C H A P T E R 2

Before You Begin

This chapter describes what steps you need to take before beginning the installation of your Access Point and contains the following sections:

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" section on page 2-30 are included in the shipment. If any item is damaged or missing, notify your sales representative.

Package Contents

The typical access point package contains the following items:

- Access point
- Cisco product documentation and translated safety warnings
- 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)

Note These cable glands are **NOT** hazardous locations/Ex certified.

Tools and Hardware

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

- Optional Tools and Hardware, page 2-30
- Optional Tools and Hardware That You Supply, page 2-31
- Pole Installation Hardware and Tools, page 2-31

Optional Tools and Hardware

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

- Optional power injector (AIR-PWRINJ1500-2=)

Caution Caution: Power injector (AIR-PWRINJ1500-2=) is not certified for installation within hazardous locations environments.

- Antennas, 2.4/5 GHz (refer to the "Antenna Configurations" section on page 1-15)

- Optional pole mount kit (AIR-ACCPMK1550=, AIR-ACCPMK1550HZM=)
- Optional banding strap tool (BAND IT) (AIR-BAND-INST-TL=)

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
- Torque Wrench (ft-lbs)
- 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 (.0.51 to 0.89 cm) diameter
- 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=, AIR-ACCPMK1550HZM=)
    - 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

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** **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

⚠ **Caution** 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

⚠ **Caution** 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 adapter.

⚠ **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   **Explosion Hazard—The area must be known to be nonhazardous before installing, servicing, or replacing the unit.** Statement 1082

Warning   **In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 7.9 inches (20 cm) or more from the body of all persons.** 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   **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**   **When using a DC input voltage source, observe this warning statement:**
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 power from the power source using
a suitable service disconnect.

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:

```
txpwr + tx gain + rx gain - [attenuation due to antenna spacing] < 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:

```
txpwr - [attenuation due to coaxial components] < 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.

Additional Considerations for Hazardous Locations

This section describes special considerations for preparing the 1552H, 1552SA/1552SD and 1552WU access points for installation in Class I, Division 2/Zone 2 hazardous locations.

Note This document does not provide specific procedures for installing conduit. You must ensure that your installation techniques and procedures comply with Class I, Division 2/Zone 2 hazardous location installation regulations for your geographic location.

The access point hazardous location option complies with safety standards for Class I, Division 2/Zone 2 hazardous locations where ignitable concentrations of flammable gases, vapors, or liquids are not likely to exist under normal operation conditions.

When you select the hazardous location option as part of the ordering process, Cisco configures the system to contain the new components. Assembly instructions placed in the shipping box provide information and assembly procedures. The hazardous location option configures the access point as follows:

- Do not install a battery in a Hazardous Location environment. Battery packs are not approved for Hazardous Locations.

- The AC power connections are moved to the inside of the access point by installing an AC entry board containing a terminal block. To comply with hazardous location requirements, AC power must be installed through rigid metal conduit to the terminal block.

⚠
Caution   The electrical rating for hazardous location installations has a lower voltage rating (100-240 VAC, 50/60 Hz, 1A) than a non-hazardous location installation (100-480 VAC).

⚠
Caution   Do not use 12 VDC input connection in hazardous locations.

⚠
Caution   Caution: Power injector (AIR-PWRINJ1500-2=) is not certified for installation within hazardous locations environments.

Warnings

⚠
Warning   **Do not disconnect connections to this equipment unless power has been removed or you have verified that the area is nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product. Substitution of components may impair suitability for Class I, Zone 2, Division 2.** Statement 1062

⚠
Warning   **When used in a Class I, Zone 2, Division 2 hazardous location, this equipment must be mounted with a proper wiring method that complies with the governing electrical codes.** Statement 1069

⚠
Warning   **If you connect or disconnect the console cable with power applied to the unit or any device on the network, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.**

To verify unit operation, perform POST on the device in a nonhazardous location before installation. Statement 1080

Warning   **In switch installations in a hazardous location, the DC power source could be located away from the vicinity of the switch. Before performing any of the following procedures, locate the DC circuit to ensure that the power is removed and cannot be turned on accidentally, or verify that the area is nonhazardous before proceeding.** Statement 1059

