Cisco Dual LTE-Single GPS Multi-band Antenna Installation Guide (4G-LTE-ANTM-O-3-B)

This chapter contains the following:

Overview

This section provides the description, supported features, and installation instructions of the Cisco Dual LTE-Single GPS Multi-band (4G-LTE-ANTM-O-3-B) Antenna.

⚠

Caution Read the information in the installation instructions before installing or replacing antennas.

Deciding which antenna to use involves multiple factors, such as coverage area, maximum distance, indoor location, outdoor location, and antenna height.

When an antenna is used indoors, the building construction, ceiling height, and internal obstructions must be considered. In outdoor environments, obstructions such as trees, vehicles, buildings, and hills must be considered. Distance is the primary factor when using outdoor-wireless communications. However, coverage area also becomes important when you use wireless client devices to communicate with a wireless device.

4G-LTE-ANTM-O-3-B antenna is an integrated 3-in-1- indoor and outdoor antenna. It comes with two Long Term Evolution (LTE) antennas and one Global Positioning System (GPS) antenna in a single radome. The following graphic shows the 4G-LTE-ANTM-O-3 antenna.

Figure 1: 4G-LTE-ANTM-O-3 Antenna

Parts List

The shipment of your antenna includes the following items:

- One Antenna Unit
- Two SMA-Female to TNC-Male Adapters
- Installation Guide

Features of the 4G-LTE-ANTM-O-3-B Antenna

The 4G-LTE-ANTM-O-3-B antenna supports the following features:

- No tune, multiband coverage, dual 4G LTE, and GPS L1 frequencies.
- Metal 5/8-inch stud mount with serrated face nut provides single cable exit for easier installation or antenna replacement.
- Attractive low-profile housing for added overhead clearance.
- IP67-compliant design provides maximum protection against water or dust under severe environmental conditions.
- High-performance, low-loss cable, and high-quality connectors for maximum Radio Frequency (RF) system efficiency.
- UV-resistant red, blue, black, or white radome.

Technical Specifications

The following table lists the specifications for the RF antenna.

Table 1: Specifications of RF antenna

Operating Frequencies	698-960 MHz 1710-2700 MHz
Polarization	Vertical, linear
Nominal Impedance	50 Ohms
Gain (Typical) **Note 1**	2.5 dBi
Maximum Power	3 Watts
VSWR **Note 2**	< 2.5:1
Elevation Plane (3 dB Beamwidth)	30° (nominal)
Azimuth Plane (3 dB Beamwidth)	Omni-directional
Connector type	SMA-Male
Cable	4 foot RG174 VW-1 compliant
Height	90 mm
Base Diameter	137 mm
Color	White, Black, Red or Blue
Flammability	UL-94 V0
Environment	Indoor and outdoor
Mounting	5/8 inch lug with serrated face nut, optional adhesive backing (peel-off), 17 sq. inches area (minimum) on a flat smooth surface, 5/8 inch diameter hole through mounting surface
Operating and storage temperature	-40 to +85 degree C
Ingress Protection **Note 3**	IP67

Note 1: Total gain, free space test when mounted on a 1-foot diameter ground plane with unused ports loaded.

Note 2: Free space Voltage Standing Wave Ratio (VSWR) over all operating frequency ranges when mounted on a 1-foot diameter ground plane with unused ports loaded.

Note 3: When mounted per installation instructions.

The following table lists the specifications for the GPS Antenna.

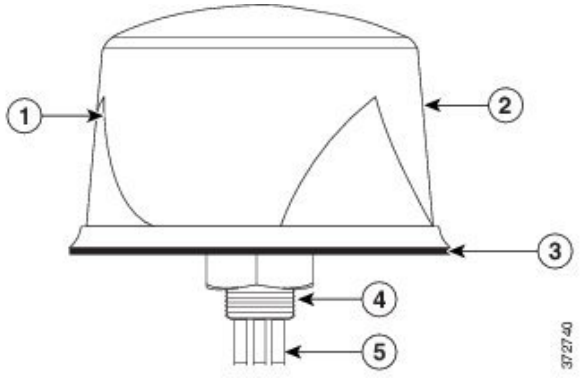
Table 2: Specifications of the GPS Antenna

Frequency Band	1575.42 MHz (GPS L1)

Amplifier Gain	26 dBc ± 3 dB
Nominal Impedance	50 Ohms
Output VSWR	1.5:1 typical
DC Current	20 mA nominal; < 30 mA @ -40°C to +85° C
DC Voltage	3.3-5 V
Noise Figure	1.8 dB typical
Filtering	> 40 dB rejection @ ± 50 MHz from center frequency

