WINNF-TS-0122 Test Report
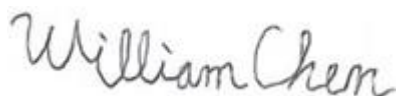
APPLICANT	Airspan Networks Inc.
EQUIPMENT	AirSpot 312,LTE ODU B42, B43, B48, CAT 6, US
BRAND NAME	Airspan
MODEL NAME	My-Pro-ZM-B42-B43-B48-C6-US
FCC ID	PIDAS312A
REFERENCE	WINNF-TS-0122 Version V1.0.1

The product was received on Jan. 15, 2020 and testing was started from Feb. 19, 2020 and completed on Mar. 18, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in WINNF-TS-0122 Version V1.0.1 and has been in compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Reviewed by:　　　　　　　　　　　　　　　　Approved by:

William Chen / Deputy Manager　　　　　　**Jones Tsai / Manager**

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
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TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number　　: 1 of 54
Issued Date　　: Mar. 23, 2020
Report Version　: 01

Table of Contents

TEL : 886-3-327-3456

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Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 2 of 54

Issued Date   : Mar. 23, 2020

Report Version   : 01

Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG9D2002B	01	Initial issue of report	Mar. 23, 2020

1. Administration Data

1.1 Testing Laboratory

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Engineer	Thomas Chen and William Chen
Temperature	20-23℃
Relative Humidity	52-55%

1.2 Applicant

Company Name	Airspan Networks Inc.
Address	777 Yamato Rd, Suite 310, Boca Raton, Florida, 33431

1.3 Manufacturer

Company Name	Airspan Networks Inc.
Address	777 Yamato Rd, Suite 310, Boca Raton, Florida, 33431

2. General Information

2.1 Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	AirSpot 312,LTE ODU B42, B43, B48, CAT 6, US
Brand Name	Airspan
Model Name	My-Pro-ZM-B42-B43-B48-C6-US
FCC ID	PIDAS312A
Professional Installation	☒ Yes ☐ No
UUT Category	☐ Category A ☒ Category B
Unit Under Test in Test ID	☐ UUT with Domain Proxy ☒ UUT without Domain Proxy
UUT HW Version	V1.0
UUT SW Version	MG6_0.3.2.20_V0.4_CBSD-T14b
Device Power Class	LTE Band 48: Power Class 3

2.2 Protocol Test Summary

Section	Test Case ID	Test Case Title	Test Result
1	WINNF.FT.C.REG.1	Multi-Step registration	PASS
2	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	PASS
3	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	PASS
4	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	PASS
5	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	PASS
6	WINNF.FT.C.REG.16	Unsupported SAS protocol version (responseCode 100)	PASS
7	WINNF.FT.C.REG.18	Group Error (responseCode 201)	PASS
8	WINNF.FT.C.GRA.1	Unsuccessful Grant responseCode=400 (INTERFERENCE)	PASS
9	WINNF.FT.C.GRA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	PASS
10	WINNF.FT.C.HBT.1	Heartbeat Success Case (first Heartbeat Response)	PASS
11	WINNF.FT.C.HBT.3	Heartbeat responseCode=105 (DEREGISTER)	PASS
12	WINNF.FT.C.HBT.4	Heartbeat responseCode=500 (TERMINATED_GRANT)	PASS
13	WINNF.FT.C.HBT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	PASS
14	WINNF.FT.C.HBT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	PASS
15	WINNF.FT.C.HBT.7	Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	PASS
16	WINNF.FT.C.HBT.9	Heartbeat Response Absent (First Heartbeat)	PASS
17	WINNF.FT.C.HBT.10	Heartbeat Response Absent (Subsequent Heartbeat)	PASS
18	WINNF.FT.C.HBT.11	Successful Grant Renewal in Heartbeat Test Case	PASS
19	WINNF.FT.C.MES.3	Grant Response contains measReportConfig	PASS
20	WINNF.FT.C.MES.4	Heartbeat Response contains measReportConfig	PASS
21	WINNF.FT.C.RLQ.1	Successful Relinquishment	PASS
22	WINNF.FT.C.RLQ.3	Unsuccessful Relinquishment, responseCode=102	PASS
23	WINNF.FT.C.RLQ.5	Unsuccessful Relinquishment, responseCode=103	PASS
24	WINNF.FT.C.DRG.1	Successful Deregistration	PASS
25	WINNF.FT.C.DRG.3	Deregistration responseCode=102	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number : 7 of 54
Issued Date : Mar. 23, 2020
Report Version : 01

Section	Test Case ID	Test Case Title	Test Result
26	WINNF.FT.C.DRG.5	Deregistration responseCode=103	PASS
27	WINNF.FT.C.SCS.1	Successful TLS connection between UUT and SAS Test Harness	PASS
28	WINNF.FT.C.SCS.2	TLS failure due to revoked certificate	PASS
29	WINNF.FT.C.SCS.3	TLS failure due to expired server certificate	PASS
30	WINNF.FT.C.SCS.4	TLS failure when SAS Test Harness certificate is issue by unknown CA	PASS
31	WINNF.FT.C.SCS.5	TLS failure when certificate at the SAS Test Harness is corrupted	PASS
32	WINNF.PT.C.HBT	UUT RF Transmit Power Measurement	PASS

2.3　Time test for getting Grant Summary

Trail	Time limit	Monitoring time	Measured result	Verdict
1	1 second	10 seconds	1.25ms	PASS
2	10 seconds	300 seconds	75ms	PASS
3	20 seconds	3600 seconds	12.93s	PASS

