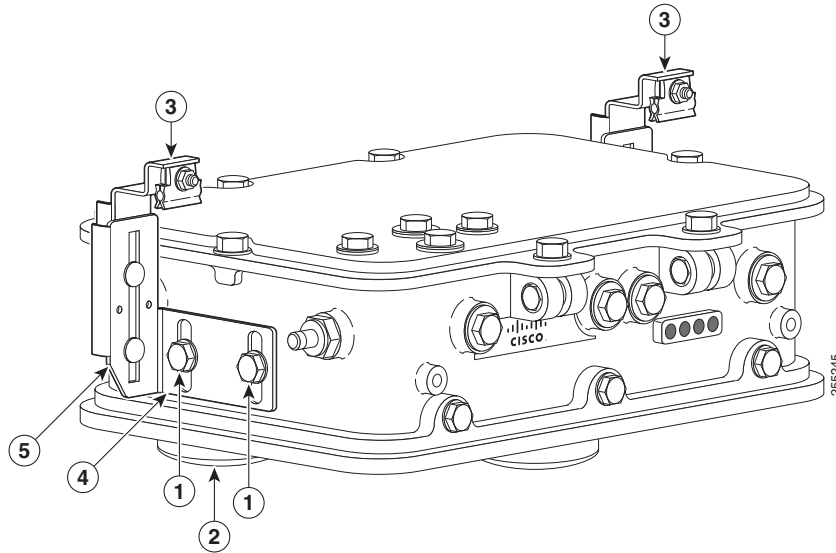
**Figure 2-17 Assemble Cable Brackets**



<b>1</b>	M8 flange nut and flat washer	<b>2</b>	Cable Clamps
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- Step 2** Secure each strap bracket with two M8 x16 bolts (with lock washers) on each side of the access point with the antennas facing down. (Figure 2-18). Only hand-tighten the bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).

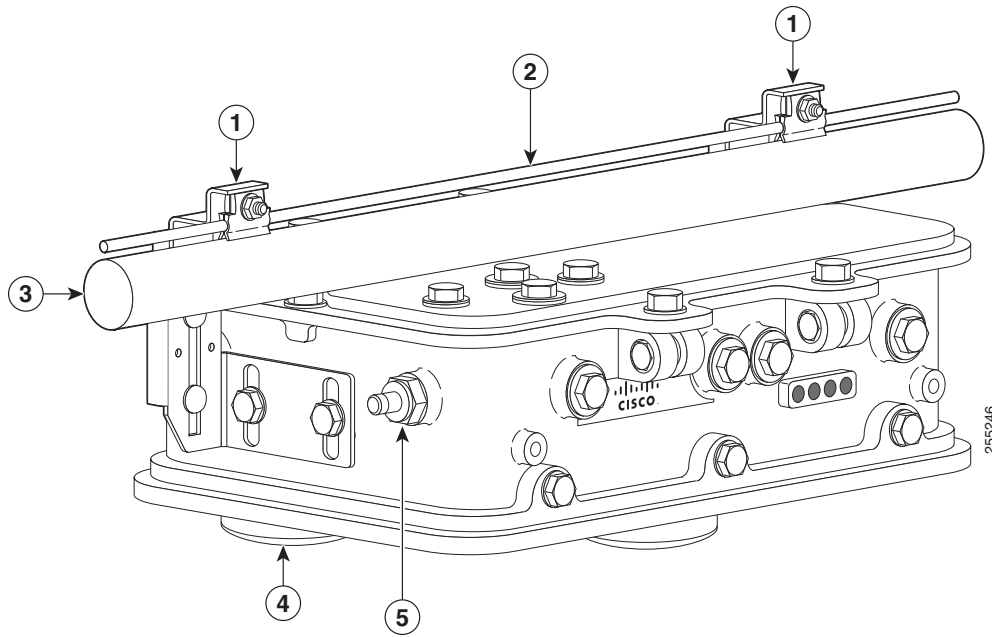
Figure 2-18 Attach Strap Brackets to Access Point



1	M8 x16 bolts with lock washers (supplied with cable mount kit)	4	Height and Pivot Adjustment
2	Antenna unit assembly (shown with the Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array)	5	Height and Tilt Adjustment
3	Strap bracket assemblies		

**Step 3** Place the clamp bracket on the strand support cable (see [Figure 2-19](#)). On each cable support bolt, ensure that one cable clamp is placed on each side of the support cable. Tighten the two M8 flange nuts to 13 to 15 in. lbs (17.6 to 20.3 Nm). Ensure the cable is mounted to the bottom side of the access point.

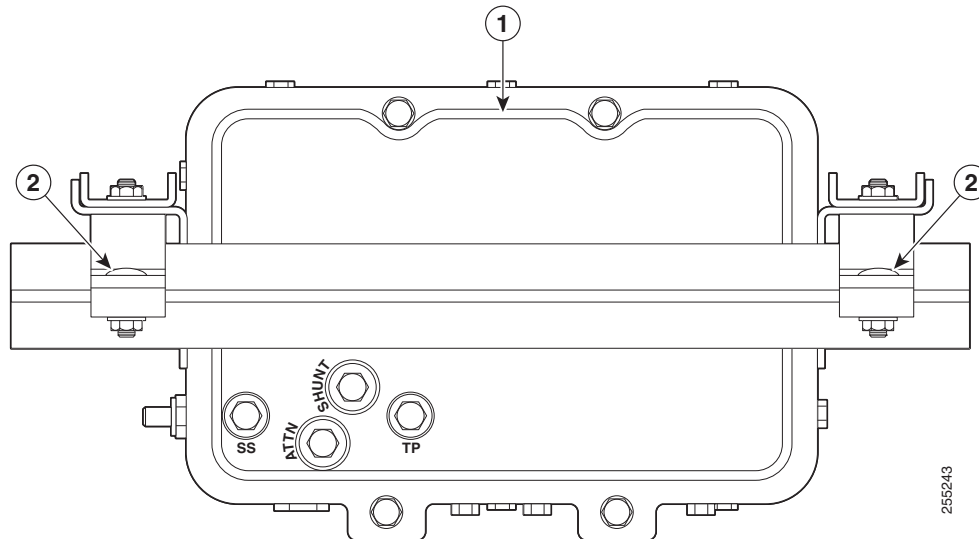
**Figure 2-19 Attach the Cable Strand to the Cable Mount Brackets**



1	Strap bracket assemblies	4	Antenna unit assembly (shown with the Low Profile Dual-Band 2.4/5 GHz Omni Antenna Array)
2	Strand support cable	5	F-Connector Adapter (for Cable Modem models only); sometimes referred to as a “stringer”
3	Fiber or Cable bundle		

**Step 4** The assembled cable mounting kit is shown from the top view of the access point (Figure 2-20).

**Figure 2-20** Clamp Brackets Attached to Cable Strand-Top View of Access Point



1	Top view of access point	2	Cable strand bracket
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**Note** The strand support cable might have to be pulled away from the fiber or cable bundle. Be sure to resecure the cable as necessary.



**Note** The strand support cable and the mounting hardware provide grounding for the access point.

**Step 5** For the 1552CU access point, continue with [Installing Antennas, page 2-36](#). For the 1552C access point, continue with [Grounding the Access Point, page 2-41](#) and [Powering the Access Point, page 2-45](#).

## Mounting the 1552C or 1552CU Access Point on a Pole/Wall

The 1552C or 1552CU access point can be mounted on a wall, pole, or a below-ground vault location, using the pole mount kit. You can use the mounting bracket as a template to mark the positions of the mounting holes for your installation. You then install the mounting plate, attach the grounding lug, and attach the access point when you are ready.

To mount the 1552C or 1552CU access point on a vertical wall, follow these instructions:



**Tip**

When installing the 1552C or 1552CU access point using the pole mount kit, the grounding lug and cable must be attached to the access point before attaching the access point to the mounting bracket.

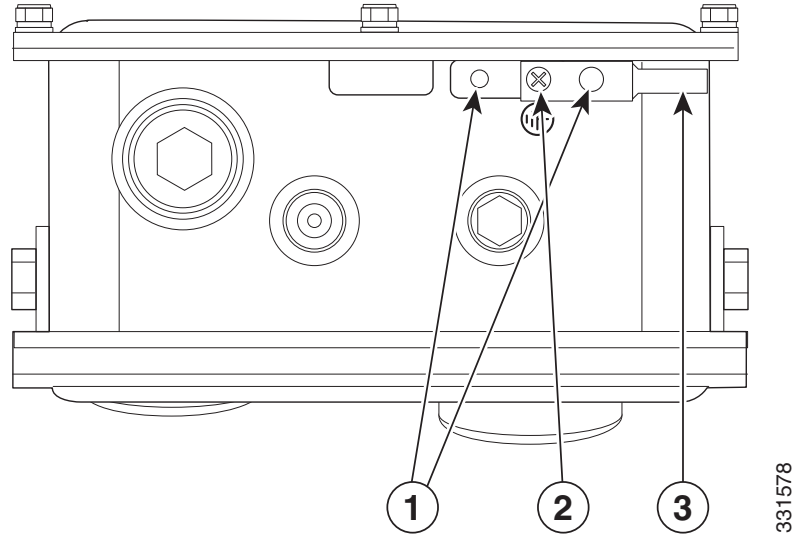


**Tip**

When installing the 1552C or 1552CU access point in this configuration, you can use only one hole in the grounding block (see [Figure 2-21](#)).

**Step 6** Attach the grounding lug and cable to the access point. Refer to “[Grounding the Access Point](#)” section on page 2-41.

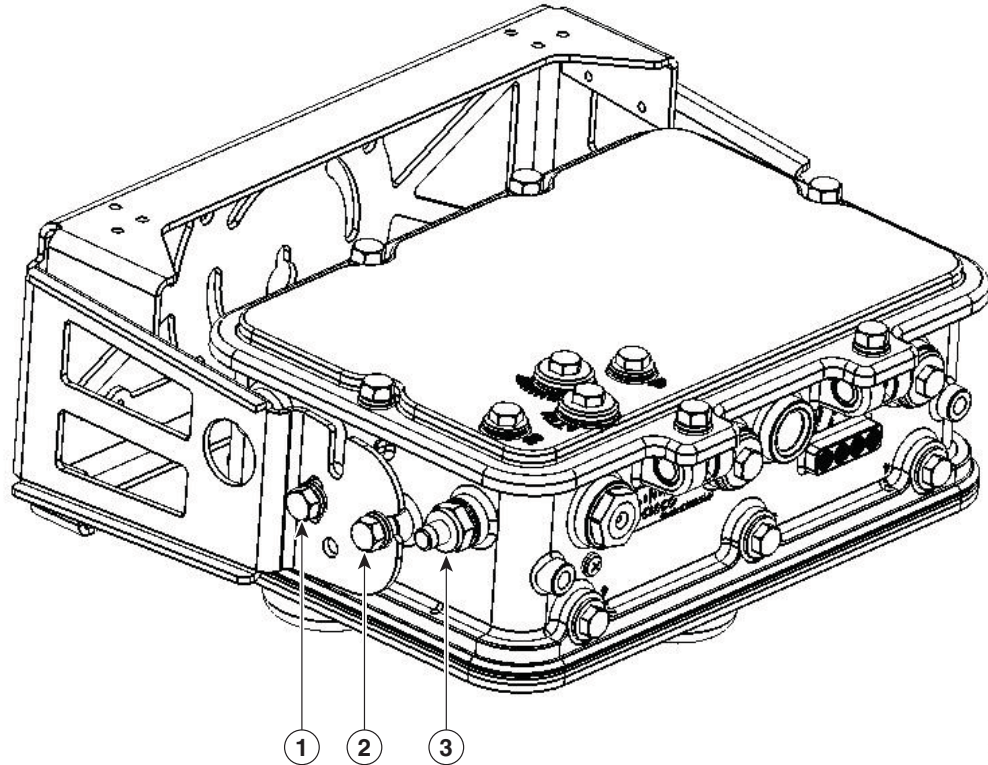
**Figure 2-21 Attaching Grounding Lug to Grounding Point**



1	Unused	3	Grounding lug
2	Phillips head M4 x10mm screw (supplied with pole mount kit)		

- Step 7** Screw a M8 x16 bolt in the top support bolt hole on each side the access point (see [Figure 2-22](#)). Do not screw the bolt all the way in; leave approximately a 0.25 inch (0.635 cm) space.

**Figure 2-22** Position of 1552C or 1552CU Access Point in Pole Mount Bracket



331579

<b>1</b>	M8 x16 bolt (supplied with pole mount kit)	<b>3</b>	F-connector
<b>2</b>	M8 x16 bolt (supplied with pole mount kit)		

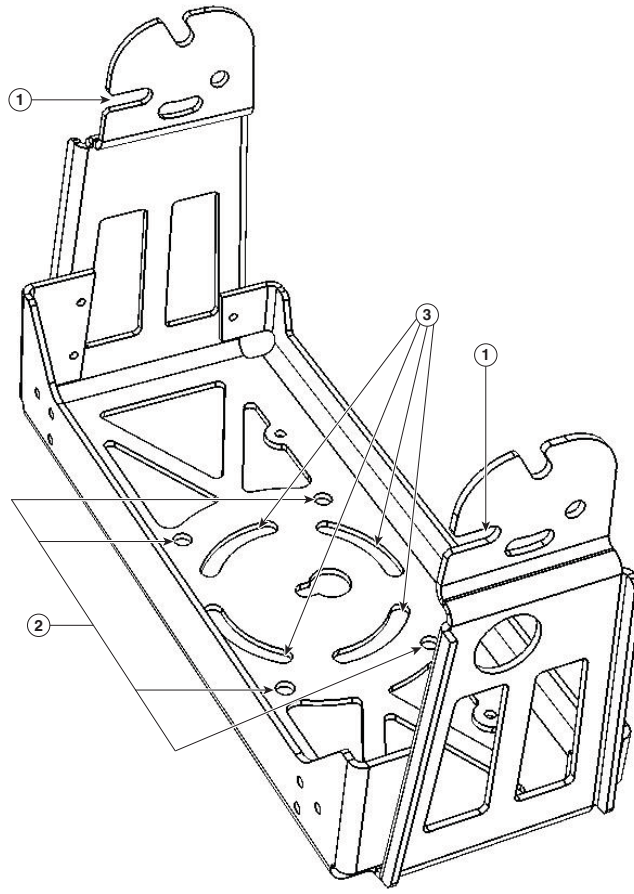
- Step 8** Position the two bolts on the access point into the appropriate quick mount notches on each side of the mounting bracket (see [Figure 2-22](#)). Ensure that the hinged door is facing out.
- Step 9** Screw a M8 x16 bolt (with flat and lock washers) into the second bolt hole on each side of the access point.
- Step 10** Ensure that the front of the access point is vertical, and tighten the four bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).
- Step 11** For the 1552CU access point, continue with [Installing Antennas, page 2-36](#). For the 1552C access point, continue with [Connecting a Cable POC Power to the Access Point, page 2-58](#).

## Mounting the 1552C or 1552CU Access Point Facing Up in a Vault Application

To mount the 1552C or 1552CU access point on a horizontal surface in a below-ground vault location, follow these instructions:

- Step 1** Use the mounting bracket as a template to mark four screw hole locations on your mounting surface. See [Figure 2-23](#) for the mounting bracket screw hole locations. You can optionally use the individual mounting holes or the mounting slots.

**Figure 2-23** Mounting Bracket Position for Vault Mounting



<b>1</b>	Access point quick mount notch	<b>3</b>	Mounting slots (allows bracket rotation)
<b>2</b>	Mounting holes		

- Step 2** Use four customer-supplied screws and optional screw anchors to attach the mounting plate to the mounting surface.



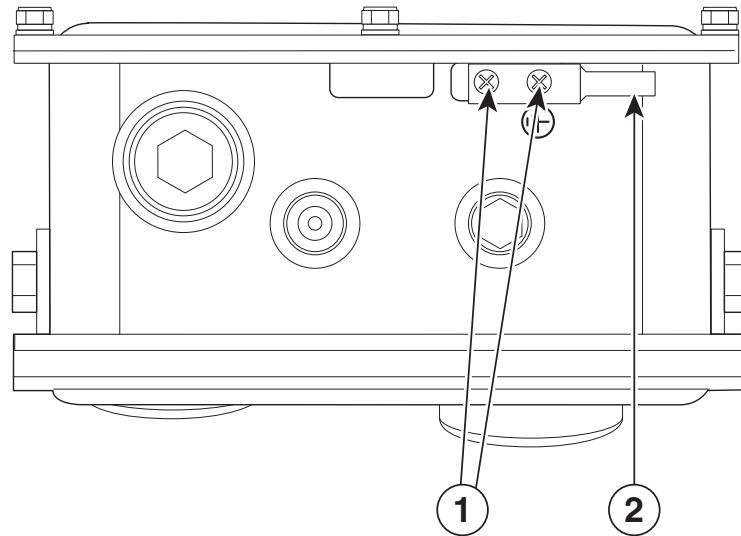
**Note** If necessary, use suitable screw anchors and an exterior-grade plywood backboard to mount the access point to the base.

**Tip**

When installing the 1552C or 1552CU access point using the pole mount kit, the grounding lug and cable must be attached to the access point before attaching the access point to the mounting bracket.

- Step 3** Attach the grounding lug and cable to the access point. Refer to “[Grounding the Access Point](#)” section on page 2-41. See [Figure 2-24](#).

