



SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/1

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TEST REPORT

Application No.: SZCR2407002841AT
Applicant: Baicells Technologies Co., Ltd.
Address of Applicant: 9-10F, 1stBldg., No.81BeiqingRoad, Haidian District, Beijing, China
Equipment Under Test (EUT):
EUT Name: 5G NR Base Station
Model No.: BSC7048A227
Trade Mark: Baicells
FCC ID: 2AG32BSC7048A227
Standard(s): FCC 47 CFR Part 96
KDB 940660 D01 V03
CBRSA-TS-9001-V1.2.1
WINNF-TS-0122-V1.0.2
Date of Receipt: 2024-07-22
Date of Test: 2025-02-13 to 2025-4-29
Date of Issue: 2025-04-29

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



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Shenzhen Branch (EMC Laboratory)

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2025-04-29		Original

Authorized for issue by:				
		Calvin Weng		
		Calvin Weng /Project Engineer		
		Eric Fu		
		Eric Fu/Reviewer		



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2 Test Summary

Test Summary for CBSD under control of Domain Proxy			
Item	Standard	Test Case ID	Result
Domain Proxy Multi-Step registration	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.2	Pass
Domain Proxy Single-Step registration for CBSD with CPI signed data	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.6	Pass
Domain Proxy Missing Required parameters (responseCode 102)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.9	Pass
Domain Proxy Pending registration (responseCode 200)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.11	Pass
Domain Proxy Invalid parameters (responseCode 103)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.13	Pass
Domain Proxy Blacklisted CBSD (responseCode 101)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.15	Pass
Domain Proxy Unsupported SAS protocol version responseCode 100)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.17	Pass
Domain Proxy Group Error (responseCode 201)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.REG.19	Pass
Unsuccessful Grant responseCode=400 (INTERFERENCE)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.GRA.1	Pass
Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.GRA.2	Pass
Domain Proxy Heartbeat Success Case (first Heartbeat Response)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.HBT.2	Pass
Heartbeat responseCode=105 (DEREGISTER)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.3	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.5	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.6	Pass
Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.7	Pass
Domain Proxy Heartbeat responseCode=500 (TEMINATED_GRANT)	WINNF-TS-0122-V1.0.0	WINNF.FT.D.HBT.8	Pass
Heartbeat Response Absent (First Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.9	Pass



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Test Summary for CBSD under control of Domain Proxy			
Item	Standard	Test Case ID	Result
Heartbeat Response Absent (Subsequent Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.10	Pass
Domain Proxy Registration Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.D.MES.2	Pass
Grant Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.C.MES.3	Pass
Domain Proxy Heartbeat Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.D.MES.5	Pass
Domain Proxy Successful Relinquishment	WINNF-TS-0122-V1.0.2	WINNF.FT.D.RLQ.2	Pass
Domain Proxy Successful Deregistration	WINNF-TS-0122-V1.0.2	WINNF.FT.D.DRG.2	Pass
Successful TLS connection between UUT and SAS Test Harness	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.1	Pass
TLS failure due to revoked certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.2	Pass
TLS failure due to expired server certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.3	Pass
TLS failure when SAS Test Harness certificate is issue by unknown CA	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.4	Pass
TLS failure when certificate at the SAS Test Harness is corrupted	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.5	Pass
UUT RF Transmit Power Measurement	WINNF-TS-0122-V1.0.2	WINNF.PT.C.HBT.1	Pass
SAS Version: 1.0.0.3			

Test Summary for Standalone CBSD			
Item	Standard	Test Case ID	Result
Multi-Step registration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.1	Pass
Single-Step registration for CBSD with CPI signed data	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.5	Pass
Missing Required parameters (responseCode 102)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.8	Pass
Pending registration (responseCode 200)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.10	Pass
Invalid parameter (responseCode 103)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.12	Pass
Blacklisted CBSD (responseCode 101)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.14	Pass



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Test Summary for Standalone CBSD			
Item	Standard	Test Case ID	Result
Unsupported SAS protocol version (responseCode 100)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.16	Pass
Group Error (responseCode 201)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.18	Pass
Unsuccessful Grant responseCode=400 (INTERFERENCE)	WINNF-TS-0122-V1.0.2	WINNF.FT.D.GRA.1	Pass
Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.GRA.2	Pass
Heartbeat Success Case (first Heartbeat Response)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.1	Pass
Heartbeat responseCode=105 (DEREGISTER)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.3	Pass
Heartbeat responseCode=500 (TERMINATED_GRANT)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.4	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.5	Pass
Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.6	Pass
Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.7	Pass
Heartbeat Response Absent (First Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.9	Pass
Heartbeat Response Absent (Subsequent Heartbeat)	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.10	Pass
Successful Relinquishment	WINNF-TS-0122-V1.0.2	WINNF.FT.C.RLQ.1	Pass
Successful Deregistration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.DRG.1	Pass
Successful TLS connection between UUT and SAS Test Harness	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.1	Pass
TLS failure due to revoked certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.2	Pass
TLS failure due to expired server certificate	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.3	Pass
TLS failure when SAS Test Harness certificate is issue by unknown CA	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.4	Pass
TLS failure when certificate at the SAS Test Harness is corrupted	WINNF-TS-0122-V1.0.2	WINNF.FT.C.SCS.5	Pass



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Test Summary for Standalone CBSD			
Item	Standard	Test Case ID	Result
UUT RF Transmit Power Measurement	WINNF-TS-0122-V1.0.2	WINNF.PT.C.HBT	Pass
SAS Version: 1.0.0.3			

The UUT is a BTS-CBSD which can operate under control of Domain Proxy or operate as standalone CBSD. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

CBRSA-TS-9001-V1.2.1

CBRS Alliance Certification Test Plan

WINNF-TS-0122-V1.0.2

Test and Certification for Citizens Broadband Radio Service (CBRS); Conformance and Performance Test Technical Specification; CBSD/DP as Unit Under Test (UUT)

KDB 940660 D01 Part 96 CBRS Eqpt v03



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4 General Information

4.1 Details of E.U.T.

Product Information:	The EUT is a base station
Power supply:	12VDC 3A/POE++ POE POWER SUPPLY Model: G0566-480-100 Input Power: AC 100-240V 50-60Hz 1.5A Max DC Output: 48V 1A
Sample Type:	Fixed device
CBSD Class:	A
Transmitter Frequency Band:	NR n48/n77/n78
Transmitter Frequency Range:	3550~3700MHz
Hardware Version:	B01
Software Version:	BNQ_2.6.12
Test sample:	1202000669245NB0053/1202000660247AB0017
Antenna Gain:	3.5dBi(Ant1/Ant2)
MIMO supported	2*2 UL 2*2 DL
Antenna Type:	Internal Antenna
Note: The UUT is a BTS-CBSD which can operate under control of Domain Proxy or operate as standalone CBSD. Domain Proxy information show as below: Model No. of Domain Proxy: LICA-1513A Software Version of Domain Proxy: BaiOMC_8.3.7	



