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Coho 6 dBi Patch Antenna Specification (AIR-ANT2460P-R)

Headline

This document outlines the technical requirements for a 2.4 GHz, 6 dBi patch antenna that can be connected directly to a Cisco AP via an RP-TNC connector. This Cisco design is intended to replace an antenna that is procured from an outside supplier.

Approvals

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Revision History

Rev	Date	Author	Comment
1.0	2/23/2005	Steve Saliga	Initial Release, using simulated results for electrical specs
2.0	3/25/2005	Steve Saliga	Updated the patterns and the electrical specs after prototyping. Also updated the physical size of the patch, the dielectric and the ground plane.

1. Introduction

This document describes the set of specifications for a single patch antenna to be used in the 2.4 GHz band. The basic features of this antenna are as follows:

- Directional antenna for indoor/outdoor operation
- RP-TNC Connector with 3-ft of plenum rated, cold temperature capable cable.
- Operates over the entire 2.4 GHz band.
- Peak gain is around 6 dBi

In general, this antenna will be housed in a white polycarbonate radome very similar to the Coho AIR-ANT2485P-R. It will be built with 3 feet of off-white plenum rated cable and terminated in an RP-TNC.

The specifications for this antenna will be presented sequentially with Electrical Specifications first, followed by Mechanical/Environmental Specifications and General Specifications.

2. Physical Appearance

The actual antenna inside the radome is expected to be built on a fairly large ground plane of about 90 mm x 100 mm (3.5 in x 4.3 in). This large ground plane size allows for the use of a simple radome that fits over the ground plane rather than use two pieces of plastic to form the enclosure. This will lend itself to a (roughly) square radome that may look something like that shown in the preliminary drawing in Figure 2.1.

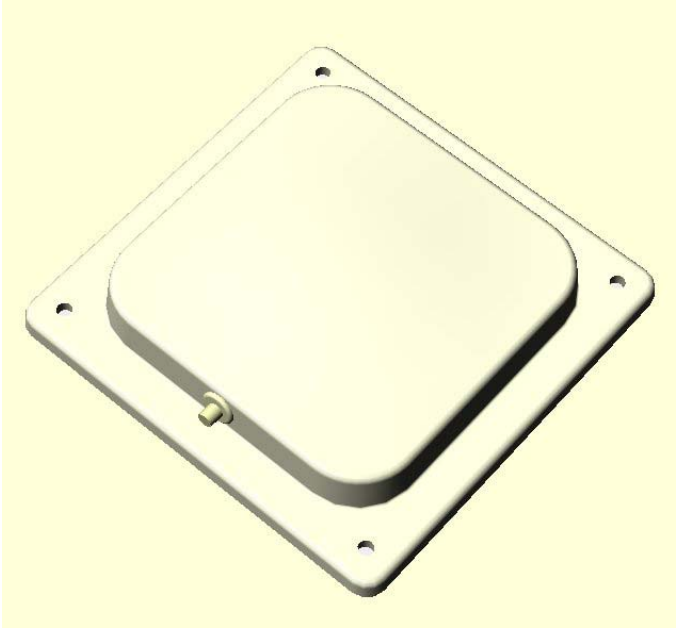

Figure 2.1
Preliminary Industrial Design of the 6 dBi Patch Antenna

3. 6 dBi Patch Antenna Specification

This section contains both the electrical and mechanical specs for the Coho 6 dBi patch antenna. Basically, this is a single patch antenna built with a high density polyethylene dielectric over a ground plane. The antenna will have 3 feet of white/off-white plenum rated coaxial cable capable of operating down to -30 C.

3.1. Antenna Electrical Specifications and Patterns

The electrical specifications for this antenna are summarized in Table 3.1.1 below. H- and E-plane patterns covering the whole band are shown in Figures 3.1.1.and 3.1.2. Note that the patterns include all cable loss as well as losses associated with a radome.