Warning   **Do not connect or disconnect cables to the ports while power is applied to the switch or any device on the network because an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed from the switch and cannot be accidentally be turned on, or verify that the area is nonhazardous before proceeding.** Statement 1070

Compliance

The 1552H, 1552SA/1552SD, and 1552WU access points comply with the following versions of hazardous location certifications:

- IEC 60079-0 Edition 6.0
- IEC 60079-15 Edition 4.0
- CAN/CSA E60079-0: 11
- CAN/CSA E60079-15: 12
- UL 60079-0: Edition 6
- UL 60079-15: Edition 4
- EN 60079-0: 2012
- EN 60079-15: 2010

Table 2-1 interprets the information on the compliance labels.

Table 2-1   Interpreting the Hazardous Compliance Label

Label Text	Description
Class I, Division 2, Groups A, B, C, D	Defines the environment in which the access point can be used: • Class I—Environment containing flammable gases, vapors, or liquids • Division 2—Environmental classification used by the U.S. and Canada • Groups A, B, C, D—Gas identification for the U.S. and Canada: – A—Acetylene – B—Hydrogen – C—Ethylene – D—Propane
Class I, Zone 2, Group II	Defines the environment in which the access point can be used: • Class I—Environment containing flammable gases, vapors, or liquids • Zone 2—Environment classification used in North America • Group II—Gas identification for Zone II, which includes: – IIa—Propane – IIb—Ethylene – IIc—Acetylene & Hydrogen

Table 2-1   Interpreting the Hazardous Compliance Label (continued)

Label Text	Description
Ex nA II T5	Defines parameters that the product complies with for U.S. Certification: • Ex —Denotes explosive atmosphere • nA —Non-sparking • II = Group II as defined previously • T5 = Temperature code < 100 degrees C, maximum surface temperature
CSA Certificate 1945576	Identifies the Canadian Standards Association (CSA) certificate number.
SIRA 11ATEX4253	Identifies Sira ATEX certificate number.
-40 ≤ Ta < +55C	The operating temperature range for the access point in all countries. **Note** Current safety certifications only include operation of this outdoor equipment down to -40C.
Type 4, IP67	Defines the enclosure degree of protection (Type 4 = indoor or outdoor use primarily to provide a degree of protection against windblown dust and rain, splashing water, hose-directed water, and damage from external ice formation. IP67 = Dust tight (dust, dirt, sand, and so forth) and protected against powerful water jets. Also, the unit can be immersed in water up to 1m for short periods of time (30min).

KOSHA Certificate Information (for Korean hazardous locations)

add in statements here when available

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*.

• 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.

• 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. Cisco recommends 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.
- Applications and type of devices to be used on the WLAN.

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 Appendix F, "Configuring DHCP Option 43").
- Become familiar with the access point installation components (see the "Becoming Familiar with Access Point Installation Components" section on page 2-41).

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)

✎ **Note** The illustrations in this document show all available connections for the access point. Unused connections must be 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.

⚠ **Caution** The liquid-tight adapter(s) supplied in the kit are IP68/69 certified with .200 to .350 diameter cables but not ATEX certified or hazardous locations compliant. The installer must use cable glands appropriate to the installation.

