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TESTING  
NVLAP LAB CODE: 100275-0

# **Spectrum Allocation Server- Citizens Band Radio Service Device Conformity Assessment Test Report**

## **Test Standards**

**CBRSA-TS-9001 V1.0.0, March 20, 2018  
WINNF-TS-0122 Version V1.0.0, December 19, 2017**

## **Client**

**Nokia Solutions and Networks, OY  
2000 Lucent Lane  
Naperville, Illinois 60563**

## **Product Evaluated**

**Flexi Zone Multiband Indoor Pico BTS CBRS Band 48 Module (MBI-B48)  
FCC ID: 2AD8UFW2QADPM01**

**GPCL Project Number:  
2018-0130**

**Report Number:  
TR-2018-0130-CBRS -SAS**

**Date Issued:  
3/5/2019**

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## Revisions

| Date      | Revision | Section | Change                     |
|-----------|----------|---------|----------------------------|
| 7/30/2018 | 0        |         | Initial Release            |
| 10/2/2018 | 1        |         | FCC TCB Requested changes. |
| 3/5/2019  | 2        |         | FCC TCB Requested changes. |
|           |          |         |                            |
|           |          |         |                            |
|           |          |         |                            |
|           |          |         |                            |
|           |          |         |                            |

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Signed:  3/5/2019  
Compliance Engineer

Signed:  3/5/2019  
Technical Manager

## 1. System Information and Requirements

|                                    |                                                                                                                                                                                                                                             |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Company Name</b>                | Nokia Solutions and Networks, OY<br>2000 Lucent Lane<br>Naperville, Illinois 60563<br>Attention: Terry P. Schwenk                                                                                                                           |
| <b>FCC ID: / Grant Date</b>        | <b>FCC ID: 2AD8UFW2QADPM01</b>                                                                                                                                                                                                              |
| <b>Product Name</b>                | <b>Flexi Zone Multiband Indoor Pico BTS CBRS Band 48</b>                                                                                                                                                                                    |
| <b>Model Name</b>                  | <b>FW2QADPM01</b>                                                                                                                                                                                                                           |
| <b>Part No</b>                     | 474336A.X11                                                                                                                                                                                                                                 |
| <b>GPCL Project Number / PRI#</b>  | 2018-0130 / PRI20183540                                                                                                                                                                                                                     |
| <b>Serial Numbers</b>              | S/N: EB172710091                                                                                                                                                                                                                            |
| <b>Test Standard(s)</b>            | <ul style="list-style-type: none"> <li>CBRSA-TS-9001 V1.0.0, March 20, 2018</li> <li>WINNF-TS-0122 Version V1.0.0, December 19, 2017</li> <li>KDB 940660 D01 Part 96 CBRS Equipment v01</li> </ul>                                          |
| <b>Reference(s)</b>                | <ul style="list-style-type: none"> <li>47 CFR FCC Part 2 and Part 96</li> <li>ANSI C63.26 (2015)</li> <li>ANSI C63.4 (2014)</li> </ul>                                                                                                      |
| <b>Measurement Procedure(s):</b>   | FCC-WINN-SAS and FCC-IC-0B                                                                                                                                                                                                                  |
| <b>Winn Forum SAS test harness</b> | Version: 1.0.0.2                                                                                                                                                                                                                            |
| <b>Frequency Band</b>              | CBRS (Tx/Rx: 3550-3700 MHz), E-UTRAN Band 48                                                                                                                                                                                                |
| <b>Technology</b>                  | LTE-TDD: 10M0F9W, 15M0F9W, 20M0F9W                                                                                                                                                                                                          |
| <b>Test Frequency Range</b>        | 3550 – 3700 MHz                                                                                                                                                                                                                             |
| <b>Operation Mode(s)</b>           | 2 x 0.25W MIMO                                                                                                                                                                                                                              |
| <b>Submission Type</b>             | Initial Filing for Product Certification under Part 96 (Category A CBSD)                                                                                                                                                                    |
| <b>FCC Part 15 Subpart B</b>       | Compliance with Class B                                                                                                                                                                                                                     |
| <b>Test Date</b>                   | June 12, 2018 – June 28, 2018                                                                                                                                                                                                               |
| <b>Test Laboratory</b>             | Nokia Global Product Compliance Laboratory<br>600-700 Mountain Avenue, Rm 5B-108<br>Murray Hill, New Jersey 07974-0636 USA<br>NVLAP Lab Code: <b>100275-0</b> FCC Registration Number: <b>395774</b><br>Designation Number: <b>US5302</b> , |

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**Product Engineer(s):**

Ronald Remy

**Test Engineer (s):**

W. Steve Majkowski, Raymond J. Johnson

Report copies and other information not contained in this report are held by either the product engineer or in an identified file at the Global Product Compliance Laboratory in Murray-Hill, NJ.