**Figure 2-24** Attaching Grounding Lug to Grounding Point

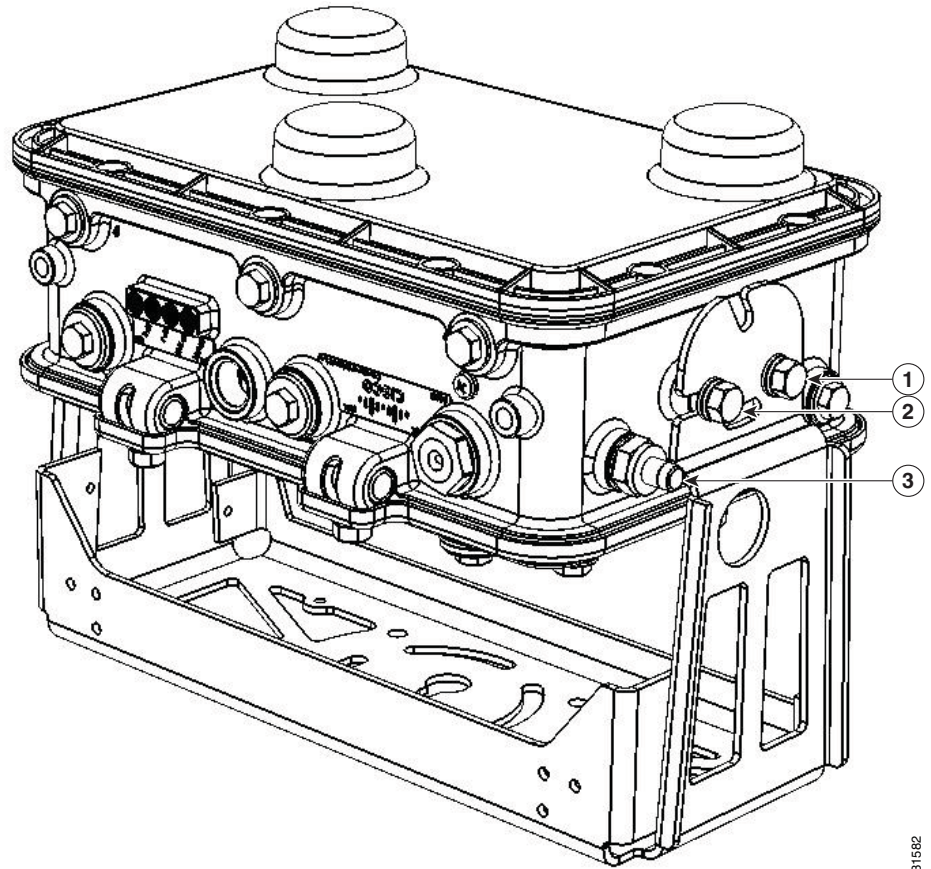


<b>1</b>	Phillips head M4 x10mm screws (supplied with pole mount kit)	<b>2</b>	Grounding lug
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- Step 4** Screw a M8 x16 bolt in the top support bolt hole on each side the access point (see [Figure 2-22](#)). Do not screw the bolt all the way in; leave approximately a 0.25 inch (0.635 cm) space.



Figure 2-25 1552C Access Point Facing Up in Vault Location



331582

1	M8 x16 bolt (supplied with pole mount kit)	3	F-connector
2	M8 x16 bolt (supplied with pole mount kit)		

- Step 5** Position the two bolts on the access point into the quick mount notches on each side of the mounting bracket (see [Figure 2-23](#)). Ensure that the hinged door is facing out.
- Step 6** Screw a M8 x16 bolt (with flat and lock washers) into the second bolt hole on each side of the access point.
- Step 7** Ensure that the front of the access point is vertical, and tighten the four bolts to 13 to 15 ft lbs (17.6 to 20.3 Nm).
- Step 8** For the 1552CU access point, continue with [Installing Antennas, page 2-36](#). For the 1552C access point, continue with [Powering the Access Point, page 2-45](#).

# Installing Antennas

Table 2-3 shows the antennas supported by the 1552 access point and provides required quantities for each model.

**Table 2-3** 1552 Access Point Supported External Antennas

Product ID	Frequency Band	Gain	Type	Supported AP and Required Quantity
AIR-ANT2547V-N	2.4 / 5 GHz	4 / 7 dBi	Omnidirectional	1552E (3)
AIR-ANT2588P3M-N	2.4 / 5 GHz	8 / 8 dBi	Directional	1552E (1)
AIR-ANT2420V-N	2.4 GHz	2 dBi	Omnidirectional	1552EU (3) 1552CU (3)
AIR-ANT2450V-N	2.4 GHz	5 dBi	Omnidirectional	1552EU (3) 1552CU (3)
AIR-ANT2480V-N	2.4 GHz	8 dBi	Omnidirectional	1552EU (3) 1552CU (3)
AIR-ANT2413P2M-N	2.4 GHz	13 dBi	Directional	1552EU (1) 1552CU (1)
AIR-ANT5140V-N	5 GHz	4 dBi	Omnidirectional	1552EU (3) 1552CU (3)
AIR-ANT5180V-N	5 GHz	8 dBi	Omnidirectional	1552EU (3) 1552CU (3)
AIR-ANT5114P2M-N	5 GHz	14 dBi	Directional	1552EU (1) 1552CU (1)

For installation instructions and detailed information on these antennas, refer to the appropriate document located at:

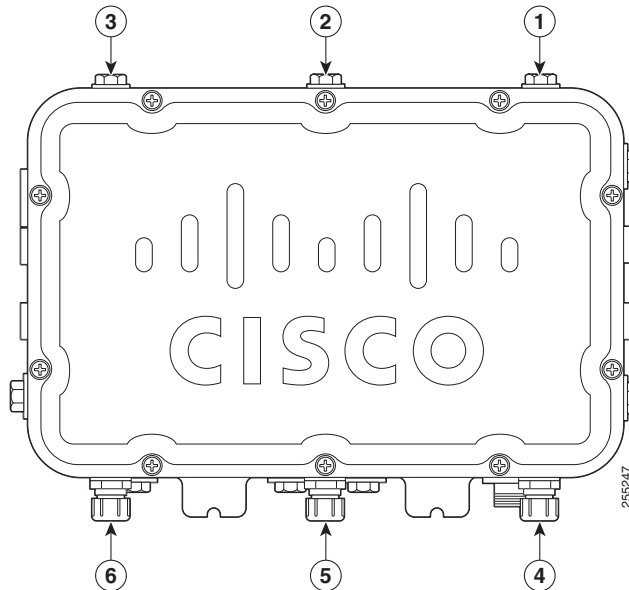
[http://www.cisco.com/en/US/products/hw/wireless/ps469/prod\\_installation\\_guides\\_list.html](http://www.cisco.com/en/US/products/hw/wireless/ps469/prod_installation_guides_list.html)

Follow all safety precautions when installing the antennas. For information on safety, refer to “Safety Precautions” section on page 2-41.

## Antenna N-Type Connector Locations

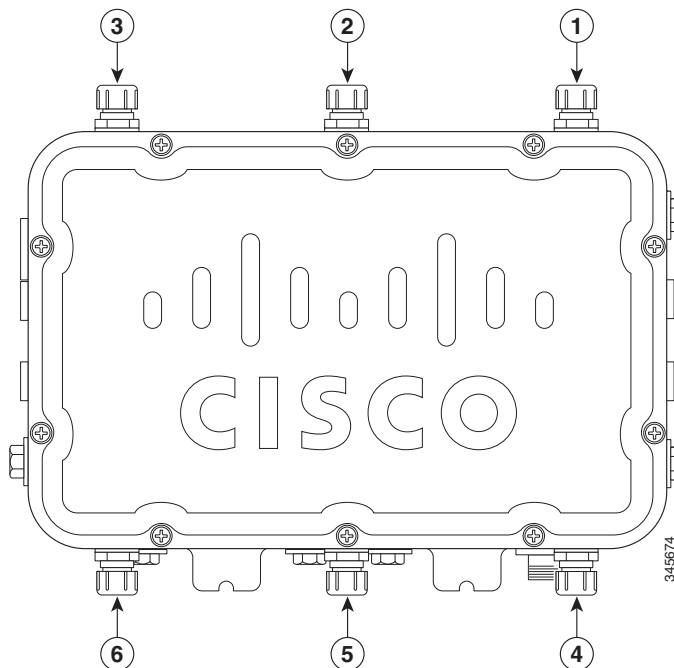
The access point antenna N-type connectors are located on the bottom of model AIR-CAP1552E-x-K9 and on both the top and bottom of the AIR-CAP1552EU-x-K9 and the AIR-CAP1552CU-x-K9. The N-type connectors support variety of the Cisco Aironet antennas. For detailed information on these antennas, refer to [Antenna Configurations, page 1-13](#). [Figure 2-26](#) and [Figure 2-27](#) shows the antenna port locations viewed from the RF cover side.

**Figure 2-26** Antenna Port Locations - Model AIR-CAP1552E-x-K9



<b>1</b>	Not used	<b>4</b>	Antenna port 4 - Type N connector (with cap)
<b>2</b>	Not used	<b>5</b>	Antenna port 5 - Type N connector (with cap)
<b>3</b>	Not used	<b>6</b>	Antenna port 6 - Type N connector (with cap)

Figure 2-27 Antenna Port Locations - Models AIR-CAP1552CU-x-K9 and AIR-CAP1552EU-x-K9



1	Antenna port 3 - Type N connector (with cap)	4	Antenna port 6 - Type N connector (with cap)
2	Antenna port 2 - Type N connector (with cap)	5	Antenna port 5 - Type N connector (with cap)
3	Antenna port 1 - Type N connector (with cap)	6	Antenna port 4 - Type N connector (with cap)

## Antenna Mounting Options

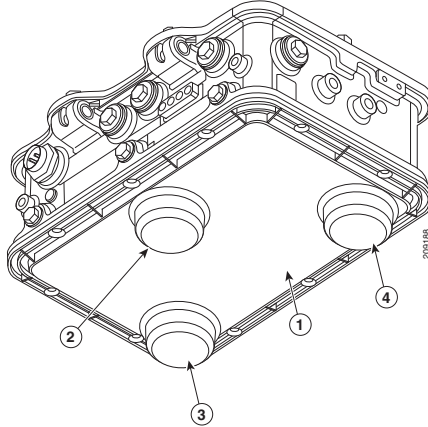
Two mounting configurations are available, the cable strand mount and the pole mount (refer to [“Mounting the Access Point”](#) section on page 2-14.)

Using an optional antenna mounting bracket kit, the directional antennas AIR-ANT2413P2M-N and AIR-ANT5114P2M-N can be mounted directly on an access point in a strand mount or pole mount environment. The antenna bracket kit contains four bracket sections and fasteners that you can assemble in multiple configurations to position and aim the directional antenna in a range of positions. For more information on mounting the antenna with the optional mounting bracket, refer to *Installing Directional-Antenna Mounting Kits on Cisco 1550 Series Outdoor Mesh Access Points*.

Figure 2-28 through Figure 2-31 show the antenna mounting options supported by the various 1552 access point models.

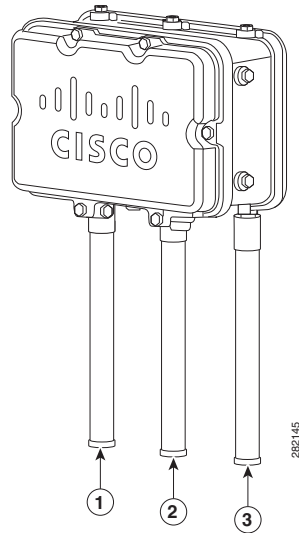
Figure 2-28 shows the integrated low-profile dual-band (2.4 GHz and 5 GHz) 3-element array antenna built-in only on models AIR-CAP1552I-x-K9 and AIR-CAP1552C-x-K9.

Figure 2-28 AIR-CAP1552C-x-K9 and AIR-CAP1552I-x-K9

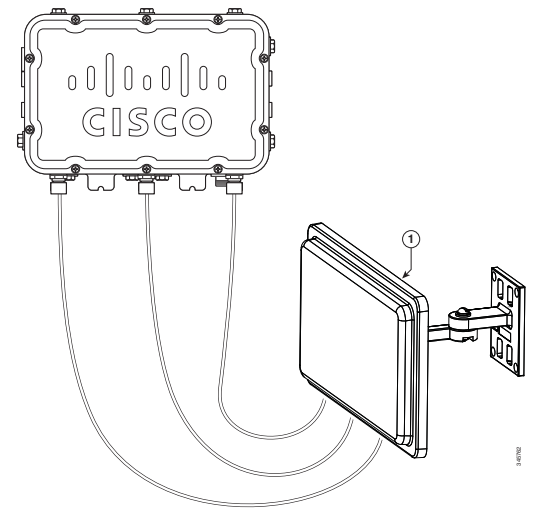


The AIR-CAP1552E-x-K9 model must always be operated with the three external antennas attached, as shown in Figure 2-29.

Figure 2-29 AIR-CAP1552E-x-K9



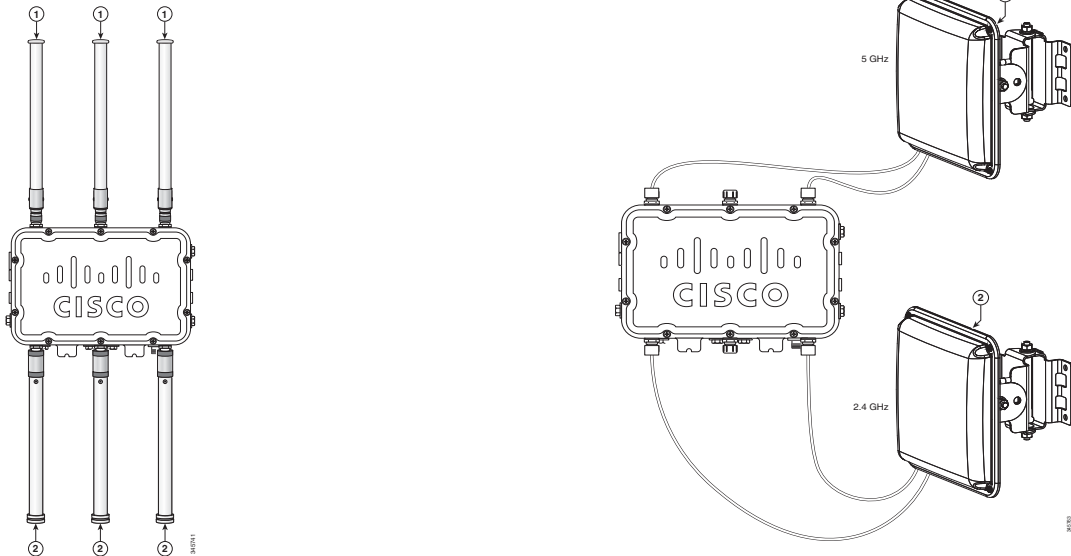
1-3 AIR-ANT2547V-N



2 AIR-ANT2588P3M-N

The AIR-CAP1552E-x-K9 model can be operated in either of the configurations shown below. In addition, it can be operated with one directional antenna installed for one frequency band and three omnidirectional “stick” antennas installed for the other frequency band.

**Figure 2-30 AIR-CAP1552EU-x-K9**

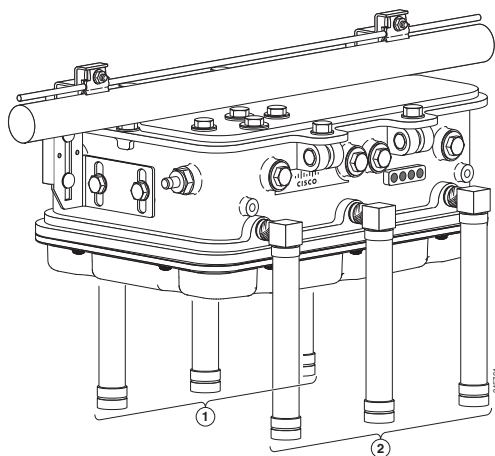


<b>1</b>	AIR-ANT5180V-N
<b>2</b>	AIR-ANT2450V-N or AIR-ANT2480V-N

<b>1</b>	AIR-ANT5114P2M-N
<b>2</b>	AIR-ANT2413P2M-N

The AIR-CAP1552CU-x-K9 model can be operated with the same configurations as the AIR-CAP1552EU-x-K9 model on a pole mount configuration, as shown in [Figure 2-30](#). In addition, when installed in a cable strand mount configuration, the AIR-CAP1552CU-x-K9 model can be operated with configuration shown in [Figure 2-31](#).

**Figure 2-31 AIR-CAP1552CU-x-K9**



<b>1</b>	5-GHz antenna AIR-ANT5140V-N	<b>2</b>	2.4-GHz antenna AIR-ANT2420V-N
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## Safety Precautions



**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, as they may cause serious injury or death. For proper installation and grounding of the antenna, please refer to national and local codes (e.g. U.S.: NFPA 70, National Electrical Code, Article 810, Canada: Canadian Electrical Code, Section 54).** Statement 280

For your safety, read and follow these safety precautions.

1. Before you install an antenna, contact your Cisco account representative to explain which mounting method to use for the size and type of antenna that you are about to install.
2. Select your installation site with safety, as well as performance, in mind. Remember that electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.
3. Contact your electric power company. Tell them your plans and ask them to come look at your proposed installation.
4. Plan your installation carefully and completely before you begin. Each person involved in an installation should be assigned to a specific task and should know what to do and when to do it. One person should be in charge of the operation to issue instructions and watch for signs of trouble.
5. When installing your antenna, follow these guidelines:
  - Do not use a metal ladder.
  - Do not work on a wet or windy day.
  - Do dress properly—wear shoes with rubber soles and heels, rubber gloves, and a long-sleeved shirt or jacket.
6. If the assembly starts to drop, move away from it and let it fall. Because the antenna, mast, cable, and metal guy wires are all excellent conductors of electrical current, even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer.
7. If any part of the antenna system should come in contact with a power line, do not touch it or try to remove it yourself. Call your local power company to have it removed safely.
8. If an accident should occur with the power lines, call for qualified emergency help immediately.

