



# Cisco Aironet Four-Element, MIMO, Dual-Band Ceiling Mount Omni-Directional Antenna (AIR-ANT2524V4C-R)

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## Overview

This section describes the AIR-ANT2524V4C-R antenna, and provides specifications and mounting instructions. The antenna is a four-element, MIMO, dual-band antenna that operates in the 2.4 and 5 GHz frequency ranges. The antenna is designed for ceiling-mounting in an indoor environment.



## Technical Specifications

Antenna type	<b>4-Element, Dual-band, Low Profile Omni</b>
Operating frequency ranges	2400–2484 MHz 5150–5850 MHz
VSWR	2:1 or less in both bands
Peak gain	2.4-GHz band: 2 dBi 5-GHz band: 4 dBi
Polarization	Linear
Azimuth plane 3 dB beamwidth	Omni-directional
Elevation plane 3 dB beamwidth	2.4 GHz band: 69° 5 GHz band: 60°
Length	7.25 in (18.4 cm)
Width	7.25 in (18.4 cm)
Depth	1 in (2.5 cm)
Weight	1.3 lb (0.59 kg)
Cable	3 foot (91.4 cm) plenum rated, UV stable
Connector	RP-TNC

<b>Antenna type</b>	<b>4-Element, Dual-band, Low Profile Omni</b>
Environment	Indoor
Temperature range	32–133°F(0–56°C)

## Radiation Patterns

Figure 1: 2.4 GHz Element 1 Azimuth and Elevation Plane Patterns

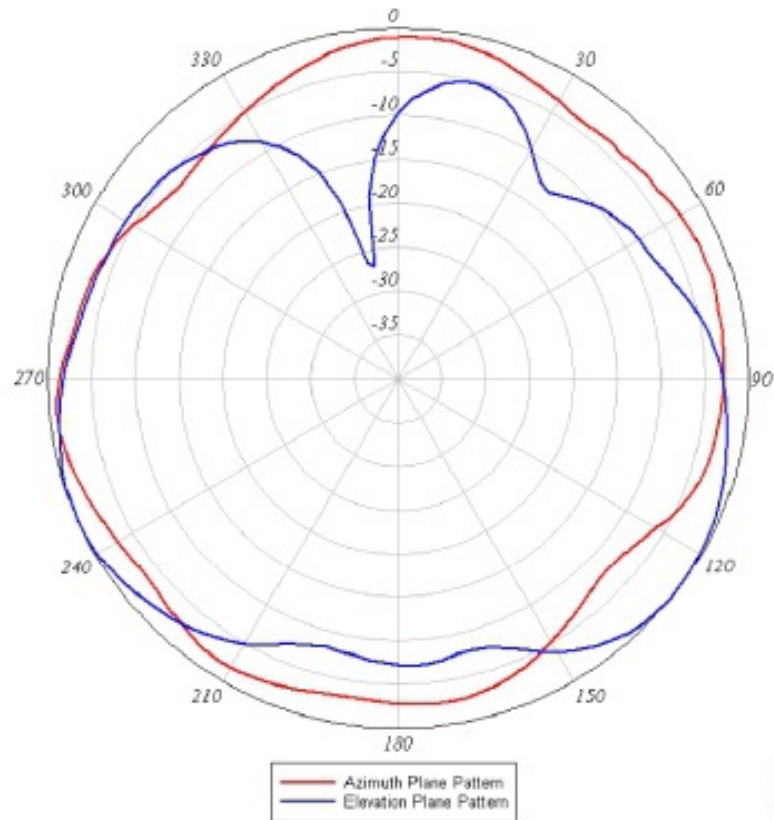
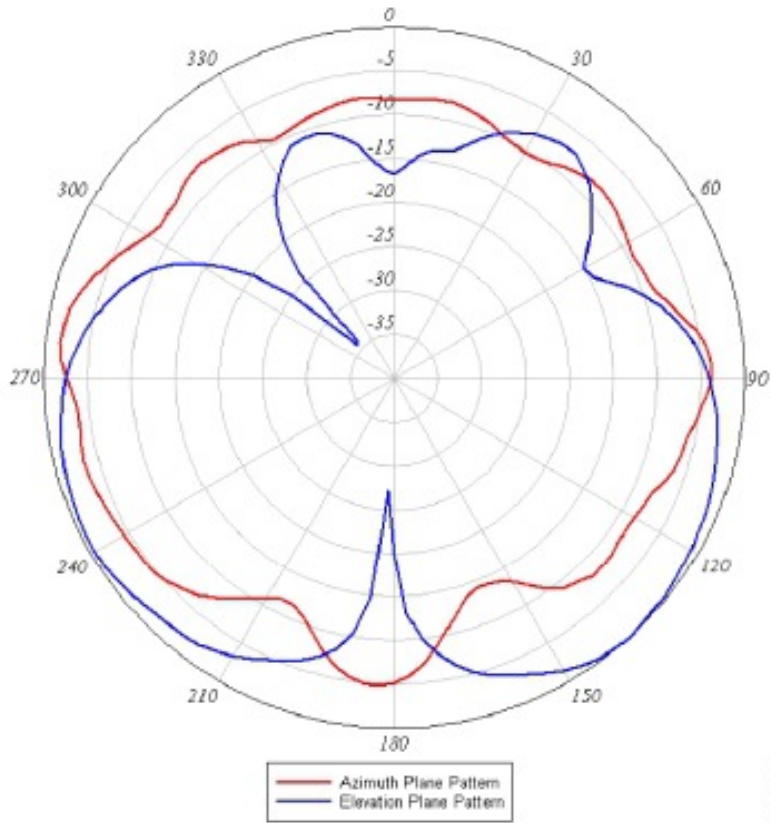


