FCC PART 15 SUBPART C

EMI MEASUREMENT AND TEST REPORT

For

Arescom, Inc.

3541 Gateway Blvd.
Fremont, CA 94538

FCC ID: PT2AG2000S

July 19, 2002

This Report Concerns:	**Equipment Type:**
☒ Original Report	802.11b Wireless LAN Router

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Report No.:	R0206254
Test Date:	June 26, 2002
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1 - GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Arescom, Inc.'s product, model: *AG2000* or the "EUT" as referred to in this report is a 802.11b wireless LAN router which measures approximately 5.75"L x 8.00' W x 1.50"H.

The EUT was fed by Arescom, Inc.'s AC/AC power adapter, M/N: JOD-48U.

** The test data was good for test sample only. It may have deviation for other product sample.*

1.2 Objective

This Class II Permissive Change type approval report is prepared on behalf of *Arescom, Inc.* in accordance with Part 2, Subpart J, Part 15, Subparts A, B and C of the Federal Communication Commissions rules.

This Class II Permissive Change device provides one Ethernet LAN port while the original granted device has four Ethernet Switch Hub for LAN.

The objective of the manufacturer is to demonstrate compliance with FCC rules for spurious radiated emission.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2000, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz. All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.4 Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997 and Article 8 of the VCCI regulations on December 25, 1997. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2000.

The Federal Communications Commission and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratory Corporation is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (NVLAP). The scope of the accreditation covers the FCC Method - 47 CFR Part 15 - Digital Devices, IEC/CISPR 22: 1998, and AS/NZS 3548: Electromagnetic Interference - Limits and Methods of Measurement of Information Technology Equipment test methods under NVLAP Lab Code 200167-0.

1.5 Test Equipment List

Manufacturer	Description	Model	Serial Number	Cal. Due Date
HP	Spectrum Analyzer	8564E	08303	12/6/02
HP	Spectrum Analyzer	8593B	2919A00242	12/20/02
HP	Amplifier	8349B	2644A02662	12/20/02
HP	Quasi-Peak Adapter	85650A	917059	12/6/02
HP	Amplifier	8447E	1937A01046	12/6/02
A.H. System	Horn Antenna	SAS0200/571	261	12/27/02
Com-Power	Log Periodic Antenna	AL-100	16005	11/2/02
Com-Power	Biconical Antenna	AB-100	14012	11/2/02
Solar Electronics	LISN	8012-50-R-24-BNC	968447	12/28/02
Com-Power	LISN	LI-200	12208	12/20/02
Com-Power	LISN	LI-200	12005	12/20/02
BACL	Data Entry Software	DES1	0001	12/20/02
Rohde & Schwarz	Signal Generator	SMIQ03B	1125.5555.03	7/10/02
Rohde & Schwarz	I/Q Modulation Generator	AMIQ	1110.2003.02	8/10/02

*** Statement of Traceability: Bay Area Compliance Laboratory Corp.** certifies that all calibration has been performed using suitable standards traceable to the NATIONAL INSTITUTE of STANDARDS and TECHNOLOGY (NIST).

1.6 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
KDS	Monitor	VCDTS2147	DP02301873	N/A
HP	ThinkJet	2225C+	N/A	DS16XU2225
EVEREX	Modem	EV-945	None	E3E5UVEV-945
Microsoft	KB	X03-30785	E06401COMB	DOC
Microsoft	Mouse	MUS9J	N/A	EMJMUSJ

1.7 External Cables List and Details

Cable Description	Length (M)	From	To
Shielded KB Cable	1.6	PS/2 KB Port/PC	Keyboard
Shielded Mouse Cable	1.5	PS/2 Mouse Port/PC	Mouse
Shielded Serial Cable	1.5	Serial Port/PC	Modem
Shielded Parallel Cable	2.0	Parallel Port/PC	Printer
Shielded VGA Cable	1.8	VGA Port/PC	Monitor
Shielded RJ45 Cable	1.2	RJ45 Port/PC	Microphone

2 - SYSTEM TEST CONFIGURATION AND REQUIREMENT

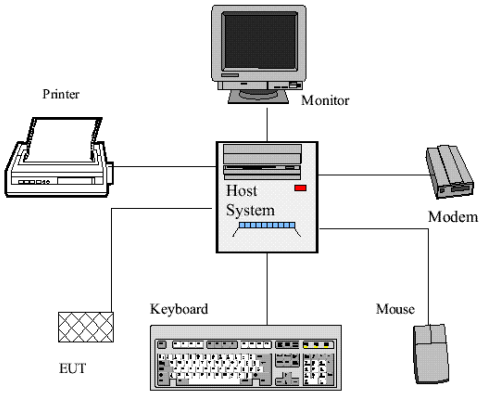
2.1 Description of Test Configuration

The EUT was configured for testing in a typical fashion (as normally used by a typical user).

