RF EXPOSURE REPORT

REPORT NO.: SA130927E08E

MODEL NO.: FiOS-G1100

FCC ID: 2ABTEG1100

RECEIVED: Sep. 27, 2013

TESTED: Dec. 03 to 04, 2013

ISSUED: Mar. 21, 2014

APPLICANT: Verizon Online LLC

ADDRESS: 1300 I Street NW, Room 400W,
Washington, District of Columbia, 20005
United State

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

LAB ADDRESS: No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen,
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R.O.C.

This report should not be used by the client to claim
product certification, approval, or endorsement by any
government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA130927E08E	Original release	Mar. 21, 2014

1. CERTIFICATION

PRODUCT:	FiOS Quantum Gateway
BRAND NAME:	Verizon
MODEL NO.:	FiOS-G1100
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	Verizon Online LLC
TESTED DATE:	Dec. 03 to 04, 2013
STANDARDS:	FCC Part 2 (Section 2.1091)
	FCC OET Bulletin 65, Supplement C (01-01)
	IEEE C95.1

The above equipment (Model: FiOS-G1100) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : _____ , DATE: _Mar. 21, 2014_
(Elsie Hsu, Specialist)

APPROVED BY : _____ , DATE: _Mar. 21, 2014_
(May Chen, Manager)

2. RF EXPOSURE LIMIT

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm^2)	AVERAGE TIME (minutes)
LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE				
300-1500	…	…	F/1500	30
1500-100,000	…	…	1.0	30

F = Frequency in MHz

3. MPE CALCULATION FORMULA

$Pd = (Pout*G) / (4*pi*r^2)$

where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

pi = 3.1416

r = distance between observation point and center of the radiator in cm

4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 28cm away from the body of the user. So, this device is classified as **Mobile Device**.

5. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

The EUT inside has one Zigbee technology module (option) which FCC ID: Z3M-ZBMOD1.

For 15.247 (2.4GHz):

FREQUENCY BAND (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11b					
2412 - 2462	76.033	3.97	28	0.01925	1.00
802.11g					
2412 - 2462	287.078	3.97	28	0.07269	1.00
802.11n (HT20)					
2412 - 2462	490.908	3.97	28	0.12430	1.00
802.11n (HT40)					
2422 - 2452	84.723	3.97	28	0.02145	1.00
CDD_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11b					
2412 - 2462	120.238	7.05	28	0.06187	1.00
NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20})^2 / 2] = 7.05$dBi					
SDM _MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11n (HT20)					
2412 - 2462	379.835	4.1	28	0.09910	1.00
802.11n (HT40)					
2422 - 2452	105.681	4.1	28	0.02757	1.00

CDD_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11b					
2412 - 2462	116.819	8.59	28	0.08570	1.00
802.11n (HT20)					
2412 - 2462	535.959	8.59	28	0.39319	1.00
802.11n (HT40)					
2422 - 2452	189.726	8.59	28	0.13919	1.00
NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20} + 10^{Chain2/20})^2 / 3] = 8.59$dBi					
STBC _MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11n (HT20)					
2412 - 2462	919.616	4.1	28	0.23993	1.00
802.11n (HT40)					
2422 - 2452	196.924	4.1	28	0.05138	1.00

For 15.247 (5GHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11a					
5745 - 5825	225.944	4.05	28	0.05827	1.00
CDD_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	446.548	7.93	28	0.28141	1.00
802.11ac (VHT40)					
5755 - 5795	597.854	7.93	28	0.37676	1.00
802.11ac (VHT80)					
5775	224.328	7.93	28	0.14137	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20})^2 / 2] = 7.93 dBi$

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
STBC_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	569.758	5.71	28	0.21536	1.00
802.11ac (VHT40)					
5755 - 5795	597.854	5.71	28	0.22598	1.00
802.11ac (VHT80)					
5775	224.328	5.71	28	0.08479	1.00
Beam forming (MCS0 N=1)_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	446.548	7.93	28	0.28141	1.00
802.11ac (VHT40)					
5755 - 5795	597.854	7.93	28	0.37676	1.00
802.11ac (VHT80)					
5775	224.328	7.93	28	0.14137	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20})^2 / 2] = 7.93 dBi$

Beam forming (MCS0 N=2)_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	446.548	5.71	28	0.38965	1.00
802.11ac (VHT40)					
5755 - 5795	597.854	5.71	28	0.22598	1.00
802.11ac (VHT80)					
5775	224.328	5.71	28	0.08479	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20})^2 / 2] = 5.71dBi$

CDD_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	585.942	9.46	28	0.52520	1.00
802.11ac (VHT40)					
5755 - 5795	625.599	9.46	28	0.56075	1.00
802.11ac (VHT80)					
5775	347.638	9.46	28	0.31160	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20} + 10^{Chain2/20})^2 / 3] = 9.46$

STBC_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5745 - 5825	848.370	5.71	28	0.32067	1.00
802.11ac (VHT40)					
5755 - 5795	904.050	5.71	28	0.34172	1.00
802.11ac (VHT80)					
5775	347.638	5.71	28	0.13140	1.00

