

27 1553 – Wireless Communications

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. UNM Cirt, University Hospitals or UNM Telecommunications must approve the installation of all wireless hardware before placement. This includes approval of data and telecommunications equipment utilizing specified radio frequencies. University Hospitals Clinical Engineering must approve all RF devices in UNMH. Please refer to the “Standard on the Deployment and Use of Wireless Internet Technologies at the University of New Mexico” document for specific technological guidelines.
- B. All wireless Access Points connected to or making use of UNM or UNM Hospitals’ network infrastructure should be registered with the respective Information Technology Department. Such registrations should indicate whether the device is a telecommunications device, wireless access point, or bridge.
- C. All access points should operate in 802.11 "infrastructure" mode.
- D. Channel/frequency allocation on wireless access points and devices should be done so as to minimize interference with other wireless services on campus. In general, devices with the ability to automatically select the best channel should be configured to use this feature. However, it may be necessary to consult with the Information Technology Department to determine what channels are available in a particular area.
- E. Wireless devices should be configured to make use of the minimum possible radio transmission power in order to achieve their objective and coverage area.
- F. All wireless access points used on campus should conform to a set of minimum specifications as published from time to time by the Information Technology Department. These specifications are intended to maintain the security and interoperability of wireless devices on campus.
- G. The respective Director(s) of Information Technology must approve any exceptions to the general provisions set out above.

- H. For UNMH approval by the Clinical engineering department is required for use of RF systems. B/G and A bands are allowed, any others will need to be approved to ensure no interference with medical systems.

1.02 RELATED SECTIONS

- A. Sections on Cat 5e/6 cabling
 - Cable Trays
 - Surface Raceways
 - Any others that are Applicable

PART 2 – PRODUCTS

2.01 WIRELESS ACCESS POINTS

- A. General: The products specified herein reflect the minimum acceptable standards of fabrication and manufacture. All materials supplied by the Contractor and specified herein are to be new unused, of first quality and in original packaging or shipping containers. The respective IT department for which the work is being done must approve any exceptions.
- B. New buildings and renovations will be treated differently than existing buildings. Special cases will be reviewed and approved by the respective IT department or Telecommunications representative.

2.02 RECOMMENDED WIRELESS ACCESS POINTS

- A. General: The University of New Mexico has currently standardized on Cisco products and/or solutions for providing wireless LAN access. This section outlines those products and/or solutions.
- B. The Cisco Aironet 1000 or 1200 Series Access Point is a single band lightweight or autonomous access point with dual diversity antenna connectors for challenging RF environments. It offers the same versatility, high capacity, security, and enterprise-class features demanded by industrial wireless LAN customers.

- C. The Cisco Aironet 1300 Series Outdoor Access Point/Bridge (hereafter called the *access point/bridge*) is a wireless device designed for building-to-building wireless connectivity. Operating in the 2.4-GHz band (2.400 to 2.497 GHz), using the IEEE 802.11g standard, the access point/bridge delivers 1 to 54 Mbps data rates without the need for a license. The access point/bridge is a self-contained unit designed for indoor or outdoor installations, providing differing antenna gains as well as coverage patterns. It supports point-to-point and multipoint bridging configurations.

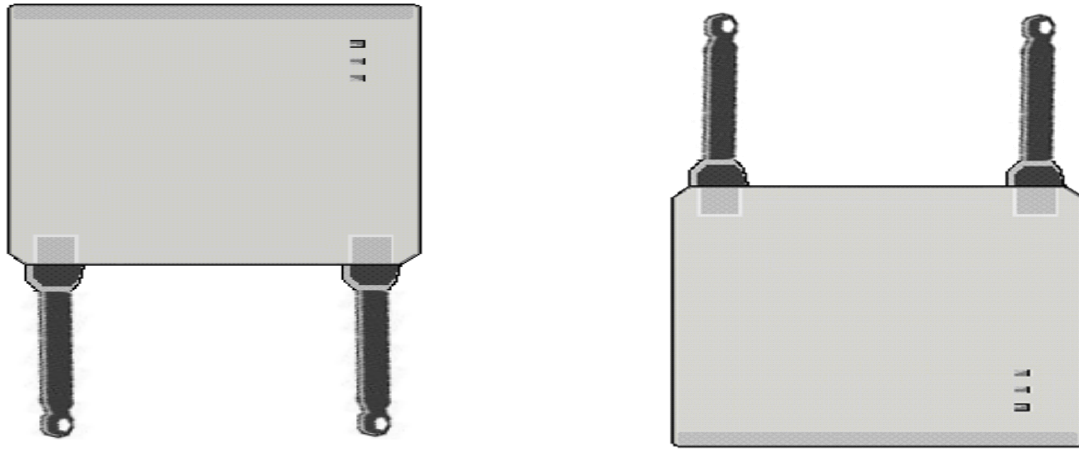
PART 3 – EXECUTION

3.01 GENERAL REQUIREMENTS

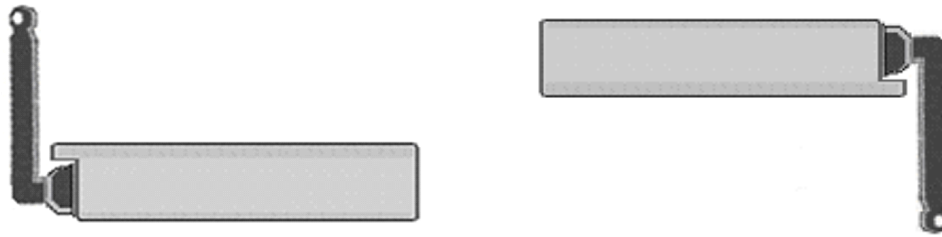
- A. The intention of this wireless specification guideline is to develop a set of standards for the deployment of wireless devices on campus. These standards will continue to evolve as the Wireless LAN products and standards evolve. This document will be updated periodically.
- B. Installation of new wireless devices shall not interfere with existing services in such a way that services are interrupted, not available, or not in compliance with University policies and standards.