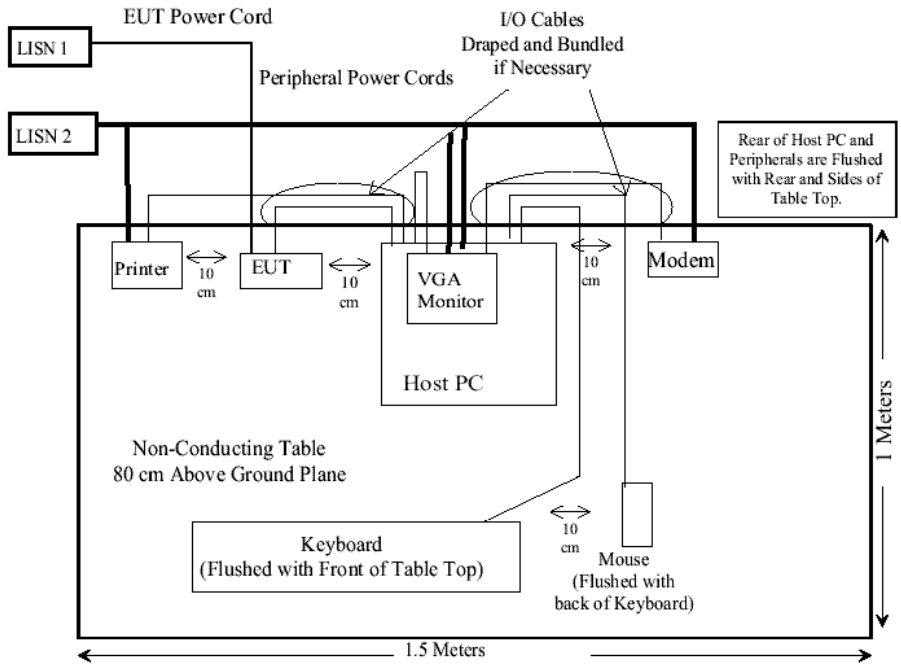
2.2 Equipment Modification

No modification(s) was made by BACL Corp. to ensure EUT comply with applicable limits and requirements.

2.3 Configuration of Test System



2.4 Test Setup Block Diagram



3 - SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT	REFERENCE
§ 15.205 §15.209 (a) §15.209 (f)	Restricted Bands, Radiated Emission, Spurious Emission	Compliant	Section 4

4 - RADIATED EMISSION

4.1 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement at BACL is $\pm$4.0 dB.

4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4-2000. The specification used was the FCC 15 Subpart C limits.

The PC was put on the center back edge of the turntable with monitor on its top. The modem and the printer were put on each side of the PC. The EUT was put in front of the printer. The rear of the EUT and peripherals were flushed with the rear of the turntable.

The keyboard was put directly in front of the PC. The mouse was put along with it. The rear of the mouse was flushed with the rear of the keyboard.

The spacing between peripherals was 10cm.

External I/O were draped along the turntable and bundled if necessary.

The EUT utilized 120Vac/60Hz power source.

4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR §15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

Start Frequency	30 MHz
Stop Frequency	25GHz
Sweep Speed	Auto
IF Bandwidth	1 MHz
Video Bandwidth	1 MHz
Quasi-Peak Adapter Bandwidth	120 kHz
Quasi-Peak Adapter Mode	Normal
Resolution Bandwidth	1MHz

4.4 Test Procedure

For the radiated emissions test, the EUT power cord was connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dBµV of specification limits), and are distinguished with a "**Qp**" in the data table.

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBµV means the emission is 7dBµV below the maximum limit for Subpart C. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Subpart C Limit

4.6 Summary of Test Results

According to the data in section 11.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207 and 15.247, and had the worst margin of:

Intentional Emission, 1000MHz to 25GHz, 3 meters

-13.9 (Avg.) dBµV at 4824.00 MHz in the Vertical polarization, Low Channel
-15.1 (Avg.) dBµV at 4884.00 MHz in the Vertical polarization, Middle Channel
-14.8 (Avg.) dBµV at 4944.90 MHz in the Vertical polarization, High Channel

Unintentional Emission, 30 to 1000MHz, 3 meters

-2.0 dBµV at 283.62.00 MHz in the horizontal polarization

Unintentional Emission, 30MHz to 26GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 SUBPART C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. DB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Channel											
4824.00	32.7	Avg.	0	1.5	v	32.5	4.9	30.0	40.1	54	-13.9
4824.00	30.4	Avg.	60	1.5	h	32.5	4.9	30.0	37.8	54	-16.2
Middle Channel											
4884.00	31.5	Avg.	45	1.5	v	32.5	4.9	30.0	38.9	54	-15.1
4884.00	29.8	Avg.	90	1.5	h	32.5	4.9	30.0	37.2	54	-16.8
High Channel											
4944.00	31.8	Avg.	270	1.5	v	32.5	4.9	30.0	39.2	54	-14.8
4944.00	30.2	Avg.	250	1.5	h	32.5	4.9	30.0	37.6	54	-16.4

* There was no apparent emission after the 2nd harmonics.

Unintentional Emission, 30MHz to 1000MHz, 3 meters

INDICATED		TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 CLASS B	
Frequency MHz	Ampl. dBμV/m	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable dB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
283.62	48.6	280	1.2	H	14.6	5.8	25.0	44.0	46	-2.0
283.62	45.10	260	1.5	V	14.6	5.8	25.0	40.5	46	-5.5
279.27	45.6	310	1.5	H	13.9	5.2	25.0	39.7	46	-6.3
314.17	44.5	0	1.5	H	15.9	3.7	25.0	39.1	46	-6.9
322.90	45.8	270	1.2	H	15.5	2.8	25.0	39.1	46	-6.9
248.72	45.4	90	1.5	H	12.6	2.3	25.0	35.3	46	-10.7
314.17	40.6	30	1.5	V	15.9	3.7	25.0	35.2	46	-10.8
322.9	41.20	250	1.2	V	15.5	2.8	25.0	34.5	46	-11.5
279.27	39.8	300	1.2	V	13.9	5.2	25.0	33.9	46	-12.1
289.62	37.5	270	1.5	H	14.6	5.8	25.0	32.9	46	-13.1
139.62	37.8	0	1.5	V	12.9	1.8	25.0	27.5	43.5	-16.0
289.62	33.4	250	1.2	V	14.6	5.8	25.0	28.8	46	-17.2
248.72	37.5	130	1.2	V	12.6	2.3	25.0	27.4	46	-18.6
139.62	31.0	0	1.2	H	12.9	1.8	25.0	20.7	43.5	-22.8