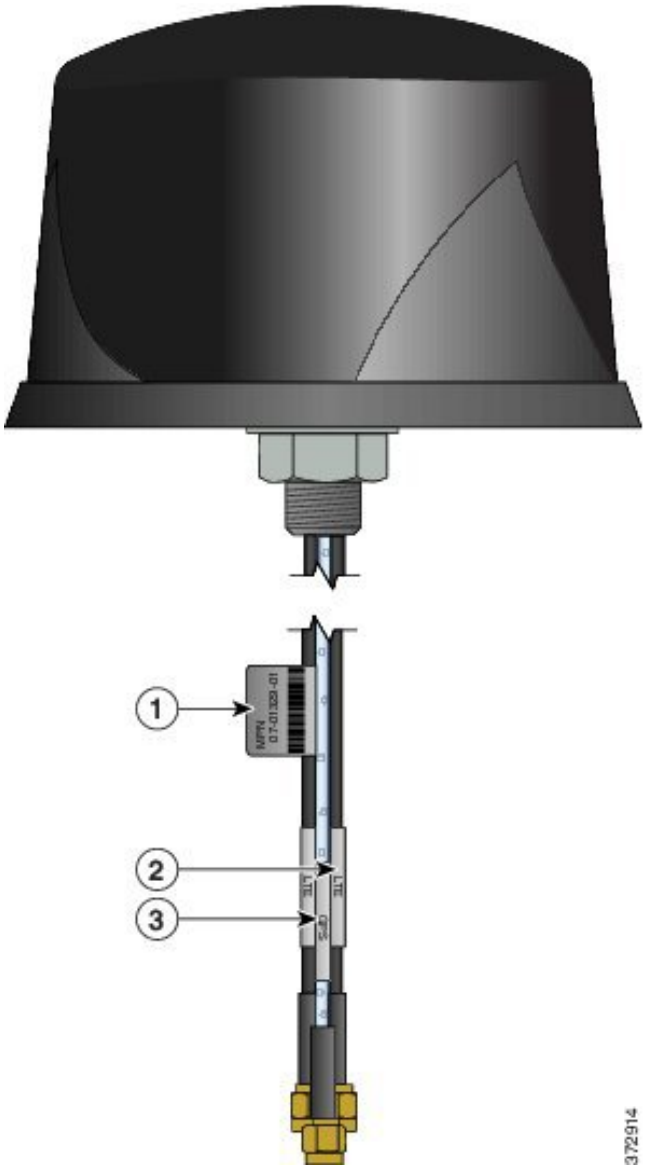
The following graphic shows the parts of 4G-LTE-ANTM-O-3-B Antenna.

Figure 2: Parts of 4G-LTE-ANTM-O-3-B Antenna



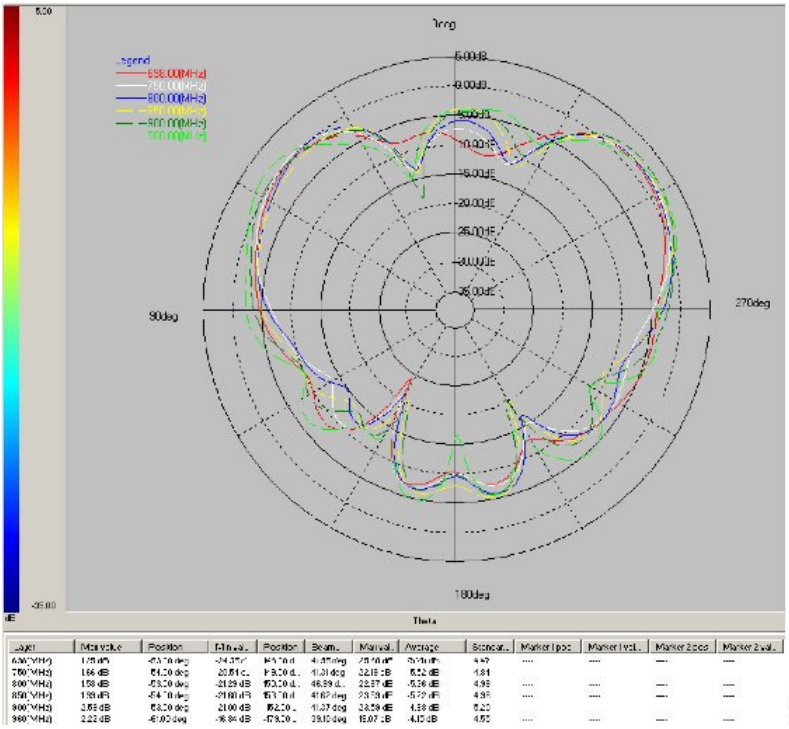
1	GPS and 2 LTE antennas inside	4	Mounting stud
2	Radome available in 4 colors: White, Black, Red or Blue (Indoor or Outdoor)	5	Cables
3	Gasket		

The following graphic shows the antenna with cable labels.