2.4　Support Equipment

Name	Manufacturer	Type/Model	Serial Number	FCC ID
Q710	Ruckus	P01-Q710-US02	991929000175	S9GQ710US02

2.5　Test Equipment List

Name	Manufacturer	Type/Model	Serial Number	Calibration	
				Last Cal.	Due Date
Spectrum Analyzer	Rohde & Schwarz	ESR7	102177	Jun. 27, 2019	Jun. 26, 2020

3. Measurement Environment

Measurement Environment Information	
SAS Test Harness version	1.0.0.3
Operating System	Windows 10
TLS version	V 1.2
Python version	V 2.7

Conditional Test Case		
☒	**C1**	Mandatory for UUT which supports multi-step registration message
☐	**C2**	Mandatory for UUT which supports single-step registration with no CPI-signed data in the registration message. By definition, this is a subset of Category A devices which determine all registration information, including location, without CPI intervention.
☐	**C3**	Mandatory for UUT which supports single-step registration containing CPIsigned data in the registration message.
☐	**C4**	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type
☒	**C5**	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.
☐	**C6**	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration.

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 9 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

3.1 Test configuration without Domain Proxy
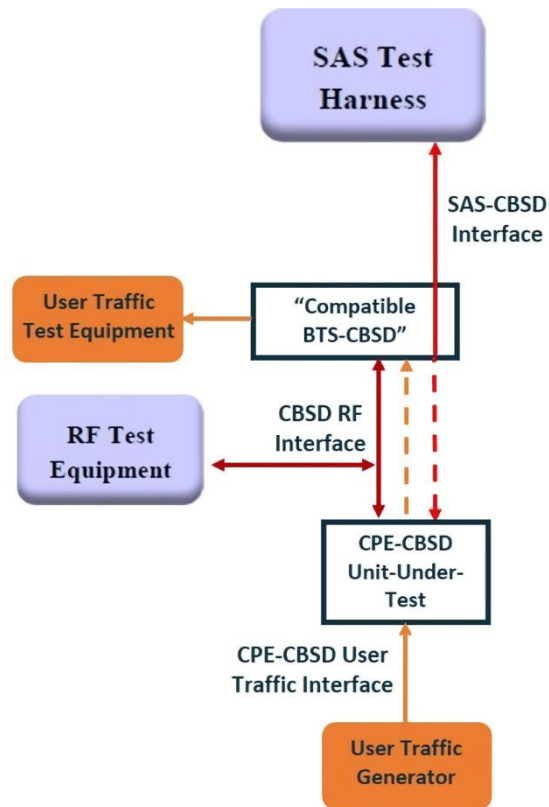
3.2   Standards

[n.1]. FCC KDB 940660 D02 CPE-CBSD Handshake Procedures v02, 22 October 2019

[n.2]. WINNF-TS-0122 Version 1.0.1, "Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT)", 28 September 2018

3.3   Protocol test procedure

The test cases for SAS<->CBSD protocol in [n.2] apply for CPE-CBSD device type. Following the [n.1], when running the test cases in [n.2] for CPE-CBSD device type, verify that

1.   CPE-CBSD can begin transmitting its RF only after receiving radio signal from its compatible BTS-CBSD.

2.   For all CPE-CBSD RF transmissions, the CPE-CBSD UUT radio frequency range and bandwidth are less or equal to the frequency range and bandwidth of its compatible BTS-CBSD.

3.   Judging the last execution step appearing in [n.2] with "User data traffics" instead of "RF transmission."

3.4   Time test for getting Grant Procedure

Use the WinnForum SAS Harness run test case WINNF.FT.C.GRA.1. Without answering the last question in WINNF.FT.C.GRA.1 will keep UUT's grant request being rejected, then measure the time.

4. Protocol Test Results

4.1 [WINNF.FT.C.REG.1] Multi-Step registration

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness: • The required userId, fccId and cbsdSerialNumber registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. • Any REG-conditional or optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges. Note: It is outside the scope of this document to test the Registration information that is supplied via another means.	PASS
3	• SAS Test Harness sends a CBSD Registration Response as follows: − *cbsdId* = C − *measReportConfig* shall not be included − *responseCode* = 0	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 12 of 54
Issued Date   : Mar. 23, 2020
Report Version : 01

4.2 [WINNF.FT.C.REG.8] Missing Required parameters (responseCode 102)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.3 [WINNF.FT.C.REG.10] Pending registration (responseCode 200)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=200) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 14 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

4.4 [WINNF.FT.C.REG.12] Invalid parameter (responseCode 103)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=103) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.5 [WINNF.FT.C.REG.14] Blacklisted CBSD (responseCode 101)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=101) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.6 [WINNF.FT.C.REG.16] Unsupported SAS protocol version (responseCode 100)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=100) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.7 [WINNF.FT.C.REG.18] Group Error (responseCode 201)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT is in the Unregistered state	--
2	CBSD sends a Registration request to SAS Test Harness.	--
3	SAS Test Harness rejects the request by sending a CBSD Registration Response as follows: − SAS response does not include *cbsdId* − *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=201) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.8 [WINNF.FT.C.REG.20] Category A CBSD location update

This section is specific to Category A CBSDs that do not require professional installation. The requirement is for the Category A (non-professionally installed) to report to the SAS any location change exceeding a distance of 50m horizontally or 3m vertically within a 60 second window. It is left to the CBSD vendor and certification lab to generate the required evidence showing the UUT meets the requirement.