4.2 Description of CBSD Support Features

Test Summary for CBSD under control of Domain Proxy		
Condition	Feature Description	Supported
C1	Mandatory for UUT which supports multi-step registration message.	Y
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.	N
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	Y
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	Y
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	Y
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration.	N

Test Summary for Standalone CBSD		
Condition	Feature Description	Supported
C1	Mandatory for UUT which supports multi-step registration message.	Y
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.	N
C3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message.	Y
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	N
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	N
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration.	N

Y: Supported

N: Not supported

4.3 Summary of Test Results

Test Summary for CBSD under control of Domain Proxy			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT (CBSD, DP/CBSD)	28	28	100
PT (CBSD, DP/CBSD)	1	1	100
Total	29	29	100

Test Summary for Standalone CBSD			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT (CBSD, DP/CBSD)	25	25	100
PT (CBSD, DP/CBSD)	1	1	100
Total	26	26	100

Note:

1. Functional Test (FT): Test to validate the conformance of the Protocols and functionalities implemented in the CBSD UUT to the requirements developed by WINNForum and supporting FCC/DoD requirements.
2. Field/Performance Test (PT): Test to check the capability of the CBSD UUT to support various traffic models and actual operations in the field.

4.4 Measurement Uncertainty

No.	Item	Measurement Uncertainty
1	Radio Frequency	$\pm 7.25 \times 10^{-8}$
2	RF conducted power	$\pm 0.75\text{dB}$
3	Temperature test	$\pm 1^{\circ}\text{C}$
4	Humidity test	$\pm 3\%$
5	Supply voltages	$\pm 1.5\%$
6	Time	$\pm 3\%$



4.5 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
CPE	SMAWAVE	USB Dongle	/
OMC	Lanner Electronics Inc.	LICA-1513A	LR202002004052
Router	TP-LINK	TL-R860+	1175379002425

4.6 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen Branch

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053

Fax: +86 755 2671 0594

No tests were sub-contracted.

4.7 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

• A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

• FCC (Designation Number: CN1336)

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch has been recognized as an accredited testing laboratory.

Designation Number: CN1336.

Test Firm Registration Number: 787754



5 Equipment List

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Laptop (With SAS Test harness)	Samsung	930XCJ	REF. No.SEA1900	/	/
Spectrum Analyzer	Keysight	N9020B	SEM004-28	2024-03-19 2025-03-18	2025-03-18 2026-03-17
Shield Room	SAEMC	MSR433	SEM001-11	2024-03-12	2027-03-11
Coaxial Cable	SGS	N/A	SEM031-01	2024-07-10	2025-07-09
Attenuator	Weinschel Associates	WA41	SEM021-09	N/A	N/A
Splitter	MACOM	2090-6214-00	N/A	N/A	N/A
Humidity/ Temperature Indicator	Shanghai Meteorological Industry Factory	ZJ1-2B	SEM002-03	2024-09-26	2025-09-25



6 Test Method and Environment

6.1 CBSD/DP Conformance and Performance

Test Requirement: CBRS CBSD Test Specification WINNF-TS-0122-V1.0.2
Test Method: CBRS CBSD Test Specification WINNF-TS-0122-V1.0.2
WINNF-IN-0156_WInnForum_SAS_Test_Harness_CBSD_UUT_Tutorial_v1_0_0_1

6.2 CBSD Test Procedure

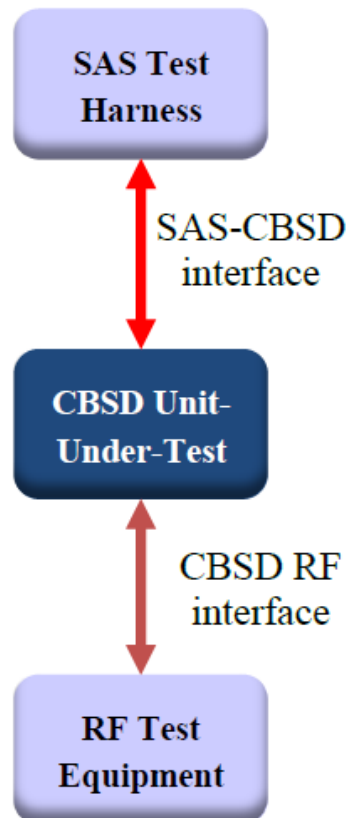
- Connect the UUT to SAS Test Harness system and RF Test instruments via the CBSD interface and RF components. The highest level is set to test configuration.
- UUT shall be UTC time synchronized
- The frequency band is granted and set as UUT supported Modulation and Channels, transmitted power of the UUT according to it granted parameters from the SAS TestHarness.
- Each test case results were recorded and validated by SAS Test Harness system and RF instruments test cases was recorded test results from SAS Test Harness system.



6.3 Test Environment

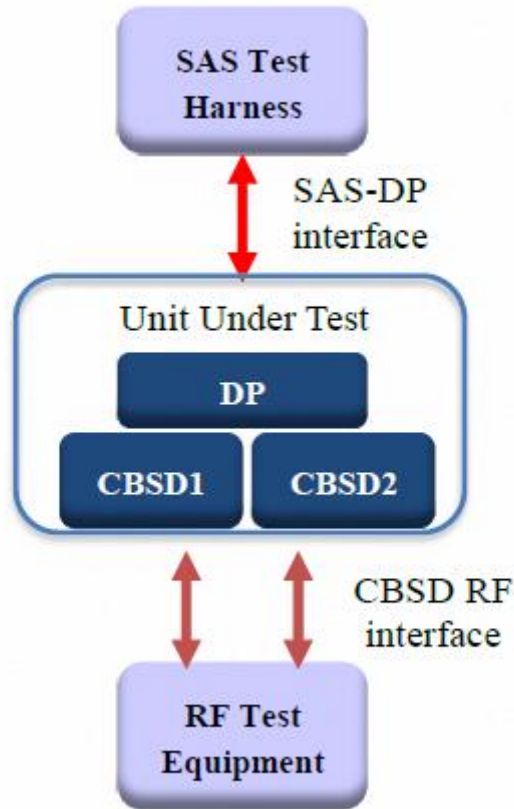
Test Harness Version:	V1.0.0.3
Operating System:	Microsoft Windows 10
TLS Version:	1.2
Python Version:	2.7.13
Environmental Conditions:	25deg. C, 65%RH
Input Power:	120Vac, 60Hz

6.4 Test Setup



CBSD as UUT, BTS-CBSD communication with SAS





DP/CBSD as UUT, BTS-CBSD communication with Domain Proxy



7 Test Data

7.1 CBSD Registration Process

7.1.1 WINNF.FT.D.REG.2

#	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	DP with two CBSD sends correct Registration request information, as specified in [n.5], in the form of one 2-element Array or as individual messages to the SAS Test Harness: ● The required userId, fcId and cbsdSerialNumber registration parameters shall be sent for each 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	□ Fail
3	● SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or individual messages as follows: - cbsdId = Ci - measReportConfig shall not be included - responseCode = 0 for each CBSD	--	--
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	□ Fail