## Grounding the Access Point

The access point must be grounded before connecting power.



**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



**Installation of the equipment must comply with local and national electrical codes.** Statement 1074

**Note**

When the access point is cable strand mounted, the strand support cable and the mounting hardware provide grounding for the access point.

In all outdoor installations and when powering the access point with AC power, you must follow these instructions to properly ground the case:

**Step 1** If using insulated 6-AWG copper ground wire, strip the insulation as required for the grounding lug.

**Step 2** Use the appropriate crimping tool to crimp the bare 6-AWG copper ground wire to the supplied grounding lug (Panduit PLCD6-10A-L).

**Note**

The grounding lug and hardware used must comply with local and national electrical codes.

**Step 3** Open the electrical joint compound (supplied), and apply a liberal amount over the metal surface where the ground strap screw holes are located (see [Figure 2-13](#)).

**Step 4** Connect the grounding lug to the access point grounding screw holes (see [Figure 2-13](#)) using the supplied two Phillips head screws (M4 x10 mm) with lock washers. Tighten the grounding screw to 22 to 24 in. lbs (2.49 to 2.71 Nm).

**Step 5** If necessary, strip the other end of the ground wire, and connect it to a reliable earth ground such as a grounding rod (see [Figure 2-2](#)), an appropriate grounding point on a metal streetlight pole that is grounded (see [Figure 2-38](#)), or a grounded cable on a cable strand.

## Connecting a Fiber-Optic Cable to the Access Point

The fiber-optic kit (AIR-1520-FIB-REEL=) enables the access point to support fiber-optic network connections. The kit contains these parts:

- Eight screws
- Two small take-up reels
- Two large take-up reels
- One liquid-tight adapter—Accepts a cable diameter of 0.20 to 0.35 inches (0.51 to 0.89 cm)

**Note**

Fiber backhaul is only possible on the 1552E and 1552EU access points.

**Warning**

**Class 1 laser product.** Statement 1008

**Note**

You need a customer-supplied outdoor-rated fiber-optic cable with an LC connector. The cable diameter must be 0.20 to 0.35 in. (0.52 to 0.89 cm) in diameter.

To connect a fiber-optic cable to the access point, follow these steps:



**Step 1** Ensure that all power sources have been disconnected from the access point.



**Warning**

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

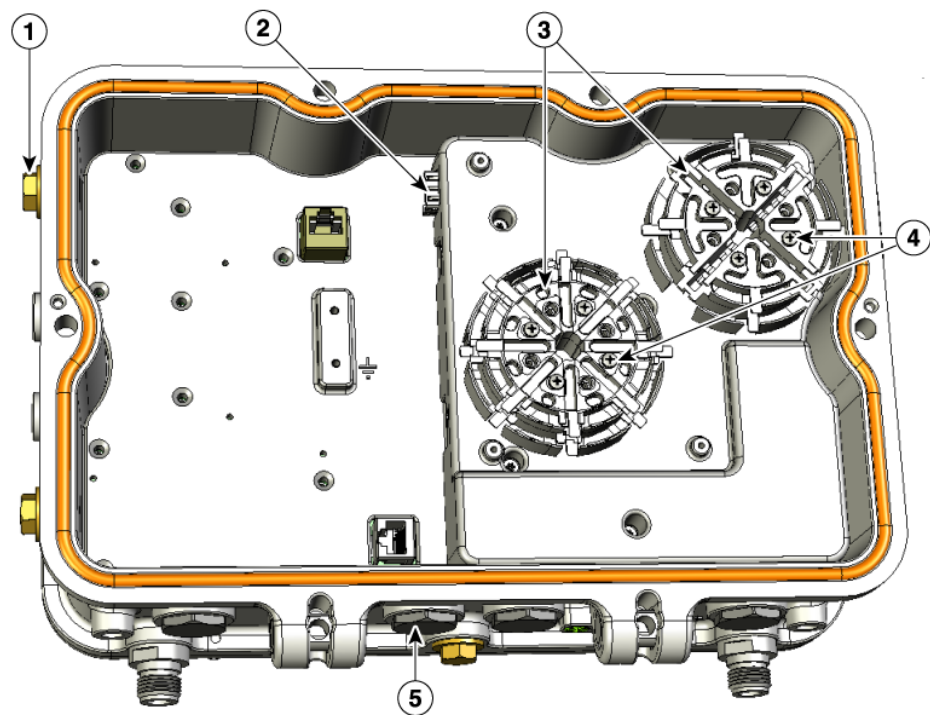


**Note**

If your access point contains a backup battery pack, you must depress the reset button for 10 seconds or more (see the “Disabling Backup Battery Power” section on page 3-10).

- Step 2** Open the hinged cover (see the “Opening the Access Point Hinged Cover” section on page 2-13 for instructions).
- Step 3** Place the two large reels with the small reels on top as shown in Figure 2-32.
- Step 4** Align the screw holes in the large and small reels, and insert four attachment screws in each of the reel pairs. Tighten the screws to 3 to 4 in. lbs (0.34 to 0.45 Nm).
- Step 5** Remove the plug from the end of the SFP module, and insert the module into the SFP receptacle (see Figure 2-32).

**Figure 2-32** Fiber-Optic Cable Components



231591

1	Not used	4	Four screws for each reel assembly
2	SFP module slot	5	Fiber-optic connector plug
3	Fiber reels (large reel with small reel on top)		

- Step 6** Loosen the round end of the liquid-tight connector by turning counterclockwise, but do not remove (see [Figure 2-33](#)).

**Figure 2-33** *Liquid-Tight Adapter*



<b>1</b>	Thread end	<b>2</b>	Round end
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- Step 7** Carefully screw the threaded end of the adapter into the access point and hand-tighten.
- Step 8** Use an adjustable wrench, the 22 mm socket, or the Sealcon S-2200-WR wrench to tighten the threaded end of the adapter to 6 to 7 ft lbs (8.1 to 9.5 Nm).
- Step 9** Carefully remove approximately 1 to 2 ft (30.5 cm) of the external jacket from the fiber-optic cable, exposing the inner strand.
- Step 10** Carefully insert the fiber-optic LC cable connector into the rounded end of the liquid-tight adapter (see [Figure 2-33](#)), and push through the adapter.
- Step 11** Wrap excess fiber-optic cable around the take-up reels in a figure eight (8) pattern.
- Step 12** Insert the fiber-optic LC cable connector into the SFP module.
- Step 13** Use an adjustable or open-end wrench to tighten the round end of the adapter to 2.7 to 3.2 ft lbs (3.66 to 4.34 Nm).
- Step 14** Close the hinged cover (see the [“Closing the Access Point Hinged Cover”](#) section on page 2-13).

# Powering the Access Point

The access point can be powered by one of these methods:

- PoE—56 VDC; for 1552E and 1552EU access points
  - [Connecting a 1500 Series Power Injector, page 2-45](#)
- AC power
  - 110 to 240 VAC for a 1552I access point—[Connecting Streetlight AC Power, page 2-51](#)
  - 110 to 480 VAC for 1552E and 1552EU access points—[Connecting Streetlight AC Power, page 2-51](#)
  - 120 VAC—[Connecting an AC Power Cable to the Access Point, page 2-54](#)
- External 12 VDC
  - [Connecting a DC Power Cable to the Access Point, page 2-55](#)
- POC—40 to 90 VAC (Quasi-AC); only for a 1552C and 1552CU access points
  - [Connecting a Cable POC Power to the Access Point, page 2-58](#)

**Note**

In all cases above, the AC branch circuit powering the access point must be limited to no more than 20A from the over-protection device supplied by the user. This branch power protection must meet all local and national electrical codes.

## Connecting a 1500 Series Power Injector

The power injector provides (AIR-PWRINJ1500-2=) 56 VDC to the access point over the Ethernet cable and supports a total end-to-end Ethernet cable length of 100 m (328 ft) from the switch to the access point.

**Note**

The PoE-Out port is disabled when the access point is powered by the power injector.

**Note**

When not using the AC input connector to power the 1552E or 1552EU (for example when powering using the Cisco power injector), it is important to cover the AC power entry connector. The correct cap is Remke part number 75-0086 (<http://www.remke.com/>).

When your access point is powered by an optional power injector, follow these steps to complete the installation:

**Step 1** Before applying PoE to the access point, ensure that the access point is grounded (see the “[Grounding the Access Point](#)” section on page 2-41).

**Step 2** Review [Figure 2-2](#) to identify the components needed for the installation.

**Note**

The 1550 power injector can only be used in an indoor environment, therefore, the cable from the injector must travel from the protected location to the outside mounted access point.

**Step 3** Connect a CAT5e or better Ethernet cable from your wired LAN network to the power injector.



**Warning**

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

Use only the 1500 power injector (AIR-PWRINJ1500-2=) for the access point. This power injector is designed to meet the power requirements of the access point and is a listed Class 2 limited power source (LPS).



**Note**

The installer is responsible for ensuring that powering the access point from this type of power injector is allowed by local and/or national safety and telecommunications equipment standards.



**Tip**

To forward bridge traffic, add a switch between the power injector and controller. Refer to the *Cisco Wireless Mesh Access Points, Design and Deployment Guide, Release 7.0* for more information.

**Step 4** Ensure that the antennas are connected and that a ground is attached to the access point before you apply power to the access point.

**Step 5** Connect a shielded outdoor-rated Ethernet (CAT5e or better) cable between the power injector and the PoE-in connector of the access point (see [Figure 2-34](#)).

**Step 6** Connect the Ethernet cable to the access point PoE-In port (see [“Connecting an Ethernet Cable to the Access Point”](#) section on page 2-46).



**Note**

When a 1552E or 1552EU access point is powered by PoE, the PoE-Out port is not active.

**Step 7** Continue with [What to Do Next, page 2-63](#).

## Connecting an Ethernet Cable to the Access Point

You need to supply these tools and materials:

- Shielded outdoor-rated Ethernet (CAT5e or better) cable with 0.2 to 0.35 in. (0.51 to 0.89 cm) diameter



**Note**

The PoE-out port is disabled when the access point is powered by the power injector.

- RJ-45 connector and installation tool
- Adjustable wrench

To connect the shielded Ethernet cable to the access point, follow these steps:

**Step 1** Disconnect power to the power injector, and ensure all power sources to the access point are turned off.

**Warning**

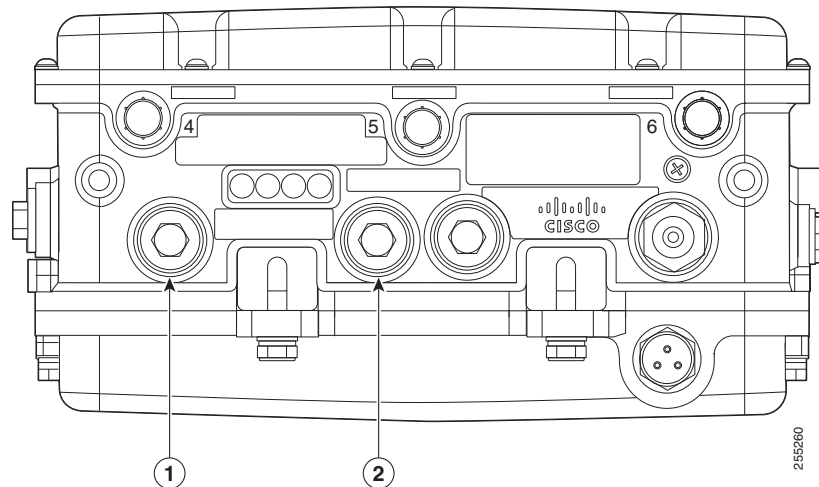
**This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.** Statement 1028

**Note**

If your access point contains a backup battery pack, you must press the reset button for 10 seconds or more (see the [“Disabling Backup Battery Power”](#) section on page 3-10).

- Step 2** Ensure a 6 AWG ground wire is connected to the access point (see the [“Grounding the Access Point”](#) section on page 2-41).
- Step 3** Use an adjustable wrench, a 22-mm socket, or the Sealcon S-2200-WR wrench to remove the Ethernet connector plug from the access point (see [Figure 2-34](#) for the location).

**Figure 2-34** Location of Ethernet Liquid-Tight Adapters (Only Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9)



<b>1</b>	PoE-in port	<b>2</b>	PoE-out port
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**Note**

For information on data cable entry, refer to [Figure 1-1](#) on page 1-6

- Step 4** Loosen the round end of the liquid-tight adapter by turning counterclockwise, but do not remove (see [Figure 2-35](#)).

Figure 2-35 liquid-tight Adapter



1	Thread end	2	Round end
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**Step 5** Insert the unterminated end of the Ethernet cable into the round end of the liquid-tight adapter (see Figure 2-35), and pull several inches of cable through the adapter.

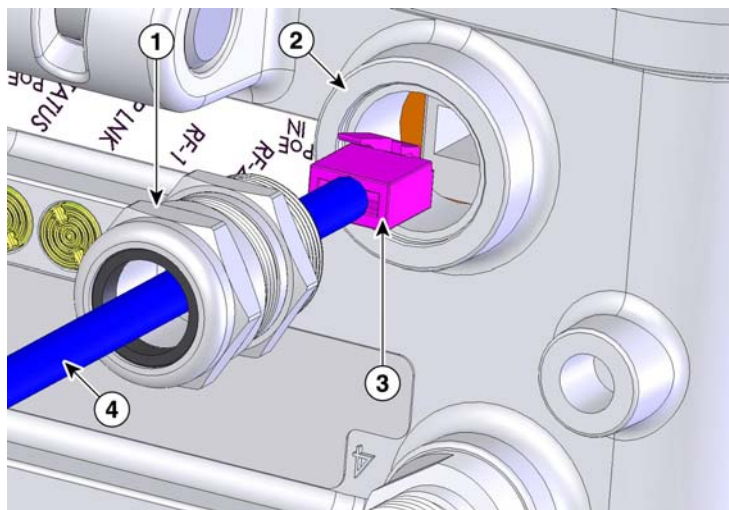
**Step 6** Install an RJ-45 connector on the unterminated end of the Ethernet cable using your Ethernet cable installation tool.

**Warning**

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

**Step 7** Carefully insert the RJ-45 cable connector into the Ethernet port opening on the access point, and connect to the internal Ethernet connector (see Figure 2-36).

Figure 2-36 Inserting RJ-45 Connector into the Ethernet Port Opening in Case



1	Liquid-tight adapter	3	RJ-45 connector
2	Ethernet port opening in access point case	4	Shielded outdoor-rated Ethernet (CAT5e or better) cable

- Step 8** Slide the liquid-tight adapter towards the access point, and screw the threaded end of the adapter into the access point, and hand-tighten.
- Step 9** Use an adjustable wrench, a 22-mm socket, or a Sealcon S-2200-WR wrench to tighten the threaded end of the adapter to 6 to 7 ft lbs (8.1 to 9.5 Nm).
- Step 10** Use an adjustable wrench and tighten the round end of the adapter to 2.7 to 3.2 ft lbs (3.66 to 4.34 Nm).
- Step 11** Ensure that the antennas are connected to the access point before you apply power to the access point.
- Step 12** Route your Ethernet cable, and cut off any excess cable.
- Step 13** Install an RJ-45 connector on the unterminated cable end, and insert it into the power injector. For typical installation components, see [Figure 2-2](#).
- Step 14** Turn on power to the power injector.
- 

## AC Power Cords for Cisco Aironet 1550 Series Outdoor Mesh Access Points

The Cisco Aironet 1550 series outdoor mesh access point supports these AC power cord options:

- 40-ft (12.2-m) power cord (AIR-CORD-R3P-40NA=) for light pole installations in the US and Canada.
- 40-ft (12.2-m) power cord (AIR-CORD-R3P-40UE=) for light pole installations in the European Union.
- 4-ft (1.2-m) streetlight power tap adapter (AIR-PWR-ST-LT-R3P=) for light pole installations in the US and Canada.



### Warning

**A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

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### Caution

Prior to connecting or disconnecting a power cord, you must remove AC power from the power cord using a suitable service disconnect.

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### Note

European Union users need to install a country-specific plug to the blunt cut end of the cable assembly.

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### Note

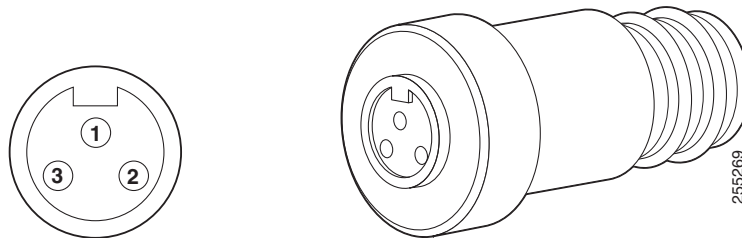
In all installations, the detachable power cord (pluggable Type B) must be an approved type acceptable to the authorities in the country where the unit is sold, and must meet all local and national electrical codes.

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**Table 2-4 AC Power Cord Information**

AC Power Cord	Cord Diameter	Comment
AIR-CORD-R3P-40NA=	0.398 to 0.413 in. (10.1 mm to 10.5 mm)	The three prong plug is limited to 120 VAC. Internal wiring is rated at 600 VAC insulation protection.
AIR-CORD-R3P-40UE=	0.398 to 0.413 in.(10.1 mm to 10.5 mm)	Power cord rating is 100 to 480 VAC. Internal wiring is 16 AWG.
AIR-PWR-ST-LT-TAP=	Strain relief bushing not needed	Power cord rating is 100 to 480 VAC

When using a user-supplied AC power plug on the AIR-CORD-R3P-40UE= power cord, ensure that the plug is certified for outdoor use and that it has a minimum IP67 rating, such as Interpower 84131251 or Hubbell HBL316P6W (IEC/EN 60309) pin-and-sleeve type connectors. The European Union power cord plug pinouts are listed in [Figure 2-37](#). For the location of the AC power connectors, see [Figure 2-39](#) and [Figure 2-40](#).

