NVLAP LAB CODE 200707-0

FCC PART 90 SUBPART Y

EMI MEASUREMENT AND TEST REPORT

For

Azalea Networks USA, Inc.

673 S.Milpitas Blvd., Suite 105,

Milpitas, CA95035, USA

FCC ID: URP-MSR4K49

Report Type:	Product Type:
Original Report	Outdoor Wireless Mesh Router

Test Engineer: Alvin Huang

Report Number: RSZ08101001-90

Report Date: 2008-10-21

Simon Mo

Reviewed By: EMC Engineer

Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen)
6/F, the 3rd Phase of WanLi Industrial Building,
ShiHua Road, FuTian Free Trade Zone
Shenzhen, Guangdong, China
Tel: +86-755-33320018
Fax: +86-755-33320008

TABLE OF CONTENTS

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *Azalea Networks USA, Inc's* product, model number: *MSR4000* or the "EUT" as referred to in this report is an *Outdoor wireless mesh router*. The EUT is measured approximately 30 cm L x 30 cmW x 15 cmH, rated input voltage: 120 VAC/60 Hz.

*Note: The Product is different with the original product by added a 4.9GHz Module, please refer to the declaration letter.

Operation Frequency Band: 5 MHz OBW: 4942.5 – 4987.5 MHz;
10 MHz OBW: 4945.0 -4985.0 MHz;
20 MHz OBW: 4950.0 -4980.0 MHz.

Modulation: BPSK, QPSK, 16QAM, 64QAM

Emission Densignators: 5 MHz: 5M0W7D;
10 MHz: 10M0W7D;
20 MHz: 20M0W7D.

** All measurement and test data in this report was gathered from production sample serial number: 0805025 (Assigned by BACL, Shenzhen). The EUT was received on 2008-05-19.*

Objective

This Type approval report is prepared on behalf of *Azalea Networks USA, Inc* in accordance with Part 2, and Part 90 of the Federal Communication Commissions rules.

Related Submittal(s)/Grant(s)

The original product was tested in MET Laboratories with FCC ID: SWX-SR4.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of federal Regulations Title 47 Part 2, Sub-part J as well as the following individual parts:

Part 90 – Private Land Mobile Radio Service

Applicable Standards: TIA 603-C and ANSI 63.4-2003.

All emissions measurement was performed and Bay Area Compliance Laboratory Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located in the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 04, 2004. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, Bay Area Compliance Laboratories Corp. (Shenzhen) is a National Institute of Standards and Technology (NIST) accredited laboratory, under the National Voluntary Laboratory Accredited Program (Lab Code 200707-0).

NVLAP LAB CODE 200707-0

The current scope of accreditations can be found at http://ts.nist.gov/ts/htdocs/210/214/scopes/2007070.htm.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

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

Special Accessories

The special accessories were supplied by Bay Area Compliance Laboratories Corp. (Shenzhen).

Equipment Modifications

No modifications were made to the unit tested.

Host System Configuration List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
IBM	PC	ThinkCentre A50	99Y5469	DoC
Logitech	Keyboard	Y-SM48	SY513U22305	DoC
Logitech	Mouse	M-SAW83A	HCA33800404	DoC
IBM	CRT Monitor	6737-66W	23-P3229	BEJT17HD
ProMOS	Memory	V826616J24SATG-C0	D61A2605H	N/A
Intel	CPU	Pentium4 2800MHz	N/A	N/A
HP	Laser Jet5L	C3941A	JPTVOB2337	DoC
ECOM	Modem	EM-56DEV	6588D51200013	DoC

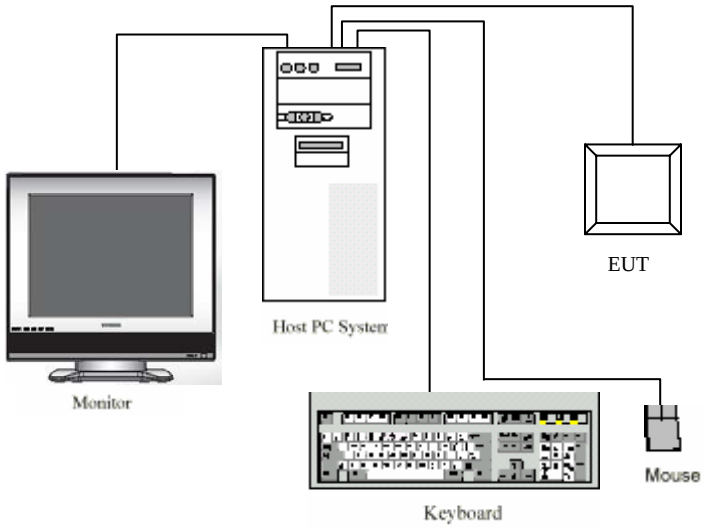
Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Intel	Motherboard	D865GKD	11S19R1949ZJ1WCB46J1K8	DoC
IBM	Power	HIPRO-A2307F3T	11S49P2191ZJ1TAR472225	DoC
Maxtor	Hard Disk	6Y080L0	Y23QNXTE	DoC
ALPS	3.5' Floppy	06P5226	11S06P5226ZJ1W25373957	DoC
Lite-ON	CD-Rom	LTN-489S	11S71P7366ZJ1SYC130015	DoC
Intel	Ethernet	PRO 10/100 VE	N/A	DoC

