

October 24, 2006

Cisco Systems 170 West Tasman Drive San Jose, CA 95134

Dear Craig Mullis,

Enclosed is the Dynamic Frequency Selection (DFS) test report for compliance testing of the Cisco Systems, CP-7921G 802.11abg Phone as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-03 ed.), Title 47 of the CFR, Part 15.407 sub part E for Intentional Radiators.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact us.

Sincerely yours, MET LABORATORIES, INC.

Jennifer Sanchez Documentation Department

Reference: (\Cisco Systems\EMCS20759-FCC407)

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Electromagnetic Compatibility Criteria Test Report

for the

Cisco Systems Model CP-7921G 802.11abg Phone

> Verified under the FCC Certification Rules contained in Title 47 of the CFR, Part 15.407 for Intentional Radiators

MET Report: EMCEMCS20759-FCC407

October 24, 2006

Prepared For:

Cisco Systems 170 West Tasman Drive San Jose, CA 95134

> Prepared By: MET Laboratories, Inc. 4855 Patrick Henry Drive, Building 6 Santa Clara, California 95054



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Shawn McMillen, Project Engineer Electromagnetic Compatibility Lab

Jennifer Sanchez Documentation Department

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 15.407, of the FCC Rules under normal use and maintenance.

Tony Permsombut, Manager Electromagnetic Compatibility Lab



Report Status Sheet

Revision	Report Date	Reason for Revision	
Ø	October 24, 2006	Initial Issue.	



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ALC	Automatic Level Control
ACF	Antenna Correction Factor
Cal	Calibration
AWG	Arbitrary Waveform Generator
EIRP	Equivalent Isotropic Radiated Power
FM	Frequency Modulation
IF	Intermediate Frequency
MPEG	Moving Picture Experts Group
d	Measurement Distance
RDD	Radar Detection Device
RF	Radio Frequency
U-NII	Unlicensed National Information Infrastructure
dB	Decibels
dBμA	Decibels above one microamp
dBμV	Decibels above one microvolt
dBµA/m	Decibels above one microamp per meter
dBμV/m	Decibels above one microvolt per meter
E	Electric Field
DSL	Digital Subscriber Line
f	Frequency
FCC	Federal Communications Commission
Hz	Hertz
kHz	kilohertz
kPa	kilopascal
kV	kilovolt
MHz	Megahertz
μ	microfarad
μs	microseconds
PRF	Pulse Repetition Frequency
RF	Radio Frequency
RMS	Root-Mean-Square
V/m	Volts per meter

List of Terms and Abbreviations



Electromagnetic Compatibility Equipment Configuration CFR Title 47, Part 15, Subpart E

Cisco Systems CP-7921G 802.11abg Phone

I. Executive Summary



A. Purpose of Test

CP-7921G 802.11abg Phone

An EMC evaluation was performed to determine compliance of the Cisco Systems CP-7921G 802.11abg Phone, with the Dynamic Frequency Selection (DFS) requirements of part §15.407 sub part E. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the CP-7921G 802.11abg Phone. Cisco Systems should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the CP-7921G 802.11abg Phone, has been **permanently** discontinued.

B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, §15.407.

Reference Description		Results
15.407 (h)(1)	407 (h)(1) Transmit Power Control (TCP)	
15.407 (h)(2)	15.407 (h)(2) Radar Detection Function of Dynamic Frequency Selection (DFS)	
15.407 (h)(2)(ii) Channel Availability Check Time		N/A
15.407 (h)(2)(iii) Channel Move Time and Channel Closing Time		Compliant
15.407 (h)(2)(iv) Non-Occupancy Period		Compliant

 Table 1 Executive Summary of EMC Part 15.407 DFS ComplianceTesting



Electromagnetic Compatibility Equipment Configuration CFR Title 47, Part 15, Subpart E

Cisco Systems CP-7921G 802.11abg Phone

II. Equipment Configuration



A. Overview

MET Laboratories, Inc. was contracted by Cisco Systems to perform testing on the CP-7921G 802.11abg Phone.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Cisco Systems CP-7921G 802.11abg Phone.

The results obtained relate only to the item(s) tested.

Model(s) Tested:	CP-7921G 802.11abg Phone				
Model(s) Covered:	CP-7921G 802.11abg Phone				
	Primary Power: 3.7V 1400mAh Std Battery				
	FCC ID: LDK7900001				
EUT Specifications:	Type of Modulations:	OFDM			
	Equipment Code:	DTS			
	EUT Frequency Ranges:	5250-5350 MHz, 5470-5725 MHz			
Analysis:	The results obtained relate only to the item(s) tested.				
	Temperature: 15-35° C				
Environmental Test Conditions:	Relative Humidity: 30-60%				
	Barometric Pressure: 860-1060 mbar				
Evaluated by:	Shawn McMillen				
Date(s):	October 24, 2006				



B. References

Public Notice DA 06-927	Compliance Measurement Procedures for Unlicensed National Infrastructure Devices Operating in the 5250-5350 MHz and 5450-5725MHz Bands Incorporating Dynamic Frequency Selection.	
CFR 47, Part 15, Subpart E	Unlicensed National Information Infrastructure Devices (UNII)	
ANSI/NCSL Z540-1-1994	Calibration Laboratories and Measuring and Test Equipment - General Requirements	
ANSI/ISO/IEC 17025:2000	General Requirements for the Competence of Testing and Calibration Laboratories	

C. Test Site

All testing was performed at MET Laboratories, Inc., 4855 Patrick Henry Drive, Building 6, Santa Clara, California 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 10 meter semi-anechoic chamber (equivalent to an Open Area Test Site). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories. In accordance with §2.948(d), MET Laboratories has been accredited by the National Voluntary Laboratory Accreditation Program

(Lab Code: 100273-0).