**Figure 2-37 European Union Plug Pinouts**

Pin	Description	Conductor Color	Pin	Description	Conductor Color
1	Ground	Green/Yellow	3	Neutral	Blue
2	Live	Brown			

**Caution**

All AC power plugs and AC receptacles must be protected from water and other outdoor elements. Use a UL listed waterproofing enclosure suitable for covering the AC receptacle and AC power plug that supplies power to the unit as described in Article 406 of the NEC. If the power cord goes through a metal cover, install a bushing to prevent fraying of the cord.

When using a strain relief bushing, you should follow these recommendations:

- Use properly sized parts (see [Table 2-4](#) for the power cord diameter)
- Use bushings that are safety certified
- Use parts that are suitable for outdoor installation

**Caution**

If your power cord does not use an AC power plug, you must ensure that the power source is OFF before connecting or disconnecting the power cord wires from the power source.



**Warning**

**When installing or replacing the unit, the ground connection must always be made first and disconnected last.** Statement 1046

## Connecting Streetlight AC Power

The access point can be installed on a streetlight pole and powered from a streetlight outdoor light control using the optional streetlight power tap adapter.

**Caution**

The access point can be powered by a light pole twist-lock outdoor light control that provides 100-to 480-VAC 50/60 Hz power. Do not connect to an outdoor light control powered by higher voltages.

When powering the access point with AC power other than the streetlight power tap adapter, you must ensure that the following conditions are observed:

1. AC power can be conveniently removed from the unit. The power should not be removed by disconnecting the AC power connector on the unit.

**Warning**

**A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022

**Caution**

Before connecting or disconnecting a power cord, you must remove AC power from the power cord using a suitable service disconnect.

2. You must protect any AC power plugs and AC receptacles from water and other outdoor elements. You can use a UL-listed waterproofing enclosure suitable for covering the AC receptacle and AC power plug that supplies power to the unit as described in Article 406 of the NEC.
3. When you install the access point outdoors or in a wet or damp location, the AC branch circuit that powers the access point should have ground fault protection (GFCI), as required by Article 210 of the National Electrical Code (NEC).

**Warning**

**Be very careful when connecting the streetlight adapter to Category 3 pole-top power. If you are not careful, you may electrocute yourself or fall.** Statement 363

For additional important safety instructions for AC power cords, refer to the *AC Power Cords for Cisco Aironet 1550 Series Outdoor Mesh Access Points* document that shipped with your AC power cords.

To install an access point on a streetlight pole, follow these steps:

**Step 1**

Before beginning the installation, ensure the AC power to the streetlight pole is turned off.

**Step 2**

Turn off power to the AC power source at the designated circuits.

**Warning**

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

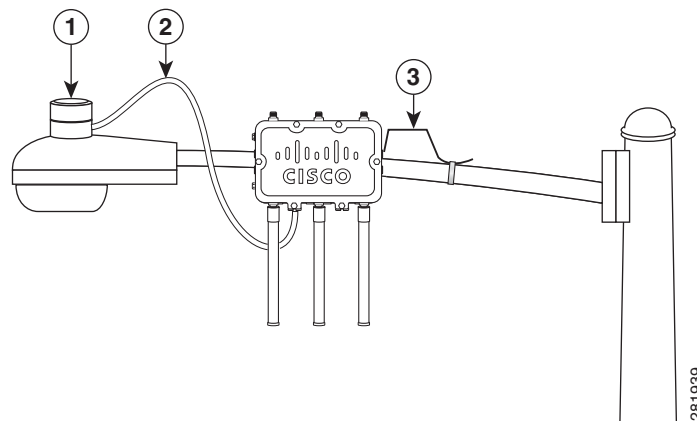
**Caution**

For your safety, when connecting the access point AC power connector, always connect the access point end of the cable FIRST. When removing the AC power connector, always disconnect the access point end of the cable LAST.

If your access point contains a backup battery pack, you must press the reset button for 10 seconds or more (see the “Disabling Backup Battery Power” section on page 3-10.)

- Step 3** When using the streetlight power tap adapter (AIR-PWR-ST-LT-R3P=), ensure that the access point is mounted within 3 feet (1 m) of the outdoor light control. For mounting instructions, refer to the “Installing the Mounting Bracket on a Pole (All Models)” section on page 2-18.
- Step 4** Ensure that a 6-AWG ground wire is attached to the access point (see Figure 2-38) and connected to the streetlight pole (for instructions see [Grounding the Access Point](#), page 2-41).

**Figure 2-38 Using the Streetlight Power Tap Adapter**



<b>1</b>	Outdoor light control	<b>3</b>	6-AWG copper grounding wire
<b>2</b>	Streetlight power tap adapter		

- Step 5** Ensure that the streetlight power tap adapter, which uses a 3-pronged LC-10 twist-lock adapter, is placed between the outdoor light control and its fixture (refer to Figure 2-38). The LC-10 twist-lock adapter is designed to be used with LC-10 listed outdoor light controls operating at 100 to 480 VAC, 50 to 60 Hz.
- Step 6** Disconnect the outdoor light control from its fixture.
- Step 7** Verify that the voltage available at the fixture is between 100 and 480 VAC, 50 to 60 Hz.
- Step 8** Turn off power to the fixture at the designated circuits.

**Caution**

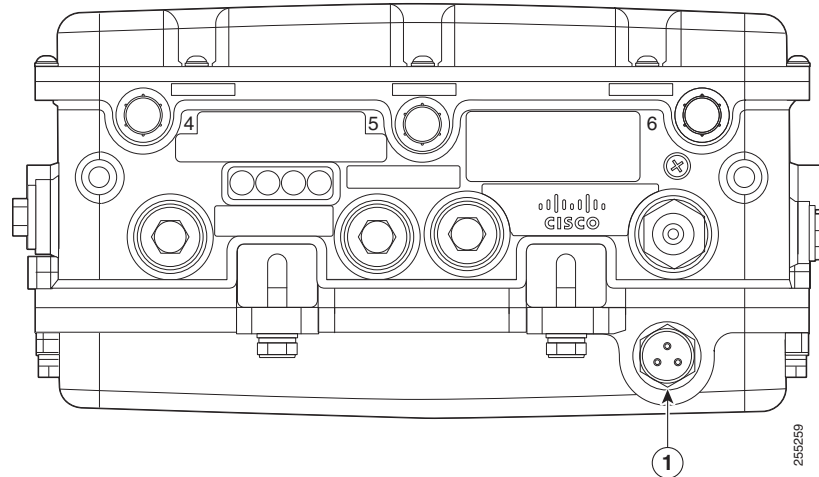
When installing the streetlight power tap adapter to the access point AC power connector, always connect the access point end of the cable FIRST. When removing the streetlight power tap adapter, always disconnect the access point end of the cable LAST.

**Note**

Ensure that your antennas are connected to the access point before you apply power to the access point.

- Step 9** Connect the streetlight power tap adapter to the access point AC power connector, as shown in [Figure 2-39](#) and [Figure 2-40](#). Hand-tighten the connector.

**Figure 2-39** AC Power Connector - Shown on Access Point Model AIR-CAP1552E-x-K9

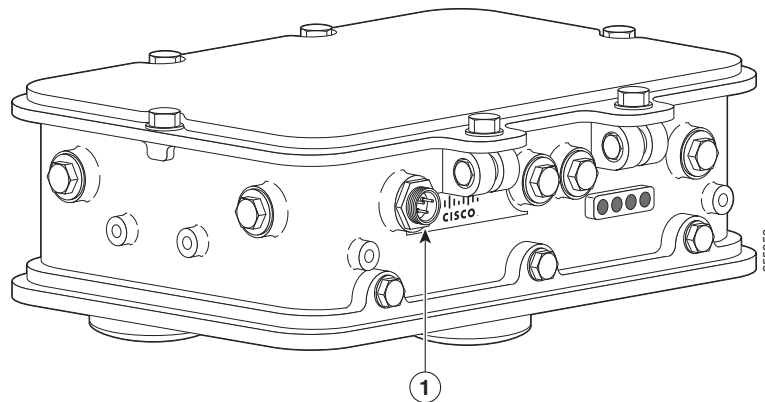



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**1** AC power connector

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**Figure 2-40** AC Power Connector - Shown on Access Point Model AIR-CAP1552I-x-K9




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**1** AC power connector

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- Step 10** Plug the streetlight power tap adapter into the outdoor light control fixture, as shown in [Figure 2-38](#).
- Step 11** Plug the outdoor light control into the streetlight power tap adapter.
- Step 12** Ensure that the antennas are connected to the access point before you apply power to the access point.
- Step 13** Turn on the power to the outdoor light control fixture at the designated circuits.
-

## Connecting an AC Power Cable to the Access Point

When powering the access point with AC power other than the streetlight power tap adapter, you must ensure that the following conditions are observed:

1. AC power can be conveniently removed from the unit. The power should not be removed by disconnecting the AC power connector on the unit.



### Warning

**A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.**

Statement 1022



### Caution

Before connecting or disconnecting a power cord, you must remove AC power from the power cord using a suitable service disconnect.

2. You must protect any AC power plugs and AC receptacles from water and other outdoor elements. You can use a UL-listed waterproofing enclosure suitable for covering the AC receptacle and AC power plug that supplies power to the unit as described in Article 406 of the NEC.
3. When you install the access point outdoors or in a wet or damp location, the AC branch circuit that powers the access point should have ground fault protection (GFCI), as required by Article 210 of the National Electrical Code (NEC).



### Note

For additional important safety instructions for AC power cords, refer to the *AC Power Cords for Cisco Aironet 1550 Series Outdoor Mesh Access Points* document that shipped with your AC power cords.

The access point supports this Cisco AC power cable:

- 40 ft (12.2 m) AC power cable (AIR-CORD-R3P-40NA=)

To connect an AC power cable to the access point, perform these steps:

- Step 1** Prior to applying AC power, ensure the access point is grounded (see [Grounding the Access Point, page 2-41](#)).
- Step 2** Turn off power to the AC power source at the designated circuits.



### Warning

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



### Caution

When connecting the access point AC power connector, always connect the access point end of the cable **FIRST**. When removing the AC power connector, always disconnect the access point end of the cable **LAST**.



### Note

If your access point contains a backup battery pack, you must press the reset button for 10 seconds or more (see the [“Disabling Backup Battery Power”](#) section on page 3-10).

- Step 3** Align the notch in the AC power cable connector with the key in the access point AC power connector, and push the cable connector into the access point connector (see [Figure 2-39](#) or [Figure 2-40](#)). When fully seated, rotate the cable connector ring clockwise until hand-tight.
- Step 4** Ensure that the antennas are connected to the access point before you apply power to the access point.
- Step 5** Turn on the AC power at the designated circuits.

## Connecting a DC Power Cable to the Access Point

When powering the access point with DC power, you must ensure that DC power can be conveniently removed from the unit. The power should not be removed by disconnecting the DC power connector on the unit.



**Warning**

**A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.** Statement 1022



**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

To connect a DC power cable, you need to supply these tools and material:

- Shielded outdoor-rated DC power cable (minimum 18 AWG) with outside cable diameter of 0.20 to 0.35 inch (0.51 to 0.89 cm).
- Adjustable or open-end wrench
- Small flat screw driver
- Two-pin DC power connector (Cisco supplied)

To connect the DC power cable to the access point, follow these steps:

- Step 1** Before connecting DC power to the access point, ensure that the ground is connected to the access point (see the “[Grounding the Access Point](#)” section on page 2-41).
- Step 2** Turn off all power sources to the access point, including the DC power source.



**Warning**

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

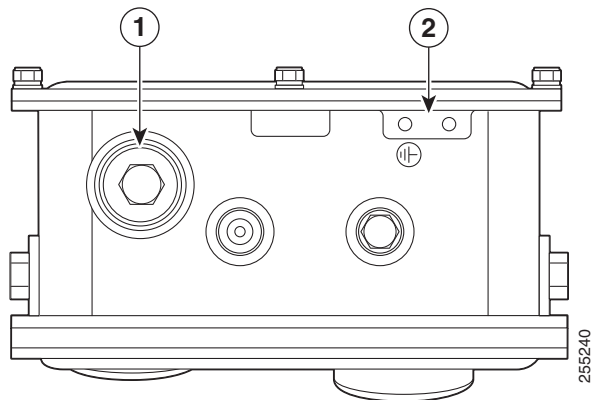


**Caution**

When installing DC power to the access point, always connect the access point end of the cable FIRST. When removing the DC power connector, always disconnect the access point end of the cable LAST.

If your access point contains a backup battery pack, you must press the reset button for 10 seconds or more (see the “[Disabling Backup Battery Power](#)” section on page 3-10.)

- Step 3** Use an adjustable wrench, a 22-mm socket, or a Sealcon S-2200 -WR wrench to remove the plug in the DC power connector opening (see [Figure 2-41](#) for the location of the DC power connector).

**Figure 2-41** Location of the DC Power Liquid-Tight Adapter

<b>1</b>	DC power connector with liquid-tight adapter	<b>2</b>	Ground lug screw holes
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**Step 4** Loosen the round end of the liquid-tight adapter by turning counterclockwise, but do not remove (see [Figure 2-42](#)).

**Figure 2-42** Liquid-Tight Adapter

<b>1</b>	Thread end	<b>2</b>	Round end
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**Note** The liquid-tight adapter accepts a cable diameter of 0.20 to 0.35 in. (0.51 to 0.89 cm).

- Step 5** Insert a bare end of the DC power cable into the rounded end of the liquid-tight adapter (see [Figure 2-42](#)), and pull approximately 6 inches of cable through the adapter.
- Step 6** Strip the DC cable jacket back about 1 inch to expose the wires and strip the insulation about 3/8 inch (9.5 mm) from each wire.
- Step 7** Insert each wire into the two-position terminal strip (supplied), and tighten each wire using a 0.1 inch (0.25 cm) flat screw driver (see [Figure 2-43](#)).

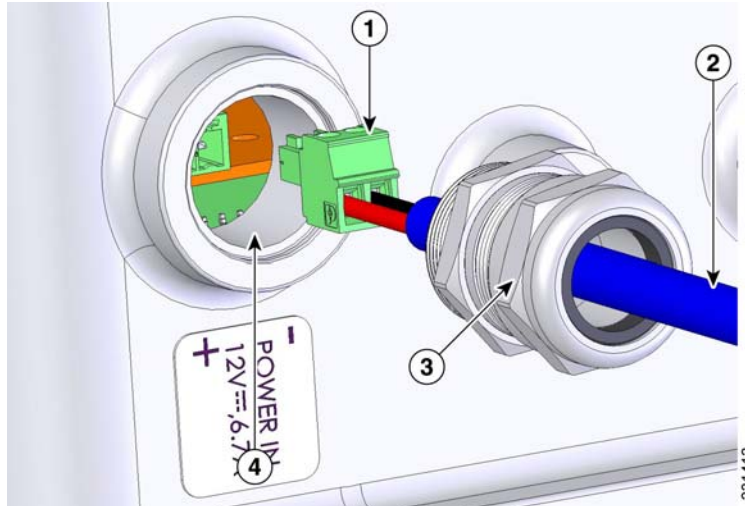
Figure 2-43 Two-Position Terminal Strip



1	Securing screws	3	Wire opening for DC +
2	Wire opening for ground (DC return)		

**Step 8** Insert the two-position terminal strip into the DC power opening in the access point case, and carefully push the terminal strip into the internal connector (see [Figure 2-44](#)).

**Figure 2-44** Inserting the Terminal Strip into the DC Power Opening in the Access Point Case



<b>1</b>	Two-position terminal strip	<b>3</b>	Liquid-tight adapter
<b>2</b>	DC power cable	<b>4</b>	DC power opening in access point case

- Step 9** Slide the liquid-tight adapter towards the access point, and screw the threaded end of the adapter into the access point, and hand-tighten.
- Step 10** Use an adjustable wrench, a 22-mm socket, or a Sealcon S-2200-WR wrench to tighten the threaded end of the adapter to 6 to 7 ft lbs (8.1 to 9.5 Nm).
- Step 11** Use an adjustable or open-end wrench to tighten the round end of the adapter to 2.7 to 3.2 ft lbs (3.66 to 4.34 Nm).
- Step 12** Ensure that the antennas are connected to the access point before you apply power to the access point.
- Step 13** Turn on the DC power at the designated circuits.

## Connecting a Cable POC Power to the Access Point

The cable configuration on a 1552C or 1552CU access point contains a cable modem and RF splitter but does not contain a cable stinger connector. The cable stinger connector is customer supplied.



### Note

To ensure system performance, with respect to immunity from external electromagnetic fields, the installer must use a well shielded coax cable (quad shield).



### Note

The POC access point is classified as a type “Hazardous Voltage Secondary” circuit as per the UL/IEC/EN 60950-1 safety standard. The cable distribution network used with this access point must provide transient reduction to the level for this type of circuit classification (that is, 500V transient/lightning surge).



To connect cable POC power to the access point, follow these steps:

**Step 1** Before connecting cable POC power to the access point, ensure that the ground is connected to the access point (see the “[Grounding the Access Point](#)” section on page 2-41).

**Step 2** Ensure that all power sources have been disconnected from the access point.



**Warning**

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

If your access point contains a backup battery pack, you must press the reset button for 10 seconds or more (see the “[Disabling Backup Battery Power](#)” section on page 3-10).