TEL : 886-3-327-3456   Page Number   : 19 of 54
FAX : 886-3-328-4978   Issued Date   : Mar. 23, 2020
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1   Report Version : 01

4.9 [WINNF.FT.C.GRA.1] Unsuccessful Grant responseCode=400 (INTERFERENCE)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness, with *cbsdId* = C	--
2	UUT sends valid Grant Request.	--
3	SAS Test Harness sends a Grant Response message, including • *cbsdId*=C • *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 20 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

4.10 [WINNF.FT.C.GRA.2] Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness, with *cbsdId* = C	--
2	UUT sends valid Grant Request.	--
3	SAS Test Harness sends a Grant Response message, including • *cbsdId*=C • *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=401) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.11 [WINNF.FT.C.HBT.1] Heartbeat Success Case (first Heartbeat Response)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness, with *cbsdId* = C	--
2	UUT sends a message: • If message is type Spectrum Inquiry Request, go to step 3, or • If message is type Grant Request, go to step 5	--
3	UUT sends Spectrum Inquiry Request. Validate: • *cbsdId* = C • List of frequencyRange objects sent by UUT are within the CBRS frequency range	PASS
4	SAS Test Harness sends a Spectrum Inquiry Response message, including the following parameters: • *cbsdId* = C • availableChannel is an array of availableChannel objects • *responseCode* = 0	--
5	UUT sends Grant Request message. Validate: • *cbsdId* = C • maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 • operationFrequencyRange, F, sent by UUT is a valid range within the CBRS band	PASS
6	SAS Test Harness sends a Grant Response message, including the parameters: • *cbsdId* = C • *grantId* = G = a valid grant ID • grantExpireTime = UTC time greater than duration of the test • *responseCode* = 0	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS

#	Test Execution Steps	Results
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	PASS
10	Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: • UUT does not transmit at any time prior to completion of the first heartbeat response • UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.	PASS

4.12 [WINNF.FT.C.HBT.3] Heartbeat responseCode=105 (DEREGISTER)

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	    ○ valid *cbsdId* = C
	    ○ valid *grantId* = G
	    ○ grant is for frequency range F, power P
	    ○ *grantExpireTime* = UTC time greater than duration of the test
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface
		--

2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within Heartbeat Interval specified in the latest Heartbeat Response, and formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • *cbsdId* = C • *grantId* = G	--
	• *transmitExpireTime = T = Current UTC time* • *responseCode* = 105 (DEREGISTER)	
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--
5	Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	PASS

TEL : 886-3-327-3456   Page Number   : 24 of 54
FAX : 886-3-328-4978   Issued Date   : Mar. 23, 2020
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1   Report Version   : 01

4.13 [WINNF.FT.C.HBT.4] Heartbeat responseCode=500 (TERMINATED_GRANT)

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	    ○ valid *cbsdId* = C
	    ○ valid *grantId* = G
	    ○ grant is for frequency range F, power P
	    ○ *grantExpireTime* = UTC time greater than duration of the test
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface
		--

2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = T = current UTC time • *responseCode* = 500 (TERMINATED_GRANT)	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--
5	Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	PASS

4.14 [WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	    ○ valid *cbsdId* = C
	    ○ valid *grantId* = G
	    ○ grant is for frequency range F, power P
	    ○ *grantExpireTime* = UTC time greater than duration of the test
	• UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)
		--

2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = T = current UTC time • *responseCode* = 501 (SUSPENDED_GRANT)	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--

5	Monitor the SAS-CBSD interface. Verify either A OR B occurs:
	A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:
	    • *cbsdId* = C
	    • *grantId* = G
	    • *operationState* = "GRANTED"
	B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:
	    • *cbdsId* = C
	    • *grantId* = G
	Monitor the RF output of the UUT. Verify:
	• UUT does not transmit at any time
		PASS

4.15 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	   ○ valid *cbsdId* = C
	   ○ valid *grantId* = G
	   ○ grant is for frequency range F, power P
	   ○ *grantExpireTime* = UTC time greater than duration of the test
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface
		--

2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = T = current UTC time • *responseCode* = 501 (SUSPENDED_GRANT)	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--

#	Test Execution Steps	Results
5	Monitor the SAS-CBSD interface. Verify either A OR B occurs: 　A.　UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters: 　　　• *cbsdId* = C 　　　• *grantId* = G 　　　• *operationState* = "GRANTED" 　B.　UUT sends a Relinquishment Request message. Ensure message is correctly formatted with parameters: 　　　• *cbdsId* = C 　　　• *grantId* = G Monitor the RF output of the UUT. Verify:	PASS
	• UUT shall stop transmission within (*T* + 60 seconds) of completion of step 3	

4.16 [WINNF.FT.C.HBT.7] Heartbeat responseCode=502 (UNSYNC_OP_PARAM)

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has registered successfully with SAS Test Harness • UUT has a valid single grant as follows: ○ valid *cbsdId* = C ○ valid *grantId* = G ○ grant is for frequency range F, power P ○ *grantExpireTime* = UTC time greater than duration of the test • UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified *heartbeatInterval*,and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = T = Current UTC Time • *responseCode* = 502 (UNSYNC_OP_PARAM)	--
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.	--
5	Monitor the SAS-CBSD interface. Verify: • UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: ○ *cbdsId* = C ○ *grantId* = G Monitor the RF output of the UUT. Verify: • UUT shall stop transmission within (T+60) seconds of completion of step 3.	PASS

4.17 [WINNF.FT.C.HBT.9] Heartbeat Response Absent (First Heartbeat)