3.02 CISCO 1200 SERIES ACCESS POINT INSTALLATION REQUIREMENTS

- A. Mount the Access Point on its slide bracket as shown with the antennas pointing downward, and just above the ceiling tiles.
- B. It must be mounted at least several feet from any large metal items such as air ducts or fluorescent light fixtures.
- C. For all installations Access Points should be mounted away from any machinery that generates a heavy magnetic field (for specific equipment and direction contact the Hospital Information Technology Department)



- D. Connect a Cat5e patch cable from the Ethernet (yellow) port-to-port 1 of the network biscuit, and another from the console (blue) port-to-port 2 of the network biscuit.
- E. If the UNM Information Technology Department or the UNM Hospital Information Technology Department supplies an external antenna instead of the usual "rubber duck" type shown above, and it has two coaxial leads, one should go to each antenna connector on the AP. However, if an external antenna is used that has only one coaxial lead, it must go to the Right/Primary connector; the Left connector isn't used.
- F. In situations where UNM Information Technology Department or the UNM Hospital Information Technology Department calls for installation horizontally, as on a ceiling, the access point should be mounted on its slide bracket as shown. Rotate the antennas downward or upward depending on space limitations. Many types of antennas may be used with the Access Points. In cases where other types of antennas are being used, always refer to the manufacturer installations guidelines.



- G. If ANY questions or issues arise during building installation, contact the UNM Information Technology Department or the UNM Hospital Information Technology Department network group for clarification.

3.03 CISCO 1200 SERIES WIRELESS ACCESS POINT MOUNTING INSTRUCTIONS

- A. This appendix provides instructions for mounting the access point to suspended ceilings, vertical surfaces, or horizontal surfaces using the access point mounting-bracket. Installation may vary slightly based on Access Point Model. It may not be possible to use the recommended fasteners in this document due to manufacturer variations. When in doubt always use the manufacturer recommendations. However, these guidelines should be followed as closely as possible, particularly pertaining to Suspended Ceilings.

The following sections are included in this chapter:

- Overview
- Mounting on a Horizontal or Vertical Surface
- Mounting Below a Suspended Ceiling
- Mounting Above a Suspended Ceiling
- Attaching the Access Point to the Mounting Bracket
- Securing the Access Point to the Mounting Bracket

Overview

You can mount the access point on any of the following surfaces:

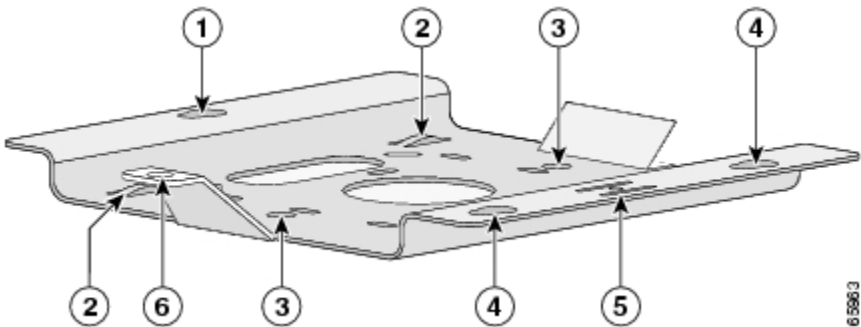
- Horizontal or vertical flat surfaces, such as walls or ceilings
- Suspended ceilings

The access point ships with a detachable mounting bracket and the necessary mounting hardware. Because it is detachable, 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 bracket and attach the access point when you are ready.

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Refer to Figure 3-1 to locate the various mounting holes for the method you intend to use.

Figure 3-1 Mounting Bracket



1	Access point mount	5	Locking detent
2	Cable tie points	6	Wall cable access
3	Ceiling mount holes	7	Suspended ceiling cable access
4	Access point mounts	8	Security hasp



Note The Cisco Aironet 1200 Series Access Point provides adequate fire resistance and low smoke-producing characteristics suitable for operation in a building's environmental air space (such as above suspended ceilings) in accordance with Section 300-22(C) of the National Electrical Code (NEC).



Caution Only the fiber-optic power injector (AIR-PWRINJ-FIB) has been tested to UL 2043 for operation in a building's environmental air space; no other power injectors or power modules have been tested to UL 2043 and they should not be placed in a building's environmental air space, such as above suspended ceilings.



Note If you plan to mount the access point in environmental air space and will upgrade to a 5-GHz radio, Cisco recommends that you mount the access point horizontally with its antennas pointing down. Doing so will result in the access point complying with regulatory requirements for environmental air space after the 5-GHz radio is installed.



Note When mounting the access point in a building's environmental air space, you must use Ethernet cable suitable for operation in environmental air space in accordance with Section 300-22(C) of the National Electrical Code (NEC).

A mounting hardware kit is provided that contains the hardware and fasteners necessary to mount the access point. Refer to the Table 3-1 to identify the materials you need to mount your access point, and then go to the section containing the specific mounting procedure.

Table 3-1 Material Needed to Mount Access Point		
Mounting Method	Materials Required	In Kit
Horizontal or vertical surface	Four #8 x 1 in. (25.4 mm) screws	Yes
	Four wall anchors	Yes
	3/16 in. (4.7 mm) or 3/32 in. (2.3 mm) drill bit	No
	Drill	No
	Standard screwdriver	No
Suspended ceiling	Two T-rail clips with studs	Yes
	Two plastic spacers	Yes
	Two 1/4-20 Keps nuts with built-in washers	Yes
	Standard screwdriver	No
	Appropriate wrench or pliers	No

Mounting on a Horizontal or Vertical Surface

Follow these steps to mount the access point on a horizontal or vertical surface.