## 1.1 Introduction

This Spectrum Access Server (SAS) Conformity Assessment Report applies to the **Nokia Flexi Zone (FZ) Multiband Indoor (MBI) Pico BTS CBRS (FZ MBI)** with Long Term Evolution (LTE) Technology (PRI04781), hereinafter referred to as the Equipment Under Test (EUT) or the **Citizens Broadband Radio Service Device (CBSD)**.

The EUT operates in the **Citizens Broadband Radio Service (CBRS)** domestic 3550-3700 MHz band (3.5 GHz Band), i.e., E-UTRAN band 48, with TDD-LTE technologies. It is a Nokia designed product and is designed with TDD\_LTE technology with capability for 10, 15 and 20 MHz carrier bandwidths.

This professionally installed Category A CBSD uses the protocol developed by WInnForum. The testing herein demonstrates compliance to WInnForum Standards™ Interface Specifications, and affirm that the device will conform to the communications security methods used by the SAS. The testing performed herein uses the SAS emulator developed by Wireless Innovation Forum (“WInnForum”) to demonstrate compliance.

The demonstration of compliance to the WInnForum Interface Specification must use a test lab that has been recognized by WInnForum. Nokia’s Global Product Compliance Laboratory is the first US accredited WInnForum CBRS Approved Lab and is a CBRS Alliance Authorized Test Lab

The RF output of this CBSD has a maximum power is 0.25 W (24.0 dBm) per transmit port with 2x MIMO operation for one or two carriers. Total power for two ports is 0.5 W (27.0 dBm). The RF performance of the product is documented in the separate Part 96 Radio Filing Test Report.

## 1.2 Purpose and Scope

The purpose of this document is to documents the digital interface conformance and operational interaction between the SAS and the CBSD.

This test data required for qualifying the EUT CBDS in compliance with FCC Part 96 requirements for certification under FCC Part 2, measured in accordance with the procedures set out in Section 2.1033 (c) (14) of the Rules and per KDB Publication 940660 D01.

## 1.3 EUT Description

The **Flexi Zone Multiband Indoor Pico BTS (FZ MBI)** is a small cell that is a small cell optimized for an indoor environment. The hardware platform supports LTE-TDD full throughput capability of 10, 15, or 20 MHz LTE carriers with 2x2 MIMO (LTE main and diversity transmit). The physical transport interface is optimized for IP-based transport solutions. The FZ MBI supports varying transmit power up to 250 mW per antenna branch

The **Flexi Zone Multiband Indoor Pico BTS (FZ MBI)** is being filed under **FCC ID: 2AD8UFW2QADPM01** for **CBRS operation in Band 48 under 47CFR Part 96**. The physical transport interface is optimized for IP-based transport solutions.

## 1.4 Test Rational

The SAS interface design is compliant to WInnForum hardware of the CBSD / FZ MBI-Band 48 is identical to that of the previously certified Band 48 product.

The testing herein demonstrates compliance to WInnForum Standards™ Interface Specifications, and affirm that the device will conform to the communications security methods used by the SAS. The testing performed herein uses the SAS emulator developed by Wireless Innovation Forum (“WInnForum”) to demonstrate compliance.

The demonstration of compliance to the WInnForum Interface Specification must use a test lab that has been recognized by WInnForum. Nokia’s Global Product Compliance Laboratory is the first accredited WInnForum CBRS Approved Lab in the USA and is a CBRS Alliance Authorized Test Lab

The operation of the CBSD product with the SAS evaluation is evaluated herein.

### 1.4.1 Test Requirements

The test requirements are described in CFR47 Part 2 and WInnForum Standards™ Each required measurement is listed below:

|               |               |                                                       |
|---------------|---------------|-------------------------------------------------------|
| WINNF-TS-0122 | Paragraph 6.1 | CBSD Registration Process                             |
| WINNF-TS-0122 | Paragraph 6.2 | CBSD Spectrum Inquiry Process                         |
| WINNF-TS-0122 | Paragraph 6.3 | CBSD Spectrum Grant Process                           |
| WINNF-TS-0122 | Paragraph 6.4 | CBSD Heart Beat Process                               |
| WINNF-TS-0122 | Paragraph 6.5 | CBSD Measurement Report                               |
| WINNF-TS-0122 | Paragraph 6.6 | CBSD Relinquishment Process                           |
| WINNF-TS-0122 | Paragraph 6.7 | CBSD Deregistration Process                           |
| WINNF-TS-0122 | Paragraph 6.8 | CBSD Security Validation                              |
| WINNF-TS-0122 | Paragraph 7   | SAS-CBSD/DP Interface Performance Test Specifications |
| WINNF-TS-0122 | Paragraph 7.1 | CBSD RF Power Measurement                             |

Section 2.1046

Section 2.1047

RF Power Output

Modulation Characteristics

## 1.5 Reference Documents, Test Specifications & Procedures

A list of the applicable documents is provided herein.