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7.1.2 WINNF.FT.D.REG.6

#	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 ● All of the required and REG-Conditional parameters shall be configured and CPI signature provided	--	--
2	DP with two CBSD sends correct Registration request information, as specified in [n.5], in the form of one 2-element Array or as individual messages to the SAS Test Harness: ● The required userId, fcId and cbsdSerialNumber and REG-Conditional cbsdCategory, airInterface, measCapability and cpiSignatureData registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. ● Any optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges.	☒ Pass	☐ Fail
3	● SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or individual messages as follows: - cbsdId = Ci - measReportConfig shall not be included - responseCode = 0 for each CBSD	--	--
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	☐ Fail



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7.1.3 WINNF.FT.D.REG.9

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 102 for CBSD1 and CBSD2	--	--
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	☐ Fail



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7.1.4 WINNF.FT.D.REG.11

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 200 for CBSD1 and CBSD2	--	--
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	☐ Fail



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7.1.5 WINNF.FT.D.REG.13

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 0 for CBSD1 - responseCode = 103 for CBSD2	--	--
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	□ Fail



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7.1.6 WINNF.FT.D.REG.15

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 0 for CBSD1 - responseCode = 101 for CBSD2	--	--
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	□ Fail



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7.1.7 WINNF.FT.D.REG.17

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 100 for CBSD1 and CBSD2	--	--
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	☐ Fail



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7.1.8 WINNF.FT.D.REG.19

#	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	The DP with two CBSDs sends a Registration request in the form of one 2-element Array or as individual messages to SAS Test Harness.	--	--
3	SAS Test Harness sends a CBSD Registration Response in the form of one 2-element Array or as individual messages as follows: - SAS response does not include a cbsdId. - responseCode = 0 for CBSD1 - responseCode = 201 for CBSD2	--	--
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	□ Fail



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7.2 CBSD Spectrum Grant Process

7.2.1 WINNF.FT.C.GRA.1

#	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 = 400	--	--
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	☐ Fail

7.2.2 WINNF.FT.C.GRA.2

#	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 = 400	--	--
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	☐ Fail

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7.3 CBSD HeartBeat Process

7.3.1 WINNF.FT.D.HBT.2

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: DP has two CBSD registered successfully with SAS Test Harness, with cbsdId = Ci, i={1,2}	--	--
2	DP 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	DP sends a Spectrum Inquiry Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message is formatted correctly for each CBSD, including for CBSDi, i={1,2}: - cbsdId = Ci - List of frequencyRange objects sent by DP are within the CBRS frequency range	■ Pass	□ Fail
4	If a separate Spectrum Inquiry Request message was sent for each CBSD, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message. If a single Spectrum Inquiry Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array. Verify parameters for each CBSD within the Spectrum Inquiry Response message are as follows, for CBSDi, i={1,2}: - cbsdId = Ci - availableChannel is an array of availableChannel objects - responseCode = 0	--	--
5	DP sends a Grant Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Grant Request message is formatted correctly for each CBSD, including for CBSDi, i={1,2}: - cbsdId = C - maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96 - operationFrequencyRange, Fi, sent by UUT is a valid range within the CBRS band	■ Pass	□ Fail
6	If a separate Grant Request message was sent for each CBSD, the SAS Test Harness shall respond to each Grant Request message with a separate Grant Response message. If a single Grant Request message was sent containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Grant Response message containing a 2-object array. Verify parameters for each CBSD within the Grant Response message are as	--	--



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	follows, for CBSDi, i={1,2}: ● cbsdId = Ci ● grantId = Gi = a valid grant ID ● grantExpireTime = UTC time greater than duration of the test ● responseCode = 0		
7	Ensure DP sends first Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Heartbeat Request message is formatted correctly for each CBSD, including, for CBSDi i={1,2}: ● cbsdId = Ci, i={1,2} ● grantId = Gi, i={1,2} ● operationState = "GRANTED"	■ Pass	□ Fail
8	If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Verify parameters for each CBSD within the Heartbeat Response message are as follows, for CBSDi: ● cbsdId = Ci ● grantId = Gi ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	--	--
9	For further Heartbeat Request messages sent from DP after completion of step 8, validate message is sent within latest specified heartbeatInterval for CBSDi: ● cbsdId = Ci ● grantId = Gi ● operationState = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters, for CBSDi ● cbsdId = Ci ● grantId = Gi ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	■ Pass	□ Fail
10	Monitor the RF output of the UUT from start of test until UUT transmission commences. Monitor the RF output of the UUT from start of test until RF 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 Fi.	■ Pass	□ Fail



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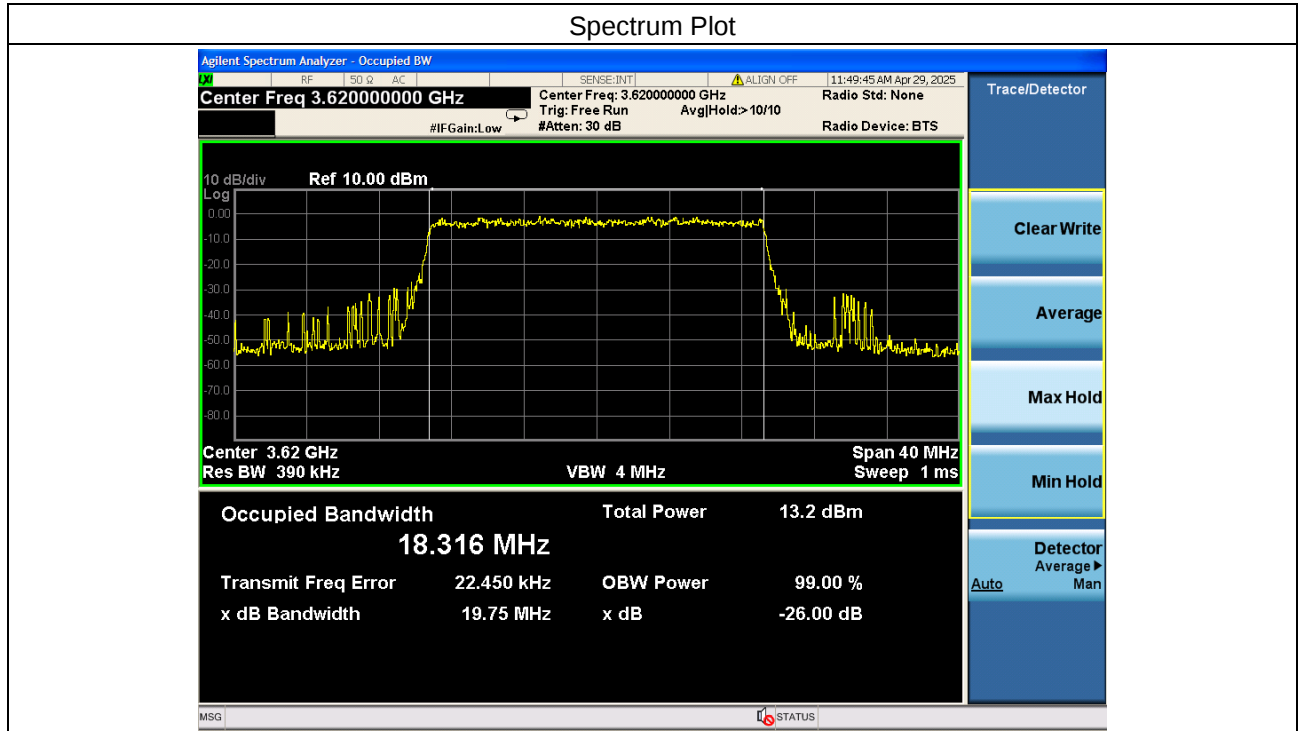
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7.3.2 WINNF.FT.C.HBT.3