Figure 2: 5 GHz Element 1 Azimuth and Elevation Plane Patterns



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Figure 3: 2.4 GHz Element 2 Azimuth and Elevation Plane Patterns

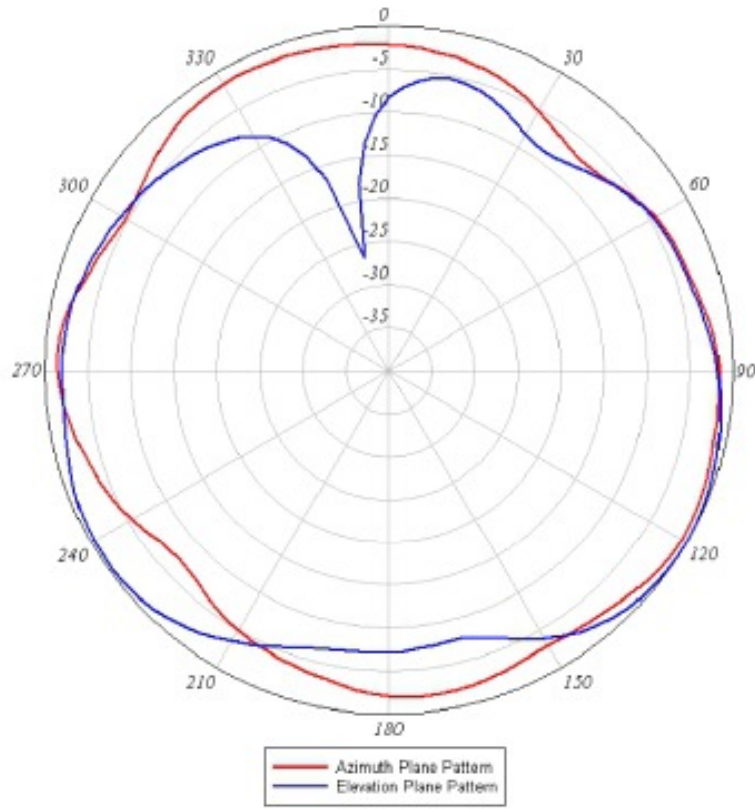
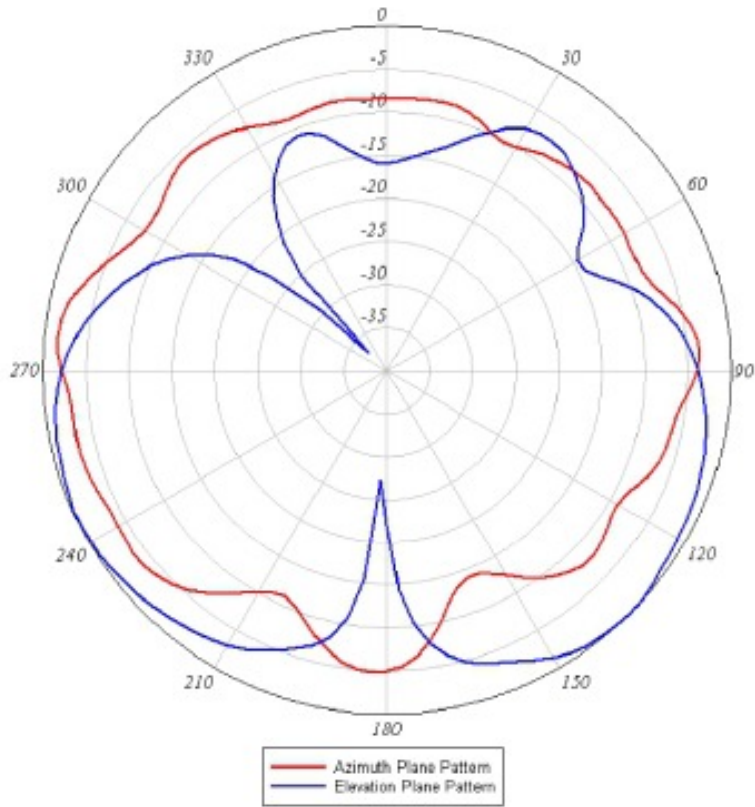