### 1.5.1 Reference Documents

A list of the applicable documents is provided herein:

- ETSI TS 136 104 V13.5.0 (2016-10) LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception (3GPP TS 36.104 version 13.5.0 Release 13)

### 1.5.2 Test Specifications

- CBRS Alliance Certification Test Plan, CBRSA-TS-9001 V1.0.0, 20 March 2018
- Working Document WINNF-TS-0122, Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT), Version V1.0.0, 19 December 2017
- Code of Federal Regulations 47, Federal Communications Commission Part 96, Subpart E – Citizens Broadband Radio Services.
- KDB 940660 D01 (Current Version) – Certification and Test Procedures for Citizens Broadband Radio Service Devices Authorized under Part 96 of The Rules, DR01 (Currently in Draft Version)
- KDB 971168 D01 (Current Version) - Measurement Guidance for Certification of Licensed Digital Transmitters

### 1.5.3 Procedures

1. GPCL Procedure FCC-WINN-SAS, Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT) Test Procedure
2. GPCL Procedure FCC-IC-OB, Power measurement, Occupied Bandwidth, & Modulation Test Procedure
3. ANSI C63.26 (2015) entitled: “American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services”, American National Standards Institute, Institute of Electrical and Electronic Engineers, Inc., New York, NY 10017-2394, USA.

### 1.5.4 MEASUREMENT UNCERTAINTY

The results of the calculations to estimate uncertainties for the several test methods and standards are shown in the Table below. These are the worst-case values.

**Worst-Case Estimated Measurement Uncertainties**

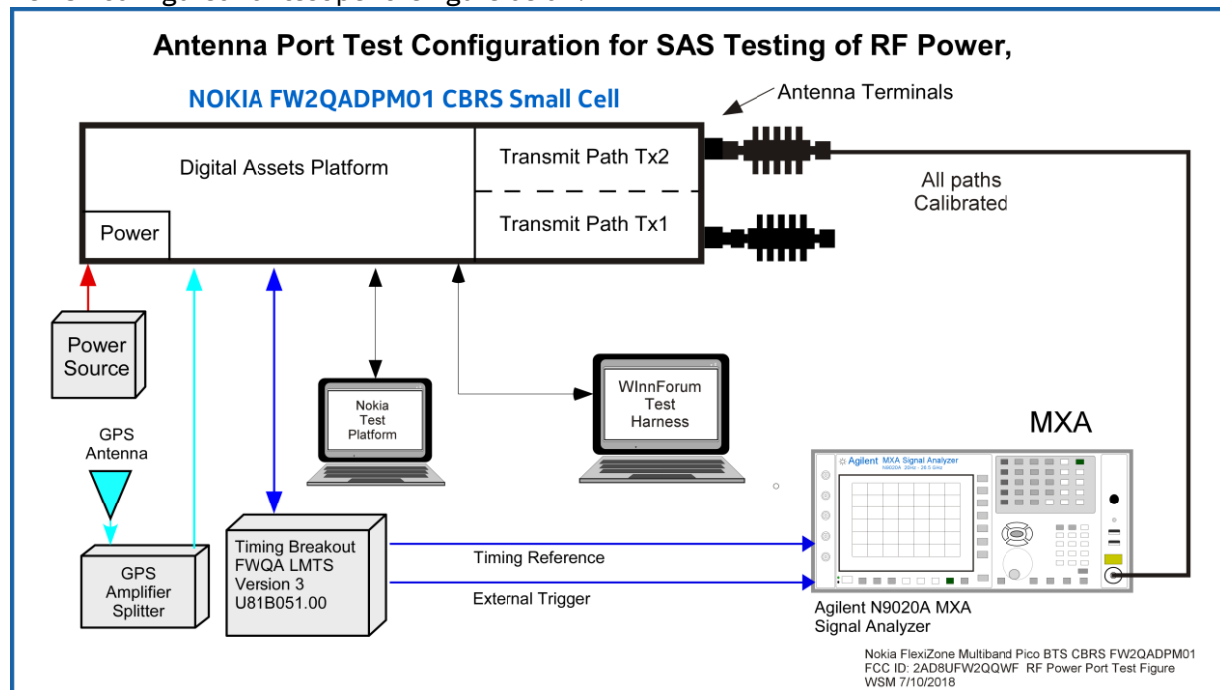
| Standard, Method or Procedure                                                                                        | Condition           | Frequency MHz | Expanded Uncertainty (k=2) |
|----------------------------------------------------------------------------------------------------------------------|---------------------|---------------|----------------------------|
| a. Classical Emissions, (e.g., ANSI C63.4, C63.26, CISPR 11, 14, 22, etc., using ESHS 30, AR-6 Semi-Anechoic Chamber | Conducted Emissions | 10 – 10,000   | ±3.5 dB                    |

| Antenna Port Test                                              | Signal Bandwidth                           | Frequency Range                                                            | Expanded Uncertainty (k=2), Amplitude |
|----------------------------------------------------------------|--------------------------------------------|----------------------------------------------------------------------------|---------------------------------------|
| Occupied Bandwidth, Edge of Band, Conducted Spurious Emissions | 10 Hz<br>100 Hz<br>10 kHz to 1 MHz<br>1MHz | 9 kHz to 20 MHz<br>20 MHz to 1 GHz<br>1 GHz to 10 GHz<br>10 GHz to 40 GHz: | 1.78 dB                               |
| RF Power with Power Meter                                      | 10 Hz to 20 MHz                            | 50 MHz to 18 GHz                                                           | 0.5 dB                                |

## 1.6 Product Equipage

### 1.6.1 System Interconnect Block Diagram

The EUT configured for test per the figure below.



