

## FCC Part 24 (E) Test Report

Test performed on the  
**PCS Base Station**  
**Model: MWIBS-1900**  
**FCC ID: LDKMWIBS1900**

for  
**Cisco Systems Inc.**

Test Report: 2037661a  
Date of Report: 02/18/01



NVLAP Laboratory Code 200201-0  
Accredited for testing to FCC

	Ollie Moyrong, EMC Test Engineer
	David Chernomordik, EMC Site Manager

Review Date: 02/28/01

All services undertaken are subject to the following general policy: Reports are submitted for exclusive use of the client to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations or surveys made. This report shall not be reproduced except in full, without written consent of Intertek Testing Services, NA Inc. This report must not be used to claim product endorsement by NVLAP, NIST nor any other agency of the U.S. Government.

**Table of Contents**

**1 JOB DESCRIPTION..... 4**

- 1.1 Client Information ..... 4
- 1.2 Equipment under test (EUT) ..... 4
- 1.3 Test plan reference..... 5
- 1.4 System test configuration ..... 5
  - 1.4.1 System block diagram & Support equipment ..... 5
  - 1.4.2 Justification ..... 6
  - 1.4.3 Mode(s) of operation..... 6
- 1.5 Modifications required for compliance ..... 6

**2 TEST SUMMARY..... 7**

**3 RADIATED POWER ..... 8**

- 3.1 Test Description..... 8
- 3.2 Test Procedure ..... 8
- 3.3 Test Results ..... 8
- 3.4 Test Instrumentation ..... 8

**4 MODULATION CHARACTERISTICS..... 9**

- 4.1 Test Description..... 9

**5 OUT-OF-BAND EMISSION AT ANTENNA TERMINAL..... 10**

- 5.1 Test description ..... 10
- 5.2 Test Procedure ..... 10
- 5.3 Test Results ..... 10
- 5.4 Test instrumentation ..... 11

**6 RADIATED SPURIOUS EMISSIONS ..... 12**

- 6.1 Test Description..... 12
- 6.2 Test Procedure ..... 12
- 6.3 Test Results ..... 12
- 6.4 Test instrumentation ..... 12

**7 FREQUENCY STABILITY..... 16**

- 7.1 Test description ..... 16
- 7.2 Test Procedure ..... 16
  - 7.2.1 Frequency Stability vs. Temperature ..... 16
  - 7.2.2 Frequency Stability vs. Voltage..... 16
- 7.3 Test Results ..... 17
- 7.4 Test instrumentation ..... 17

**8 AC LINE CONDUCTED EMISSIONS ..... 18**

- 8.1 Test description ..... 18
- 8.2 Test Procedure ..... 18
- 8.3 Test Results ..... 18
- 8.4 Test instrumentation ..... 18

Cisco Systems Inc. Model: MWIBS-1900  
FCC ID:LDKMWIBS1900

Date of Test: January 20-February 17, 2000

<b>9</b>	<b>RADIATION EXPOSURE.....</b>	<b>19</b>
<b>10</b>	<b>LIST OF TEST EQUIPMENT.....</b>	<b>20</b>
<b>11</b>	<b>EXHIBIT 1.....</b>	<b>21</b>

Cisco Systems Inc. Model: MWIBS-1900  
FCC ID:LDKMWIBS1900

Date of Test: January 20-February 17, 2000

**1 JOB DESCRIPTION****1.1 Client Information**

The EUT has been tested at the request of

**Company:** Cisco Systems Inc.**Name of contact:** Dong-Chan Park**Telephone:** 408-525-6852**Fax:** 408-525-4841**1.2 Equipment under test (EUT)****Equipment type:** Base Station Radio  
**Equipment class:** Licensed Transmitter  
**Model number(s):** MWIBS-1900  
**FCC ID:**  
**Manufacturer:** SAME as above.  
**Use of Product :** Mobile communications  
**Production is planned:**  Yes,  No**Technical Specifications:**

Type of Emission	CDMA
RF Output Power	Maximum Peak Envelope Power: 12.2 dBm Maximum Average Power: 7.5 dBm
Means for variation of operating power	Software controlled
The dc voltage applied to and current into the several elements of the final RF amplifying device	+5 V
Frequency Range	1930 to 1950 MHz
Modulation	QPSK
Emission Designator	
Max. number of Channels	14
Antenna(s) (type, gain)	7.5 dBi, 3 dBi
Detachable antenna ?	Yes
External input	Data
Frequency Tolerance	$\pm 0.05$ ppm