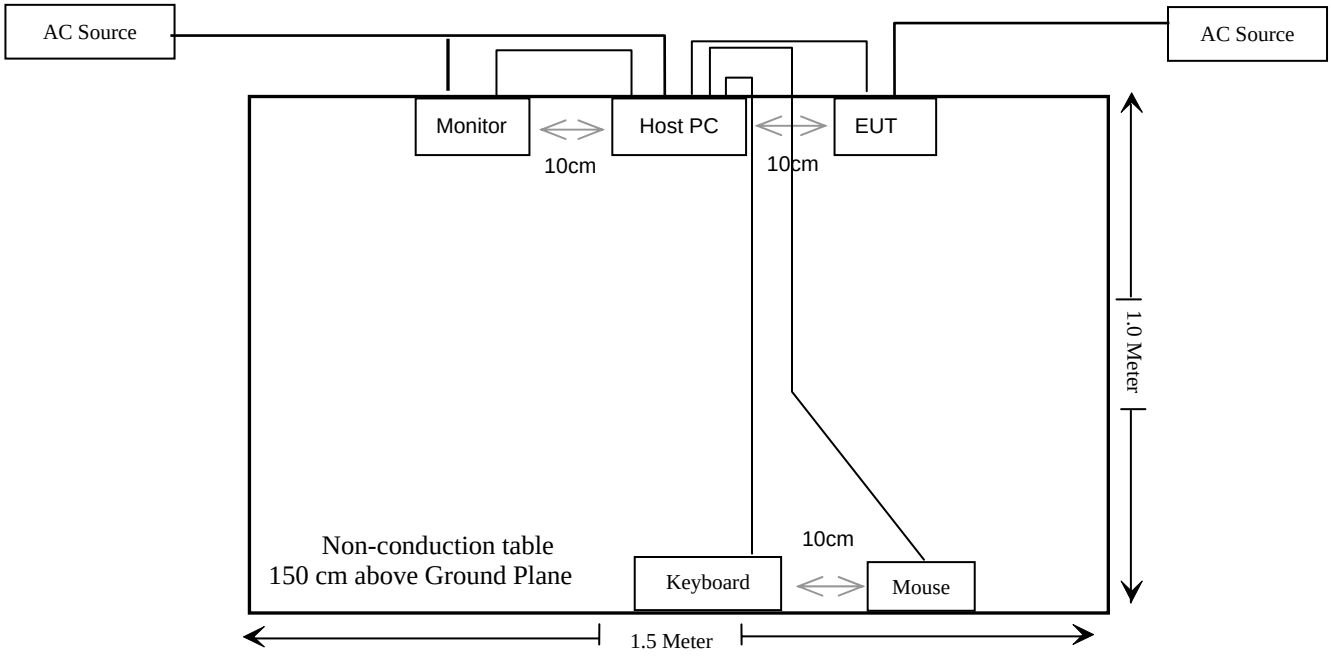
External I/O Cable

Cable Description	Length (m)	From/Port	To
Shielded Detachable K/B Cable	1.5	K/B Port	K/B
Shielded Detachable Mouse Cable	1.5	Mouse Port	Mouse
Shielded Detachable VGA Cable	1.5	VGA Port	Monitor
Unshielded Detachable RJ45 Cable	1.5	EUT	PC
Unshielded Detachable AC Cable	5.0	EUT	LISN

Configuration of Test Setup



Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Results
§1.1307; §90.1217	RF Exposure (MPE)	Compliant
§2.1046, §90.1215(a)	Peak Power Output	Compliant *
§2.1046, §90.1215(a)	Peak Power Spectral Density	Compliant *
§2.1049, §90.210(m)	Occupied Bandwidth & Emission Mask	Compliant *
§2.1051 §90.210(m)	Spurious Emission at Antenna Terminal	Compliant *
§ 2.1053 § 90.210(m)	Spurious Radiated Emissions	Compliant
§ 2.1055 § 90.213	Frequency stability	Compliant *

Note: * Original submission FCC ID: SWX-SR4 filed 2006-07-06.
Note2: the new sample Output Power is the same with the original sample conducted output power.

