



RF Exposure Evaluation Declaration

FCC ID: 2ADZR4G0812WA

APPLICANT: Nokia Shanghai Bell Co., Ltd

Application Type: Certification

Product: FastMile 4G Gateway

Model No.: 4G08-12W-A

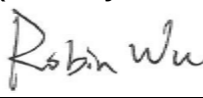
Brand Name: NOKIA

FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)
Citizens Band End User Devices (CBE)
PCS Licensed Transmitter (PCB)

Test Procedure(s): KDB 447498 D01v06

Test Date: November 02, 2019 ~ April 12, 2020

Reviewed By: 
(Sunny Sun)

Approved By: 
(Robin Wu)



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1911RSU040-U6	Rev. 01	Initial Report	04-27-2020	Valid

General Information

Applicant:	Nokia Shanghai Bell Co., Ltd
Applicant Address:	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China
Manufacturer:	Nokia Shanghai Bell Co., Ltd
Manufacturer Address:	388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai 201206, China
Test Site:	MRT Technology (Suzhou) Co., Ltd
Test Site Address:	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Tian'edang Rd., Suzhou, China.

- MRT facility is a FCC accredited (MRT Designation No. CN1166) test facility with the site description report on file and has met all the requirements specified in ANSI C63.4-2014.
- MRT facility is an IC registered (MRT Reg. No. 11384A-1) test laboratory with the site description on file at Industry Canada.
- MRT facility is a VCCI registered (R-20025, G-20034, C-20020, T-20020) test laboratory with the site description on file at VCCI Council.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (A2LA) under the American Association for Laboratory Accreditation Program (A2LA Cert. No. 3628.01) in EMC, Telecommunications, Radio and SAR testing.



1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	FastMile 4G Gateway
Model No.:	4G08-12W-A
Brand Name:	NOKIA
Wi-Fi Specification:	802.11a/b/g/n/ac
LTE Specification:	Band 2, 4, 5, 7, 25, 38, 48, 66
Operating Temperature:	0 ~ 45 °C
Power Type:	AC adapter input

1.2. Description of Available Antennas

Technology	Frequency Range (MHz)	Antenn a Type	Max Peak Gain (dBi)		Directional Gain (dBi)			
					CDD Mode		Beam-Forming Mode	
			Ant 8	Ant 9	For Power	For PSD	For Power	For PSD
2.4GHz Wi-Fi	2400 ~ 2483.5	PCB	3.81	3.95	3.95	6.96	6.96	6.96
5GHz Wi-Fi	5150 ~ 5350	Dipole	4.13	3.99	4.13	7.14	7.14	7.14
	5470 ~ 5725		4.42	4.65	4.65	7.66	7.66	7.66
	5725 ~ 5850		4.56	4.67	4.67	7.68	7.68	7.68
Technology		Frequency Range (MHz)		Antenna Type		Max Peak Gain (dBi)		
LTE Band 2		1850 ~ 1910		PCB		4.27		
LTE Band 4		1710 ~ 1755				4.49		
LTE Band 5		824 ~ 849				0.10		
LTE Band 7		2500 ~ 2570				4.70		
LTE Band 25		1850 ~ 1915				4.27		
LTE Band 38		2570 ~ 2620				4.70		
LTE Band 48		3550 ~ 3700				4.80		
LTE Band 66		1710 ~ 1780				4.49		

Note 1: The EUT supports Cyclic Delay Diversity (CDD) with 802.11a/g/n/ac, CDD signals are correlated.

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on all devices,

$$\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.11 devices,

$$\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4;$$

If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

Note 2: The EUT supports Beam Forming mode with 802.11n/ac.

The directional gain = $10 \cdot \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] \text{dBi}$.

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation Formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is the limit of MPE, 1mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result of RF Exposure Evaluation

Product	FastMile 4G Gateway
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Safety Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Wi-Fi	2412 ~ 2462	31.59	25	0.1836	1
	5180 ~ 5320	34.44		0.3539	
	5500 ~ 5720	29.80		0.1216	
	5745 ~ 5825	34.52		0.3605	
LTE Band 5	824 ~ 849	25.96		0.0502	
LTE Band 7	2500 ~ 2570	30.01		0.1276	
LTE Band 25/2	1850 ~ 1915	31.65		0.1862	
LTE Band 38	2570 ~ 2620	32.84		0.2449	
LTE Band 48	3550 ~ 3700	22.88		0.0247	
LTE Band 66/4	1710 ~ 1780	29.97		0.1264	

Note: The max Power Density at R (25 cm) = 0.1836 + 0.3605 + 0.2449 mW/cm² = 0.789 mW/cm² < 1 mW/cm².

The wireless device described within this report has been shown to be capable of compliance with basic restrictions related to human exposure to electromagnetic fields for both General public and Occupational. The calculations shown in this report were made in accordance the procedures specified in the applied test specifications

Configuration	Required Compliance Boundary (cm)
Wi-Fi 2.4GHz & Wi-Fi 5GHz & LTE Band 2, 5, 7, 25,38, 48, 66	25

The End

Appendix A – EUT Photograph

Refer to “1911RSU040-UE” file.