Cisco Systems Inc. Model: MWIBS-1900  
 FCC ID:LDKMWIBS1900

Date of Test: January 20-February 17, 2000

**EUT receive date:** 01/15/01  
**EUT received condition:** Good condition prototype  
**Test start date:** 01/20/01  
**Test end date:** 02/17/01

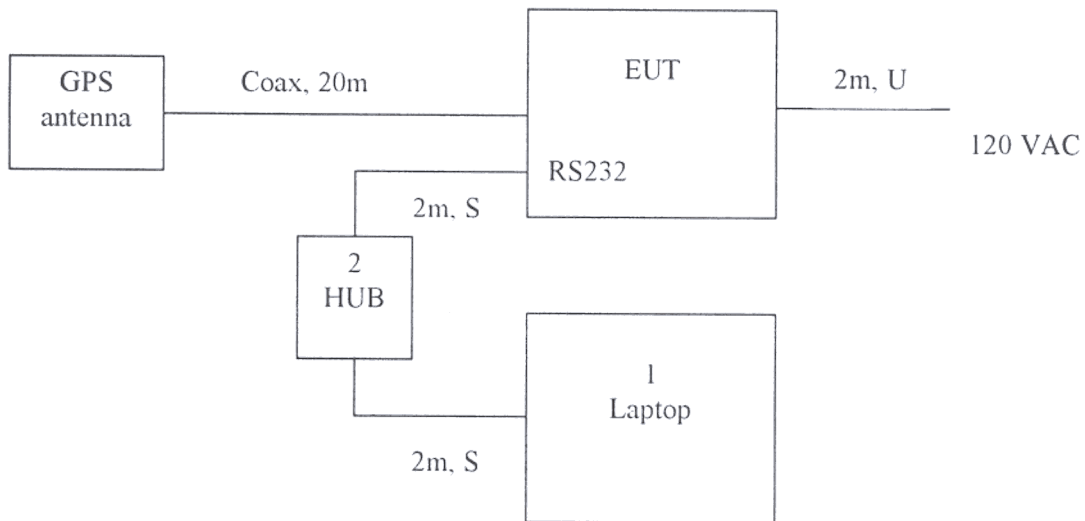
**1.3 Test plan reference**

FCC Part 2.1033, FCC Part 24 (E)

**1.4 System test configuration**

**1.4.1 System block diagram & Support equipment**

The diagram shown below details the placement of the equipment under test on the turntable.



<b>S:</b> Shielded	<b>U:</b> Unshielded	<b>F:</b> With Ferrite Core
--------------------	----------------------	-----------------------------

Support equipment					
Item	Equipment	Manufacturer	Model #	S/N #	FCC ID
1	Laptop	Sony	PCG-9212	283107313300801	AK8JPN-35060-M5-E
2	Ethernet HUB	Bay Network	EN106TP	ENT6B0A082923	N/A

**Justification**

The system was configured for testing in a typical manner in accordance with ANSI C63.4 standard.

**Mode(s) of operation**

The EUT was powered from 120 VAC. During tests, EUT was operating in transmitting/receiving mode at 3 channels:

1931.25 MHz (Ch. 25),  
1940.00 MHz (Ch. 200),  
1948.75 MHz. (Ch. 375)

**1.5 Modifications required for compliance**

No modifications were implemented by Intertek Testing Services.