§2.1046 and §90.1215(a) – PEAK POWER OUTPUT

Applicable Standard

According to FCC §2.1046, and §90.1215.

Test Result

Please refer to the RF module FCC ID: SWX-SR4 certified on July 06, 2006, MET test report No.EMCS19815-FCC90.

§2.1046 and 90.1215(a) - PEAK POWER SPECTRAL DENSITY

Applicable Standard

According to §2.1046; 90.1215(a)

Test Result

Please refer to the RF module FCC ID: SWX-SR4 certified on July 06, 2006, MET test report No.EMCS19815-FCC90.

§2.1049 and § 90.210(m) – OCCUPIED BANDWIDTH (EMISSION MASK)

Applicable Standard

§2.1049 and §90.210

Test Result

Please refer to the RF module FCC ID: SWX-SR4 certified on July 06, 2006, MET test report No.EMCS19815-FCC90.

§2.1051 and §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

§2.1051and §90.210

Test Result

Please refer to the RF module FCC ID: SWX-SR4 certified on July 06, 2006, MET test report No.EMCS19815-FCC90.

§2.1053 and §90.210 (m) - RADIATED SPURIOUS EMISSIONS

Applicable Standard

§2.1053 and §90.210 (m)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Sunol Sciences	Horn Antenna	DRH-118	A052604	2007-09-25	2008-09-25
Sunol Sciences	Broadband Antenna	JB1	A040904-1	2007-08-14	2008-08-14
Sunol Sciences	Bilog Antenna	JB1	A040904-2	2007-08-14	2008-08-14
Rohde&Schwarz	Spectrum Analyzer	FSEM30	849720/019	2008-05-09	2009-05-09
HP	Signal Generator	HP8657A	2849U00982	2007-10-16	2008-10-16
A.H. System	Horn Antenna	SAS-200/571	135	2007-05-17	2008-05-17
Giga-tronics	Signal Generator	1026	270801	2007-09-29	2008-09-29

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to NVLAP requirements, traceable to the NIST.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =10 Log_{10} (TXpwr in Watts/0.001)-the absolute level

Spurious attenuation limit in dB =55+10 Log_{10} (power out in Watts)

Test Data

Environmental Conditions

Temperature:	25 ° C
Relative Humidity:	50%
ATM Pressure:	100.5 kPa

The testing was performed by Alvin Huang on 2008-10-16.

Test Mode: Transmitting

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
10 MHz Channel and 2.4GHz 802.11b												
9930	44.89	78	1.2	H	9930	-55.6	H	6.7	2.96	-51.86	-25	Pass
9930	44.29	170	1.5	V	9930	-54.1	V	6.7	2.96	-50.36	-25	Pass
14895	43.87	268	1.5	H	14895	-55.9	H	11.4	3.05	-57.55	-25	Pass
14895	43.95	358	1.8	V	14895	-54.8	V	11.4	3.05	-56.45	-25	Pass

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
20 MHz Channel and 2.4GHz 802.11b												
9930	44.78	180	1.0	H	9930	-55.9	H	6.7	2.96	-52.16	-25	Pass
9930	42.78	0	1.5	V	9930	-55.8	V	6.7	2.96	-52.06	-25	Pass
14895	40.12	0	1.3	H	14895	-57.8	H	11.4	3.05	-49.45	-25	Pass
14895	41.45	180	1.1	V	14895	-56.3	V	11.4	3.05	-47.95	-25	Pass

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
5 MHz Channel and 2.4GHz 802.11b												
9935	44.78	0	1.2	H	9935	-55.9	H	6.7	2.96	-52.16	-25	Pass
9935	42.78	270	1.3	V	9935	-55.8	V	6.7	2.96	-52.06	-25	Pass
14902.5	41.25	12	1.1	H	14902.5	-56.4	H	11.4	3.05	-48.05	-25	Pass
14902.5	42.51	270	1.0	V	14902.5	-55.2	V	11.4	3.05	-46.85	-25	Pass

Note 1: All other emissions were measured at the noise floor of the spectrum analyzer.