#	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	□ Fail
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	□ Fail



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7.3.3 WINNF.FT.C.HBT.5

#	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	☐ Fail
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: ● cbsdId = C ● grantId = G Monitor the RF output of the UUT. Verify: ● UUT does not transmit at any time	☒ Pass	☐ Fail

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7.3.4 WINNF.FT.C.HBT.6

#	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	☐ Fail
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: ● cbsdId = 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	☐ Fail



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7.3.5 WINNF.FT.C.HBT.7

#	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	□ Fail
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: ○ cbsdId = 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	□ Fail



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7.3.6 WINNF.FT.D.HBT.8

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● DP has two CBSD registered successfully with SAS Test Harness ● Each CBSD {1,2} has a valid single grant as follows ○ valid cbsdId = Ci, i={1,2} ○ valid grantId = Gi, i={1,2} ○ grant is for frequency range Fi, power Pi ○ grantExpireTime = UTC time greater than duration of the test ● Both CBSD are in AUTHORIZED state and transmitting within their granted bandwidth on RF interface	--	--
2	DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of size 2. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly for each CBSD, including, for CBSDi i={1,2}: ● cbsdId = Ci, i = {1,2} ● grantId = Gi, i = {1,2} ● operationState = "AUTHORIZED"	■ Pass	□ Fail
3	If separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Parameters for each CBSD within the Heartbeat Response message should be as follows, for CBSDi: ● cbsdId = Ci ● grantId = Gi ● For CBSD1: ○ transmitExpireTime = current UTC time + 200 seconds ○ responseCode = 0 ● For CBSD2: ○ 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. If CBSD sends further Heartbeat Request messages for CBSD1, SAS Test Harness shall respond with a Heartbeat Response message with parameters: ● cbsdId = C1 ● grantId = G1 ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0 ● Heartbeat Request message is within heartbeatInterval of previous Heartbeat Request message	--	--



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5	Monitor the RF output of CBSD2. Verify: ● CBSD2 shall stop transmission within bandwidth F2 within (T + 60 seconds) of completion of step 3	☒ Pass	☐ Fail
---	---	--	-------------------------------



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7.3.7 WINNF.FT.C.HBT.9

#	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 ● operationState = "GRANTED"	■ Pass	□ Fail
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	□ Fail



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7.3.8 WINNF.FT.C.HBT.10

#	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	☐ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = T = current UTC time + 200 seconds ● responseCode = 0	--	--
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 all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.	☒ Pass	☐ Fail



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7.4 CBSD Measurement Report

7.4.1 WINNF.FT.D.MES.2

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness	--	--
2	DP sends a Registration Request message for each of two CBSD. This may occur in a separate Request message per CBSD, or together in a single Request message with array of 2. Verify Registration Request message contains all required parameters properly formatted for CBSDi, i={1,2}, and specifically: ● userId is present and correct ● fcld is present and correct ● cbsdSerialNumber is present and correct ● measCapability = "RECEIVED_POWER_WITHOUT_GRANT"	■ Pass	□ Fail
3	If a separate Registration Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Registration Request message with a separate Registration Response message. If a single Registration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Registration Response message containing a 2-object array. Parameters for each CBSD within the Registration Response message should be as follows, for CBSDi: ● cbsdId = Ci ● measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" ● responseCode = 0	--	--
4	UUT sends a message: ● If message is type Spectrum Inquiry Request, go to step 5, or ● If message is type Grant Request, go to step 7	--	--
5	UUT sends message type Spectrum Inquiry Request. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Spectrum Inquiry Request message contains all required parameters properly formatted for CBSDi, i= {1,2}, and specifically: ● cbsdId = Ci ● measReport is present, and is a properly formatted rcvdPowerMeasReport.	■ Pass	□ Fail
6	If a separate Spectrum Inquiry Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Spectrum Inquiry Request message with a separate Spectrum Inquiry Response message. If a single Spectrum Inquiry Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Spectrum Inquiry Response message containing a 2-object array.	--	--



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	Parameters for each CBSD within the Spectrum Inquiry Response message should be as follows: ● cbsdId = Ci ● availableChannel is an array of availableChannel objects ● responseCode = 0		
7	UUT sends message type Grant Request message. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify the Grant Request message contains all required parameters properly formatted for CBSDi, i = {1,2}, and specifically: ● cbsdId = Ci ● measReport is present, and is a properly formatted rcvdPowerMeasReport.	☒ Pass	☐ Fail



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7.4.2 WINNF.FT.C.MES.3

#	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	□ Fail
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	□ Fail
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	□ Fail
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	--	--



7.4.3 WINNF.FT.D.MES.5

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness ● DP has successfully registered 2 CBSD with SAS Test Harness, each with cbsdId=Ci, i={1,2} and measCapability = "RECEIVED_POWER_WITH_GRANT" ● DP has received a valid grant with grantId = Gi, i={1,2} for each CBSD ● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants. ● Grants have heartbeatInterval =60 seconds	--	--
2	Verify DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Heartbeat Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi: ● cbsdId = Ci ● grantId = Gi ● operationState = "AUTHORIZED"	☒ Pass	☐ Fail
3	If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Parameters for each CBSD within the Heartbeat Response message containing all required parameters properly formatted, and specifically: ● cbsdId = Ci ● grantId = Gi ● measReportConfig= "RECEIVED_POWER_WITH_GRANT" ● responseCode = 0	--	--
4	Verify DP sends a Heartbeat Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Heartbeat Request message contains all required parameters properly formatted for each CBSD, and specifically, for CBSDi, i = {1,2}: ● cbsdId = Ci ● grantId = Gi ● operationState = "AUTHORIZED" ● Check whether measReport is present, and if present, ensure it is a properly formatted rcvdPowerMeasReport object, and record its reception for each CBSDi, i = {1,2}.	☒ Pass	☐ Fail