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	
	 • UUT has registered successfully with SAS Test Harness
	
	 • UUT has a valid single grant as follows:
	     ○ valid *cbsdId* = C
	     ○ valid *grantId* = G
	     ○ grant is for frequency range F, power P
	     ○ *grantExpireTime* = UTC time greater than duration of the test
	
	 • UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)
		--

2	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G	PASS
	• *operationState* = "GRANTED"	
3	After completion of Step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection	--
4	Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify: • At any time during the test, UUT shall not transmit on RF interface	PASS

4.18 [WINNF.FT.C.HBT.10] Heartbeat Response Absent (Subsequent Heartbeat)

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	    ○ valid *cbsdId* = C
	    ○ valid *grantId* = G
	    ○ grant is for frequency range F, power P
	    ○ *grantExpireTime* = UTC time greater than duration of the test
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface
		--

2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message issent within the latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--
4	After completion of Step 3, SAS Test Harness does not respond to any further messages from UUT	--
5	Monitor the RF output of the UUT. Verify: • UUT shall stop all transmission on RF interface within (*transmitExpireTime* + 60 seconds), using the transmitExpireTime sent in Step 3.	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 31 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

4.19 [WINNF.FT.C.HBT.11] Successful Grant Renewal in Heartbeat Test Case

#	Test Execution Steps	Results

1	Ensure the following conditions are met for test entry:
	
	• UUT has registered successfully with SAS Test Harness
	• UUT has a valid single grant as follows:
	    ○ valid *cbsdId* = C
	    ○ valid *grantId* = G
	    ○ grant is for frequency range F, power P
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface.
	• Grant has the following parameters at the start of the test:
	    ○ *grantExpireTime* =UTC time equal to time at start of test + 300 seconds = Tgrant_expire
	    ○ *transmitExpireTime* = UTC time equal to time at start of test + 200 seconds
	    ○ *heartbeatInterval* = 60 seconds
		--

2	UUT sends a Heartbeat Request message. If Heartbeat Request message contains grantRenew = TRUE, go to Step 6, else go to Step 3.	--
3	Verify Heartbeat Request message is sent within the latest specified *heartbeatInterval*, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
4	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = current UTC + 200 seconds • *grantExpireTime* = same as Step 1 • *responseCode* = 0	--
5	Go to Step 2	--

#	Test Execution Steps	Results
6	Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: • *cbsdId* = C • *grantId* = G	PASS
	• *operationState* = "AUTHORIZED" • *grantRenew* = TRUE	
7	SAS Test Harness sends a Heartbeat Response message, with the following parameters: • *cbsdId* = C • *grantId* = G • *grantExpireTime* = UTC time set far in the future • *transmitExpireTime* = current UTC time + 200 seconds • *responseCode* = 0	--
8	Continue to respond to any subsquentHeartbeat Request from CBSD with Heartbeat Response with the following parameters: • *cbsdId* = C • *grantId* = G • *transmitExpireTime* = same as Step 7 • *responseCode* = 0	--
9	Monitor RF transmission of UUT from start of test until Tgrant_expire + 60 seconds and ensure UUT continues to transmit throughout the time period.	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number : 33 of 54
Issued Date : Mar. 23, 2020
Report Version : 01

4.20 [WINNF.FT.C.MES.3] Grant Response contains measReportConfig

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C and *measCapability* = "RECEIVED_POWER_WITH_GRANT"	--
2	UUT sends a Grant Request message. Verify Grant Request message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *operationParam* is present and format is valid	PASS
3	SAS Test Harness sends a Grant Response message, with the following parameters: • *cbsdId* = C • *grantId* = G = valid grant ID • *grantExpireTime* = UTC time in the future • *heartbeatInterval* = 60 seconds	--
	• *measReportConfig*= "RECEIVED_POWER_WITH_GRANT" • *operationParam* is set to valid operating parameters • *channelType* = "GAA" • *responseCode* = 0	
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G • *operationState* = "GRANTED"	PASS

TEL : 886-3-327-3456   Page Number   : 34 of 54
FAX : 886-3-328-4978   Issued Date   : Mar. 23, 2020
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1   Report Version   : 01

#	Test Execution Steps	Results

5	If Heartbeat Request message (step 4) contains *measReport* object, then:
	
	    • verify *measReport* is properly formatted as object *rcvdPowerMeasReport*
	    • end test, with PASS result
	
	else, if Heartbeat Request message (step 4) does not contain measReport object, then:
	
	     If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL
		PASS

6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically:
	
	    • *cbsdId* = C
	    • *grantId* = G
	    • *transmitExpireTime* = current UTC time + 200 seconds
	    • *responseCode* = 0
	
	Go to Step 4, above
		--

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number : 35 of 54
Issued Date   : Mar. 23, 2020
Report Version : 01

4.21 [WINNF.FT.C.MES.4] Heartbeat Response contains measReportConfig

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C and *measCapability* = "RECEIVED_POWER_WITH_GRANT" • UUT has received a valid grant with *grantId* = G	--
	• UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. • Grant has *heartbeatInterval* = 60 seconds	
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G • *operationState* = "AUTHORIZED"	PASS
3	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId = G* • *measReportConfig*= "RECEIVED_POWER_WITH_GRANT" • *responseCode* = 0	--
4	UUT sends a Heartbeat Request message. Verify message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G • operationState = "AUTHORIZED"	PASS