## 1.7 Executive Summary

### RESULTS:

1. **COMPLIES** - Passed all applicable tests.
2. **N/A** – Not Applicable.
3. **NT** – Not Tested.

| WINNF-TS-0122 | Paragraph 6.1 | CBSD Registration Process                             | Date Tested | Result          |
|---------------|---------------|-------------------------------------------------------|-------------|-----------------|
| WINNF-TS-0122 | Paragraph 6.2 | CBSD Spectrum Inquiry Process                         | 6/13/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.3 | CBSD Spectrum Grant Process                           | 6/13/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.4 | CBSD Heart Beat Process                               | 6/13-15/18  | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.5 | CBSD Measurement Report                               | 6/15/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.6 | CBSD Relinquishment Process                           | 6/18/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.7 | CBSD Deregistration Process                           | 6/18/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 6.8 | CBSD Security Validation                              | 6/20/18     | <b>Complies</b> |
| WINNF-TS-0122 | Paragraph 7   | SAS-CBSD/DP Interface Performance Test Specifications | Not Tested  | <b>NT</b>       |
| WINNF-TS-0122 | Paragraph 7.1 | CBSD RF Power Measurement                             | 6/20-27/18  | <b>Complies</b> |

## 2. Detailed Results

The results of the individual test cases are detailed in below. Documentation of specific data items follow.  
 Pass / Fail, NT= Not Tested, N/A = Not Applicable

### 2.1 CBSD Registration Process

#### 2.1.1 WINNF.FT.C.REG.1

| Test Case Title         | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|-------------------------|----------------------|---------------------------------------|---------------------|
| Multi-Step registration | Pass                 | WINNF.FT.C.REG.1_2018-06-25T23.43.19Z | FSW_Screenshot_REG1 |

#### 2.1.2 WINNF.FT.C.REG.3

| Test Case Title                              | Result<br>P/F / (NT) | Log File Name | Comment                    |
|----------------------------------------------|----------------------|---------------|----------------------------|
| Single-Step registration for Category A CBSD | N/A                  |               | This product requires CPI. |

#### 2.1.3 WINNF.FT.C.REG.5

| Test Case Title                                        | Result<br>P/F / (NT) | Log File Name | Comment                  |
|--------------------------------------------------------|----------------------|---------------|--------------------------|
| Single-Step registration for CBSD with CPI signed data | N/A                  |               | Multi step REG required. |

#### 2.1.4 WINNF.FT.C.REG.7

| Test Case Title                                         | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|---------------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Registration due to change of an installation parameter | Pass                 | WINNF.FT.C.REG.7_2018-06-26T00.56.08Z | FSW_Screenshot_REG7 |

#### 2.1.5 WINNF.FT.C.REG.8

| Test Case Title                                | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Missing Required parameters (responseCode 102) | Pass                 | WINNF.FT.C.REG.8_2018-06-13T16.53.42Z | FSW_Screenshot_REG8 |

#### 2.1.6 WINNF.FT.C.REG.10

| Test Case Title                         | Result<br>P/F / (NT) | Log File Name                          | Comment |
|-----------------------------------------|----------------------|----------------------------------------|---------|
| Pending registration (responseCode 200) | Pass                 | WINNF.FT.C.REG.10_2018-06-26T01.21.54Z |         |

#### 2.1.7 WINNF.FT.C.REG.12

| Test Case Title                      | Result<br>P/F / (NT) | Log File Name                          | Comment   |
|--------------------------------------|----------------------|----------------------------------------|-----------|
| Invalid parameter (responseCode 103) | Pass                 | WINNF.FT.C.REG.12_2018-06-26T01.25.25Z | REG 12-14 |

#### 2.1.8 WINNF.FT.C.REG.14

| Test Case Title                     | Result<br>P/F / (NT) | Log File Name                          | Comment   |
|-------------------------------------|----------------------|----------------------------------------|-----------|
| Blacklisted CBSD (responseCode 101) | Pass                 | WINNF.FT.C.REG.14_2018-06-26T01.27.19Z | REG 12-14 |

#### 2.1.9 WINNF.FT.C.REG.16

| Test Case Title                                     | Result<br>P/F / (NT) | Log File Name                          | Comment              |
|-----------------------------------------------------|----------------------|----------------------------------------|----------------------|
| Unsupported SAS protocol version (responseCode 100) | Pass                 | WINNF.FT.C.REG.16_2018-06-26T01.29.53Z | FSW_Screenshot_REG16 |