D. Description of Master Device

- 1. The AIR-AP1242AG-A-K9 802.11a/b/g Access Point, FCC ID LDK102056, operates in the following bands and is approved for DFS operation in the UNII 2 and 3 bands:
 - a) 2400-2483.5MHz
 - b) 5150-5250MHz
 - c) 5250-5350MHz
 - d) 5470-5725MHz
 - e) 5725-5850MHz
- 2. The maximum EIRP of the equipment in the 5GHz bans is 21.5 dBm, and the minimum possible EIRP is 3.5 dBm.
- 3. The Master requires 1.333 minutes to complete its power-on-cycle.
- 4. For the 5250-5350 MHz and 5470-5725 MHz bands, the Master device provides, on aggregate, uniform loading of the spectrum across all devices by selecting an operating channel among the available channels using a random algorithm.

E. Description of Client Device

- 1. The CP-7921G 802.11a/b/g Handset operates in the following bands:
 - a) 2400-2483.5MHz
 - b) 5150-5250MHz
 - c) 5250-5350MHz
 - d) 5470-5725MHz
 - e) 5725-5850MHz
- 2. The file used to transfer data was an FCC video file that was converted to be an audio file.



Photograph 1. Cisco Systems CP-7921G 802.11abg Phone



F. Method of Monitoring EUT Operation

A Spectrum Analyzer was used to monitor the EUT's transmitter channel, channel closing transmission time and channel move time.

G. Modifications

a) Modifications to EUT

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

H. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to Cisco Systems upon completion of testing.



Electromagnetic Compatibility for Intentional Radiators CFR Title 47, Part 15, Subpart E

III. Electromagnetic Compatibility Criteria for Intentional Radiators



Radar Type	Pulse Width (µsec)	PRI (µsec)	Number of Pulses	
1	1	1428	18	
2	1-5	150-230	23-29	
3	6-10	200-500	16-18	
4	11-20	200-500	12-16	

A. Radar Test Waveforms for Client Devices

 Table 2 Short Pulse Radar Test Waveform

B. Short Pulse Radar Waveform Generating System



Figure 1 Short Pulse Radar Waveform Generating System



C. Radar Waveform Calibration

The following equipment setup was used to calibrate the conducted Radar Waveform. A radar test signal was generated from table #7 above. The spectrum analyzer was set with a zero span using a peak detector with a RBW of 1MHZ and a VRB of 3MHz. The output level from the signal generator was adjusted to give -61dBm at the injection point into the master.







Plot 1 Radar Waveform Calibration

D. DFS Conformance Test Requirements, Procedures and Results

Test Requirements:

Test Requirements.	a)	Channel Move Time 10 seconds.
	b)	Channel Closing Transmission Time - 200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period.
	c)	A Client Device will not transmit before having received appropriate control signals from a Master Device.
	d)	A Client Device will stop all its transmission whenever instructed by a Master Device to which it is associated and will meet the Channel Move Time and Channel Closing Transmission Time requirements. The Client Device will not resume any transmission until it has again received control signals from a Master Device.
	e)	If a Client Device is performing In-Service Monitoring and detects a Radar Waveform above the DFS Detection Threshold, it will inform the Master Device. This is equivalent to the Master Device detecting the Radar Waveform and d) through f) apply.
	f)	Irrespective of Client Device or Master Device detection the Channel Move Time and the Channel Closing Transmission Time requirements remain the same.
Test Procedures:	a)	One frequency was chosen from the Operating Channels of the EUT within the 5250-5350 MHz and 5470-5725 MHz.
	b)	Both the Master and Client were brought into communication with each other and a file was transferred between both units.
	c)	Radar Waveform Type 4 from Table #7 above was chosen. The Pulse width was set to 11µsec with a PRI of 500µsec and 11 pulses.
	d)	The spectrum analyzer was setup to record a 10 second period at the moment the radar burst was introduced into the master. The Channel Move Time was recorded for each of the two UNII bands.
	e)	The system was reset and the sampling period reduced in order to measure and record the Channel Closing Transmission Time.
	f)	Once the EUT vacated the channel that specific frequency was monitored for 30 minutes to ensure EUT did not resume transmission on that channel.
	g)	Several attempts of radar detection were conducted until all channels were used up.



DFS Conformance Test Requirements, Results

Test Results

Below are the test results for both the Channel move time and Channel Closing Transmission Time for a Client device and are within the specified limits.



Plot 2 Channel move time for Client operating in UNII band 2



Plot 3 Channel move time for Client operating in UNII band 3





DFS Conformance Test Requirements, Results, Continued





Plot 5 Channel Closing Transmission Time for a client operating in UNII band 3





Figure 3 Setup for Client with Injection at the Master



DFS Conformance Test Requirements, Test Photograph



Photograph 2 DFS Test setup for Client Device



Electromagnetic Compatibility Test Equipment CFR Title 47, Part 15, Subpart E

IV. Test Equipment



Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
182243	Pulse/Function Generator	Hewlett Packard	8111A	See Note	
1S2460	Analyzer, Spectrum 9 kHz-40GHz	Agilent	E4407B	07/06/2005	07/06/2008
1S2278	10MHz-50GHz Swept Signal Generator	Agilent	83650B	08/23/2006	08/23/2007
1S2069	Digitizing Oscilloscope	Tektronix	TDS-540A	06/12/2006	06/12/2007
1S2034	Directional Coupler, 1-20 GHz	Krytar	101020020	See Note	

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.



Electromagnetic Compatibility End of Report CFR Title 47, Part 15, Subpart E

End of Report

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