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5	If Heartbeat Request message (step 4) contains measReport object, then: ● Verify measReport is properly formatted as object rcvdPowerMeasReport ● record which CBSD have successfully sent a measReport object If all CBSDi, i = {1,2} have successfully sent a measReport object, then ● end test, with PASS result else, if the number of Heartbeat Requests sent per CBSD is 5 or more, then stop test with result of FAIL	■ Pass	□ Fail
6	If a separate Heartbeat Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each Heartbeat Request message with a separate Heartbeat Response message. If a single Heartbeat Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Heartbeat Response message containing a 2-object array. Parameters for each CBSD within the Heartbeat Response message containing all required parameters properly formatted, and specifically: ● cbsdId = Ci ● grantId = Gi ● responseCode = 0 Go to Step 4, above.	--	--



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7.5 CBSD Relinquishment Process

7.5.1 WINNF.FT.D.RLQ.2

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness ● DP has successfully registered 2 CBSD with SAS Test Harness, each with cbsdId=Ci, i={1,2} ● DP has received a valid grant with grantId = Gi, i={1,2} for each CBSD ● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--	--
2	Verify DP sends a Relinquishment Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Relinquishment Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi: ● cbsdId = Ci ● grantId = Gi	☒ Pass	☐ Fail
3	If a separate Relinquishment Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message. If a single Relinquishment Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array. Parameters for each CBSD within the Relinquishment Response shall be as follows: ● cbsdId = Ci ● grantId = Gi ● 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 each 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 relinquishments and UUT sending the relinquishment requests for each CBSD.	☒ Pass	☐ Fail



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7.6 CBSD Deregistration Process

7.6.1 WINNF.FT.D.DRG.2

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● Each UUT has successfully registered with SAS Test Harness ● Each UUT is in the authorized state ● DP has successfully completed SAS Discovery and Authentication with SAS Test Harness ● DP has successfully registered 2 CBSD with SAS Test Harness, each with cbsdId=Ci, i={1,2} ● DP has received a valid grant with grantId = Gi, i={1,2} for each CBSD ● Both CBSD are in Grant State AUTHORIZED and actively transmitting within the bounds of their grants. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	--	--
3	Verify DP sends a Deregistration Request message for each CBSD. This may occur in a separate message per CBSD, or together in a single message with array of 2. Verify Deregistration Request message contains all required parameters properly formatted for each CBSD, specifically, for CBSDi: ● cbsdId = Ci	☒ Pass	☐ Fail
4	If a separate Deregistration Request message was sent for each CBSD by the DP, the SAS Test Harness shall respond to each request message with a separate response message. If a single Deregistration Request message was sent by the DP containing a 2-object array (one per CBSD), the SAS Test Harness shall respond with a single Response message containing a 2-object array. Parameters for each CBSD within the Deregistration Response shall be as follows: ● cbsdId = Ci ● responseCode = 0	--	--
5	After completion of step 4, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	--	--
6	Monitor the RF output of each 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	☐ Fail

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7.7 CBSD Security Validation

7.7.1 WINNF.FT.C.SCS.1

#	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	☐ Fail
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_SHA256 - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	☒ Pass	☐ Fail
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	☐ Fail
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	☐ Fail

7.7.2 WINNF.FT.C.SCS.2

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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7.7.3 WINNF.FT.C.SCS.3

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail

7.7.4 WINNF.FT.C.SCS.4

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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7.7.5 WINNF.FT.C.SCS.5

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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7.8 CBSD RF Power Measurement

7.8.1 WINNF.PT.C.HBT.1

#	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 = FL, highFrequency = FH, maxEirp = Pi}, 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	--	--
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill 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	Fail



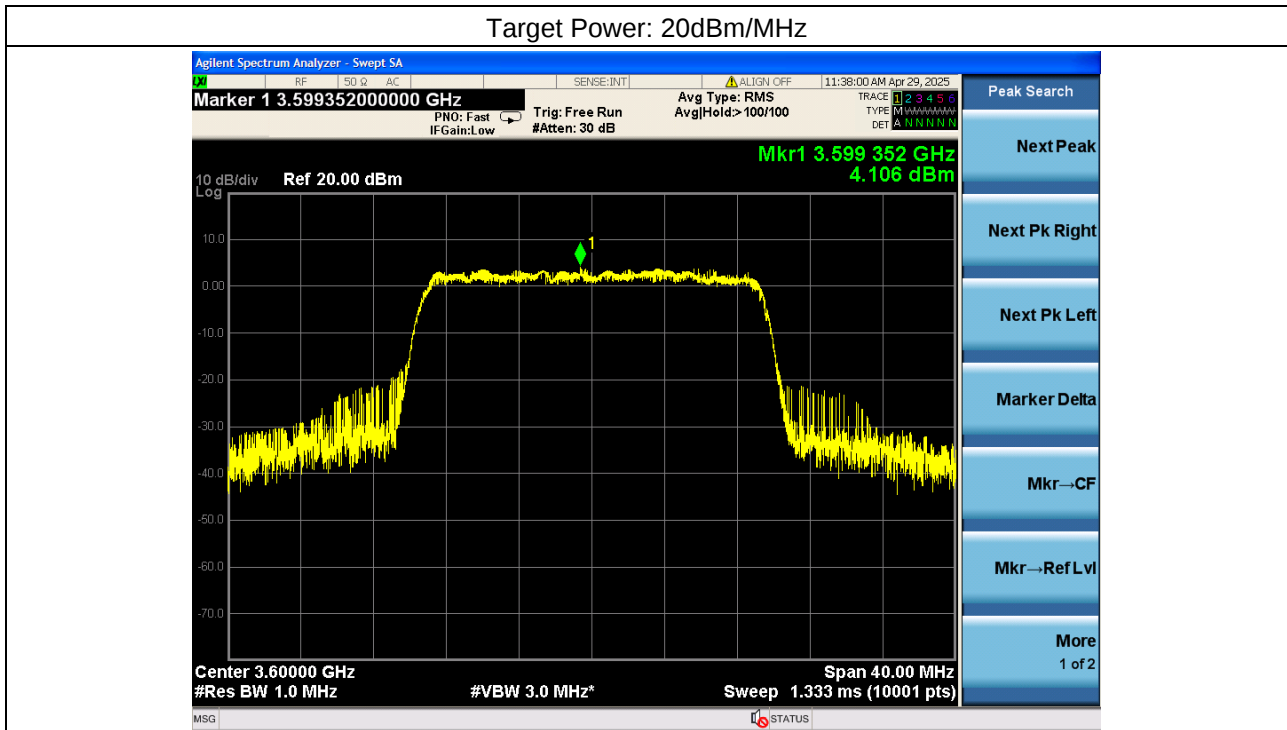
RF measurement plot for Test Case:

- Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.