### 2.1.10 WINNF.FT.C.REG.18

| Test Case Title                | Result<br>P/F / (NT) | Log File Name                          | Comment              |
|--------------------------------|----------------------|----------------------------------------|----------------------|
| Group Error (responseCode 201) | Pass                 | WINNF.FT.C.REG.18_2018-06-26T01.32.46Z | FSW_Screenshot_REG18 |

### 2.1.11 WINNF.FT.C.REG.20

| Test Case Title                 | Result<br>P/F / (NT) | Log File Name | Comment     |
|---------------------------------|----------------------|---------------|-------------|
| Category A CBSD location update | NT                   | N/A           | N/A for CPI |

## 2.2 CBSD Spectrum Inquiry Process

### 2.2.1 Successful response from SAS Test Harness

| Test Case Title                                     | Result<br>P/F / (NT) | Log File Name | Comment      |
|-----------------------------------------------------|----------------------|---------------|--------------|
| Successful response from SAS Test Harness (6.2.4.1) | NT                   | N/A           | N/A for CBSD |

### 2.2.2 Successful spectrum Inquiry response from SAS

| Test Case Title                                           | Result<br>P/F / (NT) | Log File Name | Comment      |
|-----------------------------------------------------------|----------------------|---------------|--------------|
| Successful spectrum Inquiry response from SAS (6.2.4.1.1) | NT                   | N/A           | N/A for CBSD |

## 2.3 CBSD Spectrum Grant Process

### 2.3.1 WINNF.FT.D.GRA.1

| Test Case Title                                    | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|----------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Unsuccessful Grant responseCode=400 (INTERFERENCE) | Pass                 | WINNF.FT.C.GRA.1_2018-06-26T01.37.53Z | FSW_Screenshot_GRA1 |

### 2.3.2 WINNF.FT.C.GRA.2

| Test Case Title                                      | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|------------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Unsuccessful Grant responseCode=401 (GRANT_CONFLICT) | Pass                 | WINNF.FT.C.GRA.2_2018-06-26T01.42.34Z | FSW_Screenshot_GRA2 |

## 2.4 CBSD Heart Beat Process

### 2.4.1 WINNF.FT.C.HBT.1

| Test Case Title                                   | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|---------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Heartbeat Success Case (first Heartbeat Response) | Pass                 | WINNF.FT.C.HBT.1_2018-06-25T23.01.43Z | FSW_Screenshot_HBT1 |

### 2.4.2 WINNF.FT.C.HBT.3

| Test Case Title                         | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|-----------------------------------------|----------------------|---------------------------------------|---------------------|
| Heartbeat responseCode=105 (DEREGISTER) | Pass                 | WINNF.FT.C.HBT.3_2018-06-26T02.00.37Z | FSW_Screenshot_HBT3 |

### 2.4.3 WINNF.FT.C.HBT.4

| Test Case Title                               | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|-----------------------------------------------|----------------------|---------------------------------------|---------------------|
| Heartbeat responseCode=500 (TERMINATED_GRANT) | Pass                 | WINNF.FT.C.HBT.4_2018-06-26T19.31.49Z | FSW_Screenshot_HBT4 |

### 2.4.4 WINNF.FT.C.HBT.5

| Test Case Title                                                          | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|--------------------------------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response | Pass                 | WINNF.FT.C.HBT.5_2018-06-26T02.49.30Z | FSW_Screenshot_HBT5 |

### 2.4.5 WINNF.FT.C.HBT.6

| Test Case Title                                                               | Result<br>P/F / (NT) | Log File Name                         | Comment             |
|-------------------------------------------------------------------------------|----------------------|---------------------------------------|---------------------|
| Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response | Pass                 | WINNF.FT.C.HBT.6_2018-06-26T19.58.16Z | FSW_Screenshot_HBT6 |

### 2.4.6 WINNF.FT.C.HBT.7

| Test Case Title                              | Result<br>P/F / (NT) | Log File Name                         | Comment |
|----------------------------------------------|----------------------|---------------------------------------|---------|
| Heartbeat responseCode=502 (UNSYNC_OP_PARAM) | Pass                 | WINNF.FT.C.HBT.7_2018-06-26T03.59.33Z |         |

### 2.4.7 WINNF.FT.C.HBT.9

| Test Case Title                             | Result<br>P/F / (NT) | Log File Name                         | Comment |
|---------------------------------------------|----------------------|---------------------------------------|---------|
| Heartbeat Response Absent (First Heartbeat) | Pass                 | WINNF.FT.C.HBT.9_2018-06-26T04.05.59Z |         |

### 2.4.8 WINNF.FT.C.HBT.10

| Test Case Title                                  | Result<br>P/F / (NT) | Log File Name                          | Comment              |
|--------------------------------------------------|----------------------|----------------------------------------|----------------------|
| Heartbeat Response Absent (Subsequent Heartbeat) | Pass                 | WINNF.FT.C.HBT.10_2018-06-26T21.23.31Z | FSW_ScreenShot_HBT10 |