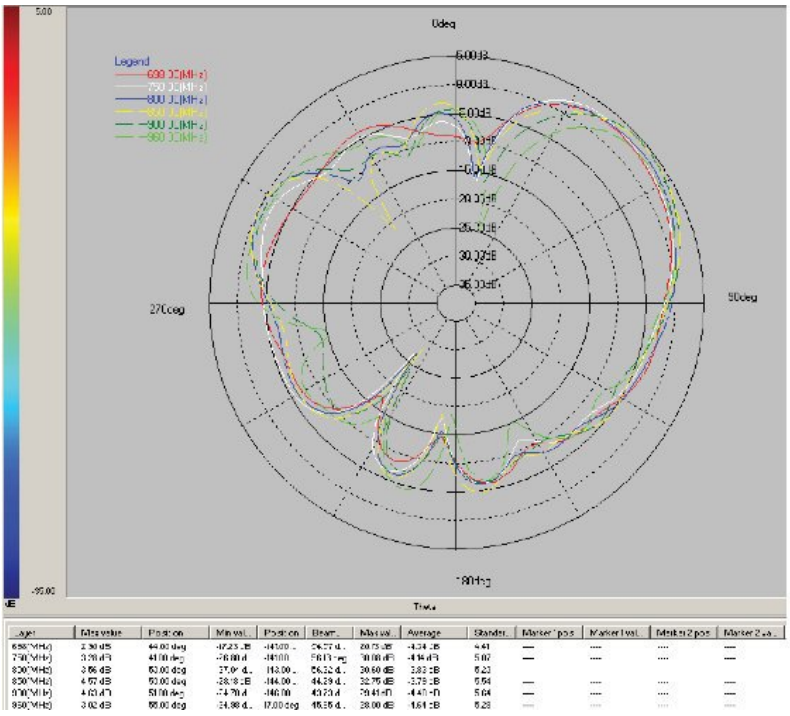


1	MPN LABEL	2	LTE-ID LABEL 2EA
3	GPS ID LABEL		

The following figure shows the Low Band 698-960 MHz EL (PHI=0).

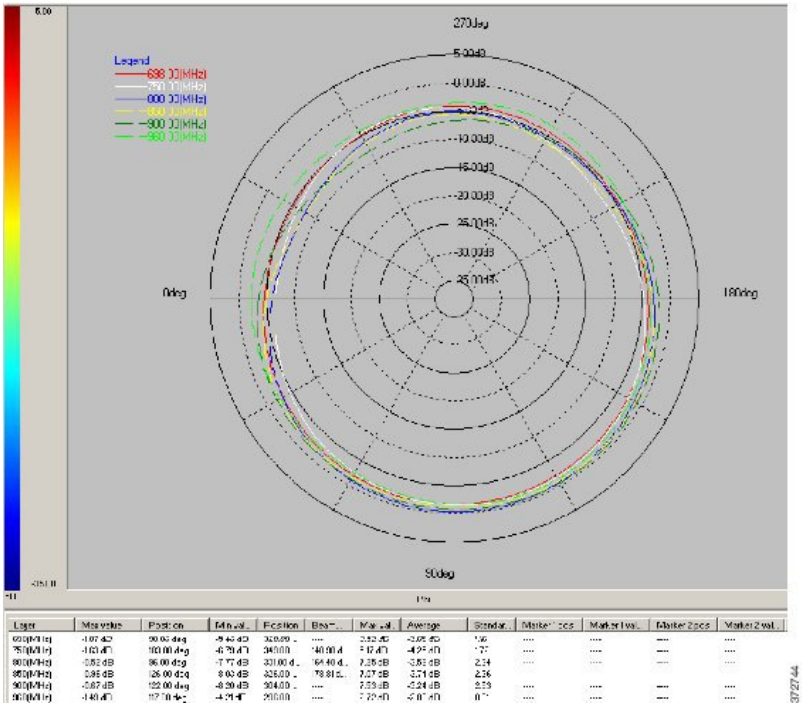


The following figure shows the Low Band 698-960 MHz EL (PHI=90).

