



RF EXPOSURE REPORT

REPORT NO.: SA130927E08D

MODEL NO.: FiOS-G1100

FCC ID: 2ABTEG1100

RECEIVED: Dec. 25, 2013

TESTED: May 05, 2014

ISSUED: Sep. 16, 2014

APPLICANT: Verizon Online LLC

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ISSUED BY: Bureau Veritas Consumer Products Services
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RELEASE CONTROL RECORD

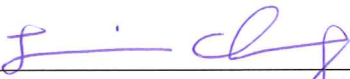
ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA130927E08D	Original release	Sep. 16, 2014



1. CERTIFICATION

PRODUCT: FiOS Quantum Gateway
BRAND NAME: Verizon
MODEL NO.: FiOS-G1100
TEST SAMPLE: ENGINEERING SAMPLE
APPLICANT: Verizon Online LLC
TESTED DATE: May 05, 2014
STANDARDS: FCC Part 2 (Section 2.1091)
KDB 447498 D03
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:** Sep. 16, 2014
(Lori Chung, Specialist)

APPROVED BY :  , **DATE:** Sep. 16, 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/cm²

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. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

WLAN Antenna Spec.				
Transmitter Circuit	Gain (dBi) (Include cable loss)	Antenna Type	Connector Type	Frequency range (GHz to GHz)
Chain (0)	3.97	Metal	NA	2.4~2.4835
	3.56			5.15~5.25
	3.86			5.25~5.35
	4.05			5.47~5.725
	4.05			5.725~5.85
Chain (1)	4.1	Metal	NA	2.4~2.4835
	5.3			5.15~5.25
	5.75			5.25~5.35
	5.75			5.47~5.725
	5.71			5.725~5.85
Chain (2)	3.36	Metal	NA	2.4~2.4835
	4.6			5.15~5.25
	4.35			5.25~5.35
	4.35			5.47~5.725
	4.21			5.725~5.85
Z-Wave Antenna Spec.				
Gain (dBi) (Include cable loss)	Antenna Type	Connector Type	Frequency range (MHz to MHz)	
1.73	Metal	NA	902~928	
Note: 1. For 1Tx mode will fix transmission on Chain (0). 2. For 2Tx mode will fix transmission on Chain (0) and Chain (1)				

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

- The EUT inside has one Zigbee technology module (option) which FCC ID: Z3M-ZBMOD1.
- For WLAN (2.4GHz) the Maximum power was refer to the FCC test report (Report No.: RF130927E08E)

For WLAN: (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 = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20})^2 / 2] = 7.05\text{dBi}$					
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



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CDD_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm²)	LIMIT (mW/cm²)
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 = $10 \log[(10^{\text{Chain0}/20} + 10^{\text{Chain1}/20} + 10^{\text{Chain2}/20})^2 / 3] = 8.59\text{dBi}$					
STBC_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm²)	LIMIT (mW/cm²)
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 WLAN: (5GHz)

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm ²)	LIMIT (mW/cm ²)
802.11a					
5260 - 5720	14.028	4.05	28	0.00362	1.00

3TX configuration					
CDD, 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)					
5260 - 5720	67.047	9.52	28	0.06010	1.00
802.11ac (VHT40)					
5270 - 5710	52.930	9.52	28	0.04744	1.00
802.11ac (VHT80)					
5290 - 5690	52.37	9.52	28	0.04759	1.00
NOTE: 5470~5725MHz (Except for UNII-3 Band): Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.52\text{dBi}$					
SDM, 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)					
5260 - 5720	67.047	5.75	28	0.02534	1.00
802.11ac (VHT40)					
5270 - 5710	52.930	5.75	28	0.02001	1.00
802.11ac (VHT80)					
5290 - 5690	52.37	5.75	28	0.01998	1.00

Beam forming (MCS0 N=2)_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm²)	LIMIT (mW/cm²)
802.11ac (VHT20)					
5260 - 5720	67.047	7.51	28	0.03801	1.00
802.11ac (VHT40)					
5270 - 5710	52.930	7.51	28	0.03000	1.00
802.11ac (VHT80)					
5290 - 5690	52.37	7.51	28	0.02996	1.00
NOTE: 5470~5725MHz (Except for UNII-3 Band): Directional gain = maximum gain of antennas + 10 log(3/2) = 7.51dBi					
STBC_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm²)	LIMIT (mW/cm²)
802.11ac (VHT20)					
5260 - 5720	51.213	5.7	28	0.01936	1.00
802.11ac (VHT40)					
5270 - 5710	82.107	5.7	28	0.03104	1.00
802.11ac (VHT80)					
5290 - 5690	83.069	5.7	28	0.03169	1.00

2TX configuration					
CDD, 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)					
5260 - 5720	55.855	7.95	28	0.03536	1.00
802.11ac (VHT40)					
5270 - 5710	80.528	7.95	28	0.05075	1.00
802.11ac (VHT80)					
5290 - 5690	96.912	7.95	28	0.06136	1.00
NOTE: 5470~5725MHz (Except for UNII-3 Band): Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 3] = 9.52\text{dBi}$					
SDM, 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)					
5260 - 5720	55.855	5.75	28	0.02131	1.00
802.11ac (VHT40)					
5270 - 5710	80.528	5.75	28	0.03044	1.00
802.11ac (VHT80)					
5290 - 5690	96.912	5.75	28	0.03697	1.00



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STBC_MODE					
FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm²)	LIMIT (mW/cm²)
802.11ac (VHT20)					
5260 - 5720	63.341	5.7	28	0.02416	1.00
802.11ac (VHT40)					
5270 - 5710	93.307	5.7	28	0.03527	1.00
802.11ac (VHT80)					
5290 - 5690	96.912	5.7	28	0.03697	1.00

For Zigbee:

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm²)	LIMIT (mW/cm²)
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/ cm²)	LIMIT (mW/cm²)
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:

$$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.39319 / 1 + 0.06136 / 1 + 0.02413 / 1 + 0.00037 / 0.61 = 0.479$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

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