### 2.4.9 WINNF.FT.C.HBT.11

| Test Case Title                                 | Result<br>P/F / (NT) | Log File Name                          | Comment              |
|-------------------------------------------------|----------------------|----------------------------------------|----------------------|
| Successful Grant Renewal in Heartbeat Test Case | Pass                 | WINNF.FT.C.HBT.11_2018-06-26T21.39.55Z | FSW_ScreenShot_HBT11 |

## 2.5 CBSD Measurement Report

### 2.5.1 WINNF.FT.C.MES.1

| Test Case Title                                 | Result<br>P/F / (NT) | Log File Name                         | Comment                      |
|-------------------------------------------------|----------------------|---------------------------------------|------------------------------|
| Registration Response contains measReportConfig | Pass                 | WINNF.FT.C.MES.1_2018-06-26T23.31.56Z | #2, 5 & 7 all met in detail. |

### 2.5.2 WINNF.FT.C.MES.3

| Test Case Title                          | Result<br>P/F / (NT) | Log File Name | Comment |
|------------------------------------------|----------------------|---------------|---------|
| Grant Response contains measReportConfig | NT                   |               | N/A     |

### 2.5.3 WINNF.FT.C.MES.4

| Test Case Title                              | Result<br>P/F / (NT) | Log File Name | Comment |
|----------------------------------------------|----------------------|---------------|---------|
| Heartbeat Response contains measReportConfig | NT                   |               | N/A     |

## 2.6 CBSD Relinquishment Process

### 2.6.1 WINNF.FT.C.RLQ.1

| Test Case Title           | Result<br>P/F / (NT) | Log File Name                         | Comment                                                   |
|---------------------------|----------------------|---------------------------------------|-----------------------------------------------------------|
| Successful Relinquishment | Pass                 | WINNF.FT.C.RLQ.1_2018-06-27T00.25.15Z | Condition. #2 N/A as trigger stops all Messages and Tx RF |

### 2.6.2 WINNF.FT.C.RLQ.3

| Test Case Title                               | Result<br>P/F / (NT) | Log File Name                         | Comment                      |
|-----------------------------------------------|----------------------|---------------------------------------|------------------------------|
| Unsuccessful Relinquishment, responseCode=102 | Pass                 | WINNF.FT.C.RLQ.3_2018-06-27T22.31.25Z | Tx off 4.4 sec after trigger |

### 2.6.3 WINNF.FT.C.RLQ.5

| Test Case Title                               | Result<br>P/F / (NT) | Log File Name                         | Comment                       |
|-----------------------------------------------|----------------------|---------------------------------------|-------------------------------|
| Unsuccessful Relinquishment, responseCode=103 | Pass                 | WINNF.FT.C.RLQ.5_2018-06-27T22.41.42Z | Tx off 2.64 sec after trigger |

## 2.7 CBSD Deregistration Process

### 2.7.1 WINNF.FT.C.DRG.1

| Test Case Title           | Result<br>P/F / (NT) | Log File Name                         | Comment                                                                    |
|---------------------------|----------------------|---------------------------------------|----------------------------------------------------------------------------|
| Successful Deregistration | Pass                 | WINNF.FT.C.DRG.1_2018-06-27T22.56.40Z | #1, #2 met, #3 N/A after trigger. Tx off @ 2.5 sec. after Trigger, #6 Pass |

### 2.7.2 WINNF.FT.C.DRG.3

| Test Case Title                 | Result<br>P/F / (NT) | Log File Name                         | Comment                     |
|---------------------------------|----------------------|---------------------------------------|-----------------------------|
| Deregistration responseCode=102 | Fail                 | WINNF.FT.C.DRG.3_2018-06-28T00.00.31Z | Tx off @ 2.7 sec after trig |

### 2.7.3 WINNF.FT.C.DRG.5

| Test Case Title                 | Result<br>P/F / (NT) | Log File Name                         | Comment                     |
|---------------------------------|----------------------|---------------------------------------|-----------------------------|
| Deregistration responseCode=103 | Pass                 | WINNF.FT.C.DRG.5_2018-06-27T23.53.17Z | Tx off @ 2.7 sec after trig |

## 2.8 CBSD Security Validation

### 2.8.1 WINNF.FT.C.SCS.1

| Test Case Title                                            | Result<br>P/F / (NT) | Log File Name                                                                          | Comment     |
|------------------------------------------------------------|----------------------|----------------------------------------------------------------------------------------|-------------|
| Successful TLS connection between UUT and SAS Test Harness | Pass                 | WINNF.FT.C.SCS1_w-REG.1_2018-06-28T20.25.40Z<br>Wireshark_MBI_SCS.1_using_REG.1.pcapng | Pass, No Tx |

### 2.8.2 WINNF.FT.C.SCS.2

| Test Case Title                        | Result<br>P/F / (NT) | Log File Name                                                                   | Comment     |
|----------------------------------------|----------------------|---------------------------------------------------------------------------------|-------------|
| TLS failure due to revoked certificate | Pass                 | WINNF.FT.C.SCS2_w-REG.1_2018-06-28T20.55.31Z<br>Wireshark_MBI_SCS.2_using_REG.1 | Pass, No Tx |