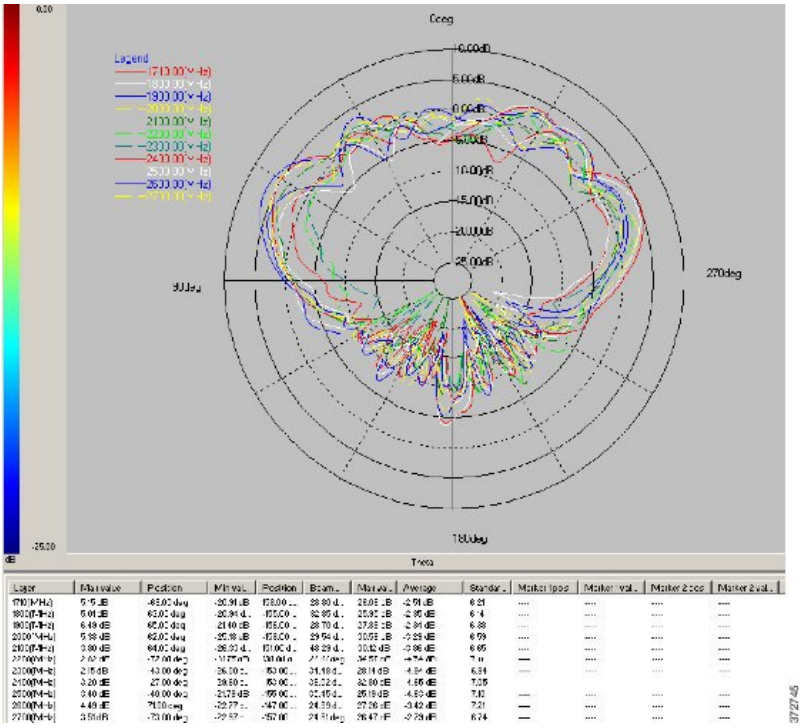


The following figure shows the Low Band 698-960 MHz AZ (THETA=90).

Figure 3: Low Band 698-960 MHz AZ (THETA=90)

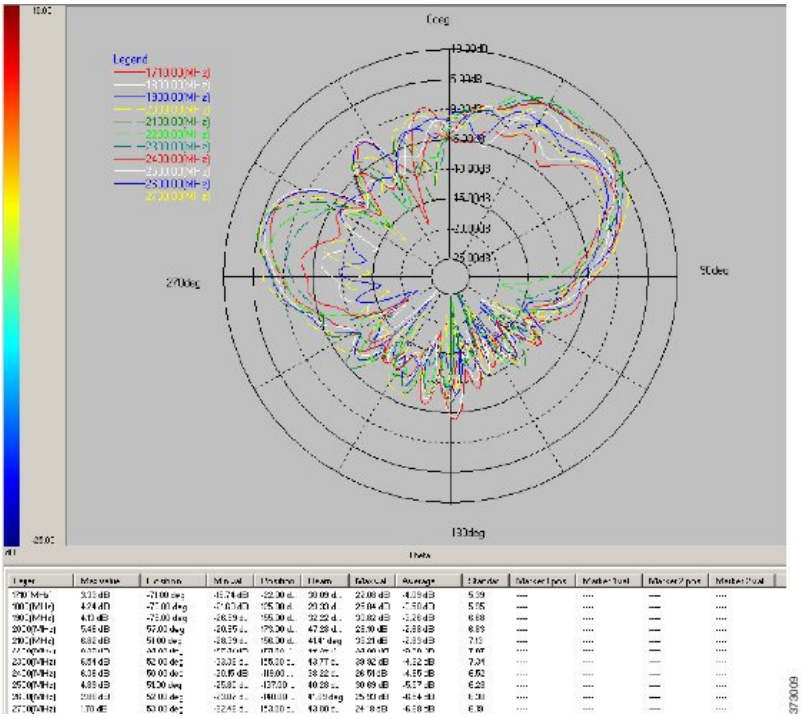


The following figure shows High Band 1710-2700 MHz EL (PHI=0).