Figure 2-1   Components in a Typical Access Point Installation
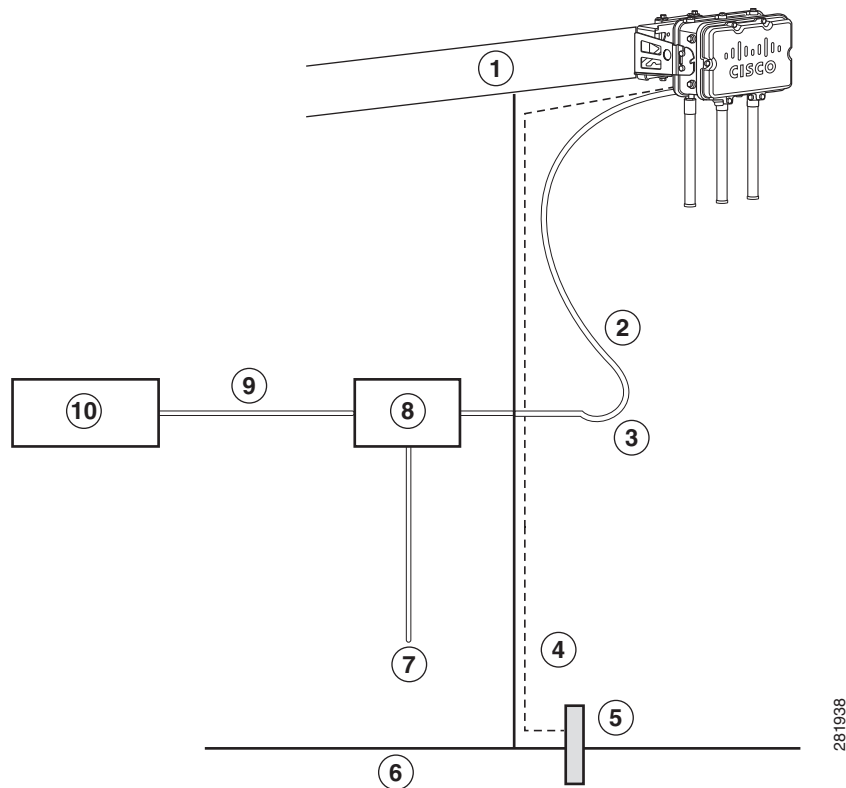
1	Building roof-overhang	6	Ground
2	Shielded outdoor-rated Ethernet (CAT5e or better) cable[1]	7	AC power cord[2]
3	Water drip loop	8	Power injector[3]
4	6-AWG copper grounding wire[1]	9	Shielded Ethernet (CAT5e or better) cable[1]
5	Ground rod[1]	10	Controller (through a switch)

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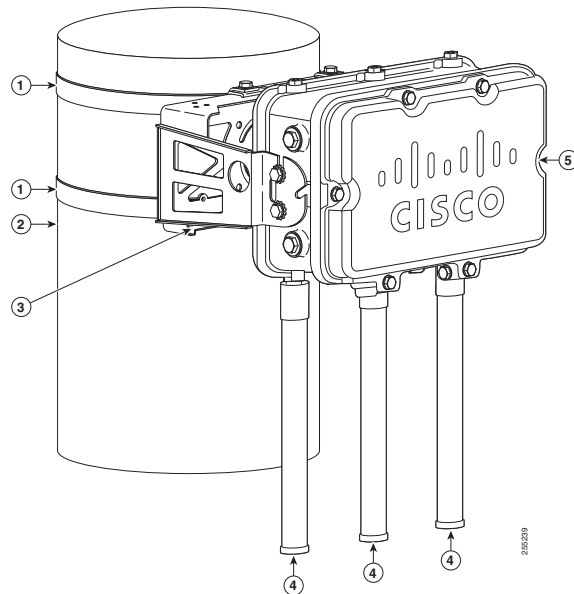
1	Stainless steel mounting straps (part of pole mount kit)	4	Cisco Aironet Dual-Band Omnidirectional Antennas. The dual-band antenna covers both the 2.4 GHz and 5 GHz bands.
2	Pole (wood, metal, or fiberglass) 2 to 16 in. (5.1 to 40.6 cm) diameter	5	1552 series access point
3	Mounting bracket (part of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

Antenna N-Type Connector Locations

The access point antenna N-type connectors are located on the bottom of models AIR-CAP1552H-*x*-K9 and on the top and bottom of model AIR-CAP1552SA/SD/WU-*x*-K9. The N-type connectors support the Cisco Aironet Antennas listed in Antenna Configurations, page 1-15. Figure 1-7 and Figure 1-8 show the antenna port locations viewed from the RF cover side. The supported antennas can be directly attached to the access point or remotely located. When used in a Class 1, Zone 2, Division 2 hazardous location, this equipment must be mounted with proper RF cables (if required) and electrical wiring methods that comply with the governing electrical codes.

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.