Freq. (MHz)	Conducted PSD (dBm/MHz)	Path Loss (dB)	Antenna Gain (dBi)	Array Gain (dB)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
3600	4.106	8	3.5	3.01	18.616	20	Pass
3620	-7.223	8	3.5	3.01	7.287	10	Pass

Note:

- Array Gain=10log(n), n is the antenna number, for this test the n=2
- EIRP PSD= Conducted PSD+ Path Loss+ Antenna Gain+ Array Gain



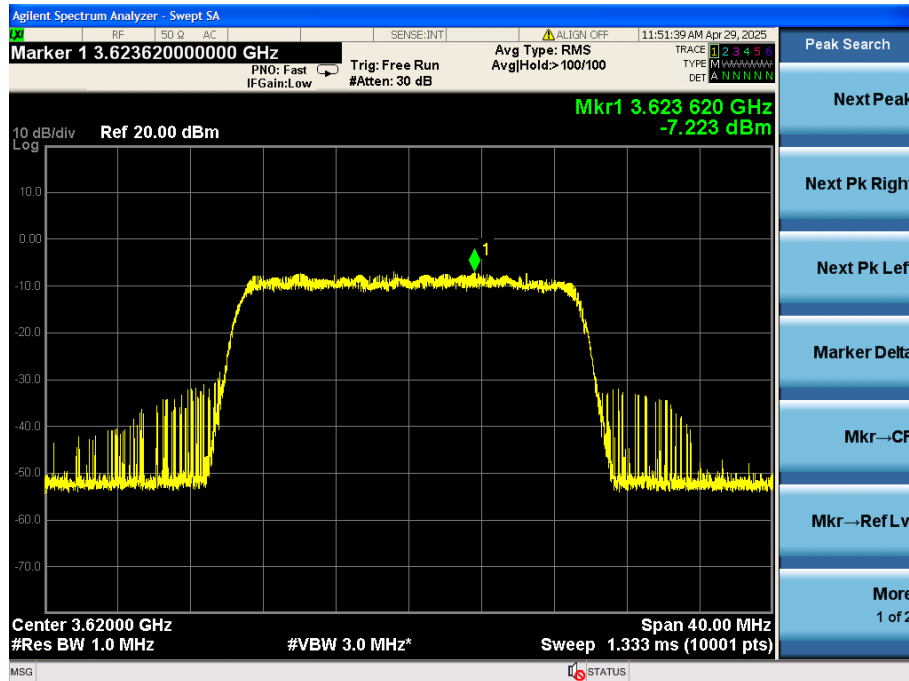
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Target Power: 10dBm/MHz



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8 Test Data Log For CBSD Under Control of Domain Proxy

Test data log refer to log files (Log files appendix) except for securitytest cases which shows below.

8.1 WINNF.FT.C.SCS.1

No.	Time	Source	Destination	Protocol	Length	Info
18	2.835300	192.168.24.88	192.168.24.103	TLSv1.2	270	Client Hello
11	2.835460	192.168.24.103	192.168.24.88	TLSv1.2	3129	Server Hello, Certificate, Certificate Request, Server Hello Done
15	2.836822	192.168.24.88	192.168.24.103	TLSv1.2	1499	Certificate
17	2.837346	192.168.24.88	192.168.24.103	TLSv1.2	321	Client Key Exchange
18	2.838812	192.168.24.88	192.168.24.103	TLSv1.2	323	Certificate Verify
19	2.838812	192.168.24.88	192.168.24.103	TLSv1.2	68	Change Cipher Spec
20	2.838812	192.168.24.88	192.168.24.103	TLSv1.2	99	Encrypted Handshake Message
22	2.843811	192.168.24.103	192.168.24.88	TLSv1.2	1592	New Session Ticket, Change Cipher Spec, Encrypted Handshake Message
24	2.844633	192.168.24.88	192.168.24.103	TLSv1.2	1592	Application Data
27	2.892797	192.168.24.103	192.168.24.88	TLSv1.2	100	Application Data
29	2.135998	192.168.24.103	192.168.24.88	TLSv1.2	492	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data, Application Data

Frame 18: 270 bytes on wire (2160 bits), 270 bytes captured (2160 bits) on interface \DeviceVNF_0793A805-D987-4C13-944F-E67D01452804, id 0
 Ethernet II, Src: Dell_du87:68 (fa:8e:38:du87:68), Dst: RealtekSmc_33:10:58 (08:e0:4c:33:10:58)
 Internet Protocol Version 4, Src: 192.168.24.88, Dst: 192.168.24.103
 Transmission Control Protocol, Src Port: 45708, Dst Port: 5000, Seq: 1, Ack: 1, Len: 216
 Transport Layer Security
 TLSv1.2 Record Layer: Handshake Protocol: Client Hello
 Content Type: Handshake (22)
 Version: TLS 1.2 (0x0303)
 Length: 211
 Handshake Protocol: Client Hello
 Handshake Type: Client Hello (1)
 Length: 207
 Version: TLS 1.2 (0x0303)
 Random: ab24687f22564ec774262b34301002c5dbf26e6c5b0ac2c8fde169a6c46399
 GMT Unix Time: Dec 26, 2060 19:58:55.000000000 中国标准时间
 Random Bytes: 22564ec774262b34301002c5dbf26e6c5b0ac2c8fde169a6c46399
 Session ID Length: 0
 Cipher Suites Length: 6
 Cipher Suites (3 suites)
 Cipher Suite: TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
 Cipher Suite: TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 (0xc02b)
 Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)
 Compression Methods Length: 1
 Compression Methods (1 method)
 Compression Method: null (0)
 Extensions Length: 100
 Extension: status_request (len=5)
 Extension: supported_groups (len=12)
 Extension: ec_point_formats (len=2)
 Extension: status_request_v2 (len=8)
 Extension: extended_master_secret (len=8)
 Extension: session_ticket (len=8)
 Extension: signature_algorithms (len=44)

8.2 WINNF.FT.C.SCS.2

No.	Time	Source	Destination	Protocol	Length	Info
6389	1424.447342	192.168.24.183	192.168.24.183	HTTP	201	GET /cr/server.cgi HTTP/1.1
6391	1424.456383	192.168.24.183	192.168.24.183	HTTP	1134	HTTP/1.1 200 OK
7422	1652.112919	192.168.24.183	192.168.24.183	HTTP	201	GET /cr/server.cgi HTTP/1.1
7424	1652.119795	192.168.24.183	192.168.24.183	HTTP	1134	HTTP/1.1 200 OK

Frame 6389: 201 bytes on wire (1608 bits), 201 bytes captured (1608 bits) on interface \Device\NPF_{0793A805-0987-4C13-9A4F-E670914520D4}, id 0