### 2.8.3 WINNF.FT.C.SCS.3

| Test Case Title                               | Result<br>P/F / (NT) | Log File Name                                                                   | Comment     |
|-----------------------------------------------|----------------------|---------------------------------------------------------------------------------|-------------|
| TLS failure due to expired server certificate | Pass                 | WINNF.FT.C.SCS3_w-REG.1_2018-06-28T21.20.06Z<br>Wireshark_MBI_SCS.3_using_REG.1 | Pass, No Tx |

### 2.8.4 WINNF.FT.C.SCS.4

| Test Case Title                                                      | Result<br>P/F / (NT) | Log File Name                                                                   | Comment     |
|----------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|-------------|
| TLS failure when SAS Test Harness certificate is issue by unknown CA | Pass                 | WINNF.FT.C.SCS4_w-REG.1_2018-06-28T21.29.22Z<br>Wireshark_MBI_SCS.4_using_REG.1 | Pass, No Tx |

### 2.8.5 WINNF.FT.C.SCS.5

| Test Case Title                                                   | Result<br>P/F / (NT) | Log File Name                                                                   | Comment     |
|-------------------------------------------------------------------|----------------------|---------------------------------------------------------------------------------|-------------|
| TLS failure when certificate at the SAS Test Harness is corrupted | Pass                 | WINNF.FT.C.SCS5_w-REG.1_2018-06-28T21.48.48Z<br>Wireshark_MBI_SCS.5_using_REG.1 | Pass, No Tx |

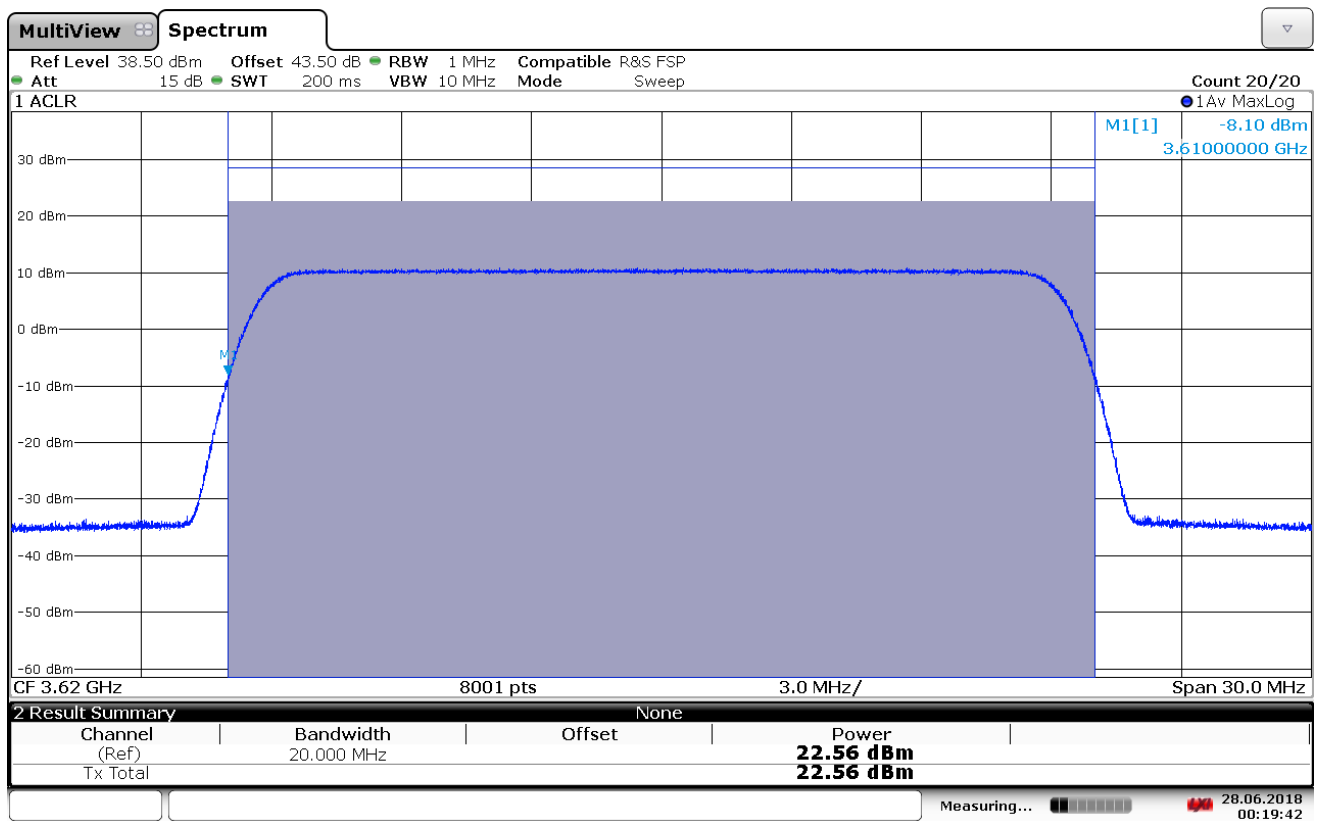
## 2.9 SAS-CBSD/DP Interface Performance Test Specifications

