RF Exposure Evaluation Report

APPLICANT	:	NetComm Wireless Limited
EQUIPMENT	:	4G WiFi M2M Router
BRAND NAME	:	NetComm Wireless
MODEL NAME	:	NTC-140W-01
FCC ID	:	XIA-NTC140W
STANDARD	:	47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Eric Huang / Deputy Manager

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA441109	Rev. 01	Initial issue of report	Oct. 08, 2014

1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978

Applicant	
Company Name	NetComm Wireless Limited
Address	Level 2, 18-20 Orion Road Lane Cove NSW Australia

Manufacturer	
Company Name	NetComm Wireless Limited
Address	Level 2, 18-20 Orion Road Lane Cove NSW Australia

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	4G WiFi M2M Router
Brand Name	NetComm Wireless
Model Name	NTC-140W-01
FCC ID	XIA-NTC140W
Wireless Technology and Frequency Range	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV: 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz CDMA2000 BC0: 824.7 MHz ~ 848.31 MHz CDMA 2000 BC10: 817.9 MHz ~ 823.1 MHz CDMA 2000 BC1: 1851.25 MHz ~ 1908.75 MHz LTE Band 17: 706.5 MHz ~ 713.5 MHz LTE Band 13: 779.5 MHz ~ 784.5 MHz LTE Band 5: 824.7 MHz ~ 848.3 MHz LTE Band 4: 1710.7 MHz ~ 1754.3 MHz LTE Band 2: 1850.7 MHz ~ 1909.3 MHz LTE Band 25: 1850.7 MHz ~ 1914.3 MHz WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz
Mode	• GPRS/EGPRS • RMC 12.2Kbps Rel 99 • HSDPA • HSUPA • DC-HSDPA • CDMA2000 : 1xRTT/1xEv-Do(Rev.0)/1xEv-Do(Rev.A) • LTE: QPSK, 16QAM • 802.11 b/g/n HT20/HT40
Antenna Type	Dipole Antenna
HW Version	V1.0
SW Version	v2.0.5.0
EUT Stage	Identical Prototype

3. Maximum RF average output power among production units

Band / Mode			Average power(dBm)
GSM	850	GMSK	33.0
		8PSK	28.0
	1900	GMSK	30.0
		8PSK	27.0
WCDMA	Band V / IV / II	RMC 12.2Kbps	24.0
		HSDPA Subtest-1	24.0
		DC-HSDPA Subtest-1	24.0
		HSUPA Subtest-5	24.0
CDMA		BC10	24.5
		BC0	24.5
		BC1	24.5
LTE		Band 12	24.0
		Band 13	24.0
		Band 5	24.0
		Band 4	24.0
		Band 2	24.0
		Band 25	24.0

Band / Frequency (MHz)		IEEE 802.11 Average Power (dBm)							
		11b			11g			HT20	HT40
		Ant1	Ant2	Ant1+2	Ant1	Ant2	Ant1+2	Ant1+2	Ant1+2
2.4GHz Band	Low	15.0	15.0	13.5	13.5	13.5	16.5	16.0	13.5
	Middle	15.0	15.0	13.5	13.5	13.5	16.5	16.0	16.0
	High	15.0	15.0	13.5	13.5	13.5	16.5	16.0	16.0

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
GPRS 850 (1 Tx slot)	824.2	-1.39	33.00	31.610	1.449	182.390	0.036	0.549	0.066
GPRS 850 (2 Tx slots)	824.2	-1.39	33.00	31.610	1.449	363.915	0.072	0.549	0.132
EGPRS 850 (1 Tx slot)	824.2	-1.39	28.00	26.610	0.458	57.677	0.011	0.549	0.021
EGPRS 850 (2 Tx slots)	824.2	-1.39	28.00	26.610	0.458	115.080	0.023	0.549	0.042
EGPRS 850 (3 Tx slots)	824.2	-1.39	28.00	26.610	0.458	171.791	0.034	0.549	0.062
EGPRS 850 (4 Tx slots)	824.2	-1.39	28.00	26.610	0.458	229.615	0.046	0.549	0.083
GPRS 1900 (1 Tx slot)	1850.2	1.96	30.00	31.960	1.570	197.697	0.039	1.000	0.039
GPRS 1900 (2 Tx slots)	1850.2	1.96	30.00	31.960	1.570	394.457	0.079	1.000	0.079
EGPRS 1900 (1 Tx slot)	1850.2	1.96	27.00	28.960	0.787	99.083	0.020	1.000	0.020
EGPRS 1900 (2 Tx slots)	1850.2	1.96	27.00	28.960	0.787	197.697	0.039	1.000	0.039
EGPRS 1900 (3 Tx slots)	1850.2	1.96	27.00	28.960	0.787	295.121	0.059	1.000	0.059
EGPRS 1900 (4 Tx slots)	1850.2	1.96	27.00	28.960	0.787	394.457	0.079	1.000	0.079
WCDMA Band 5	826.4	-1.39	24.00	22.610	0.182	182.390	0.036	0.551	0.066
WCDMA Band 4	1712.4	3.03	24.00	27.030	0.505	504.661	0.100	1.000	0.100
WCDMA Band 2	1852.4	1.96	24.00	25.960	0.394	394.457	0.079	1.000	0.079
CDMA2000 BC10	817.9	1.44	24.50	25.940	0.393	392.645	0.078	0.545	**0.143**
CDMA2000 BC0	824.7	-1.39	24.50	23.110	0.205	204.644	0.041	0.550	0.074
CDMA2000 BC1	1851.3	1.96	24.50	26.460	0.443	442.588	0.088	1.000	0.088
LTE Band 17	706.5	0.71	24.00	24.710	0.296	295.801	0.059	0.471	0.125
LTE Band 13	779.5	1.44	24.00	25.440	0.350	349.945	0.070	0.520	0.134
LTE Band 5	824.7	-1.39	24.00	22.610	0.182	182.390	0.036	0.550	0.066
LTE Band 4	1710.7	3.03	24.00	27.030	0.505	504.661	0.100	1.000	0.100
LTE Band 2	1850.7	1.96	24.00	25.960	0.394	394.457	0.079	1.000	0.079
LTE Band 25	2300.0	1.98	24.00	25.980	0.396	396.278	0.079	1.000	0.079
2.4GHz WLAN	2412.0	2.0	16.5	18.500	0.071	70.795	0.014	1.000	**0.014**

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band

WLAN Power Density / Limit	CDMA BC10 Power Density / Limit	Σ(Power Density / Limit) of WWAN+WLAN+Bluetooth
0.014	0.143	0.157

Note:

1. For colocation analysis, CDMA BC10 is chosen for summation due to the highest (power density/limit) among all WWAN wireless modes.
2. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WWAN + WLAN.
3. Considering the WWAN collocation with the WLAN transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.