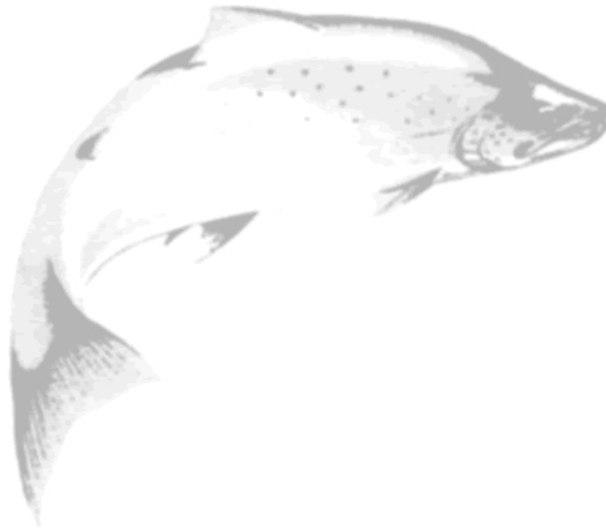




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Technical Specification for the Salar 2.4 GHz 802.11n Ceiling Mount Omnidirectional Antenna

Headline

This document outlines the technical requirements for a 2.4 GHz plenum rated antenna to be used with Cisco Aironet 802.11n and/or pre-802.11n capable access points. This antenna is built with three (3) radiating elements and three plenum rated cables. The antenna is designed to mount to a grid-style ceiling system employing T-rails or "Trimline" channel-type system.

Approvals

Name / Title	Signature	Date
Fred Anderson Manager, RF Engineering		
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Jenny Adams Marketing Business Analyst		
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Revision History

Rev	Date	Author	Comment
1.0	5/11/06	Steve Saliga	Initial Release
2.0	9/13/06	Steve Saliga	• Changed radome material from ULTem 1000 to ULTem 1110 to reflect the most recent inputs from GE • Changed drop test from 3 drops per side to 1 drop per side to reflect mechanical engineering preferences • Changed temperatures used in “Temperature Shock” test to -40 C to +85 C to match the storage temperature

1. Introduction

This document describes the complete set of required specifications for a plenum rated antenna for 2.4 GHz pre-802.11n and 802.11n 3-antenna access points. The radiating elements are simple monopole elements above a ground plane, and each element is fed with its own cable. The entire antenna will be composed of three such elements, each spaced about 4 inches (center-to-center) apart, or about 0.83 wavelengths. Each cable is 3-ft long, off-white and plenum rated, built with a reverse polarity-TNC connector. The radome will be based on those used for previous Cisco antenna products so that it has the same “family” look and feel.

2. Antenna Electrical Specifications

The electrical specifications for this antenna are summarized in Table 1 below. All the manufacturer’s specifications should be reported in data sheet format.

Electrical Specifications					
	Parameter	Design Goal	Minimum Acceptable	Maximum Acceptable	Notes
1	Antenna Type	Omnidirectional			
2	Operating Frequency Range	2402 - 2485 MHz			
3	Nominal Input Impedance	50 Ω			
4	1.5:1 VSWR Bandwidth	2385 - 2515 MHz			
5	Peak Gain	3 dBi			(1) 45-degree Downtilt. (2) Gain could be as high as 4 dBi
6	Polarization	Linear			
7	E-Plane 3 dB Beamwidth	60 Degrees			The E-plane beamwidths of the elements vary based on position on the ground plane. 60-degrees is close to all values in one plane
8	H-Plane 3-dB Beamwidth	Omnidirectional			
9	Front-to-Back Ratio	10 dB			

Table 1
Summary of Antenna Electrical Specifications

3. 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 2. A model of the antenna housing is shown in Figure 1 and Figure 2 shows the radiating elements inside the radome. The proposed ground plane is 4" x 12". Each antenna needs about 4" x 4" to give the sort of performance we are looking for so that yields spacing between each antenna of about 0.83 wavelengths.