Step 1 Use the mounting bracket as a template to mark the locations of the four mounting holes.

Step 2 Drill one of the following sized holes at the locations you marked:

- 3/16 in. (4.7 mm) if you are using wall anchors
- 1/8 in. (6.3 mm) if you are not using wall anchors

Step 3 Install the anchors into the wall if you are using them. Otherwise, go to Step 4.

Step 4 Secure the mounting bracket to the surface using the #8 fasteners.



Note On a vertical surface, mount the bracket with its security hasp facing down.

Step 5 Attach the access point to the mounting bracket.



Note You can make your installation more secure by mounting it to a stud or major structural member and using the appropriate fasteners.

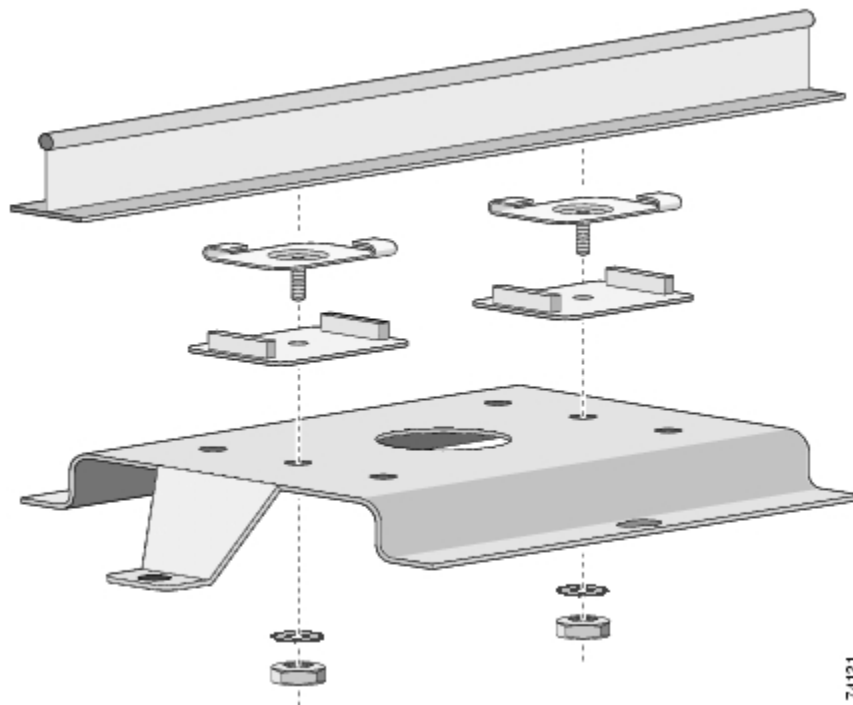
Mounting Below a Suspended Ceiling



Note To comply with NEC code, a #10-24 grounding lug is provided on the mounting bracket.

You should review Figure 3-2 before beginning the mounting process.

Figure 3-2 Mounting Bracket Parts



1	Suspended ceiling T-rail	4	Mounting bracket
2	T-rail clips	5	Keps nut (contains an attached lock washer)
3	Plastic spacer		

Follow these steps to mount your access point on a suspended ceiling:

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- Step 1** Decide where you want to mount the access point.
- Step 2** Attach two T-rail clips to the suspended ceiling T-rail.
- Step 3** Use the mounting bracket to adjust the distance between the T-rail clips so that they align with the holes in the mounting bracket.
- Step 4** Use a standard screwdriver to tighten the T-rail clip studs in place on the suspended ceiling T-rail. Do not over tighten.
- Step 5** Install a plastic spacer on each T-rail clip stud. The spacer's legs should contact the suspended ceiling T-rail.
- Step 6** Attach the mounting bracket to the T-rail clip studs and start a Keps nut on each stud.
- Step 7** Use a wrench or pliers to tighten the Keps nuts. Do not over tighten.
- Step 8** Attach the access point to the mounting bracket.
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Mounting Above a Suspended Ceiling

The access point mounting-bracket is designed to be integrated into the T-bar grid above the tiles of a suspended ceiling. Using a T-bar box hanger and bracket mounting clip (not supplied) such as the Erico 512A and BHC, you orient the access point antenna just above the top surface of a standard ceiling tile. You may need to modify a thicker tile to allow room for the antenna.

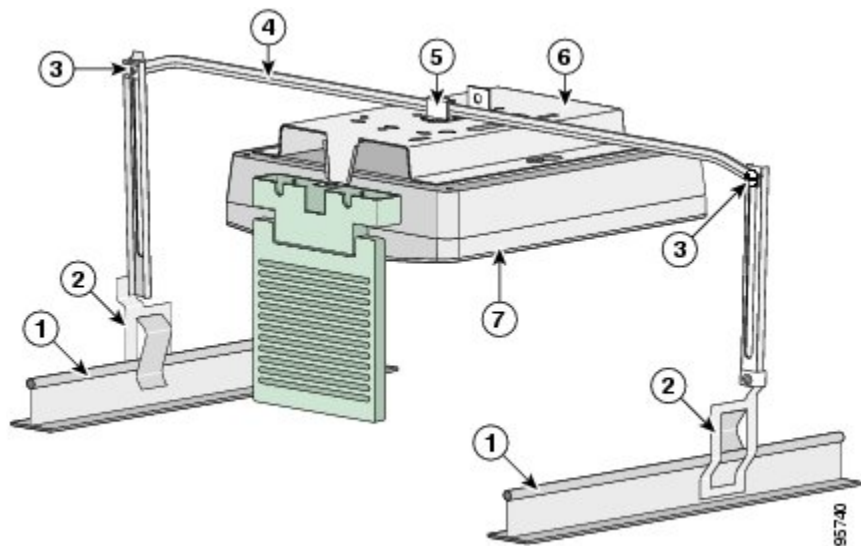


Caution Only the fiber-optic power injector (AIR-PWRINJ-FIB) has been tested to UL 2043 for operation in a building's environmental air space; no other power injectors or power modules have been tested to UL 2043 and they should not be placed in a building's environmental air space, such as above suspended ceilings.

