

Safety Guidelines and Warnings

- Safety Instructions, on page 1
- FCC Safety Compliance Statement, on page 2
- Safety Precautions, on page 2
- Safety Precautions when Installing Antennas, on page 3
- Avoiding Damage to Radios in a Testing Environment, on page 4
- Performing Site Surveys, on page 5

Safety Instructions

The translated warnings are available in the Translated Safety Warnings for Cisco Catalyst Access Points, which is available on Cisco.com.

Warning

Statement 1071—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS



Warning

Statement 1005—Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than:

20 A

Warning **Statement 9001—**Product Disposal

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

Caution **Ensure to connect the power cord of the power adapter to a socket outlet with an earthing connection.**

Warning **Statement 1074—**Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Note **Statement 438—**Taiwan RoHS

Restricted Substances Content Disclosure Table web address: http://www.cisco.com/go/taiwanrohs

Warning **Statement 1008—**Class 1 Laser Product

This product is a Class 1 laser product.

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:

Note The recommended operating atmospheric pressure range for the Ex device shall be between 80 kPa (0,8 bar) and 110 kPa (1,1 bar).

- 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

- 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:

```
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 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/ac/ax 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?