Cisco Aironet 6-dBi Omnidirectional Antenna (AIR-ANT5160V-R)

This document outlines the specifications, describes the AIR-ANT5160V-R 6-dBi omnidirectional antenna, and provides instructions for mounting it. The antenna is a ruggedized high-performance colinear antenna that operates in the 5-GHz frequency range and is designed for use in large rooms or vaulted areas where extended coverage is needed. The antenna is designed to be used indoors or outdoors and can be mounted on a mast.

The following information is provided in this document.

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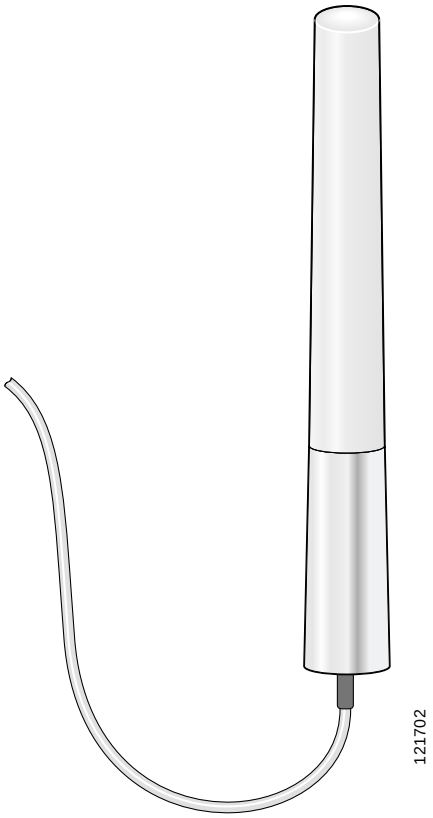
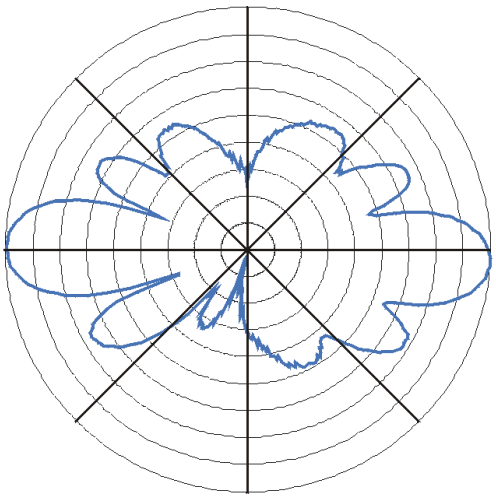
Technical Specifications

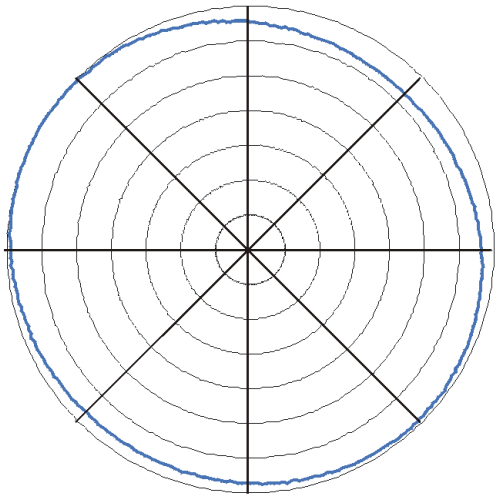
Antenna type	Omnidirectional colinear array
Operating frequency range	5150–5875 MHz
Nominal input impedence	50Ω
2:1 VSWR bandwith	5150–5850 MHz
Peak gain	6 dBi
Polarization	Linear
E-plane 3-dB beamwidth	17
H-plane 3-dB beamwidth	Omnidirectional
Cable length and type	36 in. (91.4 cm) Plenum rated
Connector type	RP-TNC Male
Length	11.5 in. (29.2 cm)
Diameter	1 in. (2.5 cm)
Weight	12 oz. (0.34 kg)
Operating temperature range	–22 F– 158 F(–30 C – 70 C)
Storage temperature range	–40 F– 185 F(–40 C – 85 C)
Wind rating	125 mph (200 kph)



E-Plane Radiation Pattern



H-Plane Radiation Pattern



System Requirements

This antenna is designed for use with Cisco Aironet access points and bridges but can be used with any 5-GHz Cisco Aironet radio device that utilizes a reverse polarity Neil Councilman (RP-TNC) connector.

Safety Precautions

Warning **Installation of this antenna near power lines is dangerous. For your safety, follow the installation directions.**

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.**

Warning **In order to comply with international radio frequency (RF) exposure limits, dish antennas should be located at a minimum of 8.7 inches (22 cm) or more from the bodies of all persons. Other antennas should be located a minimum of 7.9 inches (20 cm) or more from the bodies of all persons.**

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

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

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, 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, in Canada: Canadian Electrical Code, Section 54).**

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.