#	Test Execution Steps	Results
5	If Heartbeat Request message (step 4) contains *measReport* object, then: • verify *measReport* is properly formatted as object *rcvdPowerMeasReport* • end test, with PASS result else, if Heartbeat Request message (step 4) does not contain measReport object, then: • If number of Heartbeat Requests sent by UUT after Step 3 is = 5, then stop test with result of FAIL	PASS
6	SAS Test Harness sends a Heartbeat Response message, containing all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G • *responseCode* = 0 Go to Step 4, above	--

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 37 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

4.22 [WINNF.FT.C.RLQ.1] Successful Relinquishment

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G	PASS
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: − *cbsdId* = C − *grantId* = G − *responseCode* = 0	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response (*responseCode*=0) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	PASS

4.23 [WINNF.FT.C.RLQ.3] Unsuccessful Relinquishment, responseCode=102

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.	--
	Invoke trigger to Relinquish UUT Grant from the SAS Test Harness	
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G	--
3	SAS Test Harness shall send a Relinquishment Response message with parameters: • *cbsdId* = C • No *grantId* • *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	PASS

4.24 [WINNF.FT.C.RLQ.5] Unsuccessful Relinquishment, responseCode=103

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.	--
	Invoke trigger to Relinquish UUT Grant from the SAS Test Harness	
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: • *cbsdId* = C • *grantId* = G	--
3	SAS Test Harness shall send a Relinquishment Response message with parameters: • *cbsdId* = C • No *grantId* • *responseCode* = R	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=103) to further request messages from the UUT.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request	PASS

4.25 [WINNF.FT.C.DRG.1] Successful Deregistration

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--
2	UUT sends a Relinquishment request and receives Relinquishment response with *responseCode*=0	--
3	UUT sends Deregistration Request to SAS Test Harness with *cbsdId* = C.	PASS
4	SAS Test Harness shall approve the request with a Deregistration Response message with parameters: • *cbsdId* = C • *responseCode* = 0	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (*responseCode*=0) to further request messages from the UUT.	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: • UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	PASS

4.26 [WINNF.FT.C.DRG.3] Deregistration responseCode=102

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--
2	UUT sends a Relinquishment request and receives Relinquishment response with *responseCode*=0	--
3	UUT sends Deregistration Request to SAS Test Harness with *cbsdId* = C	--
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: • No *cbsdId* • *responseCode* = 102	--
5	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: • UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	PASS

4.27 [WINNF.FT.C.DRG.5] Deregistration responseCode=103

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness • UUT has successfully registered with SAS Test Harness, with *cbsdId*=C • UUT has received a valid grant with *grantId* = G • UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--
2	UUT sends a Relinquishment request and receives Relinquishment response with *responseCode*=0	--
3	UUT sends Deregistration Request to SAS Test Harness with *cbsdId* = C	--
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: • No *cbsdId* • *responseCode* = 103	--
5	After completion of step 3, SAS Test Harness will not provide any positive response (*responseCode*=0) to further request messages from the UUT.	--
6	Monitor the RF output of the UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify: • UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message	PASS

4.28 [WINNF.FT.C.SCS.1] Successful TLS connection between UUT and SAS Test Harness

#	Test Execution Steps	Results
1	• UUT shall start CBSD-SAS communication with the security procedure • The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate. • Configure the SAS Test Harness to accept the security procedure and establish the connection	PASS
2	• Make sure that Mutual authentication happens between UUT and the SAS Test Harness. • Make sure that UUT uses TLS v1.2 • Make sure that cipher suites from one of the following is selected, 　• TLS_RSA_WITH_AES_128_GCM_SHA256 　• TLS_RSA_WITH_AES_256_GCM_SHA384 　• TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA2 56 　• TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA3 84 　• TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	PASS
3	A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability. • UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with *responseCode* = 0 and *cbsdId*.	PASS
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.29 [WINNF.FT.C.SCS.2] TLS failure due to revoked certificate

#	Test Execution Steps	Results
1	• UUT shall start CBSD-SAS communication with the security procedures	PASS
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	PASS
3	UUT may retry for the security procedure which shall fail	PASS
4	SAS Test-Harness shall not receive any Registration request or any application data.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.30 [WINNF.FT.C.SCS.3] TLS failure due to expired server certificate

#	Test Execution Steps	Results
1	• UUT shall start CBSD-SAS communication with the security procedures	PASS
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	PASS
3	UUT may retry for the security procedure which shall fail.	PASS
4	SAS Test-Harness shall not receive any Registration request or any application data.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.31 [WINNF.FT.C.SCS.4] TLS failure when SAS Test Harness certificate is issued by an unknown CA

#	Test Execution Steps	Results
1	• UUT shall start CBSD-SAS communication with the security procedures	PASS
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	PASS
3	UUT may retry for the security procedure which shall fail.	PASS
4	SAS Test-Harness shall not receive any Registration request or any application data.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 47 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

4.32 [WINNF.FT.C.SCS.5] TLS failure when certificate at the SAS Test Harness is corrupted