Beam forming (MCS0 N=1)_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5745 - 5825	435.183	9.46	28	0.39007	1.00
802.11ac (VHT40)					
5755 - 5795	443.598	9.46	28	0.39761	1.00
802.11ac (VHT80)					
5775	347.638	9.46	28	0.31160	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20} + 10^{Chain2/20})^2 / 3] = 9.46$

Beam forming (MCS0 N=2)_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5745 - 5825	585.942	7.47	28	0.33214	1.00
802.11ac (VHT40)					
5755 - 5795	625.599	7.47	28	0.35462	1.00
802.11ac (VHT80)					
5775	347.638	7.47	28	0.19706	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20} + 10^{Chain2/20})^2 / 3] = 7.47$dBi

Beam forming (MCS0 N=3)_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5745 - 5825	585.942	5.71	28	0.22148	1.00
802.11ac (VHT40)					
5755 - 5795	625.599	5.71	28	0.23647	1.00
802.11ac (VHT80)					
5775	347.638	5.71	28	0.13140	1.00

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 5.71$dBi

For 15.407(5GHz):

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11a					
5180 - 5240	29.174	3.56	28	0.00672	1.00

CDD_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	33.656	7.48	28	0.01912	1.00
802.11ac (VHT40)					
5190 - 5230	49.493	7.48	28	0.02812	1.00
802.11ac (VHT80)					
5210	49.268	7.48	28	0.02799	1.00

Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.48$ dBi

3STBC_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	33.656	5.30	28	0.01158	1.00
802.11ac (VHT40)					
5190 - 5230	49.493	5.30	28	0.01702	1.00
802.11ac (VHT80)					
5210	49.268	5.30	28	0.01694	1.00

Beam forming (MCS0 N=1)_MODE

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	33.656	7.48	28	0.01912	1.00
802.11ac (VHT40)					
5190 - 5230	34.358	7.48	28	0.01952	1.00
802.11ac (VHT80)					
5210	35.082	7.48	28	0.01993	1.00

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.48$ dBi

Beam forming (MCS0 N=2)_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5180 - 5240	33.656	5.3	28	0.01158	1.00
802.11ac (VHT40)					
5190 - 5230	49.493	5.3	28	0.01702	1.00
802.11ac (VHT80)					
5210	49.268	5.3	28	0.01694	1.00

NOTE: Directional gain = $10 \log[(10^{Chain0/20} + 10^{Chain1/20})^2 / 2] = 5.3$dBi

CDD_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5180 - 5240	26.041	9.29	28	0.02245	1.00
802.11ac (VHT40)					
5190 - 5230	49.247	9.29	28	0.04245	1.00
802.11ac (VHT80)					
5210	49.372	9.29	28	0.04256	1.00

NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.29$dBi

STBC_MODE					
FREQUENCY BAND (MHz)	**MAX POWER (mW)**	**ANTENNA GAIN (dBi)**	**DISTANCE (cm)**	**POWER DENSITY (mW/ cm^2)**	**LIMIT (mW/cm^2)**
802.11ac (VHT20)					
5180 - 5240	39.110	5.3	28	0.01345	1.00
802.11ac (VHT40)					
5190 - 5230	49.247	5.3	28	0.01694	1.00
802.11ac (VHT80)					
5210	49.372	5.3	28	0.01698	1.00

Beam forming (MCS0 N=1)_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	23.349	9.29	28	0.02013	1.00
802.11ac (VHT40)					
5190 - 5230	23.103	9.29	28	0.01991	1.00
802.11ac (VHT80)					
5210	22.688	9.29	28	0.01956	1.00
NOTE: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3]$ = 9.29dBi					
Beam forming (MCS0 N=2)_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	34.760	7.06	28	0.01793	1.00
802.11ac (VHT40)					
5190 - 5230	38.974	7.06	28	0.02010	1.00
802.11ac (VHT80)					
5210	39.183	7.06	28	0.02021	1.00
NOTE: Directional gain = maximum gain of antennas + $10 \log(3/2)$ = 7.06dBi					
Beam forming (MCS0 N=3)_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
802.11ac (VHT20)					
5180 - 5240	41.871	5.3	28	0.01440	1.00
802.11ac (VHT40)					
5190 - 5230	49.247	5.3	28	0.01694	1.00
802.11ac (VHT80)					
5210	49.372	5.3	28	0.01698	1.00

For Zigbee:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
2405 - 2480	106.17	3.5	28	0.02413	1.00

For Zwave:

FREQUENCY BAND (MHz)	FIELD STRENGTH OF FUNDAMENTAL @3m (dBuV/m)	POUT EIRP (dBm)	POUT EIRP (mW)	DISTANCE (cm)	POWER DENSITY (mW/ cm^2)	LIMIT (mW/cm^2)
908.4-916.0	100.9	5.67	3.691	28	0.00037	0.61

CONCLUSION:

All of the Z-Wave technology, Zigbee technology and WLAN (2.4GHz & 5GHz) can transmit simultaneously, the formula of calculated the MPE is:

CPD_1 / LPD_1 + CPD_2 / LPD_2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Therefore, the worst-case situation is 0.39319 / 1 + 0.56075 / 1 + 0.02413 / 1 + 0.00037 / 0.61= 0.979, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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