	6 dBi Patch Antenna - Electrical Specifications				
	Parameter	**Design Goal**	**Minimum Acceptable**	**Maximum Acceptable**	**Notes**
1	Antenna Type	Single Patch Antenna			
2	Operating Frequency Range	2400 MHz - 2484 MHz			
3	Nominal Input Impedance	50 Ω			
4	2:1 VSWR Bandwidth	2400 MHz – 2484 MHz			
5	Peak Gain	6 dBi			More like 6.5 dBi including Cable Loss
6	Polarization	Linear, Vertical			
7	E-Plane 3 dB Beamwidth	69 degrees			
8	H-Plane 3-dB Beamwidth	75 degrees			
9	F/B Ratio	18 dB			
10	Cross-Pol Discrimination	15 dB			Within the main beam.
11	Construction	The antenna is a single patch built with a HDPE dielectric over a ground plane. The patch is about 40 mm W x 38.8 mm L and is formed from a single piece of brass. The feed is located 10.5 mm from the edge of the patch. The ground plane is 90 mm x 100 mm and is built from 2.6 mm thick aluminum. The dielectric is ¼" thick			
12	Size	90 mm x 100 mm (3.5 in x 3.9 in)			

Table 3.1.1
Coho 6 dBi Patch Antenna, Electrical Specifications

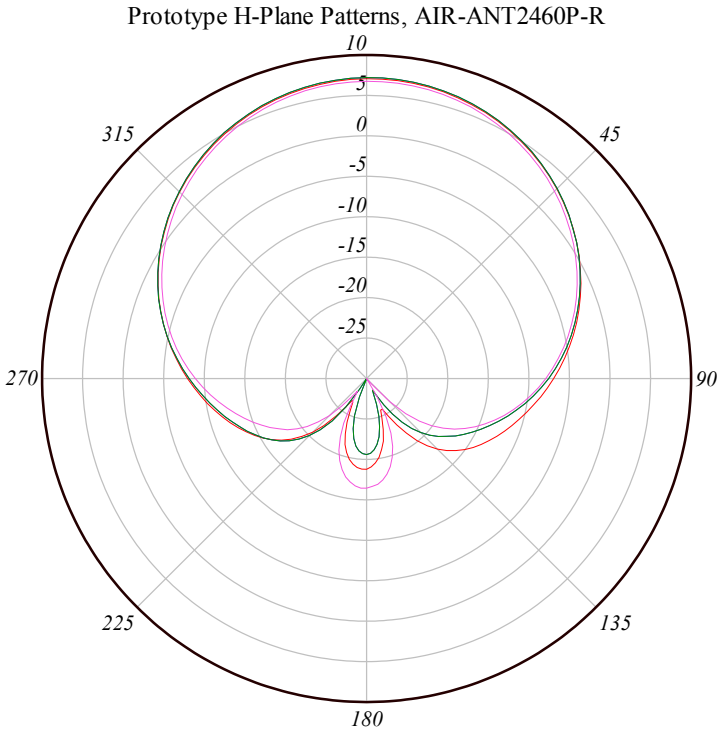

Figure 3.1.1
AIR-ANT2460P-R, Prototype H-Plane Patterns

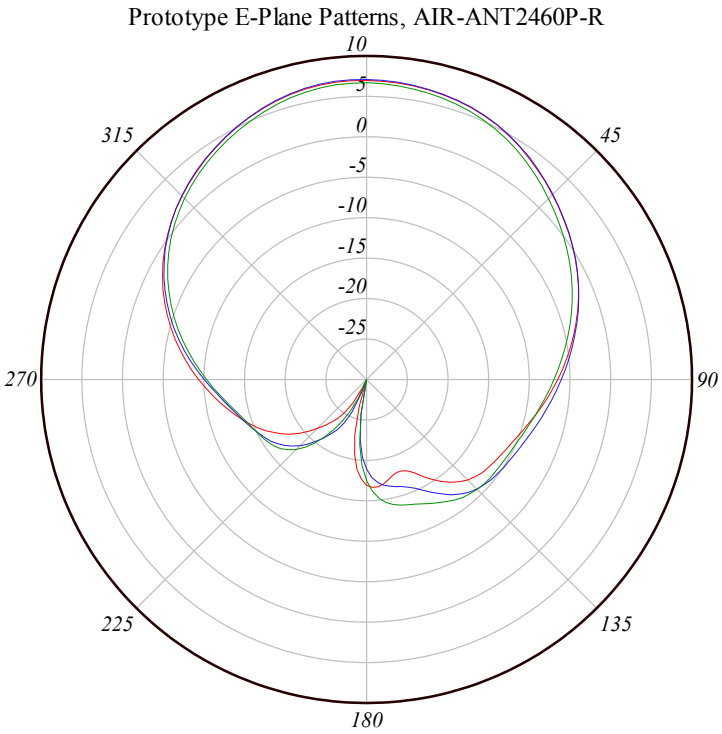

Figure 3.1.2
AIR-ANT2460P-R, Prototype E-Plane Patterns

3.2.Antenna Mechanical and Environmental Specifications

The mechanical specifications will cover the physical appearance of the antenna as well as all mounting, cable and connectors. The mechanical and environmental specs are summarized in Table 3.2.1.

	6 dBi Patch Antenna - Mechanical /Environmental Specifications				
	Parameter	**Design Goal**	**Minimum Acceptable**	**Max Acceptable**	**Notes**
1	Radome Length	4.0 inches			
2	Radome Width	3.6 inches			
3	Radome Height	< 1 inch			
4	Radome Thickness	0.060 inches			
5	Radome Material	Lexan™ EXL 9330			
6	Radome Color	White			GE Color #WH9B084
7	Antenna Dielectric	1/4" thick HDPE			Color is opaque white
8	Cable Type	Times AA-9303 or equivalent			Plenum Rated, UV Stable, Cold Temperature Capable
9	Cable Color	White/Off White			Pantone Cool Grey 2C
10	Cable Length	36 in	36 in	38 in	
11	Connector Type	RP-TNC Male			
12	Mounting Options	Wall mountable with four screws. Decorative screw caps will cover the screw heads.			