It may be helpful to refer to Figure 3-3 before proceeding.

Figure 3-3 Mounting Bracket Parts

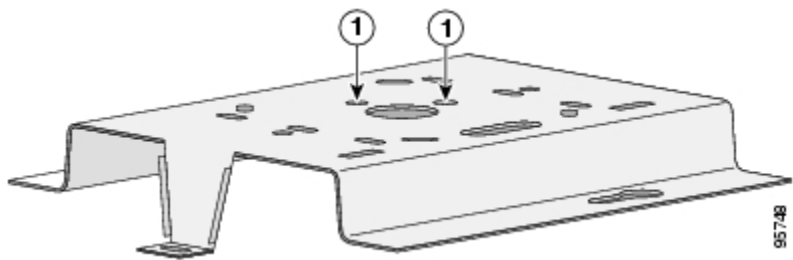
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1	Suspended ceiling T-rail	5	Bracket mounting clip
2	T-rail clip	6	Access point mounting bracket
3	Height adjustment screw	7	Access point
4	T-bar box hanger		

The bracket-mounting clip requires the use of an access point mounting-bracket (700-13520-03) with two extra holes (see Figure 3-4).

Figure 3-4 Mounting Bracket Holes



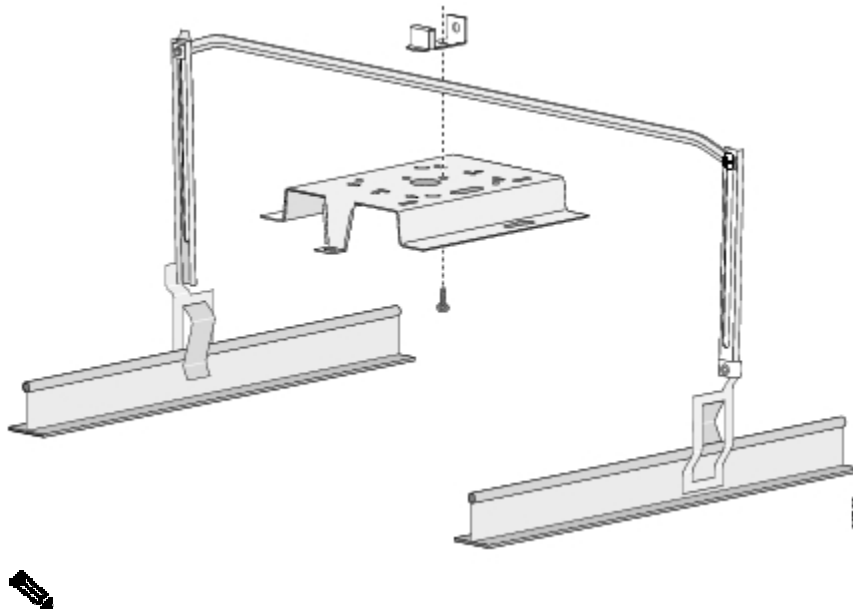
1	Extra holes	
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Follow these steps to mount the access point above a suspended ceiling.

Step 1 Insert the bracket mounting clip's tab into the large hole on the access point mounting-bracket.

Step 2 Place the clip over the T-bar box hanger and secure it to the access point mounting-bracket (see Figure 3-5) with the 1/4-20 fastener (supplied with the T-bar hanger).

Figure 3-5 Access Point Mounting Bracket



Note The illustration shows the access point mounting-bracket mounted perpendicular to the T-bar box hanger. You can also mount the bracket parallel to the T-bar box hanger.

Step 3 Determine the location in the ceiling where you will mount the access point and remove an adjacent ceiling tile.

Step 4 Orient the access point 2-GHz antennas so that they are pointing down when mounted on the T-bar Box hanger. Orient the 5-GHz antenna for patch or omnidirectional operation as desired.

Step 5 Adjust the height of the T-bar box hanger to provide antenna clearance above the ceiling tile using the height adjusting screws (refer to Figure 3-3).

Step 6 Attach the T-rail clips on each end of the T-bar box hanger to the ceiling grid T-rails. Make sure the clips are securely attached to the T-rails.

Step 7 Connect a drop wire to a building structural element and through the hole provided in the bracket mounting clip. This additional support is required in order to comply with the U.S. National Electrical Safety Code.

Step 8 Attach the access point to the access point mounting bracket (refer to the "Attaching the Access Point to the Mounting Bracket" section).

Step 9 Connect the Ethernet cables to the access point.

Step 10 If you need additional security, you can secure the access point to a nearby immovable object using a Kensington lock and security cable.

Step 11 Verify that the access point is operating before replacing the ceiling tile.

Attaching the Access Point to the Mounting Bracket

Follow these steps to attach the access point to the mounting bracket:

Step 1 Line up the three mounting pins on the access point with the large ends of the keyhole-shaped holes on the mounting bracket.

Step 2 Insert the access point into the keyhole shaped holes and maintain a slight pressure to hold it in place.

Step 3 Slide the access point's mounting pins into the small ends of the keyhole-shaped holes on the mounting bracket and push the connector end of the access point. You will hear a click when the locking detent contacts the access point and locks it into place.

Step 4 Attach and adjust the antenna(s) or antenna cables.

Step 5 Connect the Ethernet cable to the access point's Ethernet port.

Step 6 If using local power, insert the 1200 series power module cable connector into the access point's 48-VDC power port.

Securing the Access Point to the Mounting Bracket

The security hasp on the mounting bracket enables you to lock the access point to the bracket to make it more secure. When the access point is properly installed on the mounting bracket, the holes in the security hasps line up so you can install a padlock.