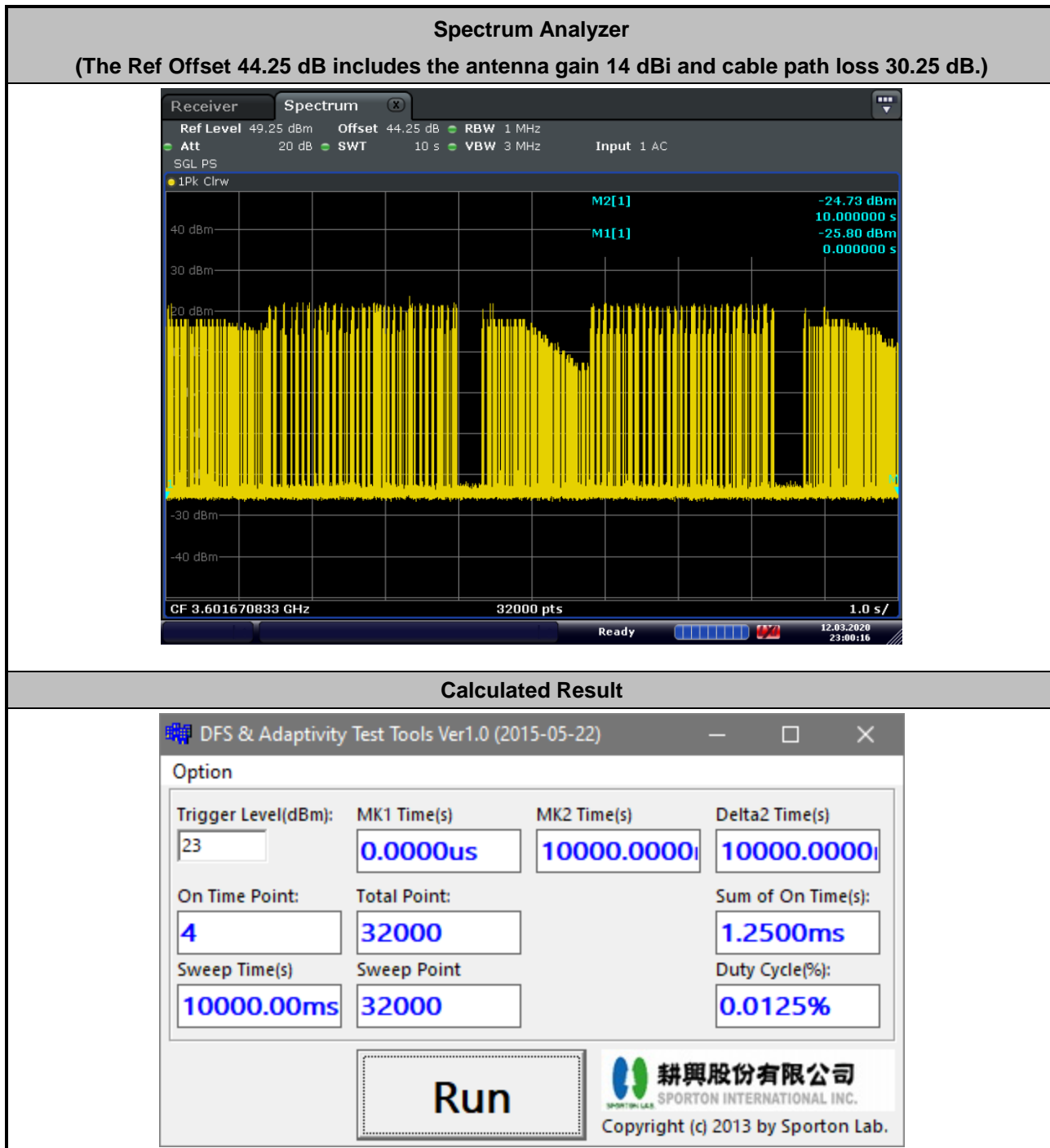| #	Test Execution Steps	Results
1	• UUT shall start CBSD-SAS communication withthe security procedures	PASS
2	• Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.	PASS
3	UUT may retry for the security procedure which shall fail.	PASS
4	SAS Test-Harness shall not receive any Registration request or any application data.	--
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: • UUT shall not transmit RF	PASS

4.33 [WINNF.PT.C.HBT] UUT RF Transmit Power Measurement

#	Test Execution Steps	Results
1	Ensure the following conditions are met for test entry: • UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness • UUT has registered with the SAS, with CBSD ID = C • UUT has a single valid grant G with parameters {lowFrequency = F_L, highFrequency = F_H, maxEirp = P_i}, with grant in AUTHORIZED state, and grantExpireTime set to a value far past the duration of this test case *Note: in order for the UUT to request a grant with the parameters {lowFrequency, highFrequency, maxEirp), the SAS Test Harness may need to provide appropriate guidance in the availableChannel object of the spectrumInquiry response message, and the operationParam object of the grant response message. Alternately, the UUT vendor may provide the ability to set those parameters on the UUT so that the UUT will request a grant with those parameters.*	--
2	UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which continues until the other test steps are complete. Messaging for each cycle is as follows: • UUT sends Heartbeat Request, including: ○ *cbsdId* = C ○ *grantId* = G • SAS Test Harness responds with Heartbeat Response, including: ○ *cbsdId* = C ○ *grantId* = G ○ *transmitExpireTime* = current UTC time + 200 seconds ○ *responseCode* = 0	--

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 49 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

