EMC TEST REPORT for Class II permissive change
No. SH12120553-002

Applicant	: Aruba Networks, Inc. 1344 Crossman Ave. Sunnyvale California 95089 United States
Manufacturer	: Aruba Networks, Inc. 1344 Crossman Ave. Sunnyvale California 95089 United States
Product Name	: Outdoor Wireless Mesh Access Router
Type/Model	: MST2H13N1-XX(where – XX can be any alphanumeric or blank)

SUMMARY

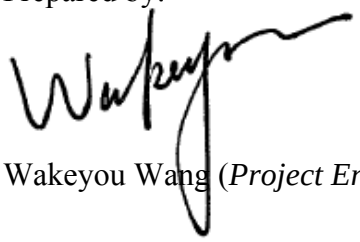
The equipment complies with the requirements according to the following standard(s):

47CFR Part 15 (2010): Radio Frequency Devices

ANSI C63.4 (2003): 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

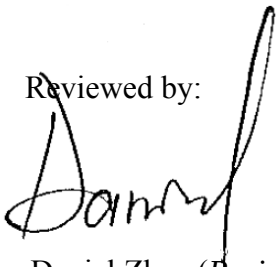
Date of issue: Jan 13, 2013

Prepared by:



Wakeyou Wang (*Project Engineer*)

Reviewed by:



Daniel Zhao (*Reviewer*)

Description of Test Facility

Name: Intertek Testing Services Limited Shanghai
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IC Assigned Code: 2042B-1

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Content

1. General Information

1.1 Applicant Information

Applicant:		Aruba Networks, Inc. 1344 Crossman Ave. Sunnyvale California 95089 United States
Name of contact:		Ivaylo Tankov
Tel:		408-754-3035
Fax:		408-227-4550
Manufacturer:		Aruba Networks, Inc. 1344 Crossman Ave. Sunnyvale California 95089 United States
Sample received date	:	Dec 10, 2012
Sample Identification No	:	*0121210-17-001*
Date of test	:	Dec 10, 2012 ~ Dec 30, 2012

1.2 Identification of the EUT

Equipment:	Outdoor Wireless Mesh Access Router
Type/model:	MST2H13N1-XX(where – XX can be any alphanumeric or blank)
FCC ID:	Q9DMST200

1.3 Technical specification

Operation Frequency Band: 5745 – 5825 MHz, 5755 – 5795MHz

Modulation: DBPSK @1Mbps
DQPSK@2Mbp
CCK@5.5/11Mbps
BPSK@6/9 Mbps
QPSK@12/18Mbps
16-QAM@24Mbps
64-QAM@48/54Mpb and above

Gain of Antenna: Internal, 13dBi

Rating: 100-240Va.c., 0.5A, 50/60Hz

Description of EUT: Here are a series of models. They are electrically identical except for different model names.
The EUT supports wireless network of 802.11a/n.
The RF module used contains of two chains, namely chain 1 and chain 2.

Port identification:

Port	Description	Type	Number
1	Console	USB2.0	1
4	Ethernet	RJ45	1

Dimension: 26cm * 18cm *8cm

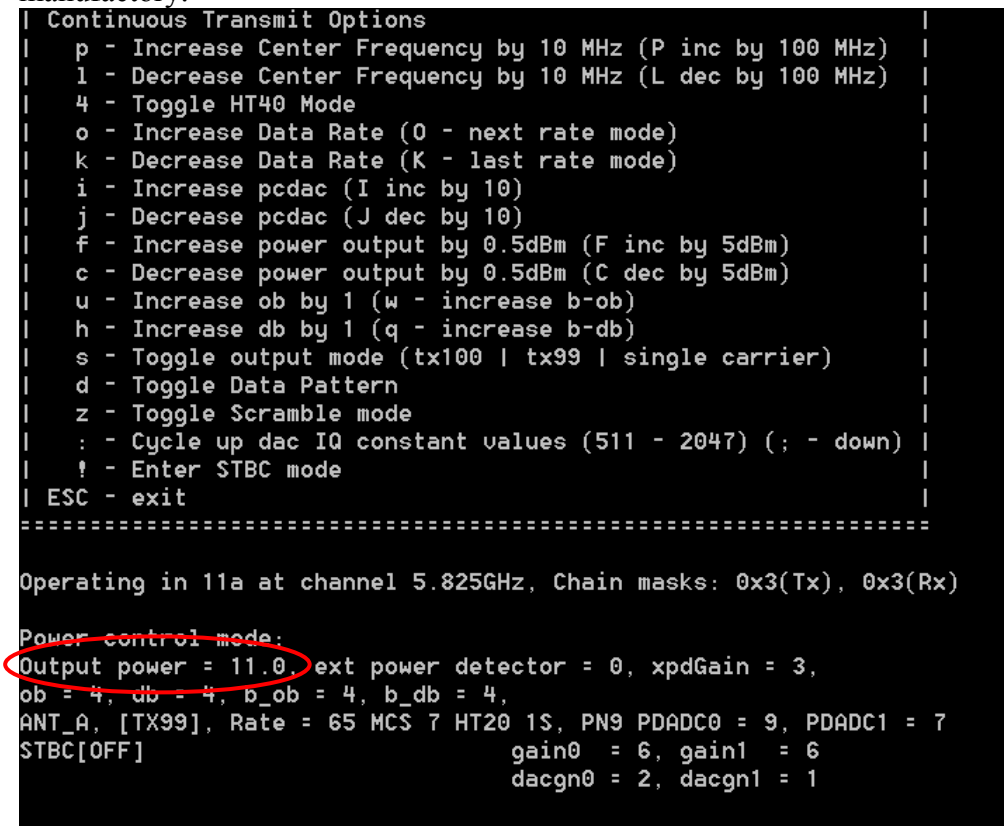
Declared Temperature range: -30°C ~ 60°C

Channel Description:

HT 20 Channel	Frequency (MHz)	HT 40 Channel	Frequency (MHz)
149	5745	151	5755
153	5765	159	5795
157	5785	/	
161	5805		
165	5825		

1.4 Mode of operation during the test / Test peripherals used

While testing transmitting mode of EUT, the internal modulation and continuously transmission was applied.
The power level setting for 802.11a/b/g/n is “11.0” indicated in software offered by the manufactory.



Test peripherals used:

Item No	Description	Band and Model	S/No
1	Laptop computer	FUJITSU SIMENS, LIFEBOOK	NA

The lowest, middle and highest channel were tested as representatives.
For 802.11a----- lowest, 5745MHz; middle, 5785MHz; highest, 5825MHz.
For 802.11n HT20 ----- lowest, 5745MHz; middle, 5785MHz; highest, 5825MHz.
For 802.11n HT40 ----- lowest, 5755MHz; highest, 5795MHz.

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2. Test Specification

2.1 Instrument list

Equipment	Type	Manu.	Internal no.	Cal. Date	Due date
Test Receiver	ESIB 26	R&S	EC 3045	2012-10-21	2013-10-20
Semi-anechoic chamber	-	Albatross project	EC 3048	2012-5-21	2013-5-20
Bilog Antenna	CBL 6112D	TESEQ	EC 4206	2011-5-16	2013-5-15
Horn antenna	HF 906	R&S	EC 3049	2011-5-13	2013-5-12
Pre-amplifier	Pre-amp 18	R&S	EC 3222	2013-4-12	2013-4-11
Test Receiver	ESCS 30	R&S	EC 2107	2012-10-21	2013-10-20
A.M.N.	ESH2-Z5	R&S	EC 3119	2012-1-9	2013-1-8
A.M.N.	ESH3-Z5	R&S	EC 2109	2012-1-10	2013-1-9
High Pass Filter	WHKX 1.0/15G-10SS	Wainwright	EC4297-1	2012-2-8	2013-2-7
High Pass Filter	WHKX 2.8/18G-12SS	Wainwright	EC4297-2	2012-2-8	2013-2-7
High Pass Filter	WHKX 7.0/1.8G-8SS	Wainwright	EC4297-3	2012-2-8	2013-2-7
Band Reject Filter	WRCGV 2400/2483-2390/2493-35/10SS	Wainwright	EC4297-4	2012-2-8	2013-2-7
Test Receiver	FSV40	R&S	/	2012-10-21	2013-10-20
Preamplifier	AP-025C	Quietek	QT-AP003	2012-11-25	2013-11-24
Preamplifier	AP-180C	Quietek	CHM-0602013	2012-11-25	2013-11-24
Broad-Band Horn Antenna	BBHA9120D	Schwarzbeck	496	2012-11-25	2013-11-24
Broad-Band Horn Antenna	BBHA9170	Schwarzbeck	294	2012-11-25	2013-11-24