3.04 CISCO 1000 SERIES WIRELESS ACCESS POINT MOUNTING INSTRUCTIONS

- A. The following procedures are designed to ensure that the 1000 series access point installation goes as expected.

Preparing Mounting Locations

On your map, you should have the access point locations, mounting options, and power options.

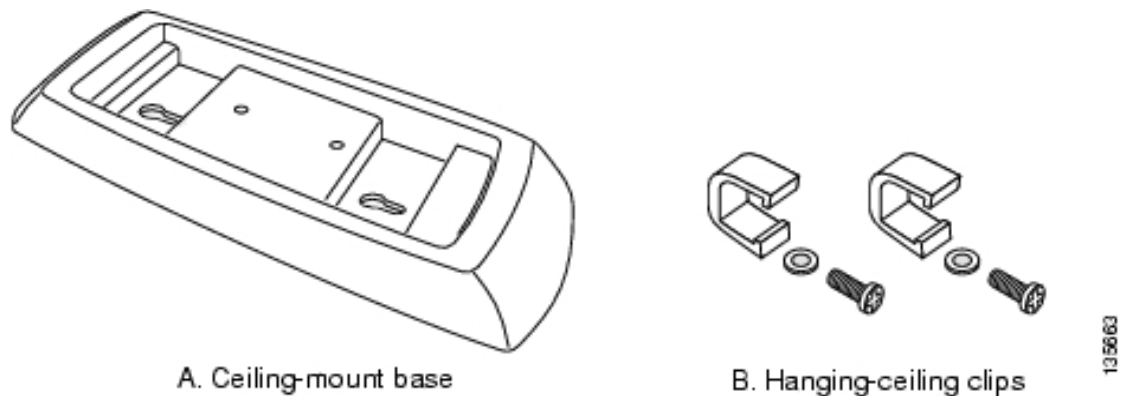


Note Be sure that plenum-mounted access points use only the metal projection-mount and flush-mount brackets (not the ceiling-mount base or the hanging-ceiling clips) and are powered using PoE to comply with safety regulations.

Step 1 Find the required mounting locations and prepare them in one of these ways:

- Use the ceiling-mount base to mark the wall or ceiling locations for sheet metal, drywall, or other screws. Be sure you leave enough space around the access point and base to plug the CAT-5 cable, optional power supply cable, and optional Kensington MicroSaver Security Cable into the sides of the access point.

Figure 2 Factory-Supplied Mounting Options

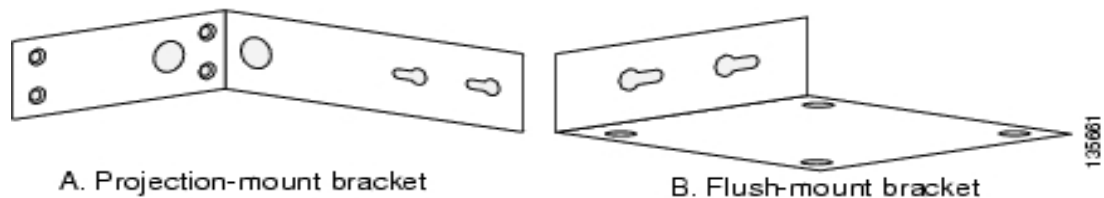


Step 2 Attach the hanging ceiling clips to the access point. Be sure you leave enough space around the access point to plug the CAT-5 cable, optional power supply cable, and optional Kensington MicroSaver Security Cable into the sides of the access point.

Step 3 Use the optional mounting bases and/or brackets to mark the wall or ceiling locations for sheet metal, drywall, or other screws. Be sure you leave enough space around the access point and brackets to plug the CAT-5 cable,

optional power supply cable, and optional Kensington MicroSaver Security Cable into the sides of the access point.

Figure 3 Factory-Orderable Mounting Brackets



Step 4 If necessary, drill holes for the various cables where they can be mostly hidden from casual view. When you are mounting the access point using an optional separately orderable projection-mount L-bracket (the one with two long legs), the cables can be routed through the 5/8-inch (15.9 mm) holes in the bracket.

Step 5 Route the CAT-5, optional power supply and optional Kensington MicroSaver Security cables to where they can plug into the access point. Be sure to leave about 6 inches (15 cm) of slack in the cables for future modifications.

Step 6 Attach the brackets to the wall or ceiling, or install screws for ceiling-mount base:

- Where you are going to use the projection-mount or flush-mount bracket, use customer-supplied sheet metal, drywall, or other screws to attach the bracket to the ceiling or wall.
- Where you are going to use the ceiling-mount base, install customer-supplied sheet metal, drywall, or other screws with 1/4 inch (6.35 mm) or smaller heads protruding from the ceiling about 0.1 inch (2.5 mm).

You are now ready to install the access point.

Mounting the Access Points

Using the supplied or optional orderable access point mounting kits, mount each access point in its indicated location, oriented as shown on the map. Note that you can mount the access point in the ceiling plenum or below the ceiling, but that they perform best when mounted below the ceiling.

Note that the access point supports Antenna Sectorization, which can be used to increase the number of clients and client throughput in a given air space. Installers can mount two APs back-to-back and the Network operator can disable the second antenna in both APs to create a 360-degree coverage area with two sectors.