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

1. 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.
2. Select your installation site with safety, as well as performance in mind. Remember: electric power lines and phone lines look alike. For your safety, assume that any overhead line can kill you.

3. Call your electric power company. Tell them your plans and ask them to come look at your proposed installation. This is a small inconvenience considering your life is at stake.
4. 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.
5. When installing your antenna, remember:
   a. **Do not** use a metal ladder.
   b. **Do not** work on a wet or windy day.
   c. **Do** dress properly—shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
6. If the assembly starts to drop, get away from it and let it fall. Remember, 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 complete an electrical path through the antenna and the installer: **you!**
7. If any part of the antenna system should come in contact with a power line, **don't touch it or try to remove it yourself. Call your local power company**. They will remove it safely.
8. If an accident should occur with the power lines call for qualified emergency help immediately.

Installation Guidelines

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 a building's 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 reflects signals, causing poor penetration.

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.

Step 1 Measure the height of your antenna.

Step 2 Add this length to the length of your tower or mast and then double this total for the minimum recommended safe distance.

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

Generally, the higher an antenna is above the ground, the better it performs. Good practice is to install your antenna about 5 to 10 ft (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.

Installing the Antenna

A mounting hardware kit is provided that allows you to install the antenna on a suspended ceiling, open beam ceiling, or a pole.

The ceiling mount kit consists of the following hardware:

- One T-rail grid bracket
- One bracket plate
- Two internal tooth lock washers
- Two #6-32 x 1/4-in. SS Phillips machine screws
- One I-beam clamp
- One 1/4-in. flat washer
- One 1/4-in. split lock washer
- One 1/4 x 20 x 1/2-in. hex head bolt

The pole (mast) mount kit consists of the following hardware:

- Six 5/16-in. x 18 SS hex nuts
- Four 5/16-in. SS lock washers
- One U-bolt
- One V-bracket
- Two base brackets
- Two 5/16-in. flat washers

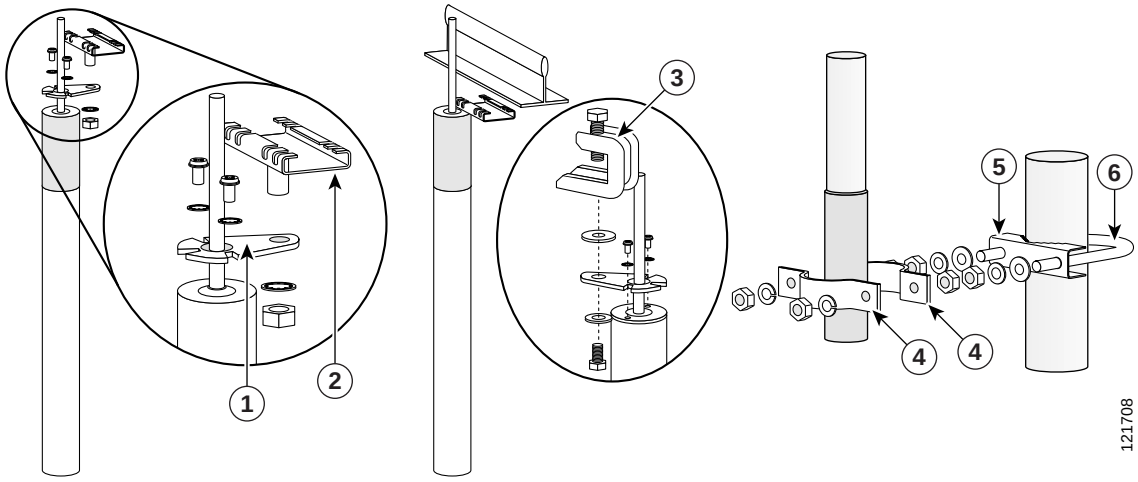
You will need the following tools and equipment, which are not provided:

- Phillips head screwdriver
- 7/16-in. open end or box end wrench (or adjustable wrench)
- 1/2-in. open end or box end wrench (or adjustable wrench)

The following sections contain typical procedures for installing the antenna on a suspended ceiling or mast. Your installation may vary. Before you begin, you may want to refer to Figure 1.

Figure 1 shows how the antenna should be mounted to a suspended ceiling or pole (mast).

Figure 1 Antenna Mounting Details



1	Bracket plate	**4**	V-bracket
2	Ceiling T-rail grid bracket	**5**	Base bracket
3	I-beam clamp	**6**	U-bolt

T-Rail Grid Bracket Installation

Follow these steps to install the antenna on a suspended ceiling using the T-rail grid bracket:

Step 1 Attach the bracket plate to the antenna base using two #6 Phillips head screws and #6 lock washers as shown in Figure 1.

