



Safety Guidelines and Warnings

Translated versions of the following safety warnings are provided in the translated safety warnings document shipped with your AP. The translated warnings are also in the Translated Safety Warnings for Cisco Catalyst Access Points, available on Cisco.com.



Danger **IMPORTANT SAFETY INSTRUCTION**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. **SAVE THESE INSTRUCTIONS** Statement 1071



Danger 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.



Danger **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



Danger The cables specified in this installation guide that are used with the specified cable glands 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 cable gland.



Danger 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.



Danger 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



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



Danger Read the installation instructions before using, installing or connecting the system to the power source. Statement 1004



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



Danger To reduce the risk of fire, use only No. 24 AWG or larger telecommunication line cord. Statement 1023



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



Danger 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



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



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



Danger Class 1 Laser Product. Statement 1008



Danger Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051



Danger 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



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



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



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



Danger This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than 20A. Statement 1005



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



Danger In order to comply with FCC radio frequency (RF) exposure limits, antennas should be located at a minimum of 12 inches (30 cm) or more from the body of all persons. Statement 332



Danger This equipment is suitable for use in environment air spaces (plenums) in accordance with Section 300.22 (C) of the National Electrical Code, and Sections 2-128, 12-010(3) and 12-100 of the Canadian Electrical Code, Part 1, CSA C22.2. External power supply, power adapter and/or power injector, if provided, are not suitable for installation in air spaces. Statement 440

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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 antennas, Cisco Catalyst 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

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 to look at your proposed installation
- Plan your installation carefully and thoroughly before you begin. Successful raising of a mast or tower is mostly a matter of coordination. Each person should be assigned to a specific task and 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 AP or its 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 AP. If the assembly starts to drop, get away from it and let it fall.
- If any part of the antenna system comes in contact with a power line, do not touch it or remove it yourself. Call your local power company. They will remove it safely.

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

Safety Precautions when Installing Antennas



Danger 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

- 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
- 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.
- Contact 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. 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.
- 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
- 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.
- 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.
- If an accident should occur with the power lines, 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 (APs). When you test high-power radios in a link, you must avoid exceeding the receiver's maximum receive input level. 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 testbed, 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 AP to the antenna port of another AP 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 AP 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.

Performing Site Surveys

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

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

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 the performance of wireless devices. Avoid locating the devices in a location where there is an obstruction between the sending and receiving antennas.
- How far is your wireless link?
- Has a previous site survey been conducted?
- Do you have a clear Fresnel zone between the APs or radio line of sight?
- What is the minimum acceptable data rate within the link?
- Do you have the correct antenna (if more than one antenna is being offered?)
- Do you have the proper permits, if required?
- Are you following the proper safety procedures and practices?
- Have you configured the APs before you go onsite? It is always easier to resolve configurations or device problems first.
- Do you have the proper tools and equipment to complete your survey?