Figure 4: 5 GHz Element 2 Azimuth and Elevation Plane Patterns



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Figure 5: 2.4 GHz Element 3 Azimuth and Elevation Plane Patterns

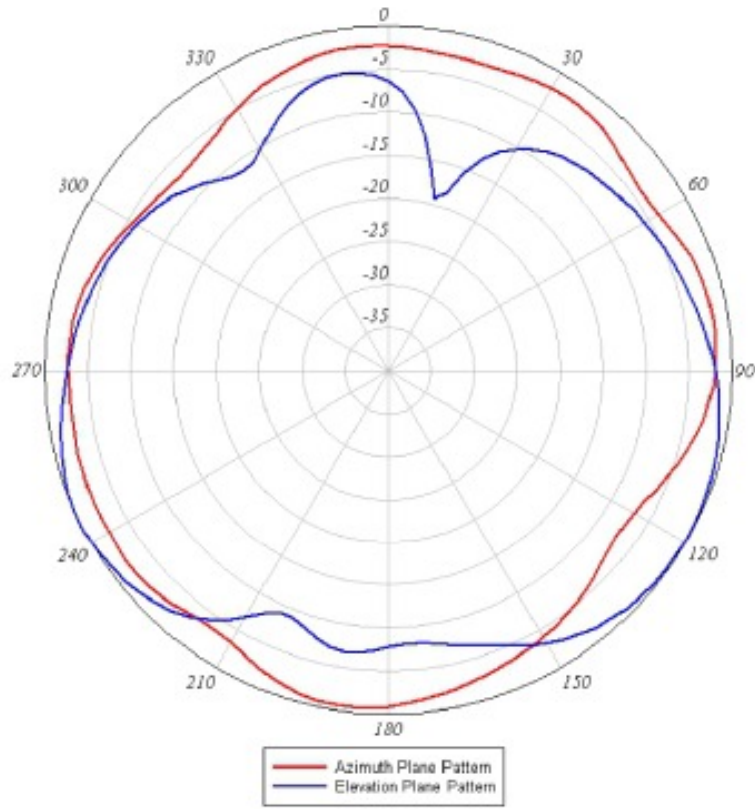
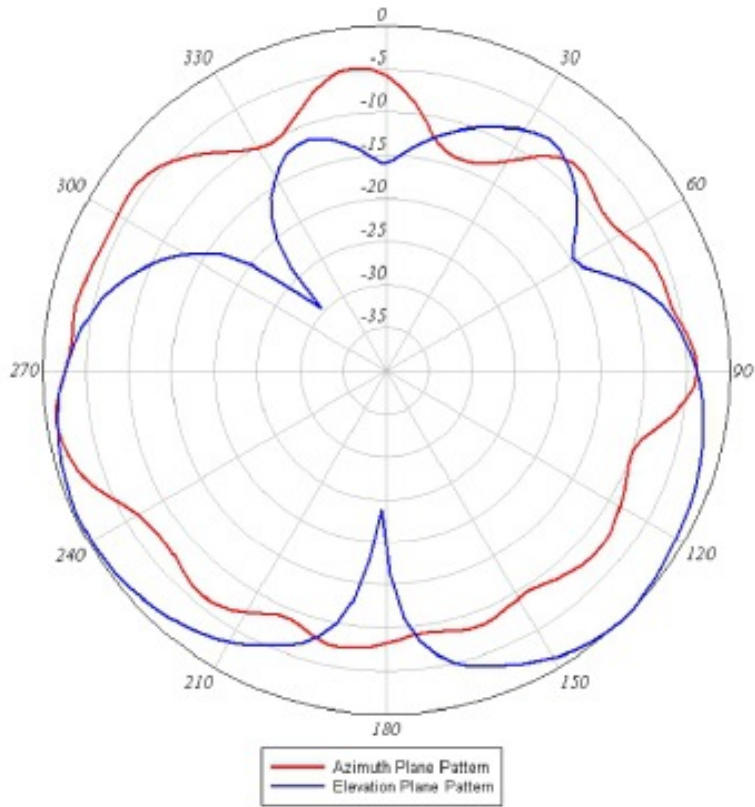