**2 TEST SUMMARY**

<b>FCC RULE</b>	<b>DESCRIPTION OF TEST</b>	<b>RESULT</b>	<b>PAGE</b>
<b>Transmitter Section</b>			
2.1046 24.232(b)	RF Power Output	12.2 dBm (Peak); 7.5 dBm (Average)	7
	Equivalent Isotropic Radiated Power (EIRP)	19.7 dBm (Peak), maximum 16 dBm (Average), maximum	
2.1047	Modulation Characteristics	Not Applicable	-
2.1051 24.238	Out-of-band emissions at antenna terminal	Pass	9
2.1053 24.238	Radiated Spurious Emission Attenuation	Pass	12
2.1055 24.235	Frequency Stability	Pass	18
2.1091	Radiated Exposure	Pass	20
<b>Digital Section</b>			
15.109	Radiated Emissions	Pass	12
15.107	Line Conducted Emissions	Pass	19

### 3 RADIATED POWER

#### 3.1 Test Description

Parameter:	FCC § 2.1046
Requirement:	FCC § 24.232(a)
(EIRP):	< 1640 Watts peak

#### 3.2 Test Procedure

The spectrum analyzer was connected to the antenna terminal of the EUT through a cable having 1.0 dB insertion loss, which was included as OFFSET. The Average output power was set to -8.5 dBm measured by a spectrum analyzer with 30 kHz resolution and 300 Hz video bandwidth. This corresponds to 7.5 dBm of average power. The peak output power then was measured with a spectrum analyzer with the resolution bandwidth of 10 MHz (which is 8 times wider than the bandwidth of the signal) and the video bandwidth of 7 MHz. A peak power meter was also used to verify that the Spectrum Analyzer measured a peak power.

The Equivalent Isotropic Radiated Power (EIRP in dBm) was calculated using equation:

$$\text{EIRP} = P + G$$

Where P is the Output Power (in dBm), G is an antenna Gain (in dBi)

#### 3.3 Test Results

Frequency, MHz	Peak Output Power, dBm	Antenna Gain, dBi	Peak EIRP, dBm	Peak EIRP, mWatt
1931.25	12.2	7.5	19.7	93.3
1940.00	12.2	7.5	19.7	93.3
1948.75	11.1	7.5	18.6	72.4

See plots # 3.1, 3.2, 3.3 in Exhibit 1 for the peak output power.

See also plots # 3.4, 3.5, 3.6 in Exhibit 1 performed with 30 kHz resolution, 300 Hz video bandwidth. The average power equals the readings on the plots plus 16 dB.

#### 3.4 Test Instrumentation

Tektronix 2784 Spectrum Analyzer  
HP 8900D Peak Power Meter  
HP 7470A Plotter



Cisco Systems Inc. Model: MWIBS-1900  
FCC ID:LDKMWIBS1900

Date of Test: January 20-February 17, 2000

#### 4 MODULATION CHARACTERISTICS

##### 4.1 Test Description

Parameter:	FCC § 2.1047
Requirement:	Not Applicable

## 5 OUT-OF-BAND EMISSION AT ANTENNA TERMINAL

### 5.1 Test description

Parameter:	FCC §2.1051
Requirement:	FCC § 238
Emission Attenuation:	At least $43 + 10\log(P \text{ in Watts})$ dB below the transmitter Power on any frequency outside a licensee's frequency block.

### 5.2 Test Procedure

The RF output was connected to the input of the spectrum analyzer through sufficient attenuation. For measurements below 1 GHz, the resolution and video bandwidths of the spectrum analyzer were set to 100 kHz. For each of three fundamental frequencies, the output power (peak reading) was measured and plotted. in the frequency range from 30 MHz to 1 GHz.

For measurements above 1 GHz, the resolution bandwidth of the spectrum analyzer was set to 1 MHz and the video bandwidth to 7 MHz. For each of three fundamental frequencies, the output power (average reading) was measured and plotted. in the frequency range from 1 GHz to 20 GHz.

For Low Channel (1931.25 MHz fundamental), the resolution bandwidth of 30 kHz was used for measurement in the frequency range from 1929 MHz to 1930 MHz.

### 5.3 Test Results

See Exhibit for the out-of-band antenna conducted emission plots:

Plot Number	Description
5.1.a	Low Channel, 30 - 1000 MHz, 100 kHz resolution
5.2.a	Low Channel, 1000 - 1929 MHz, 1 MHz resolution
5.3.a	Low Channel, 1929 - 1930 MHz, 30 kHz resolution
5.4.a	Low Channel, 1930 - 1990 MHz, 30 kHz resolution
5.5.a	Low Channel, 1930 - 1990 MHz, 1 MHz resolution
5.6.a	Low Channel, 1990- 10000 MHz, 1 MHz resolution
5.7.a	Low Channel, 10 -20 GHz, 1 MHz resolution