2.2 Test Standard

47CFR Part 15 (2010)
ANSIC63.4 (2003)

2.3 Test Summary

This report applies to tested sample only. This report shall not be reproduced in part without written approval of Intertek Testing Service Shanghai Limited.

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emission	15.205 & 15.209	-	Pass
Power line conducted emission	15.207	-	Pass

3. Radiated emission

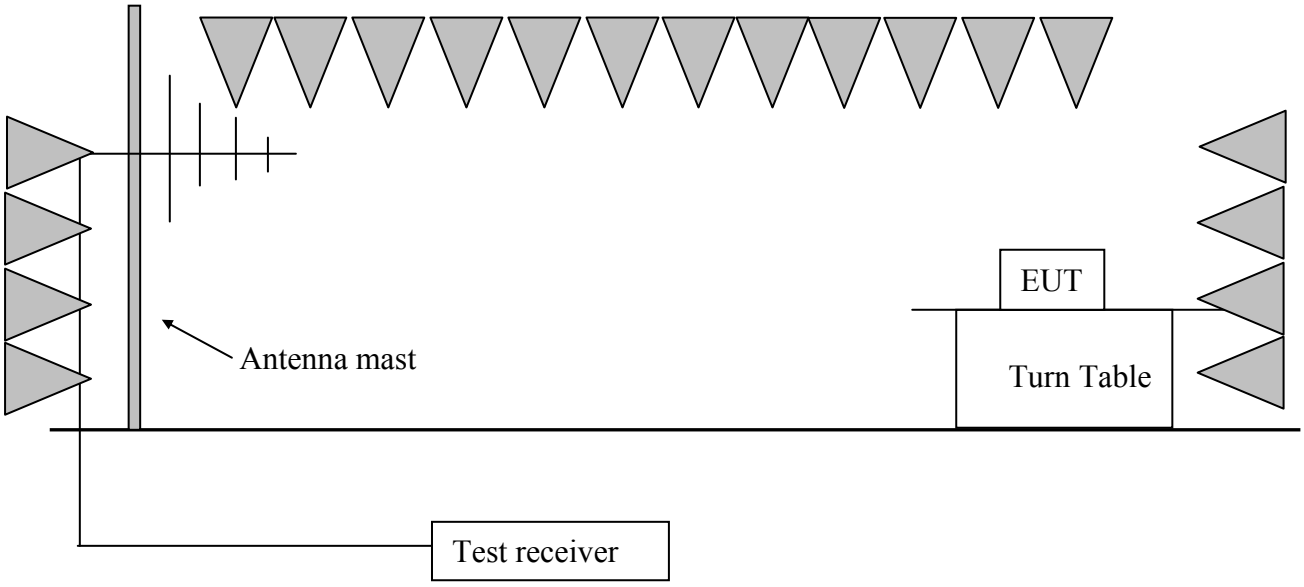
Test result: PASS

3.1 Test limit

The radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) showed as below:

Frequency (MHz)	Field Strength (dBuV/m)	Measurement Distance (m)
30 - 88	40.0	3
88 - 216	43.5	3
216 - 960	46.0	3
Above 960	54.0	3

3.2 Test Configuration



3.3 Test procedure and test setup

The measurement was applied in a semi-anechoic chamber. While testing for spurious emission higher than 1GHz, if applied, the pre-amplifier would be equipped just at the output terminal of the antenna.
The EUT and simulators were placed on a 0.8m high wooden turntable above the horizontal metal ground plane. The turn table rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna which was mounted on an antenna mast. The antenna moved up and down between from 1meter to 4 meters to find out the maximum emission level.
The EUT was tested according to DTS test procedure of KDB558074 D01 DTS “Meas Guidance v02” for compliance to FCC 47CFR 15.247 requirements.