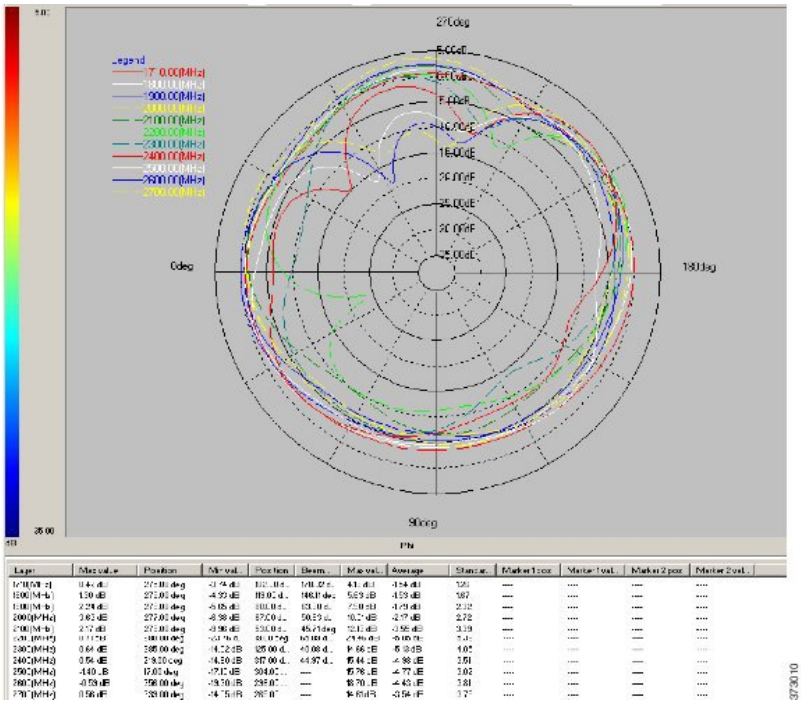
The following figure shows High Band 1710-2700 MHz EL (PHI=90).

Figure 4: High Band 1710-2700 MHz EL (PHI=90)



The following figure shows High Band 1710-2700 MHz AZ (THETA=90).

Figure 5: High Band 1710-2700 MHz AZ (THETA=90)



Supported Antennas

The following table lists the supported antennas.

Table 3: Supported Antennas

Part Number	Description
4G-LTE-ANTM-O-3-W	Indoor or outdoor low-profile antenna with 4-foot dongle, white radome.
4G-LTE-ANTM-O-3-B	Indoor or outdoor low-profile antenna with 4-foot dongle, black radome.
4G-LTE-ANTM-O-3-R	Indoor or outdoor low-profile antenna with 4-foot dongle, red radome.
ANT-4G-SR-OUT-TNC	Multiband low-profile saucer outdoor 4G Antenna
4G-LTE-ANTM-O-3-C	Indoor or outdoor low-profile antenna with 4-foot dongle, blue radome.

Supported Antenna Accessories

The following table lists the supported antenna accessories.

Table 4: Supported Antenna Accessories

Part Number	Cable Length	Maximum Insertion Loss
4G-CAB-LMR240-25	25 foot (7.5 m)	2.1 dB @ 700 MHz 4.0 dB @ 2.6 GHz
4G-CAB-LMR240-50	50 foot (15 m)	4.1 dB @ 700 MHz 7.4 dB @ 2.6 GHz
4G-CAB-LMR240-75	75 foot (23 m)	6.1 dB @ 700 MHz 11.0 dB @ 2.6 GHz
4G-CAB-ULL-20	20 foot (6 m)	0.90 dB @ 700 MHz 1.8 dB @ 2.6 GHz
4G-CAB-ULL-50	50 foot (15 m)	2.2 dB @ 700 MHz 4.3 dB @ 2.6 GHz

Antenna Options by Deployment Type

The following table lists the antenna options by deployment type.

Table 5: Antenna Options by Deployment Type

Deployment Type	Description	Antenna Accessories Required
Indoor	The antenna is installed indoors on a grounded metal surface and attached directly to a router.	None
Indoor, with extension	The antenna is installed on a grounded metal surface and attached to a router with extension cables.	• 4G-CAB-LMR240-25 • 4G-CAB-LMR240-50 • 4G-CAB-LMR240-75 • 4G-CAB-ULL-20 • 4G-CAB-ULL-50
Outdoor flush	The antenna is installed outdoors to a grounded metal surface and attached directly to a router mounted indoors.	None

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.

Installation Instructions

The following section contains steps for installing the 4G-LTE-ANTM-O-3-B antenna:

Step 1 While choosing the location, keep the following in mind:

- Attempt to center the antenna on a flat plane.

  Attempt to position the antenna so that it has 8 inches of flat plane in any given direction.