Not Tested

## 2.10 CBSD RF Power Measurement

### 2.10.1 WINNF.PT.C.HBT

| Test Case Title                      | Result<br>P/F / (NT) | Log File Name                                                                                     | Comment or Plot Data Reference                                                                                                                                 |
|--------------------------------------|----------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UUT RF Transmit<br>Power Measurement | Pass                 | WINNF.PT.C.HBT.1_2018-06-27T21.30.37Z<br>FSW_MaxPwr_24dBm_result_22-73dBm_2018-06-<br>28_00-19-42 | TX1 = 22.56 dBm/20 MHz<br>22.56 dBm/20MHz x 2 carriers = 22.56 dBm/10MHz<br>22.56 dBm/10MHz + 6dBi Gain<br>= 28.56 dBm/10MHz EIRP ≤ 30 dBm/10MHz Limit<br>PASS |



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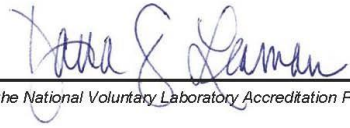
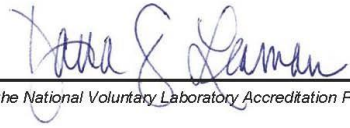
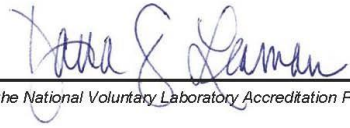
### 3. List of Test Equipment

The Equipment used for performance of the tests results are listed below.

**Asset ID Manufacturer Type Description Model Serial Calibration Date Calibration Due Calibration Type Status**

| Asset ID ▲            | Manufacturer         | Type                 | Description                    | Model                | Serial      | Calibration Date | Calibration Due |
|-----------------------|----------------------|----------------------|--------------------------------|----------------------|-------------|------------------|-----------------|
| <a href="#">P339</a>  | Control Company      | Electronic Stopwatch |                                | 1051                 | 181179959   | 2018-05-12       | 2020-05-12      |
| <a href="#">E950</a>  | Agilent Technologies | Power Meter          | P-Series                       | N1921A               | MY45101984  | 2018-03-29       | 2020-03-29      |
| <a href="#">E949</a>  | Agilent Technologies | Power Sensor         | -35 - +20 dBm 50 MHz -18 GHz   | N1921A               | MY45242502  | 2018-04-02       | 2020-04-02      |
| <a href="#">E1260</a> | Rohde & Schwarz      | Spectrum Analyzer    | 10 Hz-67 GHz                   | FSW67                | 104007      | 2018-02-12       | 2020-02-12      |
| <a href="#">P324</a>  | Extech               | Data Logger          | Pres/Humidity/Temp Data Logger | SD700                | Q679346     | 2016-06-26       | 2018-06-26      |
| GPCL-LAP-231          | Lenova               | Thinkpad             | GPCL-LAP-231                   | T530                 | PK-290GF    | N/A              | N/A             |
| FWQA-LMTS             | Nokia                | Trigger Buffer       | Timing Trigger buffer          | FWQA-LMTS U81B051.00 | EC163610199 | N/A              | N/A             |

#### 4. nVLAP Certificate of Accreditation

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                     |                                                                                                                                                                             |                                                                                     |                                                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>United States Department of Commerce<br/>National Institute of Standards and Technology</p> <p><b>NVLAP<sup>®</sup></b></p> <hr/> <p><b>Certificate of Accreditation to ISO/IEC 17025:2005</b></p> <hr/> <p>NVLAP LAB CODE: 100275-0</p> <p><b>Nokia, Global Product Compliance Lab</b><br/>Murray Hill, NJ</p> <p><i>is accredited by the National Voluntary Laboratory Accreditation Program for specific services,<br/>listed on the Scope of Accreditation, for:</i></p> <p><b>Electromagnetic Compatibility &amp; Telecommunications</b></p> <p><i>This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.<br/>This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality<br/>management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).</i></p> <table><tr><td><p>2017-08-17 through 2018-09-30</p><hr/><p><i>Effective Dates</i></p></td><td></td><td><p></p><hr/><p><i>For the National Voluntary Laboratory Accreditation Program</i></p></td></tr></table> |                                                                                     | <p>2017-08-17 through 2018-09-30</p> <hr/> <p><i>Effective Dates</i></p>                                                                                                    |  | <p></p> <hr/> <p><i>For the National Voluntary Laboratory Accreditation Program</i></p> |
| <p>2017-08-17 through 2018-09-30</p> <hr/> <p><i>Effective Dates</i></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  | <p></p> <hr/> <p><i>For the National Voluntary Laboratory Accreditation Program</i></p> |                                                                                     |                                                                                                                                                                             |