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
10 MHz Channel and 5.8 GHz 802.11a												
9930	43.69	78	1.2	H	9930	-56.8	H	6.7	2.96	-53.06	-25	Pass
9930	43.09	170	1.5	V	9930	-55.3	V	6.7	2.96	-51.56	-25	Pass
14895	42.67	268	1.5	H	14895	-57.1	H	11.4	3.05	-58.75	-25	Pass
14895	42.79	358	1.8	V	14895	-56.0	V	11.4	3.05	-57.65	-25	Pass

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
20 MHz Channel and 5.8 GHz 802.11a												
9930	43.58	180	1.0	H	9930	-59.2	H	6.7	2.96	-53.36	-25	Pass
9930	41.58	0	1.5	V	9930	-57.0	V	6.7	2.96	-53.26	-25	Pass
14895	38.92	0	1.3	H	14895	-59.0	H	11.4	3.05	-50.65	-25	Pass
14895	40.25	180	1.1	V	14895	-57.5	V	11.4	3.05	-49.15	-25	Pass

Indicated		Table Angle Degree	Test Antenna		Substituted			Ant. Gain (dBi)	Cable Loss (dB)	Absolute Level (dBm)	FCC 90	
Freq. (MHz)	Amp. (dBuV/m)		Height (m)	Polar (H/V)	Freq. (MHz)	Level (dBm)	Polar (H/V)				Limit (dBm)	Result
5 MHz Channel and 5.8 GHz 802.11a												
9935	43.58	0	1.2	H	9935	-57.1	H	6.7	2.96	-53.36	-25	Pass
9935	41.58	270	1.3	V	9935	-57.0	V	6.7	2.96	-53.26	-25	Pass
14902.5	40.05	12	1.1	H	14902.5	-57.6	H	11.4	3.05	-49.25	-25	Pass
14902.5	41.31	270	1.0	V	14902.5	-56.4	V	11.4	3.05	-48.05	-25	Pass

Note 1: All other emissions were measured at the noise floor of the spectrum analyzer

§2.1055 and §90.213- FREQUENCY STABILITY

Applicable Standard

§2.1055& §90.213

Test Result

Please refer to the RF module FCC ID: SWX-SR4 certified on July 06, 2006, MET test report No.EMCS19815-FCC90.

§90.1217 and 1.1310 – RF EXPOSURE (MPE)

Applicaable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Radio frequency radiation exposure was calculated based on § 1.1310 limits.

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Polulation/Uncontrolled Exposures				
0.3 - 1.34	614	1.63	*(100)	30
1.34 - 30	842/f	2.19/f	*(180/ f^2)	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	/	/	f/1500	30
1500 - 100,000	/	/	1.0	30

f = frequency in MHz
* = Plane-wave equivalent power density

Test Data

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$

S = power density (in appropriate units, e.g. mW/cm2)
P = power input to the antenna (in appropriate units, e.g., mW).
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Two antennas are available for the EUT, one is Omni directional antenna with 11 dBi Gain, the other is directional antenna with 15 dBi Gain.

For Omni-Directional Antenna:

Maximum peak output power at antenna input terminal: 32.6 (dBm)
Maximum peak output power at antenna input terminal: 1819.7 (mW)
Prediction distance: 45 (cm)
Predication frequency: 4965 (MHz)
Antenna Gain (typical): 11 (dBi)
Antenna Gain (typical): 12.59 (numeric)
The worst case is power density at predication frequency at 45 cm: 0.90 (mW/cm^2)
MPE limit for general polulation/uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

For Directional Antenna:

Maximum peak output power at antenna input terminal: 32.6 (dBm)
Maximum peak output power at antenna input terminal: 1819.7 (mW)
Prediction distance: 70 (cm)
Predication frequency: 4965 (MHz)
Antenna Gain (typical): 15 (dBi)
Antenna Gain (typical): 31.62 (numeric)
The worst case is power density at predication frequency at 70 cm: 0.935 (mW/cm^2)
MPE limit for general polulation/uncontrolled exposure at prediction frequency: 1.0 (mW/cm^2)

Result: This MPE level is below the 1 mW/cm^2 MPE at 70 cm distance for General Population / Uncontrolled Exposure as stated in OET BULLETIN 65 Edition 97-01. The precautions are outlined in the User's Manual to prevent exposure to high levels of RF energy.

******END OF REPORT *******