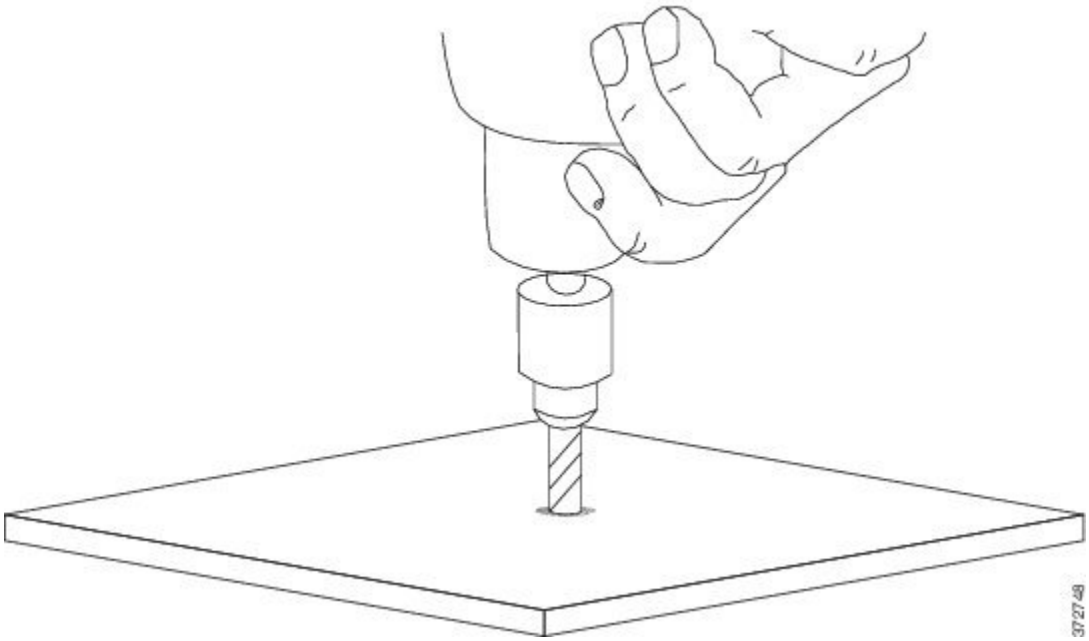
  Attempt to space at least 16 inches from an adjacent antenna or metallic structure and choose a location with gentle surface curves to ensure proper sealing.

  Ensure that there is a space that is 2 inches deep and 2 inches in diameter below the mounting surface to allow sufficient clearance for the mounting stud, hardware, and cables.

  Ensure that the diameter of the hole is 5/8 inch.

Step 2 Drill a hole through the mounting surface where the center of the antenna is located. Ensure that the hole is deburred of sharp edges to prevent cable damage during installation.

Figure 6: Drill the Mounting Surface



Step 3 Clean the mounting surface around the hole. The surface must be free of any debris, which would otherwise prevent the antenna's inner foam gasket from adhering to or the outer rubber gasket from forming a seal.

Step 4 Remove the nut from the mounting stud and cables one by one.

Step 5 Insert the mounting stud through the hole and then thread the cables through the serrated face nut one by one.

Warning It is important that the orientation of the serrated face nut should be correct. Otherwise, the serrated part of the lock nut will not bite into the mounting stud.

Figure 7: Bottom View of the Antenna

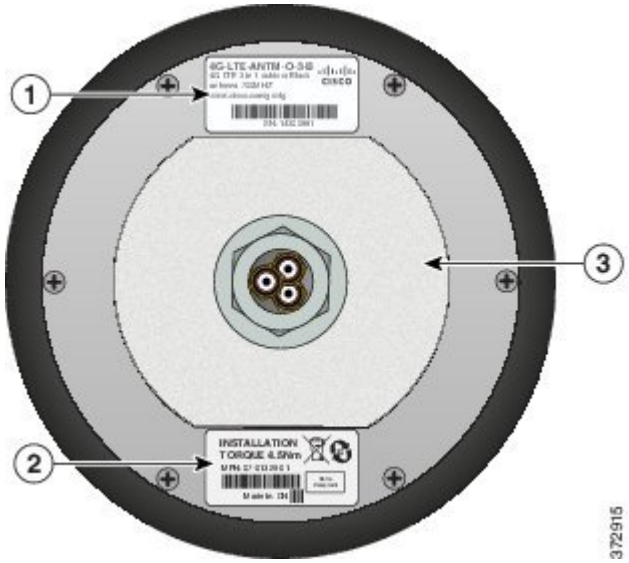
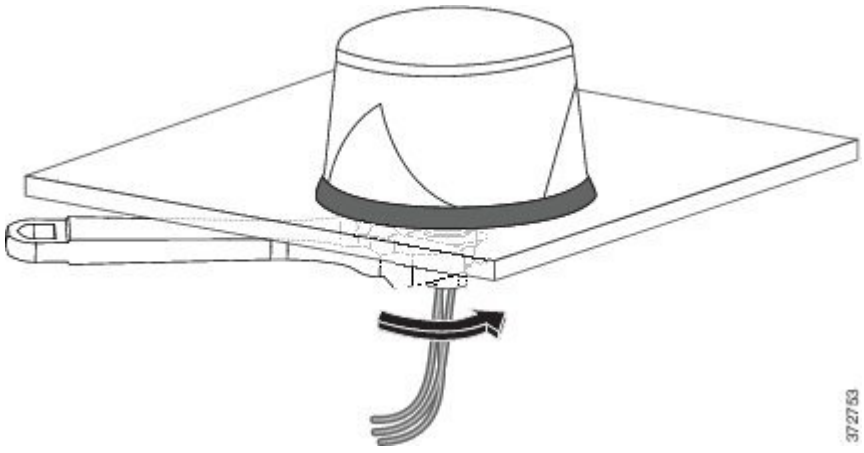