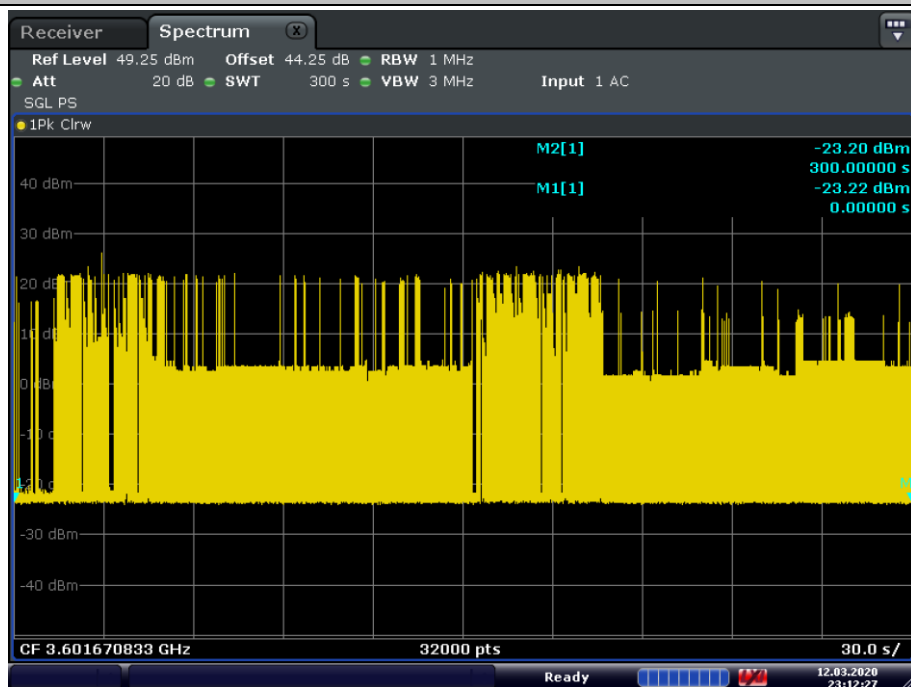| #	Test Execution Steps	Results
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, P¡. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfil the requirements of the power measurement method. *Note: it may be required for the vendor to provide a method or configuration to bring the UUT to a mode which is required by the measurement methodology. Any such mode is vendor-specific and depends upon UUT behavior and the measurement methodology.*	PASS

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 50 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

5. Result of Time test for getting Grant

5.1　1 second within any 10-second period

Spectrum Analyzer
(The Ref Offset 44.25 dB includes the antenna gain 14 dBi and cable path loss 30.25 dB.)

Calculated Result

The sum of On Time (aggregated time from marker 1 to 2): 1.25ms < 1s, Pass.

5.2 10 seconds within any 300-second period

Spectrum Analyzer
(The Ref Offset 44.25 dB includes the antenna gain 14 dBi and cable path loss 30.25 dB.)

Calculated Result

The sum of On Time (aggregated time from marker 1 to 2): 75ms < 10s, Pass.

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number   : 52 of 54
Issued Date   : Mar. 23, 2020
Report Version   : 01

5.3 20 seconds within any 3600-second period

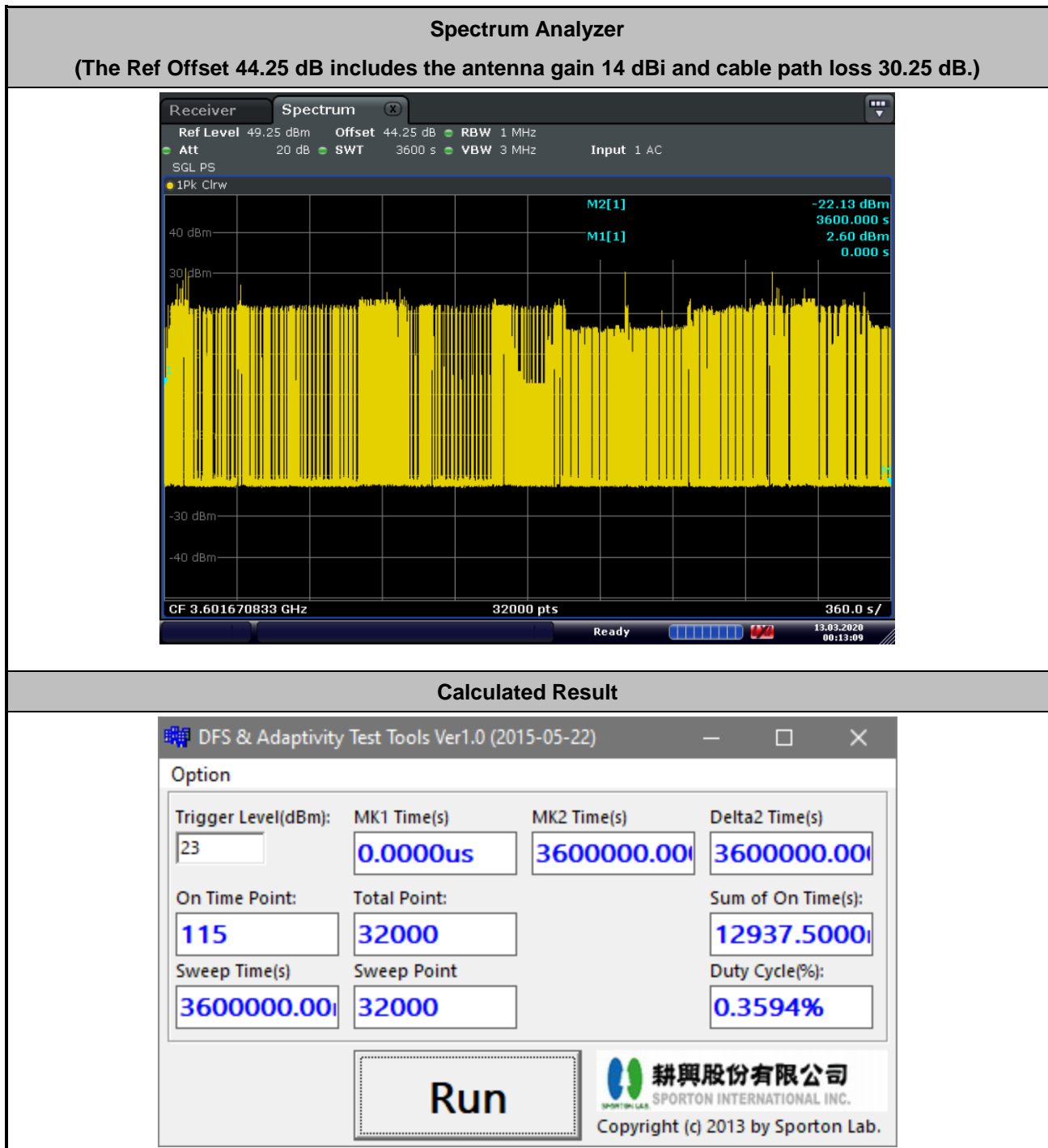| Spectrum Analyzer |
|---|
| **(The Ref Offset 44.25 dB includes the antenna gain 14 dBi and cable path loss 30.25 dB.)** |