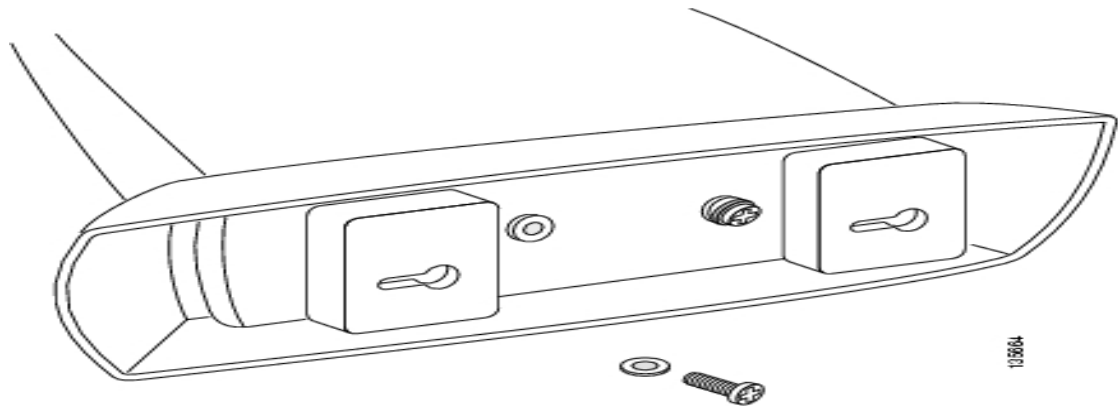
The APs can be mounted in any one of the following configurations:

- Ceiling Mount Base
- Ceiling-Mount Clips
- Projection Wall Mount
- Flush Wall Mount
- Ceiling-Mount Bezel -- Refer to the *Quick Start Guide: Ceiling Mount Bezels for Cisco Aironet 1000 Series Lightweight Access Points*.

Ceiling Mount Base

When you are mounting the access point in the middle of a ceiling (flat sides toward the room or hallway), use the ceiling-mount base to mount the access point as shown in the following figure and as described below:

Figure 4 Attaching the access point and Ceiling-Mount Base



Step 1 Attach the ceiling-mount base to the bottom of the access point using the factory-supplied machine screws and washers.

Step 2 Position the ceiling-mount base so its keyhole slots are partly on the drywall, sheet metal, or other screw heads installed in "Preparing Mounting Locations."



Note If the screws do not securely hold the ceiling-mount base, remove the access point and adjust the screws until they hold the ceiling-mount base securely.

Step 3 Attach the cables to the sides of the access point.



Note When the access point is powered up and is associated with a Cisco Wireless LAN Controller (Green/Power and Yellow/802.11b/g and/or Yellow or Amber/802.11a LEDs lit), the access point is broadcasting its beacon signal(s). When this happens, complete the installation as quickly as possible to remove yourself from within 8 inches (20 cm) of the access point to comply with FCC RF radiation exposure guidelines.

Step 4 Slide the ceiling-mount base onto the drywall, sheet metal, or other screw heads until it fits snugly in place.

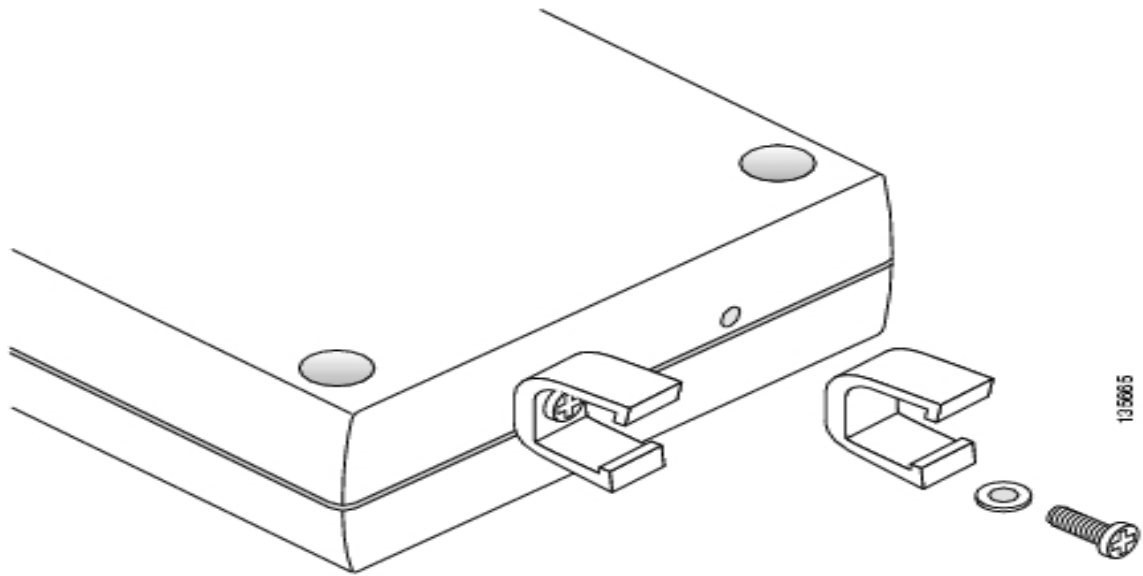
You have installed the access point. Repeat, " Mounting the Access Points" for each access point location, and then continue with " Returning MAC Information."

Ceiling-Mount Clips

When you are mounting the access point on the extruded aluminum rails of a hanging ceiling, use the ceiling-mount clips to mount the access point as shown in the following figure and as described below:

Figure 5 Assembling the access point and Ceiling-Mount Clips

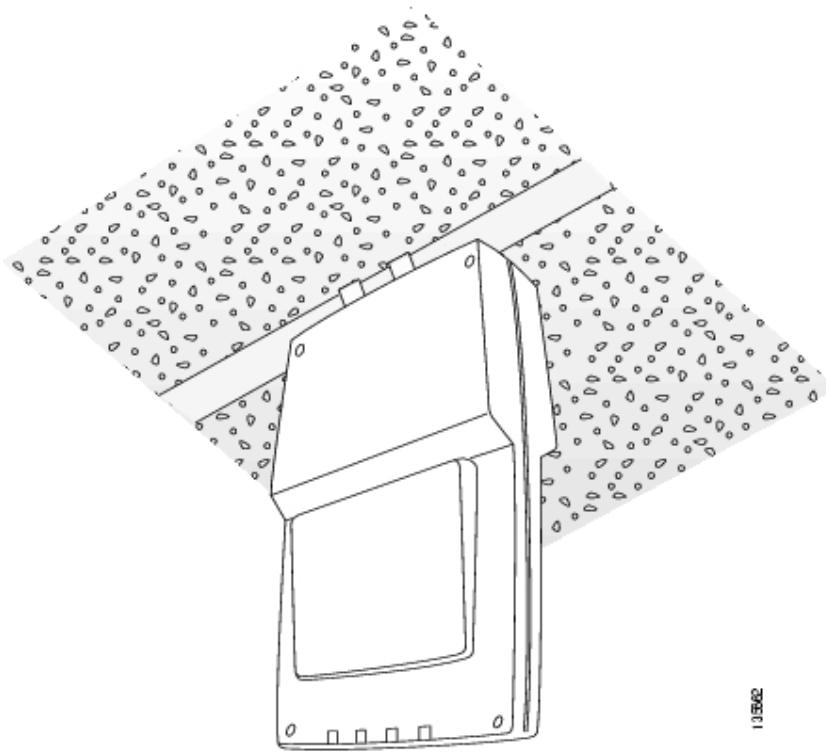
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Step 1 Attach the ceiling-mount clips to the bottom of the access point using the factory-supplied machine screws and washers.

Step 2 Snap the ceiling-mount clips onto a hanging ceiling rail.

Figure 6 Clipping the access point and Ceiling-Mount Clips to a Hanging-Ceiling Rail



Step 3 Attach the cables to the sides of the access point.



Note Be sure the cables are routed away from the access point antennas.



Note When the access point is powered up and is associated with a Cisco Wireless LAN Controller (Green/Power and Yellow/802.11b/g and/or Yellow or Amber/802.11a LEDs lit), the access point is broadcasting its beacon signal(s). When this happens, complete the installation as quickly as possible to remove yourself from within 8 inches (20 cm) of the access point to comply with FCC RF radiation exposure guidelines.

You have installed the access point. Repeat, "Mounting the Access Points" for each access point location.

Projection Wall Mount

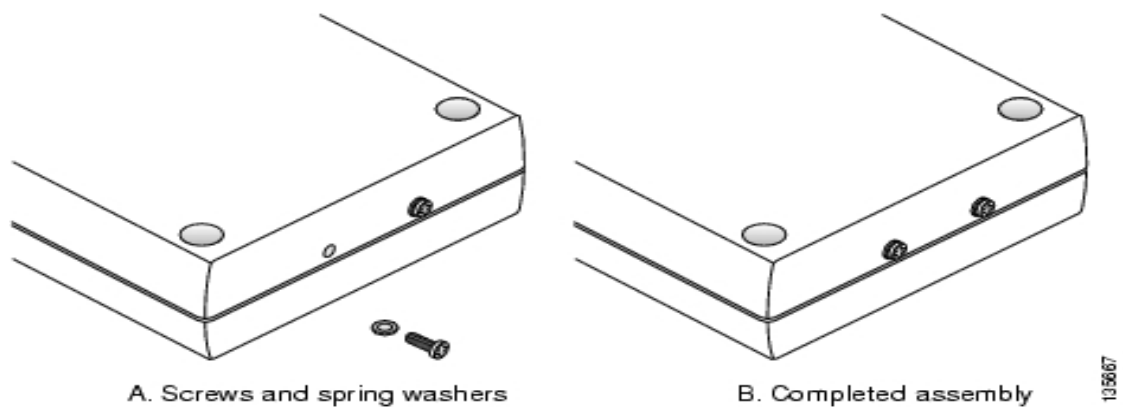
When you are mounting the access point out from a wall (flat sides along the wall or hallway), use an optional factory-orderable projection-mount L-bracket.

Step 1 Before proceeding, gently screw the two factory-supplied screws and spring washers into the bottom of the access point. Be sure the spring washers have their convex (high center sections) pointing toward the screw heads.



Note The access point threaded holes have precision-depth threads. Do not over tighten the screws, or the bracket will not fit under the screw heads.

Figure 7 Attaching the Mounting Screws and Spring Washers to the access point



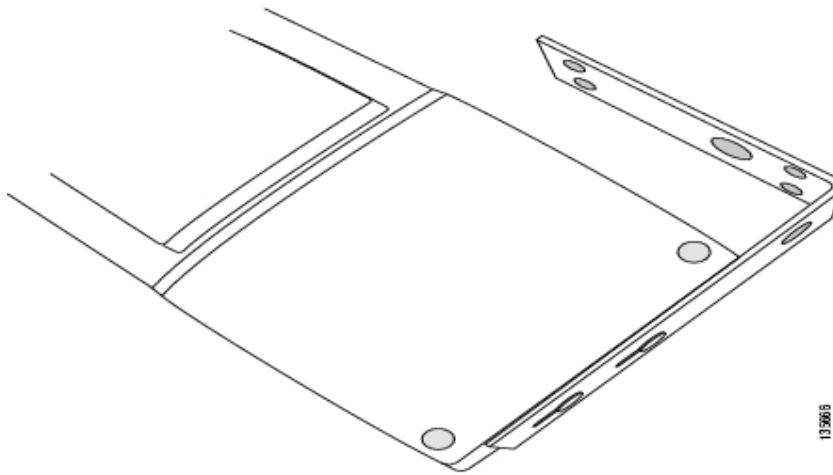
Step 2 You have already attached the projection-mount L-bracket to the wall in "Mounting the Access Points."

Step 3 Slide the screws into the keyhole slots on the mounting bracket as shown in the following figure.



Note If the screws do not securely hold the bracket, remove the access point and adjust the screws until they securely hold the bracket.