Table 6:

Item	Description
1	Product ID and Serialization Label
2	MPN and Torque Label
3	Liner

Step 6 Position the antenna onto the mounting surface and tighten the nut hand-tight, as shown in the following figure. Tighten it further using a wrench until the antenna is fully seated. Visually inspect the outer rubber antenna gasket to ensure that it has been compressed and sealed tightly against the mounting surface and radome.

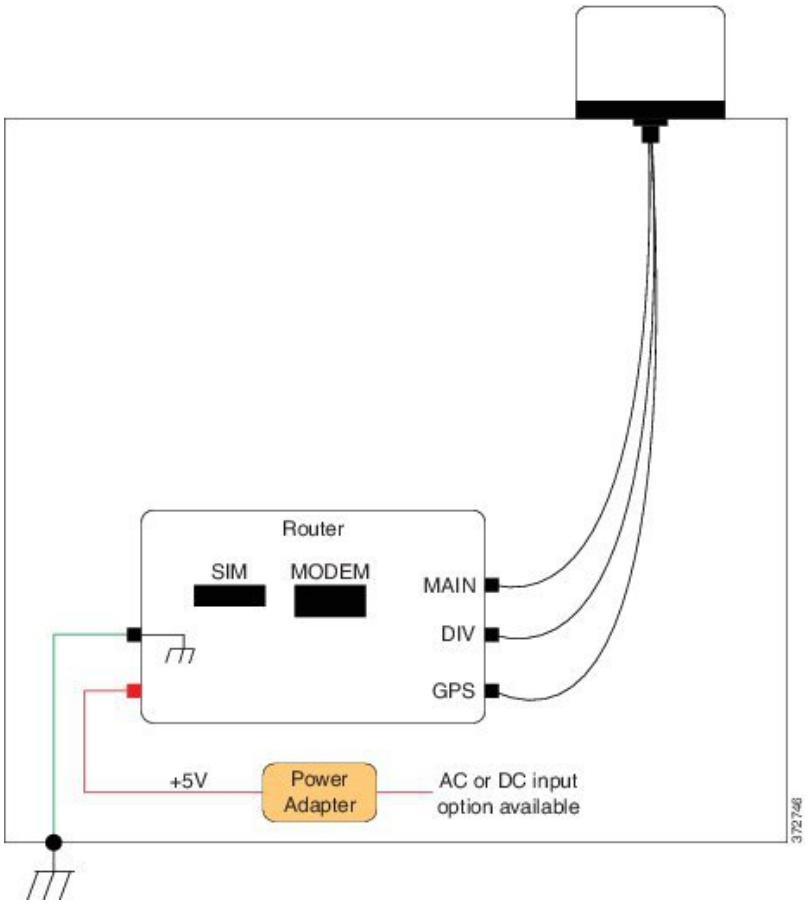
Figure 8: Tighten the Nut after the Antenna is fully seated