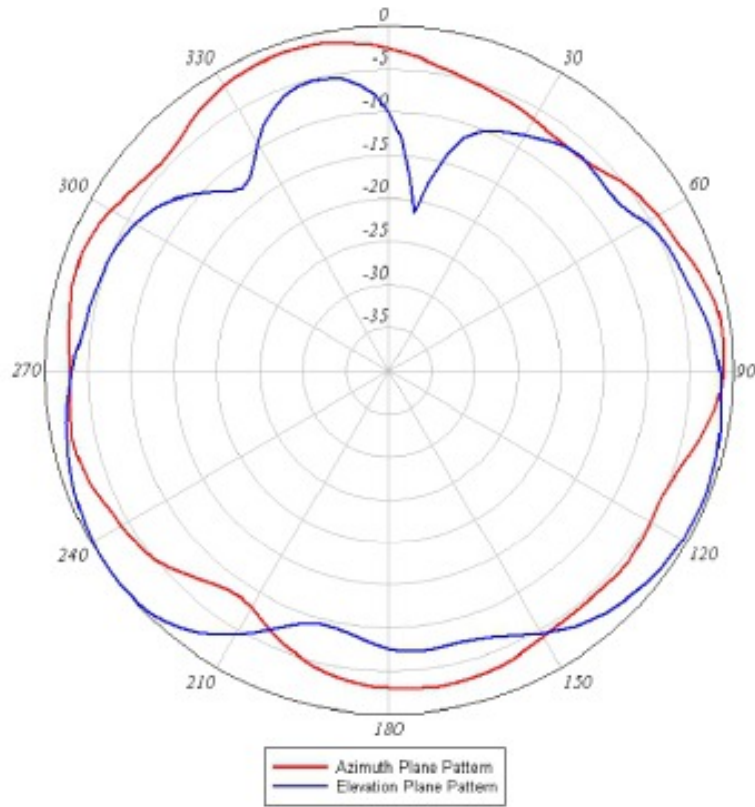
Figure 6: 5 GHz Element 3 Azimuth and Elevation Plane Patterns