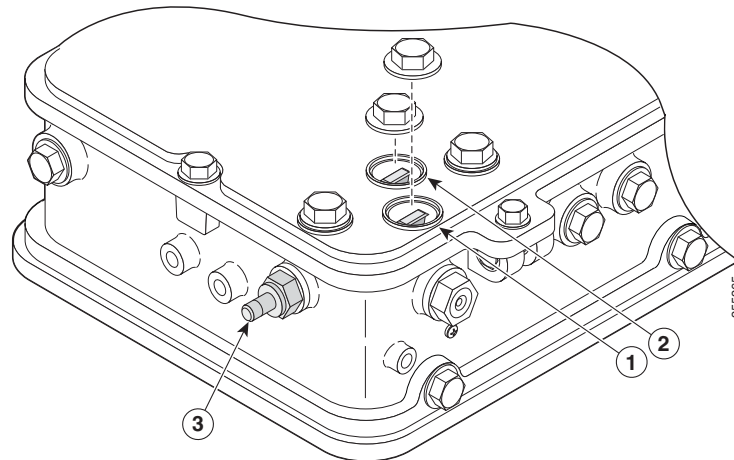
**Step 3** Remove the ATTN and SHUNT connector plugs on the top of the access point. Follow your cable company procedures to measure the cable signal strength and possibly adjust signal attenuation externally to the access point or on the RF splitter (see [Figure 2-45](#)).



**Note** The cable modem MAC address is located on the bottom of the access point under the LEDs.

**Step 4** Locate the F-connector adapter on the access point (see [Figure 2-45](#)).

**Figure 2-45 RF Splitter Components**

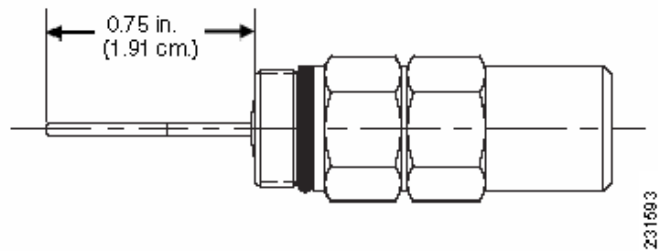


<b>1</b>	RF splitter attenuator (ATTN)	<b>2</b>	RF splitter shunt (SHUNT) <sup>1</sup>
<b>3</b>	F-connector adapter (stinger connector pin)		

<sup>1</sup> Shunt is a 20 amp fuse.

**Step 5** Use a Phillips screw driver to loosen the pin capture screw, but be careful not to remove it.

**Step 6** Cut the cable stinger connector pin (see [Figure 2-46](#)) to  $0.75 \pm 0.1$  inch ( $1.91 \pm 0.25$  cm).

**Figure 2-46 Cable Stinger Connector Pin**


---

**1** Pin length is 0.75 ± 0.1 inch (1.91 ± 0.25 cm).

---

- Step 7** Insert the cable stinger connector pin into the cable POC connector opening in the access point case.
- Step 8** Screw the F-connector adapter into the POC connector opening, and hand-tighten.
- Step 9** Use an adjustable wrench to tighten the F-connector adapter to 6 to 7 ft lbs (8.1 to 9.5 Nm).
- Step 10** Use a Phillips screw driver to tighten the F-connector adapter pin capture screw on the RF splitter to 5.5 to 6.0 in. lbs (0.62 to 0.67 Nm).
- Step 11** Before connecting cable POC power to the access point, ensure that the antennas are attached to the access point.
- Step 12** Connect or attach the cable company POC cable to the F-connector adapter according to their specifications.
- Step 13** Turn on cable POC power.
- Step 14** Reinsert the RF splitter shunt.
- Step 15** Check the cable modem Power and Cable LEDs and verify that the cable modem receives power and registers to the cable network.

The Power LED (fifth LED from the hinge) is green to indicate power is available. The Cable LED (second LED from the hinge) should be blinking green to indicate scanning the cable network and green to indicate registered on the cable network.

- Step 16** Replace the ATTN and SHUNT connector plugs on the top of the access point and tighten to 6 to 7 ft lbs (8.1 to 9.5 Nm).
- 

## Configuring the Access Point

### Adding the Access Point MAC Addresses to the Controller Filter List

Before installing your access points, configure your controller by adding the MAC addresses of the access points to the filter list. MAC address filtering is enabled by default. This enables the controller to respond to the listed access points. To add a MAC filter entry on the controller, follow these steps:

- 
- Step 1** Log into your controller using a web browser.

- Step 2** Choose **SECURITY > MAC Filtering > New**.
- Step 3** Enter the MAC address of the access point to the MAC Filter list; for example, 00:0B:91:21:3A:C7.



**Note** The access point MAC address is located on the bottom of the unit. When two MAC addresses are shown, use the top MAC address.

- Step 4** Select a WLAN ID or **Any WLAN** from the WLAN ID pop-up menu.
- Step 5** Enter a description (32 characters maximum) of the access point in the Description field; for example, Fisher\_Street\_00.0B.91.21.3A.C7 shows the location and MAC address of the access point.
- Step 6** Choose an interface from the Interface Name pop-up menu, and click **Apply**.
- Step 7** Repeat Steps 2 to 6 to add other access points to the list.
- Step 8** Log out of your controller, and close your web browser.

## Configuring a RAP

The access point defaults to the mesh access point (MAP) radio role. One or more of your access points must be reconfigured as a root access point (RAP). The RAPs connect to a wired Ethernet link through a switch to the controller. The MAPs use their wireless backhaul interface to connect to a RAP to reach the controller.

To configure a RAP on the controller GUI, follow these steps:

- Step 1** Log into your controller using a web browser.
- Step 2** Click **Wireless**. When your access point associates to the controller, the name of the access point appears in the AP Name list.
- Step 3** Double-click your access point name.
- Step 4** Find Mesh Information, and choose **Root AP** by clicking the drop-down arrow in the AP Role field.
- Step 5** Click **Apply**.
- Step 6** Repeat Steps 2 through 5 for each RAP.
- Step 7** Log out from your controller, and close your web browser.

## Configuring a Bridge Group Name

The bridge group name (BGN) controls the association of the access points to a RAP. BGNs can be used to logically group the radios to avoid different networks on the same channel from communicating with each other. This setting is also useful if you have more than one RAP in your network in the same area.

If you have two RAPs in your network in the same area (for more capacity), we recommend that you configure the two RAPs with the same BGN, but on different channels.

The BGN is a string of ten characters maximum. A factory-set bridge group name (NULL VALUE) is assigned during manufacturing. It is not visible to you, but allows new access point radios to join a network of new access points. The BGN can be reconfigured from the Controller CLI and GUI. After configuring the BGN, the access point reboots.

The BGN should be configured very carefully on a live network. You should always start from the farthest node (last node) from the RAP and move towards the RAP. If you start configuring the BGN in a different location, then the access points beyond this point (farther away) are dropped, as they have a different BGN.

To configure the BGN for the access points using the GUI, follow these steps:

- 
- Step 1** Log into your controller using a web browser.
  - Step 2** Click **Wireless**. When access points associates to the controller, the name of the access point appears in the AP Name list.
  - Step 3** Double-click on an access point name.
  - Step 4** Find Mesh Information, and enter the new BGN in the Bridge Group Name field.
  - Step 5** Click **Apply**.
  - Step 6** Repeat Steps 2 through 5 for each access point.
  - Step 7** Log out from your controller, and close your web browser.
- 

## What to Do Next

When you power up a MAP that is not connected to a wired Ethernet, fiber-optic, or cable network to the controller, the access point uses the Cisco Adaptive Wireless Path Protocol (AWPP) to bind to another mesh access point (MAP) with the best path to a root access point (RAP) connected to the wired network to a controller. The access point sends a discovery request when powered up. If you have configured the access point in the controller correctly, the controller sends back a discovery response to the access point. When that happens, the access point sends out a join request to the controller, and the controller responds with a join confirmation response. Then the access point establishes a Control And Provisioning of Wireless Access Points (CAPWAP) connection to the controller and gets the shared secret configured on the controller.

Refer to the *Cisco Wireless LAN Controller Configuration Guide* for more information on configuring, monitoring, and operating your access points.





## CHAPTER 3

# Troubleshooting

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This chapter provides troubleshooting procedures for basic problems with the access point. For the most up-to-date, detailed troubleshooting information, refer to the Cisco Technical Support and Documentation website at the following URL:

<http://www.cisco.com/cisco/web/support/index.html>

Sections in this chapter include:

- [Guidelines for Using the Access Points](#), page 3-2
- [Controller MAC Filter List](#), page 3-3
- [Using DHCP Option 43](#), page 3-4
- [Monitoring the Access Point LEDs](#), page 3-4
- [Verifying Controller Association](#), page 3-5
- [Changing the Bridge Group Name](#), page 3-6
- [Connecting to the Access Point Locally](#), page 3-6
- [Access Point Power Injector](#), page 3-8
- [Using the Reset Button](#), page 3-9

# Guidelines for Using the Access Points

You should keep these guidelines in mind when you use the access points:

- The access point can only communicate with controllers and cannot operate independently.
- The access point does not support Wireless Domain Services (WDS) and cannot communicate with WDS devices. However, the controller provides functionality equivalent to WDS when the access point associates to it.
- The access point only supports Layer 3 CAPWAP communications with the controllers.

In Layer 3 operation, the access point and the controller can be on the same or different subnets. The access point communicates with the controller using standard IP packets. A Layer 3 access point on a different subnet than the controller requires a DHCP server on the access point subnet and a route to the controller. The route to the controller must have destination UDP ports 12222 and 12223 open for CAPWAP communications. The route to the primary, secondary, and tertiary controllers must allow IP packet fragments.

- Before deploying your access points, ensure that the following has been done:
  - Your controllers are connected to switch ports that are configured as trunk ports.
  - Your access points are connected to switch ports that are configured as untagged access ports.
  - A DHCP server is reachable by your access points and has been configured with Option 43. Option 43 provides the IP addresses of the management interfaces of your controllers. Typically, a DHCP server can be configured on a Cisco switch.
  - Optionally, a DNS server can be configured to enable CISCO-CAPWAP-CONTROLLER. Use *local domain* to resolve to the IP address of the management interface of your controller.
  - Your controllers are configured and reachable by the access points.
  - Your controllers are configured with the access point MAC addresses and the MAC filter list is enabled.
  - Your switch must forward DHCP requests.
- The access point PoE-out port should be connected only to a single peripheral customer device, such as a camera or sensor gateway. We recommend that the PoE-out port not be connected to a switch or hub.
- After the access points are associated to the controller, you should change the bridge group name (BGN) from the default value. With the default BGN, the mesh access points (MAPs) can potentially try to connect with other mesh networks and slow down the convergence of the network.

## Important Notes

### Convergence Delays

During deployment, the access points can experience convergence delays due to various causes. The following list identifies some operating conditions that can cause convergence delays:

- A root access point (RAP) attempts to connect to a controller using any of the wired ports (cable, fiber-optic, PoE-in, or PoE-out). If the wired ports are operational, the RAP can potentially spend several minutes on each port prior to connecting to a controller.



- If a RAP is unable to connect to a controller over the wired ports, it attempts to connect using the wireless network. This results in additional delays when multiple potential wireless paths are available.
- If a MAP is unable to connect to a RAP using a wireless connection, it then attempts to connect using any available wired port. The access point can potentially spend several minutes for each connection method, before attempting the wireless network again.

## Bridge Loop

The access point supports packet bridging between wired and wireless network connections. The same network must never be connected to multiple wired ports on an access point or on two bridged access points. A bridge loop causes network routing problems.

## Controller DHCP Server

The controller DHCP server only assigns IP addresses to lightweight access points and wireless clients associated to an access point. It does not assign an IP address to other devices, including Ethernet bridging clients on the mesh access points.

## MAP Data Traffic

If the signal on the access point backhaul channel has a high signal-to-noise ratio, it is possible for a MAP to connect to the controller, via parent node, but not be able to pass data traffic, such as pinging the access point. This can occur because the default data rate for backhaul control packets is set to 6 Mb/s, and the backhaul data rate set to auto by the user.

## Controller MAC Filter List

Before activating your access point, you must ensure that the access point MAC address has been added to the controller MAC filter list and that **Mac Filter List** is enabled.



### Note

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The access point MAC address and barcode is located on the bottom of the unit. When two MAC addresses are shown, use the top MAC address.

---

To view the MAC addresses added to the controller MAC filter list, you can use the controller CLI or the controller GUI:

- Controller CLI—Use the **show macfilter summary** controller CLI command to view the MAC addresses added to the controller filter list.
- Controller GUI—Log into your controller web interface using a web browser, and choose **SECURITY > AAA > MAC Filtering** to view the MAC addresses added to the controller filter list.

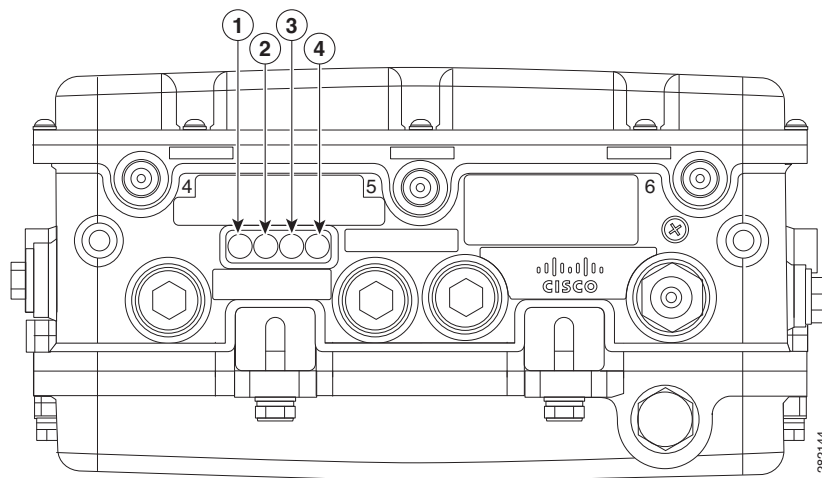
## Using DHCP Option 43

You can use DHCP Option 43 to provide a list of controller IP addresses to the access points, enabling the access point to find and join a controller. Refer to the product documentation for your DHCP server for instructions on configuring DHCP Option 43. For additional information, refer to the “[Configuring DHCP Option 43](#)” section on page F-1.

## Monitoring the Access Point LEDs

If your access point is not working properly, look at the LEDs on the bottom of the unit. You can use them to quickly assess the status of the unit. [Figure 3-1](#) shows the location of the access point LEDs.

**Figure 3-1** Access Point LEDs - Shown on the Bottom of Model AIR-CAP1552E-x-K9



<b>1</b>	RF-2 LED—Status of the 5 GHz MIMO backhaul radio	<b>3</b>	Uplink LED—Ethernet, cable, or fiber status
<b>2</b>	RF-1 LED—Status of the 2.4 GHz MIMO access radio	<b>4</b>	Status LED—access point and software status



### Note

It is expected that there will be small variations in LED color intensity and hue from unit to unit. This is within the normal range of the LED manufacturer specifications and is not a defect.

The access point LED signals are listed in [Table 3-1](#).

**Table 3-1 Access Point LED Signals**

LED	Color <sup>1,2</sup>	Meaning
Status	Black	No power applied or LED off.
	Steady green	Access point is operational.
	Blinking green	Download or upgrade of Cisco IOS image file in progress.
	Steady amber	Mesh neighbor access point discovery in progress.
	Blinking amber	Mesh authentication in progress.
	Blinking red / green / amber	CAPWAP discovery in progress.
	Steady red	Firmware failure. Contact your support organization for assistance.
Uplink	Black	All network ports down or LED off.
	Steady green	Uplink port is operational (cable, fiber optic, or Ethernet).
RF-1	Black	Radio turned off or LED off.
	Steady green	Radio is operational; network is good.
	Steady red	Firmware failure. Contact your support organization for assistance.
RF-2	Black	Radio is turned off or LED off.
	Steady green	Radio is operational; network is good.
	Steady red	Firmware failure. Contact your support organization for assistance.

1. If all LEDs off, the access point has no power.

2. When the access point power supply is initially turned on, all LEDs are amber.

## Verifying Controller Association

To verify that your access point is associated to the controller, follow these steps:

- 
- Step 1** Log into your controller web interface using a web browser.  
You can also use the controller CLI **show ap summary** command from the controller console port.
- 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.
-

## Changing the Bridge Group Name

The bridge group name (BGN) controls the association of the access points to a RAP. BGNs can be used to logically group the radios to avoid different networks on the same channel from communicating with each other. This setting is also useful if you have more than one RAP in your network in the same area.

If you have two RAPs in your network in the same area (for more capacity), we recommend that you configure the two RAPs with different BGNs and on different channels.

The BGN is a string of ten characters maximum. A factory-set bridge group name (NULL VALUE) is assigned during manufacturing. It is not visible to you, but allows new access point radios to join a network of new access points. The BGN can be reconfigured from the Controller CLI and GUI. After configuring the BGN, the access point reboots.

After the access points are deployed and associated to the controller, the BGN should be changed from the default value to prevent the MAPs from attempting to associate to other mesh networks.

The BGN should be configured very carefully on a live network. You should always start with the most distant access point (last node) from the RAP and move towards the RAP. If you start configuring the BGN in a different location, then the access points beyond this point (farther away) are dropped, as they have a different BGN.

To configure the BGN for the access points using the controller GUI, follow these steps:

- 
- Step 1** Log into your controller using a web browser.
  - Step 2** Click **Wireless**. When access points associates to the controller, the access point name appears in the AP Name list.
  - Step 3** Click on an access point name.
  - Step 4** Find the Mesh Information section, and enter the new BGN in the Bridge Group Name field.
  - Step 5** Click **Apply**.
  - Step 6** Repeat Steps 2 through 5 for each access point.
  - Step 7** Log out from your controller, and close your web browser.
- 

## Connecting to the Access Point Locally

If you need to monitor the access point locally (without connecting the access point to a wired LAN), you can connect a PC to its console port using a DB-9 to RJ-45 serial cable.