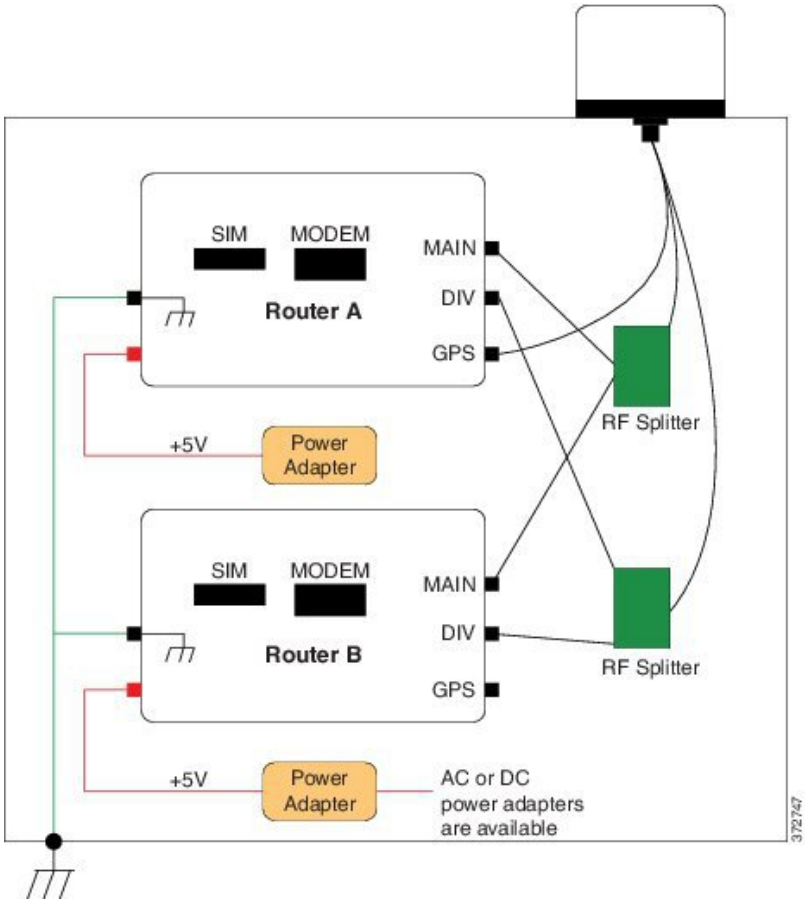
Deployment Scenarios

The following figure shows the deployment of the 4G-LTE-ANTM-O-3-B antenna on an ATM with a single router.

Note All the three antenna cables are SubMiniature version A (SMA-male) connectors, but the MAIN and the Diversity (DIV) of the router has the Threaded Neill–Concelman (TNC-female) connectors, and the GPS has an SMA-female connector. In this case, an SMA-female to TNC-male adapter needs to be used to connect the SMA-male connectors to the MAIN and DIV of the router because they cannot be connected to the SMA-male connectors directly.



The following figure shows the deployment of 4G-LTE-ANTM-O-3-B on an ATM with dual routers.



Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager .
- To get the business impact you're looking for with the technologies that matter, visit Cisco Services .
- To submit a service request, visit Cisco Support .
- To discover and browse secure, validated enterprise-class apps, products, solutions and services, visit Cisco Marketplace .
- To obtain general networking, training, and certification titles, visit Cisco Press .
- To find warranty information for a specific product or product family, access Cisco Warranty Finder .

Modifications to this product not authorized by Cisco could void the FCC approval and negate your authority to operate the product.

The Cisco implementation of TCP header compression is an adaptation of a program developed by the University of California, Berkeley (UCB) as part of UCB's public domain version of the UNIX operating system. All rights reserved. Copyright © 1981, Regents of the University of California.

NOTWITHSTANDING ANY OTHER WARRANTY HEREIN, ALL DOCUMENT FILES AND SOFTWARE OF THESE SUPPLIERS ARE PROVIDED "AS IS" WITH ALL FAULTS. CISCO AND THE ABOVE-NAMED SUPPLIERS DISCLAIM ALL WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, THOSE OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE

AND NONINFRINGEMENT OR ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

IN NO EVENT SHALL CISCO OR ITS SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES, INCLUDING, WITHOUT LIMITATION, LOST PROFITS OR LOSS OR DAMAGE TO DATA ARISING OUT OF THE USE OR INABILITY TO USE THIS MANUAL, EVEN IF CISCO OR ITS SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Any Internet Protocol (IP) addresses and phone numbers used in this document are not intended to be actual addresses and phone numbers. Any examples, command display output, network topology diagrams, and other figures included in the document are shown for illustrative purposes only. Any use of actual IP addresses or phone numbers in illustrative content is unintentional and coincidental.

All printed copies and duplicate soft copies of this document are considered uncontrolled. See the current online version for the latest version.

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco website at www.cisco.com/go/offices .