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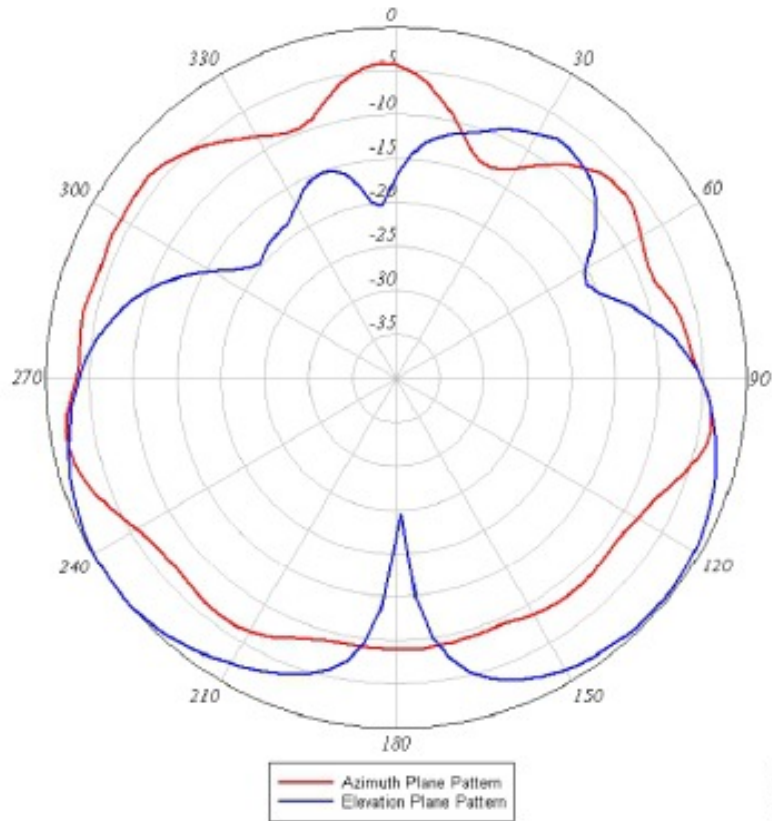


Figure 7: 2.4 GHz Element 4 Azimuth and Elevation Plane Patterns



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Figure 8: 5 GHz Element 4 Azimuth and Elevation Plane Patterns



## System Requirements

This antenna is for indoor use with any Cisco Aironet radio device with dual-band (2.4 and 5 GHz) RP-TNC antenna ports. The antenna can be mounted on suspended ceiling tiles having a thickness between ½ in. (1.27 cm) and 1 in. (2.54 cm).

## General Safety Precautions



### Warning

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**



### Warning

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

**Warning**

Do not locate the outdoor 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 (for example, U.S.:NFPA 70, National Electrical Code, Article 810, Canada:Canadian Electrical Code, Section 54). **Statement 1052**

**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**

Each year hundreds of people are killed or injured when attempting to install an antenna. In many of these cases, the victim was aware of the danger of electrocution, but did not take adequate steps to avoid the hazard.

**Warning**

For your safety, and to help you achieve a good installation, please read and follow these safety precautions. **They may save your life!**

For your safety, read and follow these safety precautions.

- If you are installing an antenna for the first time, for your own safety as well as others, seek professional assistance. Your Cisco sales representative can explain which mounting method to use for the size and type antenna you are about to install.
- 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.
- Find someone to help you—installing an antenna is often a two-person job.
- 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.

# General Installation Guidelines and Tips for Optimal Performance

This section contains the following:

## Installation Guidelines

**Caution**

For outside installations, make sure you do not mount the antenna upside down or block the bottom of the antenna at the cable exit. The correct mounting position is with the cable pointing down (towards the ground) so that any moisture will drain through the antenna drain holes. The antenna ships with a yellow mounting instruction label temporarily attached to the antenna radome.

The following instructions are common to most mast mounted installations. For specific installation instructions for each antenna, see the antenna data-sheet and the router hardware installation guide.

- Assemble your new antenna on the ground or a level surface at the installation site.
- Connect its coaxial cable while you are on the ground and attach the antenna to the mast.
- Ensure that the mast does not fall as you raise or remove it. Use a durable non-conductive rope secured at each two foot level as the mast is raised. Have an assistant tend the rope, ready to pull the mast clear of any hazards (such as power lines) should it begin to fall.
- Use the mounting bracket provided with the antenna.
- If the installation will use guy wires:
  - Install guy anchor bolts.
  - Estimate the length of guy wire and cut it before raising the mast.
  - Attach guy wires to a mast using guy rings.
- Carefully connect the antenna and mast assembly to its mounting bracket and tighten the clamp bolts.
  - In the case of a a guyed (tall, thin mast) installation, you must have at least one assistant to hold the mast upright while the guy wires are attached and tightened to the anchor bolts.
- Attach a “DANGER” label at eye level on the mast.
- Install ground rods to remove any static electricity buildup and connect a ground wire to the mast and ground rod. Use ground rods designed for that purpose, not a spare piece of pipe.