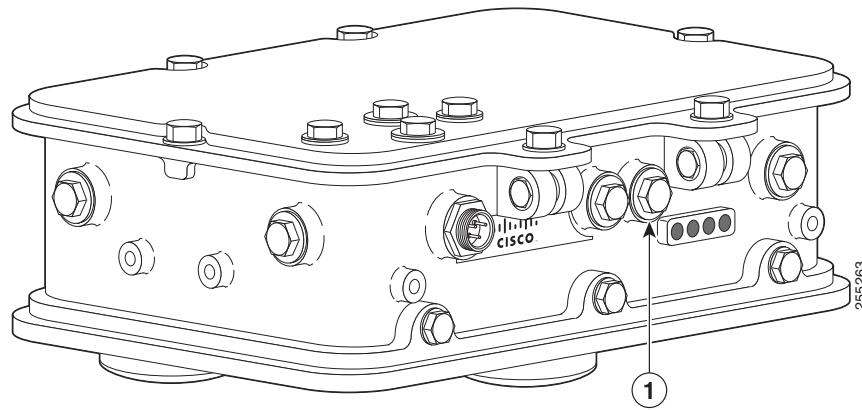
### Note

The console port should only be used for debugging in a lab environment.

Follow these steps to open the CLI by connecting to the access point console port:

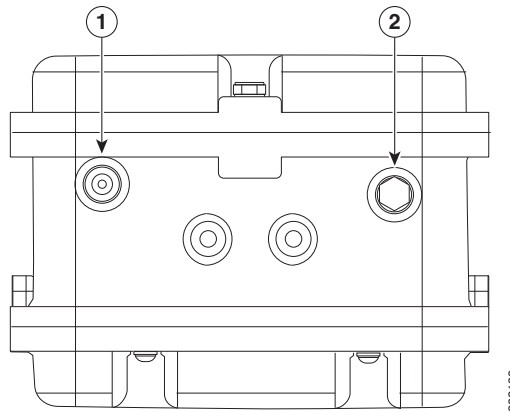
- 
- Step 1** Open the hinged cover of the access point (see [“Opening the Access Point Hinged Cover”](#) section on [page 2-13](#) for instructions).  
Connect a nine-pin, female DB-9 to RJ-45 serial cable to the RJ-45 console port on the access point and to the COM port on a computer (see [Figure 3-2](#) and [Figure 3-3](#) for the console port locations).

**Figure 3-2** Console Port Location on Access Point Models AIR-CAP1552C-x-K9, AIR-CAP1552CU-x-K9, and AIR-CAP1552I-x-K9



1	Console port
---	--------------

**Figure 3-3** Console Port Location on Access Point Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9



1	Console port	2	Not used
---	--------------	---	----------



**Note** The Cisco part number for the DB-9 to RJ-45 serial cable is AIR-CONCAB1200. To order a serial cable, browse to:

<http://www.cisco.com/cgi-bin/marketplace/welcome.pl>

**Step 2** Set up a terminal emulator program on your PC to communicate with the access point. Use the following settings for the terminal emulator connection: 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

**Step 3** When finished, remove your serial cable, and close the hinged cover (see the “Closing the Access Point Hinged Cover” section on page 2-13 for instructions).

# Access Point Power Injector

The power injector (AIR-PWRINJ1500-2=) has three LEDs on the front end of the case (see [Figure 3-4](#)). For detailed information on the power injector, see the *Cisco Aironet 1550 Series Outdoor Mesh Access Point Power Injector Installation Instructions*.

**Figure 3-4** Power Injector Connectors and LEDs



1	Mounting tabs	4	AC POWER LED
2	AP POWER LED	5	TO AP—Ethernet connector (RJ-45) to access point (10/100/1000BASE-T)
3	FAULT LED	6	TO SWITCH—Ethernet connector (RJ-45) to switch (10/100/1000BASE-T)

## Monitoring the Power Injector LEDs

You can use the power injector LEDs to check the power injector status. The LEDs provide the following status information:

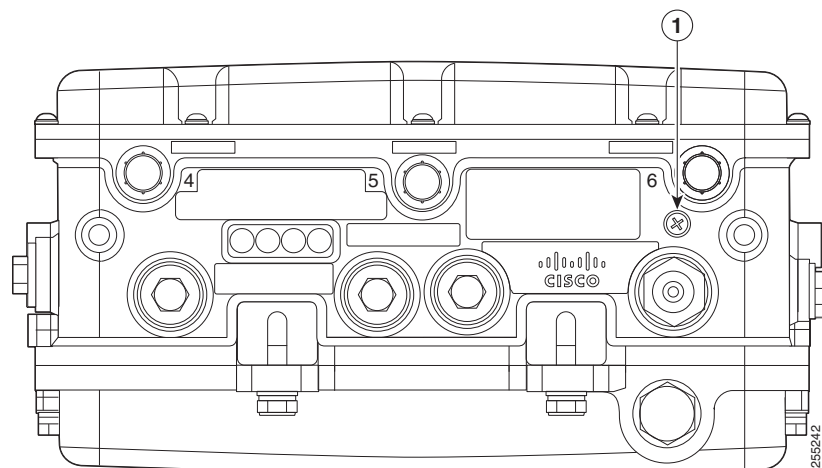
- AP POWER—Turns solid green after successful discovery; indicates that power injector is supplying power to the access point.
- FAULT—Turns solid red when a fault occurs during discovery mode or power-up. Check Ethernet cables and connections before contacting your support organization for assistance.
- AC POWER—Turns solid green when power injector is receiving AC power and is ready to provide power to the access point.

## Using the Reset Button

The access point has a reset button located on the bottom of the unit (see [Figure 3-5](#) and [Figure 3-6](#)). The reset button is recessed in a small hole that is sealed with a screw and a rubber gasket. The reset button can be used to perform these functions:

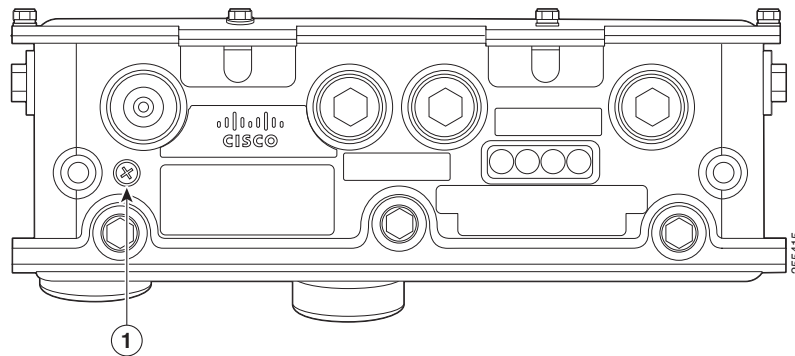
- Reset the access point—Press the reset button for less than 10 seconds.
- Disable battery backup power—Press the reset button for more than 10 seconds.

**Figure 3-5**      **Reset Button Location - Models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9**



<b>1</b>	Reset button
----------	--------------

**Figure 3-6** *Reset Button Location - Models AIR-CAP1552C-x-K9, AIR-CAP1552CU-x-K9, and AIR-CAP1552I-x-K9*




---

1 Reset button

---

## Reboot the Access Point

To reboot (power cycle) the access point, follow these steps:

- 
- Step 1** Use a Phillips screwdriver to remove the reset button screw (Figure 3-5). Be careful not to lose the screw.
  - Step 2** Use a straightened paperclip, and push the reset button for less than 10 seconds. This action causes the access point to reboot (power cycle), all LEDs to turn off for approximately 5 seconds, and then the LEDs to reactivate.
  - Step 3** Replace the reset button screw and use a Phillips screwdriver to tighten to 22 to 24 in. lbs (2.49 to 2.71 Nm).
- 

## Disabling Backup Battery Power

To disable battery backup power, follow these steps:

- 
- Step 1** Use a Phillips screwdriver to remove the reset button screw (Figure 3-5). Be careful not to lose the screw.
  - Step 2** Use a straightened paper clip and push the reset button for longer than 10 seconds.
    - When the access point is only battery powered, the access point reboots and then disables the backup battery power. The LEDs turn off for approximately 5 seconds, reactivate for approximately 5 seconds, and then turn off and stay off.
    - When the access point has battery power and another power source, the access point reboots, then disables the battery and continues operating from the second power source. The LEDs turn off for approximately 5 seconds and then reactivate.




---

**Note** If your access point does not contain a battery backup unit, the access point only reboots.

---





---

**Note** The battery backup unit is reactivated when the access point is rebooted (power cycled) again.

---

**Step 3** Replace the reset button screw, and use a Phillips screwdriver to tighten to 22 to 24 in. lbs (2.49 to 2.71 Nm).

---





## CHAPTER 4

# Installing or Replacing the Backup Battery

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This chapter describes the procedures to install or replace the backup battery in the 1552E and 1552EU access points. These sections are included in this chapter:

- [Before Beginning the Installation or Replacement, page 4-2](#)
- [Opening the Access Point Radio Cover, page 4-3](#)
- [Removing a Backup Battery, page 4-4](#)
- [Installing a New Backup Battery, page 4-5](#)
- [Connecting the Backup Battery Cable and Closing the Radio Cover, page 4-6](#)

## Before Beginning the Installation or Replacement

The backup battery is located internal to the 1552E and 1552EU access points and attached to the radio cover. The backup battery cannot be installed or replaced in an outdoor environment. You must use a static-protected work surface within an indoor environment.

**Warning**

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

---

**Caution**

---

ESD can damage the internal components of the access point. We recommend that the backup battery installation or replacement procedures be performed by an ESD-trained service technician at an ESD-protected workstation.

---

The following operations summarize the backup battery installation or replacement procedure:

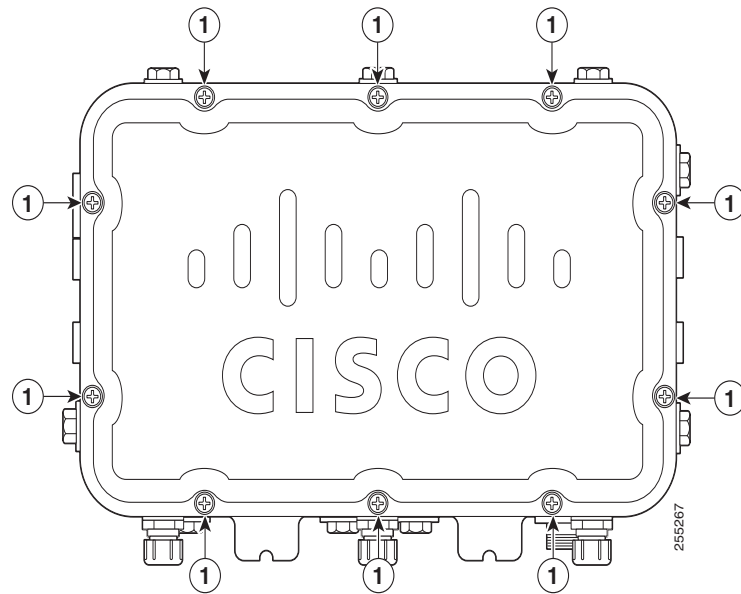
1. If the access point has been deployed, deactivate all power sources, remove all cables, remove the access point.
2. Follow standard electrostatic discharge (ESD) procedures.
3. Place the access point on an indoor ESD-protected work surface.
4. Open the access point's radio cover.
5. If applicable, remove the defective backup battery.
6. Install the new backup battery.
7. Connect the backup battery cable.
8. Close the access point radio cover.
9. Deploy your access point.

# Opening the Access Point Radio Cover

To open the 1552E or 1552EU access point radio cover, follow these steps:

- 
- Step 1** Position the access point with the cover attached with hex bolts facing down.
- Step 2** Use a #8 Torx screwdriver to unscrew all the Torx screws on the access point cover, but do not attempt to remove the screws (see [Figure 4-1](#)).

**Figure 4-1** Access Point Radio Cover Screws



---

<b>1</b>	Radio cover Torx screws
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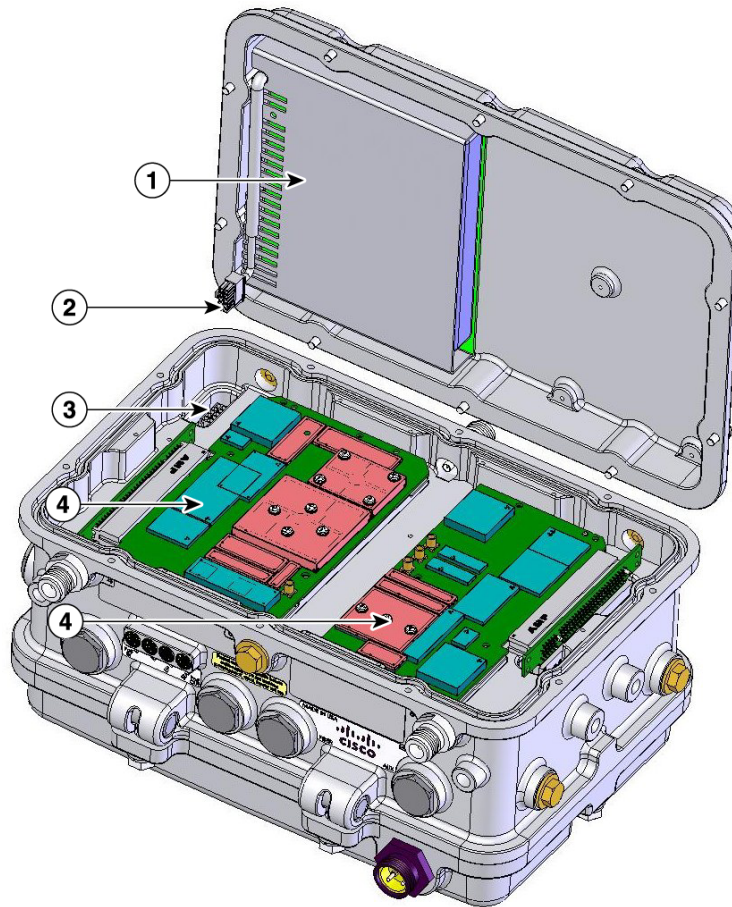
- Step 3** Carefully open the cover.
-

# Removing a Backup Battery

To remove a backup battery, follow these steps:

- Step 1** While holding the access point cover open, carefully disconnect the backup battery cable from the internal connector (see [Figure 4-2](#)). Be careful not to touch the radio board components.

**Figure 4-2** Battery Backup Location



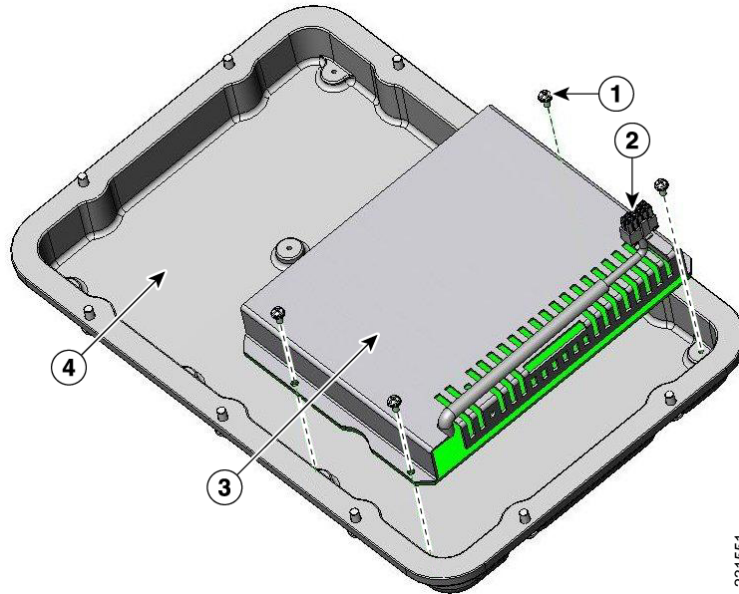
231650

1	Backup battery	3	Internal connector for the backup battery cable
2	Backup battery cable	4	Radio boards (Do not touch)

- Step 2** Carefully place the cover onto your static-protected table.

- Step 3** Use a Phillips screw driver to remove the four screws attaching the backup battery to the cover (see [Figure 4-3](#)).

**Figure 4-3 Backup Battery Screws**



1	Battery backup screws (4 places)	3	Backup battery
2	Battery backup cable and connector	4	Access point radio cover

## Installing a New Backup Battery



**Note**

The AIR-1520-BATT-6AH= backup battery is used only on access point models AIR-CAP1552E-x-K9 and AIR-CAP1552EU-x-K9. Do not use this battery on model AIR-CAP1552H-x-K9, AIR-CAP1552SA-x-K9, or AIR-CAP1552SD-x-K9.

To install a new backup battery into your access point, follow these steps:

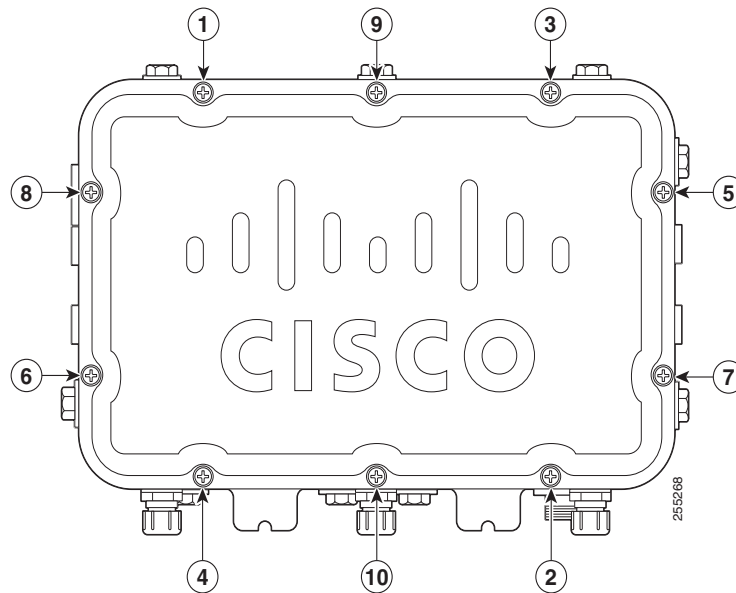
- Step 1** Carefully orient your new backup battery as shown in [Figure 4-3](#) over the access point radio cover.
- Step 2** Position the backup battery over the four screw holes in the radio cover.
- Step 3** Use the four supplied screws to attach the backup battery to the radio cover and tighten to 5.5 to 6.5 lbs (0.62 to 0.73 Nm).
- Step 4** Position and bend the backup battery cable as shown in [Figure 4-3](#).