Calculated Result

The sum of On Time (aggregated time from marker 1 to 2): 12.93s < 20s, Pass.

TEL : 886-3-327-3456
FAX : 886-3-328-4978
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1

Page Number　　: 53 of 54
Issued　Date　　: Mar. 23, 2020
Report Version　 : 01

6. UUT register with the SAS irrespective of power levels

6.1 Test Procedure

1. Ensure the UUT power be below 23 dBm EIRP.

2. Make SAS test harness to grant UUT power level above 23 dBm EIRP.

3. Enable UUT, then check UUT power will follow the power limit that SAS test harness authorized.

6.2 Result

The UUT will register with the SAS irrespective of power levels at which the device is set to operate – even below 23 dBm.
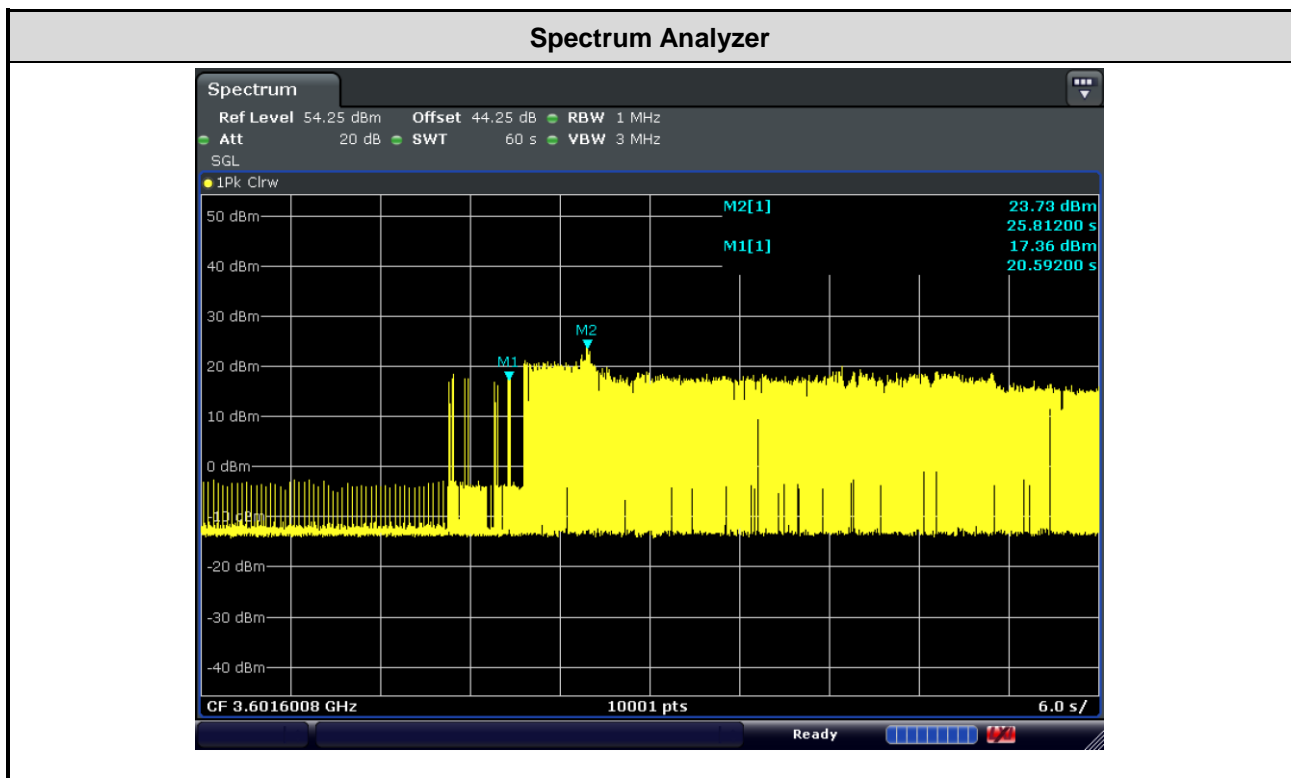
Note : The Ref Offset 44.25 dB includes the antenna gain 14 dBi and cable path loss 30.25 dB.

Marker 1 : Signal power before UUT is authorized by the SAS,

Marker 2 : Signal power after UUT is authorized by the SAS.

───────THE END───────

TEL : 886-3-327-3456   Page Number : 54 of 54
FAX : 886-3-328-4978   Issued Date : Mar. 23, 2020
Report Template No.: BU5-FGWINNF-TS-0122 Version 2.1   Report Version : 01