## Unused Antenna Ports

Port plugs must be installed in any unused antenna ports.

The weatherproof caps on the connectors protect the router interior from environmental elements including water, heat, cold, and dust. They are installed on unused ports before the router is shipped.

When you install a new antenna in a port with an N-connector:

- Chassis-mounted antennas—Remove the weather proof cap before installing a chassis-mounted antenna.
- External antennas—Remove weatherproof cap, then connect the supported Cisco cable to the connector.

## Tips for Optimal Performance

Because the antenna transmits and receives radio signals, they are susceptible to RF obstructions and common sources of interference that can reduce throughput and range of the device to which they are connected. Follow these guidelines to ensure the best possible performance:

- Mount the antenna to utilize its propagation characteristics. One way to do this is to orient the antenna vertically and mount it as high as possible.
- Keep the antenna away from metal obstructions such as heating and air-conditioning ducts, large ceiling trusses, building superstructures, and major power cabling runs. If necessary, use a rigid conduit to lower the antenna away from these obstructions.
- The density of the materials used in the building construction determines the number of walls the signal must pass through and still maintain adequate coverage. Consider the following before choosing the location to install your antenna:
  - Paper and vinyl walls have very little affect on signal penetration.
  - Solid and pre-cast concrete walls limit signal penetration to one or two walls without degrading coverage.
  - Concrete and wood block walls limit signal penetration to three or four walls.
  - A signal can penetrate five or six walls constructed of drywall or wood.
  - A thick metal wall causes signals to reflect off, causing poor penetration.
  - A chain link fence or wire mesh spaced between 1 and 1 1/2 in. (2.5 and 3.8 cm) acts as a harmonic reflector that blocks a 2.4-GHz radio signal.
- Install the antenna away from microwave ovens and 2-GHz cordless phones. These products can cause signal interference because they operate in the same frequency range as the device your antenna is connected to.
- Install the antenna in a vertical orientation to maximize signal propagation.

## Site Selection

Before attempting to install your antenna, determine where you can best place the antenna for safety and performance.

Follow these steps to determine a safe distance from wires, power lines, and trees.

1. Measure the height of your antenna.
2. Add this length to the length of the structure on which you are mounting the antenna and then double this total for the minimum recommended safe distance.



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**Caution** If you are unable to maintain this safe distance, stop and get professional help.

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Generally, the higher an antenna is above the ground, the better it performs. Good practice is to install your antenna about 5 to 10 foot (1.5 to 3 m) above the roof line and away from all power lines and obstructions. If possible, find a mounting place directly above your wireless device so that the lead-in cable can be as short as possible.

## Choosing a Mounting Location

Mount the antenna mounted clear of obstructions to the sides of the radiating elements. Generally, the higher an antenna is above the floor, the better it performs. If possible, mount the antenna on the ceiling panel within 12 in. (30.5 cm) of the access point so you can connect its cables directly to the access point. If you must mount the antenna farther away from the access point, try to make the distance as short as possible.

## Installing the Antenna

You can install the antenna on a ceiling tile having a thickness between ½ in. (1.27 cm) and 1 in. (2.54 cm).

## Tools and Equipment Required

The following tools and equipment are not provided:

- 1" (2.54 cm) hole saw to create a hole in the suspended ceiling tile.
- A step ladder high enough to access your ceiling safely.

## Installing the Antenna

The antenna is installed to a suspended ceiling tile with a supplied 1 in. (2.54 cm) plastic nut.