Figure 1
Solid Model of Antenna Housing

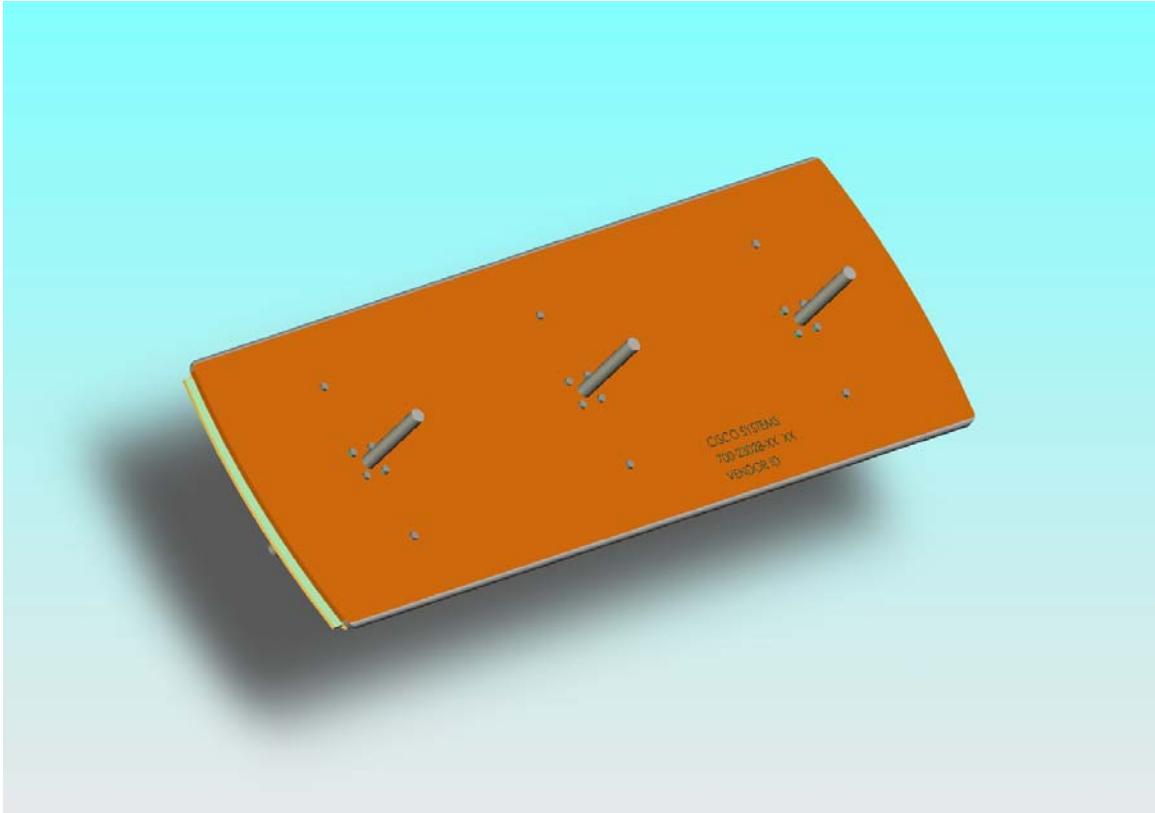


Figure 2
Solid Model of Monopole Elements inside Housing

	Mechanical /Environmental Specifications				
	Parameter	Design Goal	Minimum Acceptable	Maximum Acceptable	Notes
1	Antenna Length	12.1 in			Including radome
2	Antenna Width	4.2 in			Including radome
3	Antenna Height	1.6 in			Including radome
4	Antenna Weight	1.5 lb			estimate
5	Antenna Ground Plane	80 mil thick Aluminum			
6	Antenna Color	White			Cisco White
7	Radome Material	GE ULTem™ 1110			To aid in passing UL-2043 burn test
8	Coax Type	Plenum Rated, UV stable Times AA-9303 or equivalent			
9	Coax Length	36 inches	36 in	38 in	
10	Connector Type	RP-TNC Plug			Threads inspected with standard go/no-go gauge.
11	Connector Finish	Shiny Chrome			
12	Mounting Options	- Mountable to standard dropped ceiling T-rail system with integral clips - Mountable to "channel-type" dropped ceiling system with integral clips			
13	Environment	Indoor, office ONLY			- Not usable for outdoor deployments. - Not usable for enclosed outdoor environments like "garden center" retail or subways.
14	Operating Temperature Range	0 C to +55 C			
15	Storage Temperature Range	-40 to +85 C			
16	Pull Test	Straight pull of 40-lb applied to connector. No connector separation or deformation at either end of cable. VSWR still less than 2:1.			
17	Drop Test	1-meter drop to tile, 1 drop per side. No permanent damage or deformation. VSWR still less than 2:1.			