The radiated emission was measured using the Spectrum Analyzer with the resolutions bandwidth set as:

RBW = 100kHz, VBW = 300kHz (30MHz-1GHz)
RBW = 1MHz, VBW = 3MHz (>1GHz for PK);
RBW = 1MHz, VBW = 10Hz (>1GHz for AV);

3.4 Test protocol

Dual chain, 11na, HT20 mode (which mode with max. output power):

CH	Polarization	Frequency (MHz)	Correct Factor (dB/m)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
L	V	5747.29	33.60	117.10	Fundamental	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5460.00	0.10	43.20	54.00	10.80	PK
	V	11466.03	12.90	61.20	74.00	12.80	PK
	V	11465.92	12.90	51.50	54.00	2.50	AV
M	V	5780.86	33.60	117.30	Fundamental	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5460.00	0.10	43.60	54.00	10.40	PK
	V	11565.67	13.30	60.50	74.00	13.50	PK
	V	11565.53	13.30	50.90	54.00	3.10	AV
H	V	5828.33	33.60	117.80	Fundamental	/	PK
	V	131.08	15.10	41.00	43.50	2.50	PK
	H	340.02	16.60	43.50	46.00	2.50	PK
	H	749.23	22.90	35.70	46.00	10.30	PK
	V	1000.00	24.60	35.30	54.00	18.70	PK
	V	5460.00	0.10	43.20	54.00	10.80	PK
	V	11648.71	13.70	60.10	74.00	13.90	PK
	V	11648.60	13.70	51.00	54.00	3.00	AV

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (-Amplifier, is employed)
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = limit – Corrected Reading
4. If the PK reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10dBuV.
Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m
Assuming limit = 54dBuV/m, Corrected Reading = 10.20dBuV/m, then Margin = 54 -10.20 = 43.80dBuV/m