# Connecting the Backup Battery Cable and Closing the Radio Cover

To connect the backup battery cable and close the access point radio cover, follow these steps:

- Step 1** Carefully position the access point radio cover over the access point as shown in [Figure 4-2](#).
- Step 2** Hold the radio cover upright while placing the edge of the radio cover on the top edge of the access point.
- Step 3** Carefully push the backup battery cable connector into the internal battery connector (see [Figure 4-2](#)).
- Step 4** Close the radio cover, while being careful not to pinch the backup battery cable.
- Step 5** Use a Phillips screwdriver to partially tighten each cover screw in the tightening sequence, starting with 1, as shown in [Figure 4-4](#). Tighten each screw to 11 to 12 in. lbs (1.24 to 1.36 Nm).
- Step 6** Repeat [Step 5](#) using the same tightening sequence to fully tighten each screw to 22 to 24 in. lbs (2.49 to 2.71 Nm).

**Figure 4-4** Radio Cover Screw Tightening Sequence



## What to Do Next

After you have completed the backup battery procedures, your access point is ready to be deployed. Carefully read and follow the safety and installation guidelines contained in the [“Installation Guidelines”](#) section on page 2-8 and the installation and mounting instructions contained in the [“Mounting the Access Point”](#) section on page 2-14.





## APPENDIX **A**

# Translated Safety Warnings

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For translated safety warnings, refer to the safety warning document that shipped with your access point or that is available on Cisco.com.

To browse to the document on Cisco.com, follow these steps:

- 
- Step 1** Click this link and go to the Cisco Wireless documentation home page:  
<http://www.cisco.com/en/US/products/hw/wireless/index.html>
  - Step 2** Click **Support** and the Support and Documentation page displays.
  - Step 3** Click **Wireless** in the Find Product Support column.
  - Step 4** Click **1550**.
  - Step 5** Click **Install and Upgrade**.
  - Step 6** Click **Install and Upgrade Guides**.
  - Step 7** Click **Translated Safety Warnings for Cisco Aironet 1550 Series Outdoor Mesh Access Points**.
-





## APPENDIX **B**

# Declarations of Conformity and Regulatory Information

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This appendix provides declarations of conformity and regulatory information for the Cisco Aironet 1552 Outdoor Mesh Access Point.

This appendix contains the following sections:

- [Manufacturers Federal Communication Commission Declaration of Conformity Statement, page B-2](#)
- [Industry Canada, page B-3](#)
- [European Community, Switzerland, Norway, Iceland, and Liechtenstein, page B-4](#)
- [Declaration of Conformity for RF Exposure, page B-7](#)
- [Guidelines for Operating Cisco Aironet Access Points in Japan, page B-8](#)
- [VCCI Statement for Japan, page B-9](#)
- [Administrative Rules for Cisco Aironet Access Points in Taiwan, page B-9](#)
- [EU Declaration of Conformity, page B-11](#)

# Manufacturers Federal Communication Commission Declaration of Conformity Statement

**Models:**

AIR-CAP1552E-A-K9  
 AIR-CAP1552EU-A-K9  
 AIR-CAP1552C-A-K9  
 AIR-CAP1552CU-A-K9  
 AIR-CAP1552I-A-K9

**FCC Certification number:**

LDK102074P

**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 A 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 Cisco-supplied antennas. Any changes or modification to the product 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.

## Industry Canada

**Models:**

AIR-CAP1552E-A-K9  
AIR-CAP1552EU-A-K9  
AIR-CAP1552C-A-K9  
AIR-CAP1552CU-A-K9  
AIR-CAP1552I-A-K9

**IC Certification Number:**

2461B-102074P

## Canadian Compliance Statement

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

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

This device complies with Class A 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 13 dBi for 2.4 GHz and 14 dBi for 5 GHz. Antennas having a gain greater 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.

## 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. Antennas with less than 8 dBi gain should be located at a minimum of 7.9 in (20 cm) or more from the body of all persons and 20 inches (50 cm) for antennas up to 13 dBi gain.

This access point is also compliant to EN 50835 for RF exposure.

# European Community, Switzerland, Norway, Iceland, and Liechtenstein

## Access Point Models:

AIR-CAP1552E-E-K9  
AIR-CAP1552EU-E-K9  
AIR-CAP1552C-E-K9  
AIR-CAP1552CU-E-K9  
AIR-CAP1552I-E-K9

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

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

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.
Lietuvių [Lithuanian]:	Šis įrenginys tenkina 1999/5/EB Direktyvos esminius reikalavimus ir kitas šios direktyvos nuostatas.

142729

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.
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 direktiv: 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.

121404

The following standards were applied:

- 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

The following is the declaration of conformity for RF exposure for the United States, Canada, European Union and Australia.

## United States

This system has been evaluated for RF exposure for Humans in reference to ANSI C 95.1 (American National Standards Institute) limits. The evaluation was based on ANSI C 95.1 and FCC OET Bulletin 65C rev 01.01. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 7.9 inches (20 cm) for antennas with less than 8 dBi gain and 20 inches (50 cm) for antennas up to 13 dBi gain.

## Canada

This system has been evaluated for RF exposure for Humans in reference to ANSI C 95.1 (American National Standards Institute) limits. The evaluation was based on RSS-102 Rev 2. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 7.9 inches (20 cm) for antennas with less than 8 dBi gain and 20 inches (50 cm) for antennas up to 13 dBi gain.

## European Union

This system has been evaluated for RF exposure for Humans in reference to the ICNIRP (International Commission on Non-Ionizing Radiation Protection) limits. The evaluation was based on the EN 50385 Product Standard to Demonstrate Compliance of Radio Base stations and Fixed Terminals for Wireless Telecommunications Systems with basic restrictions or reference levels related to Human Exposure to Radio Frequency Electromagnetic Fields from 300 MHz to 40 GHz. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 7.9 inches (20 cm) for antennas with less than 8 dBi gain and 20 inches (50 cm) for antennas up to 13 dBi gain. Dual antennas used for diversity operation are not considered co-located.

## Australia

This system has been evaluated for RF exposure for Humans as referenced in the Australian Radiation Protection standard and has been evaluated to the ICNIRP (International Commission on Non-Ionizing Radiation Protection) limits. To maintain compliance, the minimum separation distance from the antenna to general bystanders is 7.9 inches (20 cm) for antennas with less than 8 dBi gain and 20 inches (50 cm) for antennas up to 13 dBi gain.

# 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.

## Lightweight Access Point Model:

AIR-CAP1552E-Q-K9  
 AIR-CAP1552EU-Q-K9  
 AIR-CAP1552C-Q-K9  
 AIR-CAP1552CU-Q-K9

## 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

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: 03-6434-6500

## VCCI Statement for Japan



Warning

This is a Class A product based on the standard of the Voluntary Control Council for Interference by Information Technology Equipment (VCCI). If this equipment is used in a domestic environment, radio disturbance may arise. When such trouble occurs, the user may be required to take corrective actions.

警告

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

VCCI-A

## 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.

### 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。

209139

## 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.

## 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 adapters. Using any other cables/adapters 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.

## EU Declaration of Conformity

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

<http://www.ciscofax.com>

## 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-CAP1552E-N-K9

AIR-CAP1552EU-N-K9

AIR-CAP1552C-N-K9

AIR-CAP1552CU-N-K9

AIR-CAP1552I-N-K9

## Regulatory Information

Figure 1 contains Brazil regulatory information for the access point models identified in the previous section.

**Figure 1** *Brazil Regulatory Information*



## 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.



## APPENDIX **C**

# Channels and Power Levels

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For channel and maximum power level settings, refer to the *Channels and Maximum Power Settings for Cisco Aironet Lightweight Access Points and Bridges* document available on the Cisco Wireless documentation page of Cisco.com.

To browse to the document, follow these steps:

- 
- Step 1** Click this link and go to the Cisco Wireless documentation home page:  
<http://www.cisco.com/en/US/products/hw/wireless/index.html>
  - Step 2** Click **Support**. The Support and Documentation page displays.
  - Step 3** Click **Wireless**
  - Step 4** Click **1550**.
  - Step 5** Click **Install and Upgrade**.
  - Step 6** Click **Install and Upgrade Guides**.
  - Step 7** Click **Channels and Maximum Power Settings for Cisco 1550 Series Outdoor Mesh Access Points** document.
-







# APPENDIX **D**

## Access Point Specifications

Table D-1 lists the technical specifications for the Cisco Aironet 1552 Outdoor Mesh Access Points. For detailed specifications, refer to the *Cisco Aironet 1550 Series Outdoor Access Point* data sheet at:

[http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps11451/data\\_sheet\\_c78-641373.html](http://www.cisco.com/en/US/prod/collateral/wireless/ps5679/ps11451/data_sheet_c78-641373.html)

**Table D-1** Access Point Specifications

Category	Specifications
Size	<ul style="list-style-type: none"> <li>1552C/1552I: 12.3 in. x 8.6 in. x 5.6 in. (31.2 cm x 22.9 cm x 14.2 cm)</li> <li>1552E/EU/CU: 12.3 in. x 8.6 in. x 6.1 in. (31.2 cm x 22.9 cm x 16.3 cm)</li> </ul>
Weight	<ul style="list-style-type: none"> <li>1552E/EU: 17.3 lbs (7.8 kg)</li> <li>1552C/CU: 14 lbs (6.4 kg)</li> <li>1552I: 14 lbs (6.4 kg)</li> <li>Battery backup: 1.5 lbs (0.7kg)</li> <li>Pole mounting bracket: 6.1 lbs (2.8 kg)</li> <li>Cable strand mounting bracket: 1.3 lbs (0.6 kg)</li> </ul>
Connector	<ul style="list-style-type: none"> <li>1552EU/CU: Six female Type N antenna connectors (3 for 2.4-GHz radio, 3 for 5 GHz radio)</li> <li>1552E: Three female Type N antenna connectors (dual band ports for 2.4 and 5 GHz radios)</li> <li>1552E/EU/I: AC power connector-3-pin Remke Mini-Link 50909 connector</li> <li>1552E/EU/I: Internal PoE-in connector (uplink port)-RJ-45 connector</li> <li>1552E/EU: Internal PoE-out connector (downlink port)-RJ-45 connector</li> <li>1552E/EU: Optional internal SFP fiber module- LC fiber connector</li> <li>1552C/CU: Cable connector-Stinger connector (customer supplied)</li> </ul>
Power sources (see Table D-2 and Table D-3 for power distribution budget)	<ul style="list-style-type: none"> <li>90 to 480 VAC, 50 to 60 Hz (models 1552E/EU)</li> <li>110 to 277 VAC, 50 to 60 Hz (model 1552I)</li> <li>40 to 90 VAC, 50 to 60 Hz, quasi-square wave, Power over Cable (POC) (models 1552C/CU)</li> <li>Power over Ethernet (PoE) with power injector: 56 VDC percent (models 1552E/EU)</li> <li>12 VDC</li> </ul>

**Table D-1 Access Point Specifications (continued)**

Category	Specifications
Operating temperature	<p>Access point and power injector</p> <p>-40 to 55°C (-40 to 131°F) plus Solar Loading</p> <p><b>Note</b> Up to a 20-minute start-up time might be necessary when using a cable modem at temperatures of -20°C or less.</p>
Storage temperature	<p>Access point</p> <p>-40 to 185°F (-40 to 85°C)</p> <p>Power injector</p> <p>-58 to 185°F (-50 to 85°C)</p>
Humidity	<p>Access point</p> <p>0 to 100% condensing—access point (operating and nonoperating)</p> <p>Power injector</p> <p>10 to 90% noncondensing—power injector (operating)</p>
Data rates	<p>802.11a: 6, 9, 12, 18, 24, 36, 48, and 54 Mbps</p> <p>802.11g: 1, 2, 5.5, 6, 9, 11, 12, 18, 24, 36, 48, and 54 Mbps</p> <p>802.11n data rates (2.4 GHz and 5 GHz) - refer to <a href="#">Table D-5</a> for data rates</p>
Environmental ratings	<ul style="list-style-type: none"> <li>• IP67</li> <li>• NEMA Type 4X</li> </ul>
Maximum elevation	<p>Operating—Sea level at 131°F (55°C)</p> <p>13,800 ft (4,206 m) at 104°F (40°C)</p> <p>Non-operating—16,000 ft (4,877 m) at -13°F (-25°C)</p>
Wind resistance	<p>Wind resistance:</p> <ul style="list-style-type: none"> <li>• Up to 100 MPH sustained winds</li> <li>• Up to 165 MPH wind gusts</li> </ul>

**Table D-1** Access Point Specifications (continued)


Category	Specifications
RF output power	<p>2.4 GHz</p> <ul style="list-style-type: none"> <li>• 802.11b (CCK) <ul style="list-style-type: none"> <li>– 28 dBm with 2 antennas</li> </ul> </li> <li>• 802.11g (non HT duplicate mode) <ul style="list-style-type: none"> <li>– 28 dBm with 2 antennas</li> </ul> </li> <li>• 802.11n (HT20) <ul style="list-style-type: none"> <li>– 28 dBm with 2 antennas</li> </ul> </li> </ul> <p>5 GHz</p> <ul style="list-style-type: none"> <li>• 802.11a <ul style="list-style-type: none"> <li>– 28 dBm with 2 antennas</li> </ul> </li> <li>• 802.11n non-HT duplicate (802.11a duplicate) mode <ul style="list-style-type: none"> <li>– 28 dBm with 2 antennas</li> </ul> </li> <li>• 802.11n (HT20) <ul style="list-style-type: none"> <li>– 27 dBm with 2 antennas</li> </ul> </li> <li>• 802.11n (HT40) <ul style="list-style-type: none"> <li>– 27 dBm with 2 antennas</li> </ul> </li> </ul> <p> <b>Note</b> Maximum output depends on the regulatory domain in which the access point is installed. For additional information, refer to the <a href="#">Appendix C, “Channels and Power Levels”</a> section.</p>

Table D-1 Access Point Specifications (continued)

Category	Specifications
Frequency Band and 20-MHz Operating Channels	<p data-bbox="375 317 511 344">-A Domain:</p> <ul data-bbox="375 359 808 569" style="list-style-type: none"> <li data-bbox="375 359 808 386">• 2.400 to 2.4835 GHz; 11 channels</li> <li data-bbox="375 401 808 428">• 5.725 to 5.850 GHz; 5 channels</li> <li data-bbox="375 443 808 470">• 5.500 to 5.560 GHz; 5 channels</li> <li data-bbox="375 485 808 512">• 5.680 to 5.700 GHz; 2 channels</li> <li data-bbox="375 527 808 554">• 5.745 to 5.825 GHz; 5 channels</li> </ul> <p data-bbox="375 583 511 611">-C Domain:</p> <ul data-bbox="375 625 808 701" style="list-style-type: none"> <li data-bbox="375 625 808 653">• 2.400 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 667 808 695">• 5.725 to 5.850 GHz; 5 channels</li> </ul> <p data-bbox="375 716 511 743">-E Domain:</p> <ul data-bbox="375 758 808 833" style="list-style-type: none"> <li data-bbox="375 758 808 785">• 2.401 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 800 808 827">• 5.470 to 5.725 GHz; 8 channels</li> </ul> <p data-bbox="375 854 511 882">-K Domain:</p> <ul data-bbox="375 896 808 972" style="list-style-type: none"> <li data-bbox="375 896 808 924">• 2.400 to 2.4835 GHz; 11 channels</li> <li data-bbox="375 938 808 966">• 5.250 to 5.825 GHz; 14 channels</li> </ul> <p data-bbox="375 993 511 1020">-M Domain</p> <ul data-bbox="375 1035 808 1110" style="list-style-type: none"> <li data-bbox="375 1035 808 1062">• 2.400 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 1077 808 1104">• 5.470 to 5.850 GHz; 12 channels</li> </ul> <p data-bbox="375 1131 511 1159">-N Domain:</p> <ul data-bbox="375 1173 808 1249" style="list-style-type: none"> <li data-bbox="375 1173 808 1201">• 2.400 to 2.4835 GHz; 11 channels</li> <li data-bbox="375 1215 808 1243">• 5.725 to 5.850 GHz; 5 channels</li> </ul> <p data-bbox="375 1270 511 1297">-Q Domain:</p> <ul data-bbox="375 1312 808 1388" style="list-style-type: none"> <li data-bbox="375 1312 808 1339">• 2.400 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 1354 808 1381">• 5.470 to 5.725 GHz; 11 channels</li> </ul> <p data-bbox="375 1409 511 1436">-R Domain:</p> <ul data-bbox="375 1451 808 1526" style="list-style-type: none"> <li data-bbox="375 1451 808 1478">• 2.400 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 1493 808 1520">• 5.250 to 5.725 GHz; 11 channels</li> </ul> <p data-bbox="375 1547 511 1575">-S Domain:</p> <ul data-bbox="375 1589 808 1665" style="list-style-type: none"> <li data-bbox="375 1589 808 1617">• 2.400 to 2.4835 GHz; 13 channels</li> <li data-bbox="375 1631 808 1659">• 5.725 to 5.850 GHz; 5 channels</li> </ul> <p data-bbox="375 1686 511 1713">-T Domain:</p> <ul data-bbox="375 1728 808 1803" style="list-style-type: none"> <li data-bbox="375 1728 808 1755">• 2.400 to 2.4835 GHz; 11 channels</li> <li data-bbox="375 1770 808 1797">• 5.470 to 5.850 GHz; 16 channels</li> </ul>

**Table D-1** Access Point Specifications (continued)

Category	Specifications
Immunity	<ul style="list-style-type: none"> <li>• Less than or equal to 5 mJ for 6kV/3kA @ 8/20 ms waveform</li> <li>• ANSI/IEEE C62.41</li> <li>• EN61000 4-5 Level 4 AC Surge Immunity</li> <li>• EN61000 4-4 Level 4 Electrical Fast Transient Burst Immunity</li> <li>• EN61000 4-3 Level 4 EMC Field Immunity</li> <li>• EN61000 4-2 Level 4 ESD Immunity</li> </ul>
Safety	Designed to meet: IEC 60950, 2nd Edition UL 60950, 2nd Edition CAN/CSA-C22.2 No. 60950, 2nd Edition EN 60950, 2nd Edition
Radio approvals	<ul style="list-style-type: none"> <li>• FCC Parts 15.247, 15.407</li> <li>• FCC Bulletin OET-65C</li> <li>• RSS-210</li> <li>• RSS-102</li> <li>• AS/NZS 4268.2003</li> <li>• EN 300 328</li> <li>• EN 301 893</li> </ul>
EMI and susceptibility	<ul style="list-style-type: none"> <li>• FCC Part 15.107, 15.109</li> <li>• ICES-003</li> <li>• EN 301 489-1, -17</li> </ul>

Table D-2 lists the power distribution budget for 1552E access point configurations.