Step 2 Remove the hex nut and flat washer from the T-rail grid bracket. Discard the flat washer.

Step 3 Install the T-rail grid bracket onto the bracket plate using the hex nut and a 1/4-in. internal tooth lock washer. Do not tighten the hex nut.

Step 4 Clamp the T-rail grid bracket onto the ceiling runner and tighten the hex nut with a 7/16-in. wrench or adjustable wrench.

Step 5 Route the antenna cable to the wireless device.

I-Beam Clamp Installation

Follow these steps to install the antenna on an open beam ceiling using the I-beam clamp:

Step 1 Attach the bracket plate to the antenna base using two #6 Phillips head screws and #6 lock washers.

Step 2 Install the I-beam clamp to the bracket plate using a 1/4-20 x 1/2-in. hex head bolt, a flat washer and split lock washer as shown in Figure 1.

Step 3 Position the I-beam clamp on the ceiling beam and tighten the clamp bolt.

Step 4 Route the antenna cable to the wireless device.

Pole Installation

Follow these steps to install the antenna on a pole:

Step 1 Attach the U-bolt and V-bracket to the top of the pole using two 5/16 x 18 hex nuts, 5/16-in. flat washers, and 5/16-in. lock washers as shown in Figure 1. Tighten the assembly using a 1/2-in. wrench or adjustable wrench.

Step 2 Start two more 5/16 x 18 hex nuts on the U-bolt and turn them down against the nuts securing the the U-bolt to the pole.

Step 3 Position the base brackets on the antenna base as shown in Figure 1.

Step 4 Slide the antenna and base brackets onto the U-bolt threads.

Step 5 Secure the antenna to the U-bolt using two 5/16 x 18 hex nuts and two 5/16-in. lock washers.

Step 6 Tighten the hex head bolts evenly using a 1/2-in. wrench or adjustable wrench.

Step 7 Route the antenna cable to the wireless device.

Suggested Cable

Cisco recommends a high-quality, low-loss cable for use with the antenna.

Note Coaxial cable loses efficiency as the frequency increases, resulting in signal loss. The cable should be kept as short as possible because cable length also determines the amount of signal loss (the longer the run, the greater the loss).

The antenna terminates with a RP-TNC plug after a short, 3-ft (0.91-m) cable. The mating connector to the antenna is an appropriate RP-TNC jack. The connector on the opposite end will vary according to the type of equipment used.

After the cable is attached to the antenna, make sure that the connections are sealed (if outdoors) to prevent moisture and other weathering elements from affecting performance. Cisco recommends using a coax seal (such as CoaxSeal) for outdoor connections. Silicon sealant or electrical tape are **not** recommended for sealing outdoor connections.

Grounding the Antenna

The antenna should be grounded if you are mounting it outdoors. Follow these steps to ground the antenna in accordance with national electrical code instructions.

Step 1 Use No. 10 AWG copper or No. 8 or larger copper-clad steel or bronze wire as ground wires for both mast and lead-in. Securely clamp the wire to the bottom of the mast.

Step 2 Secure the lead-in wire to a static discharge unit (lightning arrestor) and the mast ground wire to the building with stand-off insulators spaced from 4 ft (1.2 m) to 8 ft (2.4 m) apart.

Step 3 Mount the antenna discharge unit as close as possible to where the lead-in wire enters the building.

Step 4 Drill a hole in the building's wall as close as possible to the equipment to which you will connect the lead-in cable.

Caution There may be wires in the wall. Make sure your drilling location is clear of any obstructions or other hazards.

Step 5 Pull the cable through the hole and form a drip loop close to where it enters the building.

Step 6 Thoroughly waterproof the lead-in area.

Step 7 Connect the lead-in cable to the equipment.

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Ordering tool:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can send comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, Cisco Technical Support provides 24-hour-a-day, award-winning technical assistance. The Cisco Technical Support Website on Cisco.com features extensive online support resources. In addition, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not hold a valid Cisco service contract, contact your reseller.

Cisco Technical Support Website

The Cisco Technical Support Website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, 365 days a year at this URL:

http://www.cisco.com/techsupport

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

http://tools.cisco.com/RPF/register/register.do

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool automatically provides recommended solutions. If your issue is not resolved using the recommended resources, your service request will be assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

http://www.cisco.com/techsupport/servicerequest

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553 2447

For a complete list of Cisco TAC contacts, go to this URL:

http://www.cisco.com/techsupport/contacts

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:

  http://cisco.com/univercd/cc/td/doc/pcat/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html