13	Environment	Indoor/Outdoor			
14	Operating Temperature Range	-30 C to +70 C	-30 C to +70 C		
15	Storage Temperature	-40 C to +85 C			
16	Water Tightness	IEC 60529, Code IP-X4, Splashing Water. Total test time is 10 minutes according to spec. VSWR still as specified.			
17	Salt Mist	MIL-STD-810F, Method 509.4, 5% salt solution. VSWR still as specified			
18	Vibration Test (non-operational)	Product shall be tested per section 4.3.5 of ENG-3396, Rev. 10, Industrial Product (Cisco standard test). VSWR still as specified and no deformation or exterior damage such that the product is considered "un-sellable".			

19	Humidity Test (non-operational)	Product shall be tested per section 4.3.3 of ENG-3396, Rev. 10, Industrial Product (Cisco standard test). VSWR still as specified and no deformation or exterior damage such that the product is considered “un-sellable”.
20	Mechanical Shock (non-operational)	Product shall be tested per section 4.3.4 of ENG-3396, Rev. 10, Industrial Product (Cisco standard test). VSWR still as specified and no deformation or exterior damage such that the product is considered “un-sellable”.
21	Temperature Shock (non-operational)	Product shall be tested per section 4.3.1 of ENG-3396, Rev. 10, Industrial Product (Cisco standard test). VSWR still as specified and no deformation or exterior damage such that the product is considered “un-sellable”.
22	Cable Pull Test	15-lbs straight pull with antenna held fixed.
23	Drop Test	1 meter drop to tile, 3 drops vertically and horizontally, unpackaged. VSWR is still as specified. No damage to the radome that would render the product unusable.

Table 3.2.1
Coho 6 dBi Patch, Mechanical and Environmental Specifications

3.3. General Requirements

The antenna markings and documentation requirements are outlined below in Table 3.3.1.

	6 dBi Patch Antenna - General Requirements	
1	Antenna Marking	The radome will be Cisco branded with a pad-printed logo.
2	Samples	Samples will be created and submitted according to a mutually agreed upon plan between the program team and Cisco engineering.

Table 3.3.1
Coho 6 dBi Patch Antenna, General Requirements