Section number: 1

- Interface id: 0 (\Device\NPF_{0793A805-0987-4C13-9A4F-E670914520D4})
- Encapsulation type: Ethernet (1)
- Arrival Time: Apr 24, 2025 14:15:32.036354000 中国标准时间
- UTC Arrival Time: Apr 24, 2025 06:15:32.036354000 UTC
- Epoch Arrival Time: 174547332.036354000
- [Time shift for this packet: 0.000000000 seconds]
- [Time delta from previous captured frame: 0.000000000 seconds]
- [Time delta from previous displayed frame: 0.000000000 seconds]
- [Time since reference or first frame: 1424.447342000 seconds]
- Frame Number: 6389
- Frame Length: 201 bytes (1608 bits)
- Capture Length: 201 bytes (1608 bits)
- [Frame is marked: False]
- [Frame is ignored: False]
- [Protocols in frame: ethertype:ip:tcp:http]
- [Coloring Rule Name: HTTP]
- [Coloring Rule String: http || tcp.port == 80 || https]
- Ethernet II, Src: Dell_d8:07:08 (f4:8e:1b:d8:07:08), Dst: RealtekSemi_33:10:58 (00:0b:0c:33:10:58)
- Internet Protocol Version 4, Src: 192.168.24.183, Dst: 192.168.24.183
- Transmission Control Protocol, Src Port: 35124, Dst Port: 8080, Seq: 1, Ack: 1, Len: 147
- Hypertext Transfer Protocol

No.	Time	Source	Destination	Protocol	Length	Info
128	21.720952	192.168.24.183	192.168.24.183	TLSv1.2	207	Client Hello
129	21.721260	192.168.24.183	192.168.24.183	TLSv1.2	3235	Server Hello, Certificate, Certificate Request, Server Hello Done
133	21.734471	192.168.24.183	192.168.24.183	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)

Frame 133: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface \Device\NPF_{0793A805-0987-4C13-9A4F-E670914520D4}, id 0

Section number: 1

- Interface id: 0 (\Device\NPF_{0793A805-0987-4C13-9A4F-E670914520D4})
- Encapsulation type: Ethernet (1)
- Arrival Time: Apr 24, 2025 13:52:09.323483000 中国标准时间
- UTC Arrival Time: Apr 24, 2025 05:52:09.323483000 UTC
- Epoch Arrival Time: 1745473929.323483000
- [Time shift for this packet: 0.000000000 seconds]
- [Time delta from previous captured frame: 0.022294000 seconds]
- [Time delta from previous displayed frame: 0.022294000 seconds]
- [Time since reference or first frame: 21.734471000 seconds]
- Frame Number: 133
- Frame Length: 61 bytes (488 bits)
- Capture Length: 61 bytes (488 bits)
- [Frame is marked: False]
- [Frame is ignored: False]
- [Protocols in frame: ethertype:ip:tls]
- [Coloring Rule Name: TCP]
- [Coloring Rule String: tcp]
- Ethernet II, Src: Dell_d8:07:08 (f4:8e:1b:d8:07:08), Dst: RealtekSemi_33:10:58 (00:0b:0c:33:10:58)
- Internet Protocol Version 4, Src: 192.168.24.183, Dst: 192.168.24.183
- Transmission Control Protocol, Src Port: 53942, Dst Port: 5000, Seq: 154, Ack: 3238, Len: 7
- Transport Layer Security
 - TLSv1.2 Record Layer: Alert (Level: Fatal, Description: Certificate Revoked)
 - Content Type: Alert (21)
 - Version: TLS 1.2 (0x0303)
 - Length: 2
 - Alert Message
 - Level: Fatal (2)
 - Description: Certificate Revoked (44)

8.3 WINNF.FT.C.SCS.3

No.	Time	Source	Destination	Protocol	Length	Info
378	82.963180	192.168.24.88	192.168.24.103	TLSv1.2	207	Client Hello
379	82.963341	192.168.24.103	192.168.24.88	TLSv1.2	3156	Server Hello, Certificate, Certificate Request, Server Hello Done
382	82.966456	192.168.24.88	192.168.24.103	TLSv1.2	61	Alert (Level: fatal, Description: Certificate Expired)

Frame 379: 3156 bytes on wire (25248 bits), 3156 bytes captured (25248 bits) on interface \Device\NPF_{0793A805-D987-4C13-944F-E67091452804}, id 0

Section number: 1

> Interface id: 0 (\Device\NPF_{0793A805-D987-4C13-944F-E67091452804})

Encapsulation type: Ethernet (1)

Arrival Time: Apr 24, 2025 14:29:31.228443000 中国标准时间

UTC Arrival Time: Apr 24, 2025 06:29:31.228443000 UTC

Epoch Arrival Time: 1745476171.228443000

[Time shift for this packet: 0.000000000 seconds]

[Time delta from previous captured frame: 0.000253000 seconds]

[Time delta from previous displayed frame: 0.000253000 seconds]

[Time since reference or first frame: 82.963361000 seconds]

Frame Number: 379

Frame Length: 3156 bytes (25248 bits)

Capture Length: 3156 bytes (25248 bits)

[Frame is marked: False]

[Frame is ignored: False]

[Protocol is in frame: truncated]: eth:ethertype:ip:tcp:tls:x509sat:x509sat:x509sat:x509sat:x509sat:x509sat:x509ce:x509ce:x509ce:x509ce:cbrc:oids:x509sat:x509sat:x509sat:x509sat:x509sat:x509sat:x509ce:x509ce:x509ce:x509ce

[Coloring Rule Name: TCP]

[Coloring Rule String: tcp]

> Ethernet II, Src: RealtekUplink_33:10:58 (08:0d:4c:33:10:58), Dst: Dell_dg:87:88 (f4:8e:38:da:87:88)

> Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.88

> Transmission Control Protocol, Src Port: 5000, Dst Port: 48786, Seq: 1, Ack: 154, Len: 3102

> Transport Layer Security

> TLSv1.2 Record Layer: Handshake Protocol: Server Hello

Content Type: Handshake (22)

Version: TLS 1.2 (0x0303)

Length: 81

> Handshake Protocol: Server Hello

Handshake Type: Server Hello (2)

Length: 77

Version: TLS 1.2 (0x0303)

> Random: 6a3e623307a085c25a5d3037f443743b28f8ed26f90856d80baca63072174052

Session ID Length: 32

8.4 WINNF.FT.C.SCS.4

No.	Time	Source	Destination	Protocol	Length	Info
133	27.152746	192.168.24.88	192.168.24.103	TLSv1.2	207	Client Hello
134	27.153006	192.168.24.103	192.168.24.88	TLSv1.2	3158	Server Hello, Certificate, Certificate Request, Server Hello Done
137	27.306630	192.168.24.88	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
220	44.162539	192.168.24.88	192.168.24.103	TLSv1.2	207	Client Hello
221	44.162937	192.168.24.103	192.168.24.88	TLSv1.2	3158	Server Hello, Certificate, Certificate Request, Server Hello Done
224	44.163993	192.168.24.88	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