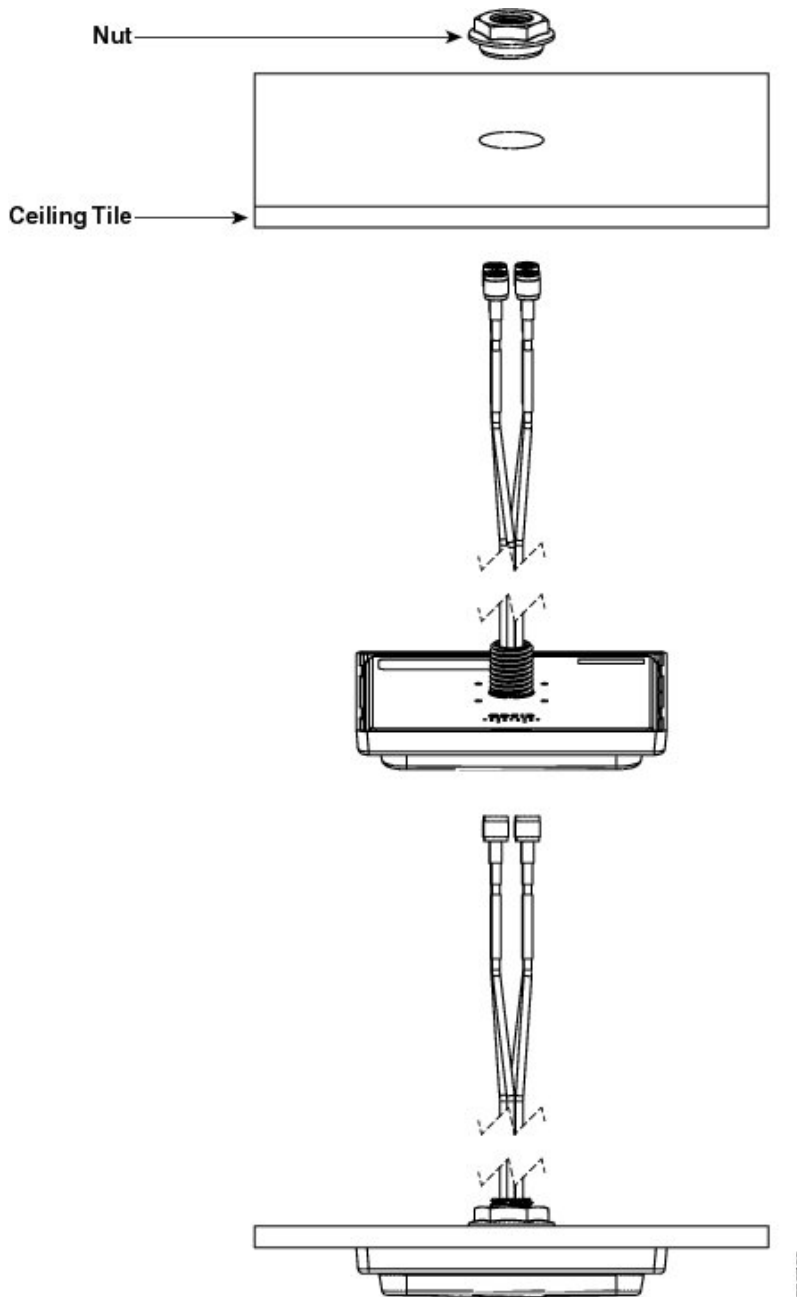
The antenna cables terminate with a straight RP-TNC plug connector after a 36 in. (91.44 cm) cable. The mating connector to the antenna on the access point is an RP-TNC jack.

## Mounting the Antenna on a Ceiling Tile

To mount the antenna on a suspended ceiling tile, perform the following:

- 
- Step 1** Mark the mounting location on the ceiling tile.
  - Step 2** Remove the ceiling tile from the ceiling grids.
  - Step 3** Use a 1" (2.54 cm) hole saw to cut a hole in the ceiling tile.
  - Step 4** Insert the antenna cables, one at a time, through the hole in the ceiling tile.
  - Step 5** Insert the antenna cables, one at a time, through the hole in the plastic nut as shown in the following figure.

Figure 9: Ceiling Tile Mounting Details



**Note** Do not use the rubber gasket when you mount the antenna on a ceiling tile. The gasket is not required for ceiling tile installations.

- Step 6** Ensure that the antenna is properly positioned on the ceiling tile and then tighten the plastic nut hand-tight.
- Step 7** Reinstall the ceiling tile.
- Step 8** Connect the antenna cables to the access point.

**Note** The 5 GHz antenna cables are identified by an orange collar near the connectors. Ensure that you connect these cables to the 5 GHz antenna connection on the access point.

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## Suggested Cable

We recommend using a high-quality, low-loss cable with the antenna.



**Note** Coaxial cable loses efficiency as the frequency increases, resulting in signal loss. Keep the cable as short as possible as cable length determines the amount of signal loss (the longer the run, the greater the loss).

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