**Table D-2** Power Distribution Budget for the AIR-CAP1552E/EU-x-K9 Access Point Configuration

Element	Nominal Power (Watts)	Absolute Max Power (Watts)
Total power budget when using DC power source	34	43
Total power budget when using AC power source	41	52
<b>Optional components</b>		
802.3af client connected	17	17
Fiber user as backhaul	1	1
Battery backup in charging state (1552E only)	8	8
<b>Total Power Consumption</b>	<b>67</b>	<b>78</b>

Table D-3 lists the power distribution budget for 1552C access point configurations.

**Table D-3 Power Distribution Budget for AIR-CAP1552C/CU-x-K9 Access Point Cable Configuration**

<b>Element</b>	<b>Nominal Power (Watts)</b>	<b>Absolute Max Power (Watts)</b>
Total power budget when using DC power source	42	50
Total power budget when using POC power source	48	58

Table D-4 lists the power distribution budget for 1552I access point configurations.

**Table D-4 Power Distribution Budget for the AIR-CAP1552I-x-K9 Access Point Configuration**

<b>Element</b>	<b>Nominal Power (Watts)</b>	<b>Absolute Max Power (Watts)</b>
Total power budget when using DC power source	34	43
Total power budget when using AC power source	39	49

**Table D-5 802.11n Data Rates (2.4 GHz and 5 GHz)**

MCS Index <sup>1</sup>	GI <sup>2</sup> = 800ns		GI = 400ns	
	20-MHz Rate (Mbps)	40-MHz Rate (Mbps)	20-MHz Rate (Mbps)	40-MHz Rate (Mbps)
0	6.5	13.5	7.2	15
1	13	27	14.4	30
2	19.5	40.5	21.7	45
3	26	54	28.9	60
4	39	81	43.3	90
5	52	108	57.8	120
6	58.5	121.5	65	135
7	65	135	72.2	150
8	13	27	14.4	30
9	26	54	28.9	60
10	39	81	43.3	90
11	52	108	57.8	120
12	78	162	86.7	180
13	104	216	115.6	240
14	117	243	130	270
15	130	270	144.4	300







# APPENDIX **E**

## Access Point Pinouts

This appendix describes the pin signals of the access point Ethernet connectors, and the power injector input and output connectors. [Table E-1](#) describes the pin signals of the access point PoE-out connector.

**Table E-1** Access Point PoE-Out Ethernet Connector Pinouts

Pin Number	Signal Name
1	Ethernet signal pair (10/100/1000BASE-T)
2	
3	Ethernet signal pair (10/100/1000BASE-T)
6	
4	Ethernet signal pair (10/100/1000BASE-T) and 48 VDC (+)
5	
7	Ethernet signal pair (10/100/1000BASE-T) and 48 VDC return
8	
Shield	Chassis ground

[Table E-2](#) describes the pin signals for the access point PoE-in Ethernet connector.

**Table E-2** Access Point PoE-In Ethernet Connector Pinouts

Pin Number	Signal Name
1	Ethernet signal pair (10/100/1000BASE-T) and 56 VDC return
2	
3	Ethernet signal pair (10/100/1000BASE-T) and 56 VDC (+)
6	
4	Ethernet signal pair (1000BASE-T) and 56 VDC (+)
5	
7	Ethernet signal pair (1000BASE-T) and 56 VDC return
8	
Shield	Chassis ground

Table E-3 describes the pin signals for the power injector input connector (To Switch).

**Table E-3 Power Injector Input Connector (To Switch) Pinouts**

Pin Number	Signal Name
1	Ethernet signal pair (10/100/1000BASE-T)
2	
3	Ethernet signal pair 10/100/1000BASE-T)
6	
4	Ethernet signal pair (1000BASE-T)
5	
7	Ethernet signal pair (1000BASE-T)
8	
Shield	Chassis ground

Table E-4 describes the RJ-45 pin signals for the power injector output connector (To AP).

**Table E-4 Power Injector Output Connector (To AP) Pinouts**

Pin Number	Signal Name
1	Ethernet signal pair (10/100/1000BASE-T) and 56 VDC return
2	
3	Ethernet signal pair (10/100/1000BASE-T) and 56 VDC (+)
6	
4	Ethernet signal pair (1000BASE-T) and 56 VDC (+)
5	
7	Ethernet signal pair (1000BASE-T) and 56 VDC return
8	
Shield	Chassis ground



**Note**

The power injector output connector (To AP) only supplies 56 VDC power when the Ethernet cable is connected to the 1550 PoE-in connector.



## APPENDIX **F**

# Configuring DHCP Option 43

---

This appendix describes the steps needed to configure DHCP Option 43 on a DHCP server, such as a Cisco Catalyst 3750 series switch, for use with Cisco Aironet Access Points. This appendix contains these sections:

- [Overview, page F-2](#)
- [Configuring Option 43 for 1000, 1500, and 1550 Series Access Points, page F-3](#)
- [Configuring Option 43 for 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1550 Series Access Points, page F-4](#)

# Overview

This section contains a DHCP Option 43 configuration example on a DHCP server for use with Cisco Aironet Access Points. For other DHCP server implementations, consult DHCP server product documentation for configuring DHCP Option 43. In Option 43, 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, 1500, and 1552 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 access point DHCP Vendor Class Identifier (VCI) string (DHCP Option 60). The VCI strings for Cisco access points that can operate in lightweight mode are listed in [Table F-1](#).

**Table F-1** 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
Cisco Aironet 1300 series	Cisco AP c1300
Cisco Aironet 1500 series	Cisco AP c1500 <sup>1</sup>
	Cisco AP.OAP1500 <sup>2</sup> , Cisco AP.LAP1510 <sup>2</sup> , or Cisco AP.LAP1505 <sup>2</sup>
	Airespace.AP1200 <sup>3</sup>
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 following is the format of the TLV block for 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1552 access points:

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

# Configuring Option 43 for 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 command line interface (CLI).
- Step 2** Create the DHCP pool, including the necessary parameters such as default router and name server. These commands are used to create a DHCP pool:

```
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 for access point using the following syntax:

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

For the VCI string, use the value from [Table F-1](#). 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 1100, 1130, 1200, 1240, 1250, 1300, 1520, and 1550 Series Access Points

To configure DHCP Option 43 for Cisco Aironet 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 F-1](#). 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
```

---



## GLOSSARY

- 802.3af** The IEEE standard that describes a mechanism for Power over Ethernet (PoE). The standard provides the capability to deliver both power and data over standard Ethernet cabling.
- 802.11** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 1- and 2-megabit-per-second (Mb/s) wireless LANs operating in the 2.4-GHz band.
- 802.11a** The IEEE standard that specifies carrier sense media access control and physical layer specifications for wireless LANs operating in the 5-GHz frequency band.
- 802.11b** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 5.5- and 11-Mb/s wireless LANs operating in the 2.4-GHz frequency band.
- 802.11g** The IEEE standard that specifies carrier sense media access control and physical layer specifications for 6, 9, 12, 18, 24, 36, 48, and 54 Mb/s wireless LANs operating in the 2.4-GHz frequency band.
- 802.11n** 802.11n is a specification for wireless LAN (WLAN) communications. In addition to the 802.11 family of standards, 802.11n increases network speed and reliability and extends the operating distance of wireless networks. Raw data throughput is expected to reach as much as 600 Mb/s, or more than 10 times the throughput of 802.11g

---

### A

- access point** A wireless LAN data transceiver that uses radio waves to connect a wired network with wireless stations.
- ad hoc network** A wireless network composed of stations without access points.
- antenna gain** The gain of an antenna is a measure of the antenna ability to direct or focus radio energy over a region of space. High gain antennas have a more focused radiation pattern in a specific direction.
- associated** A station is configured properly to allow it to wirelessly communicate with an access point.
- AWPP** Adaptive Wireless Path Protocol.

---

**B**

- beacon** A wireless LAN packet that signals the availability and presence of the wireless device. Beacon packets are sent by access points and base stations; however, client radio cards send beacons when operating in computer to computer (Ad Hoc) mode.
- BOOTP** Boot Protocol. A protocol used for the static assignment of IP addresses to devices on the network.
- BPSK** Binary phase shift keying is a modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 1 Mb/s.
- broadcast packet** A single data message (packet) sent to all addresses on the same subnet.

---

**C**

- CAPWAP** Control And Provisioning of Wireless Access Points
- CCK** Complementary Code Keying. A modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 5.5 and 11 Mb/s.
- CCKM** Cisco Centralized Key Management. Using CCKM, authenticated client devices can roam from one access point to another without any perceptible delay during reassociation. An access point on your network provides wireless domain services (WDS) and creates a cache of security credentials for CCKM-enabled client devices on the subnet. The WDS access point's cache of credentials dramatically reduces the time required for reassociation when a CCKM-enabled client device roams to a new access point.
- cell** The area of radio range or coverage in which the wireless devices can communicate with the base station. The size of the cell depends upon the speed of the transmission, the type of antenna used, and the physical environment, as well as other factors.
- client** A radio device that uses the services of an access point to communicate wirelessly with other devices on a local area network.
- CSMA** Carrier sense multiple access. A wireless LAN media access method specified by the IEEE 802.11 specification.

---

**D**

- data rates** The range of data transmission rates supported by a device. Data rates are measured in megabits per second (Mb/s).
- dBi** A ratio of decibels to an isotropic antenna that is commonly used to measure antenna gain. The greater the dBi value, the higher the gain, and the more acute the angle of coverage.



<b>DFS</b>	Dynamic Frequency Selection. In some regulatory domains, 5-GHz radios are required to use DFS to avoid interfering with radar signals.
<b>DHCP</b>	Dynamic host configuration protocol. A protocol available with many operating systems that automatically issues IP addresses within a specified range to devices on the network. The device retains the assigned address for a specific administrator-defined period.
<b>domain name</b>	The text name that refers to a grouping of networks or network resources based on organization-type or geography; for example: name.com—commercial; name.edu—educational; name.gov—government; ISPname.net—network provider (such as an ISP); name.ar—Argentina; name.au—Australia; and so on.
<b>DNS</b>	Domain Name System server. A server that translates text names into IP addresses. The server maintains a database of host alphanumeric names and their corresponding IP addresses.
<b>DSSS</b>	Direct sequence spread spectrum. A type of spread spectrum radio transmission that spreads its signal continuously over a wide frequency band.

---

**E**

<b>EAP</b>	Extensible Authentication Protocol. An optional IEEE 802.1x security feature ideal for organizations with a large user base and access to an EAP-enabled Remote Authentication Dial-In User Service (RADIUS) server.
<b>Ethernet</b>	The most widely used wired local area network. Ethernet uses carrier sense multiple access (CSMA) to allow computers to share a network and operates at 10, 100, or 1000 Mb/s, depending on the physical layer used.

---

**F**

<b>file server</b>	A repository for files so that a local area network can share files, mail, and programs.
<b>firmware</b>	Software that is programmed on a memory chip.

---

**G**

<b>gateway</b>	A device that connects two otherwise incompatible networks together.
<b>GHz</b>	Gigahertz. One billion cycles per second. A unit of measure for frequency.

---

**I**

<b>IEEE</b>	Institute of Electrical and Electronic Engineers. A professional society serving electrical engineers through its publications, conferences, and standards development activities. The body responsible for the Ethernet 802.3 and wireless LAN 802.11 specifications.
<b>infrastructure</b>	The wired Ethernet network.
<b>IP address</b>	The Internet Protocol (IP) address of a station.
<b>IP subnet mask</b>	The number used to identify the IP subnetwork, indicating whether the IP address can be recognized on the LAN or if it must be reached through a gateway. This number is expressed in a form similar to an IP address; for example: 255.255.255.0.
<b>isotropic</b>	An antenna that radiates its signal in a spherical pattern.

---

**M**

<b>MAC address</b>	Media Access Control address. A unique 48-bit number used in Ethernet data packets to identify an Ethernet device, such as an access point or your client adapter.
<b>MAP</b>	Mesh Access Point
<b>MBSSID</b>	Multiple basic SSID. Each multiple basic SSID is assigned a unique MAC address. You use multiple BSSIDs to assign a unique DTIM setting for each SSID and to broadcast SSIDs in beacons (one SSID per beacon).
<b>MIMO</b>	Multiple Input/Multiple Output
<b>modulation</b>	Any of several techniques for combining user information with a transmitter for a carrier signal.
<b>multipath</b>	The echoes created as a radio signal bounces off of physical objects.
<b>multicast packet</b>	A single data message (packet) sent to multiple addresses.

---

**O**

<b>omni-directional</b>	This typically refers to a primarily circular antenna radiation pattern.
<b>OFDM</b>	Orthogonal frequency division multiplex is a modulation technique used by IEEE 802.11a-compliant wireless LANs for transmission at 6, 9, 12, 18, 24, 36, 48, and 54 Mb/s.

---

**P**

**packet** A basic message unit for communication across a network. A packet usually includes routing information, data, and sometimes error detection information.

---

**Q****QPSK**

Quadruple phase shift keying is a modulation technique used by IEEE 802.11b-compliant wireless LANs for transmission at 2 Mb/s.

---

**R**

**range** A linear measure of the distance that a transmitter can send a signal.

**RAP** Root Access Point

**receiver sensitivity** A measurement of the weakest signal a receiver can receive and still correctly translate it into data.

**RF** Radio frequency. A generic term for radio-based technology.

**roaming** A feature of some access points that allows users to move through a facility while maintaining an unbroken connection to the LAN.

**RP-TNC** A connector type unique to Cisco Aironet radios and antennas. Part 15.203 of the FCC rules covering spread spectrum devices limits the types of antennas that may be used with transmission equipment. In compliance with this rule, Cisco Aironet, like all other wireless LAN providers, equips its radios and antennas with a unique connector to prevent attachment of non-approved antennas to radios.

---

**S**

**spread spectrum** A radio transmission technology that spreads the user information over a much wider bandwidth than otherwise required in order to gain benefits such as improved interference tolerance and unlicensed operation.

**SSID** Service set identifier (also referred to as Radio Network Name). A unique identifier used to identify a radio network and which stations must use to be able to communicate with each other or to an access point. The SSID can be any alphanumeric entry up to a maximum of 32 characters.

---

**T**

**transmit power** The power level of radio transmission.

---

**U**

**UNII** Unlicensed National Information Infrastructure—regulations for UNII devices operating in the 5.15 to 5.35 GHz and 5.725 to 5.825 GHz frequency bands.

**UNII-1** Regulations for UNII devices operating in the 5.15 to 5.25 GHz frequency band.

**UNII-2** Regulations for UNII devices operating in the 5.25 to 5.35 GHz frequency band.

**UNII-3** Regulations for UNII devices operating in the 5.725 to 5.825 GHz frequency band.

**unicast packet** A single data message (packet) sent to a specific IP address.

---

**W**

**WDS** Wireless Domain Services. An access point providing WDS on your wireless LAN maintains a cache of credentials for CCKM-capable client devices on your wireless LAN. When a CCKM-capable client roams from one access point to another, the WDS access point forwards the client's credentials to the new access point with the multicast key. Only two packets pass between the client and the new access point, greatly shortening the reassociation time.

**WEP** Wired Equivalent Privacy. An optional security mechanism defined within the 802.11 standard designed to make the link integrity of wireless devices equal to that of a cable.

**WLSE** Wireless LAN Solutions Engine. The WLSE is a specialized appliance for managing Cisco Aironet wireless LAN infrastructures. It centrally identifies and configures access points in customer-defined groups and reports on throughput and client associations. WLSE's centralized management capabilities are further enhanced with an integrated template-based configuration tool for added configuration ease and improved productivity.

**WNM** Wireless Network Manager.

**workstation** A computing device with an installed client adapter.

**WPA** Wi-Fi Protected Access is a standards-based, interoperable security enhancement that strongly increases the level of data protection and access control for existing and future wireless LAN systems. It is derived from and will be forward-compatible with the upcoming IEEE 802.11i standard. WPA leverages TKIP (Temporal Key Integrity Protocol) for data protection and 802.1X for authenticated key management.

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