18	Temperature Shock	Non-operational Temperature Shock, See ENG-3396. Humidity not controlled. Increase temp to +85 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -40 C @ 5 C/minute minimum. Dwell for 1 hr. Increase temp to +85 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -40 C @ 5 C/minute minimum. Dwell for 1 hr. Increase temp to +85 C @ 5 C/minute minimum. Dwell for 1 hr. Decrease temp to -40 C @ 5 C/minute minimum. Dwell for 1 hr.												
19	Humidity	Design Limit: All Product Categories: 95% RH Test Method: The product shall be subjected to the temperature and humidity profile detailed in the Aggravated Humidity test in MIL-STD-810 Method 507.3, Procedure III for five 24 hour cycles. The product shall be non-operational during this entire period. VSWR still less than 1.5:1 Manufacturer to provide standard test spec and results.												
20	Vibration	Cisco Vibration Test Test Method: This test shall be run at standard room conditions. The product shall be affixed to the vibration table in each of its three mutually perpendicular axes and subjected to a random vibration input of 30 minutes in each axis. The random vibration spectrum to be used covers the frequency band of 3-500 Hz at an input level of 1.12 G-rms as described below in the table titled, "Non-Operational Random Vibration Profile". MIL-STD-810, Method 514.4 should be used as a guideline. Non-Operational Random Vibration Profile <table> <tr> <th>Frequency</th><th>Spectral Break Point</th><th>Slope</th></tr> <tr> <td>3-10Hz</td><td></td><td>5 db/octave</td></tr> <tr> <td>10-100Hz</td><td>.0065 G2/Hz</td><td></td></tr> <tr> <td>100-500Hz</td><td></td><td>-5 db/octave</td></tr> </table> VSWR still as specified and no deformation or exterior damage such that the product is considered "un-sellable".	Frequency	Spectral Break Point	Slope	3-10Hz		5 db/octave	10-100Hz	.0065 G2/Hz		100-500Hz		-5 db/octave
Frequency	Spectral Break Point	Slope												
3-10Hz		5 db/octave												
10-100Hz	.0065 G2/Hz													
100-500Hz		-5 db/octave												

21	Mechanical Shock (non-operational)	Cisco Non-Operational Shock Test Conditions: Temperature = 21 C, +/- 5 C, Humidity = 30-60% RH. Product shall be subjected to one Trapezoidal Shock impact for each direction (positive and negative) in each of 3 axes at a level not to exceed the maximum peak acceleration values listed. <table><tr><td>Weight</td><td>MINIMUM Peak Acceleration</td><td>MAXIMUM Peak Acceleration</td><td>Min. Velocity Change</td></tr><tr><td>< 4.5 Kg</td><td>65 G</td><td>80 G</td><td>4.78 m/s</td></tr></table> Trapezoidal Shock pulse generation is referred to ASTM D 3332. Record VSWR at Minimum Peak Acceleration level and again at Maximum Peak Acceleration level. Pass Criteria: VSWR still as specified and no deformation or exterior damage (at minimum acceleration) levels such that the product is considered "un-sellable".	Weight	MINIMUM Peak Acceleration	MAXIMUM Peak Acceleration	Min. Velocity Change	< 4.5 Kg	65 G	80 G	4.78 m/s
Weight	MINIMUM Peak Acceleration	MAXIMUM Peak Acceleration	Min. Velocity Change							
< 4.5 Kg	65 G	80 G	4.78 m/s							

Table 2
Summary of Antenna Mechanical and Environmental Specifications

4. General Requirements

Antenna markings, documentation and sample requirements as outlined in Table 3.

General Requirements		
1	Antenna Marking	• Cisco logo pad-printed on radome
2	Mechanical/ Environmental Documentation	• A full set of mechanical drawings and all environmental test data will be created either by Cisco engineering or by a subcontractor or in combination
3	Samples	• Samples will be created and submitted according to a mutually agreed upon plan between the subcontractor and the Salar program team.

Table 3
General Requirements