Figure 8 Attaching the access point to the Projection-Mount Bracket



Step 4 Attach the cables to the sides of the access point.



Note Be sure the cables are routed away from the access point antennas.



Note When the access point is powered up and is associated with a Cisco Wireless LAN Controller (Green/Power and Yellow/802.11b/g and/or Yellow or Amber/802.11a LEDs lit), the access point begins broadcasting its beacon signal(s). When this happens, complete the installation as quickly as possible to remove yourself from within 8 inches (20 cm) of the access point to comply with FCC RF radiation exposure guidelines.

You have installed the access point. Repeat, "Mounting the Access Points" for each access point location.

Flush Wall Mount

When you are mounting the access point against a wall (flat side toward the inside of the building), use an optional separately orderable flush-mount bracket.

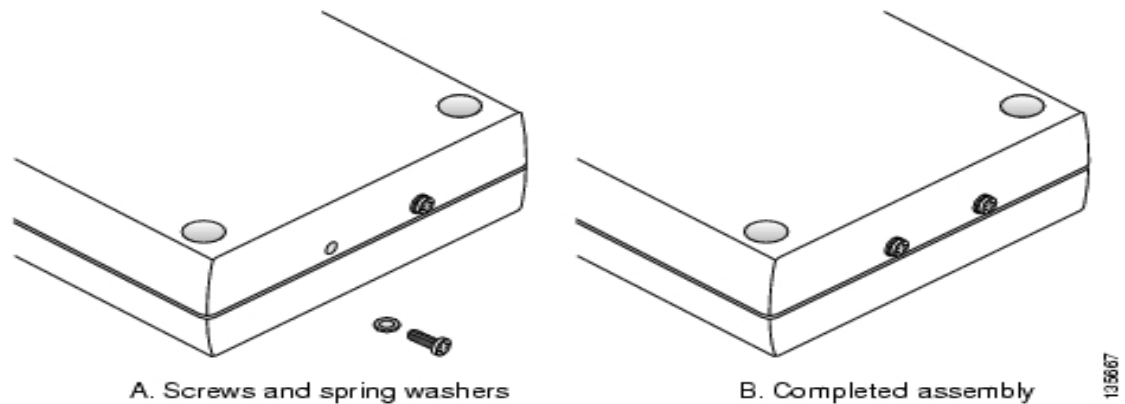
Step 1 Before proceeding, gently screw the two factory-supplied screws and spring washers into the bottom of the access point. Be sure the spring washers have their convex (high center sections) pointing toward the screw heads.



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Note The access point threaded holes have precision-depth threads. Do not over tighten the screws, or the bracket will not fit under the screw heads.

Figure 9 Attaching the Mounting Screws and Spring Washers to the access point



Step 2 You have already attached the flush-mount bracket to the wall in "Preparing Mounting Locations".

Step 3 Slide the screws into the keyhole slots on the mounting bracket as shown in the following figure.

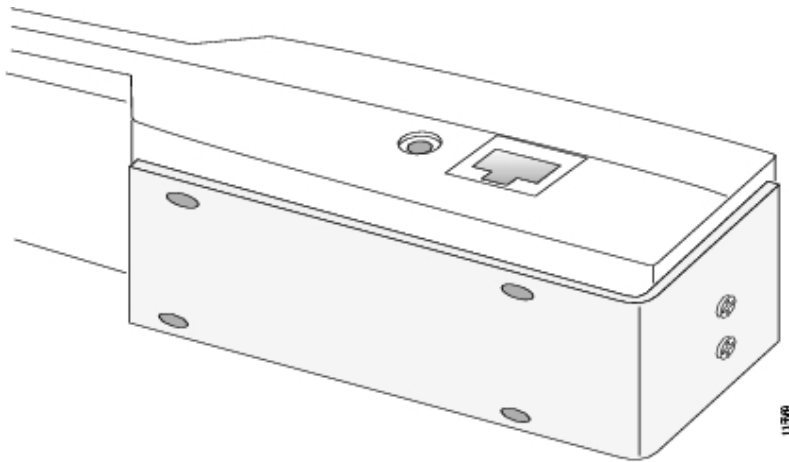


Note Be sure the side of the access point with the door is facing away from the wall (flat Side A toward the inside of the building). This ensures that the correct antenna is facing the building, and makes future upgrades easier.



Note If the screws do not securely hold the bracket, remove the access point and adjust the screws until they securely hold the bracket.

Figure 10 Attaching the access point to the Flush-Mount Bracket



Step 4 Attach the cables to the sides of the access point.



Note Be sure the cables are routed away from the access point antennas.



Note When the access point is powered up and is associated with a Cisco Wireless LAN Controller (Green/Power and Yellow/802.11b/g and/or Yellow or Amber/802.11a LEDs lit), the access point begins broadcasting its beacon signal(s). When this happens, complete the installation as quickly as possible to remove yourself from within 8 inches (20 cm) of the access point to comply with FCC RF radiation exposure guidelines.

3.05 PORT WIRING FOR WIRELESS ACCESS POINTS

- A. Port wiring for Wireless access points will follow the universal wiring plan adopted by the University of New Mexico and Hospital with the following exceptions.
1. Port shall be placed in the wall 3 to 6 inches above drop ceiling
 2. A minimum of two network jacks is required for all APs. One will be utilized for network access and the other one will be used for serial port access for management.

3. Where drop ceiling does not exist consult the UNM Information Technology Department or the UNM Hospital Information Technology Department for placement guidelines
4. Wireless port should be no further than 3 feet away from any Wireless Device unless special provisions exist. In this case contact UNM Information Technology Department or the UNM Hospital Information Technology Department.
5. If Wireless device cannot be powered off the Ethernet switch power will need to be included in the scope of work. For power guidelines for wireless devices contact UNM Information Technology Department or the UNM Hospital Information Technology Department.