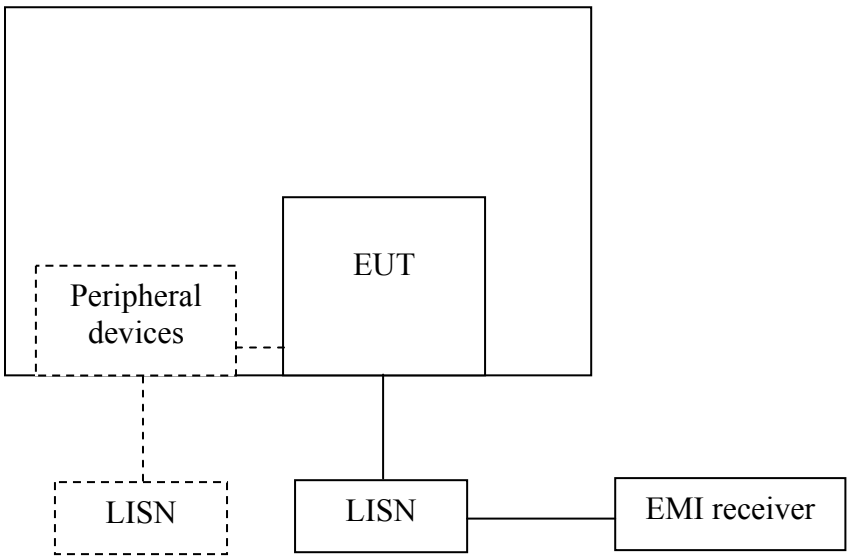
4. Power line conducted emission

Test result: **Pass**

4.1 Limit

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

4.2 Test configuration



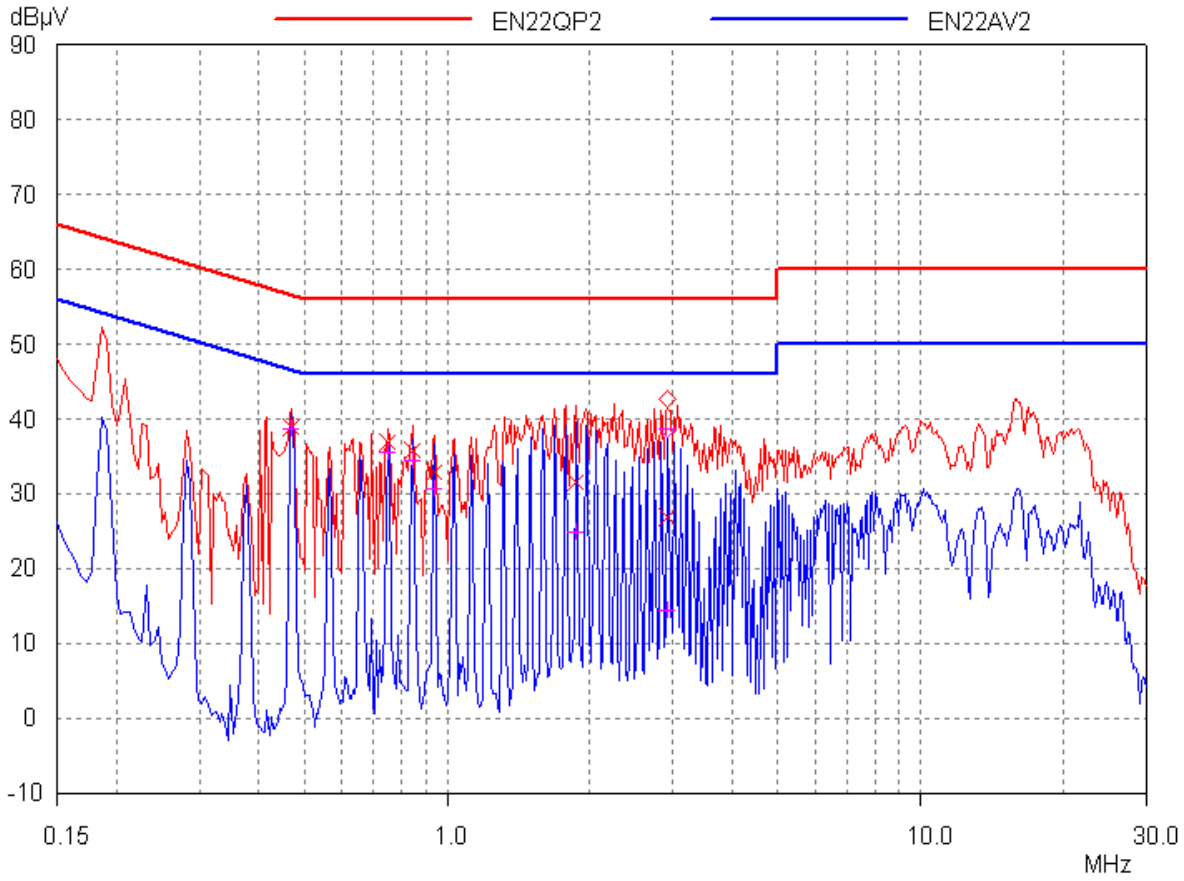
☒ For table top equipment, wooden support is 0.8m height table

☐ For floor standing equipment, wooden support is 0.1m height rack.

4.3 Test procedure and test set up

The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50Ω/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50Ω/50uH coupling impedance with 50Ω termination.
Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4 on conducted measurement.
The bandwidth of the test receiver is set at 9 kHz.

4.4 Test protocol



Frequency	Correct Factor (dB)	Corrected Reading (dBuV)		Limit (dBuV)		Margin (dB)	
		QP	AV	QP	AV	QP	AV
0.47 (N)	3.00	38.88	38.60	56.52	46.52	17.64	7.92
0.75 (N)	3.00	36.94	35.56	56.00	46.00	19.06	10.44
0.84 (N)	3.00	35.80	34.36	56.00	46.00	20.20	11.64
0.94 (L)	3.00	32.90	30.75	56.00	46.00	23.10	15.25
1.87 (L)	3.00	31.46	24.80	56.00	46.00	24.54	21.20
2.90 (N)	3.00	26.95	14.47	56.00	46.00	29.05	31.53
Remark: 1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB). 2. Margin (dB) = Limit - Corrected Reading.							