> Frame 133: 207 bytes on wire (1656 bits), 207 bytes captured (1656 bits) on interface \Device\NPF{0793A085-D987-4C13-944F-E670914520D4}, id 0 > Ethernet II, Src: Dell da:87:88: (f4:8e:38:da:87:88), Dst: RealtekSemi_33:10:58: (00:e0:4c:33:10:58) > Internet Protocol Version 4, Src: 192.168.24.88, Dst: 192.168.24.103 > Transmission Control Protocol, Src Port: 60506, Dst Port: 5000, Seq: 1, Ack: 1, Len: 153 > Transport Layer Security > TLSv1.2 Record Layer: Handshake Protocol: Client Hello - Content Type: Handshake (22) - Version: TLS 1.2 (0x0303) - Length: 148 - Handshake Protocol: Client Hello - Handshake Type: Client Hello (1) - Length: 144 - Version: TLS 1.2 (0x0303) - Random: 6809f27235ead50fe62d87134ebab6dbae9ef0802107fec2755afcbdbda2 - Session ID Length: 0 - Cipher Suites Length: 6 - Cipher Suites (3 suites) - Compression Methods Length: 1 - Compression Methods (1 method) - Extensions Length: 97 - Extension: supported_groups (len=52) - Extension: ec_point_formats (len=2) - Extension: signature_algorithms (len=26) - Extension: renegotiation_info (len=1) [JA3: t121030400_b08a1703d7a2_f00df5931c7e] [JA3_r: t121030400_b08c_c02f_c02f_000a_0000_000d_ff01_0000_0001_0500_0501_0400_0401_0300_0301_0200_0201_0202_0101] [JA3_FullString: 771.156-40195-40199,10-11-13-05281,23-1-3-19-21-6-7-9-10-24-11-12-25-13-14-15-16-17-2-18-4-5-20-8-22,0] [JA3: abc6daae7e3a04da08ba08b0f2f377]	00:00 00:10 00:20 00:30 00:40 00:50 01:00 01:10 01:20 01:30 01:40 01:50
--	--



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8.5 WINNF.FT.C.SCS.5

No.	Time	Source	Destination	Protocol	Length	Info
63	14.339232	192.168.24.88	192.168.24.103	TLSv1.2	207	Client Hello
64	14.339678	192.168.24.103	192.168.24.88	TLSv1.2	3157	Server Hello, Certificate, Certificate Request, Server Hello Done
67	14.381237	192.168.24.88	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)
1311	293.755069	192.168.24.88	192.168.24.103	TLSv1.2	207	Client Hello
1312	293.755423	192.168.24.103	192.168.24.88	TLSv1.2	3157	Server Hello, Certificate, Certificate Request, Server Hello Done
1315	293.757296	192.168.24.88	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)

> Frame 1312: 3157 bytes on wire (25256 bits), 3157 bytes captured (25256 bits) on interface \Device\NPF_{0793AB05-D987-4C13-944F-E67091452804}, Id 0
> Ethernet II, Src: RealtekSemi_33:18:15 (08:0e:8c:33:18:15), Dst: Dell_da:87:88 (f4:8e:38:da:87:88)
> Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.88
> Transmission Control Protocol, Src Port: 5800, Dst Port: 40800, Seq: 1, Ack: 154, Len: 3103
> Transport Layer Security
> TLSv1.2 Record Layer: Handshake Protocol: Server Hello
Content Type: Handshake (22)
Version: TLS 1.2 (0x0303)
Length: 81
> Handshake Protocol: Server Hello
Handshake Type: Server Hello (2)
Length: 77
Version: TLS 1.2 (0x0303)
> Random: 358067c0e56f3e539f14e73a2dffc12add8c45199f2b5b21ee786105dbde91
Session ID Length: 32
Session ID: aded6ee9161df41b02bf356406c08e49e2e60b20032c1d91die0e33c4f8879
Cipher Suite: TLS_RSA_WITH_AES_128_GCM_SHA256 (0x009c)
Compression Method: null (0)
Extensions Length: 5
> Extensions: renegotiation_info (len=1)
[JAS5 Fullstring: 771,156,65281]
[JAS5: ccd570904a9027ec272e9809924c36f7]
> TLSv1.2 Record Layer: Handshake Protocol: Certificate
Content Type: Handshake (22)
Version: TLS 1.2 (0x0303)
Length: 2961
> Handshake Protocol: Certificate
Handshake Type: Certificate (11)
Length: 2957
Certificates Length: 2954
> Certificates (2954 bytes)
> TLSv1.2 Record Layer: Handshake Protocol: Multiple Handshake Messages
Content Type: Handshake (22)



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9 Test Data For Standalone CBSD

9.1 CBSD Registration Process

9.1.1 WINNF.FT.C.REG.1

#	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, fcId 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	□ Fail
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	□ Fail



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9.1.2 WINNF.FT.C.REG.5

#	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 - All of the required and REG-Conditional parameters shall be configured and CPI signature provided	--	--
2	CBSD sends Registration request to the SAS Test Harness: - The required userId, fcId and cbsdSerialNumber and REG-Conditional cbsdCategory, airInterface, measCapability and cpiSignatureData registration parameters shall be sent from the CBSD and conform to proper format and acceptable ranges. - Any optional registration parameters that may be included in the message shall be verified that they conform to proper format and are within acceptable ranges.	■ Pass	□ Fail
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	□ Fail



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9.1.3 WINNF.FT.C.REG.8

#	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 = 102	--	--
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	☐ Fail



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9.1.4 WINNF.FT.C.REG.10

#	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 = 200	--	--
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	☐ Fail



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9.1.5 WINNF.FT.C.REG.12

#	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 = 103	--	--
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	☐ Fail



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9.1.6 WINNF.FT.C.REG.14

#	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 = 101	--	--
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	☐ Fail



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9.1.7 WINNF.FT.C.REG.16

#	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 = 100	--	--
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	☐ Fail



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9.1.8 WINNF.FT.C.REG.18

#	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 = 201	--	--
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	☐ Fail



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9.2 CBSD Spectrum Grant Process

9.2.1 WINNF.FT.C.GRA.1

#	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.	☒ Pass	☐ Fail
3	SAS Test Harness sends a Grant Response message, including - cbsdId=C - responseCode = 400	--	--
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	☐ Fail

9.2.2 WINNF.FT.C.GRA.2

#	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.	☒ Pass	☐ Fail
3	SAS Test Harness sends a Grant Response message, including - cbsdId=C - responseCode = 401	--	--
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	☐ Fail



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9.3 CBSD HeartBeat Process

9.3.1 WINNF.FT.C.HBT.1

#	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	□ Fail
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	□ Fail
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	□ Fail
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	--	--



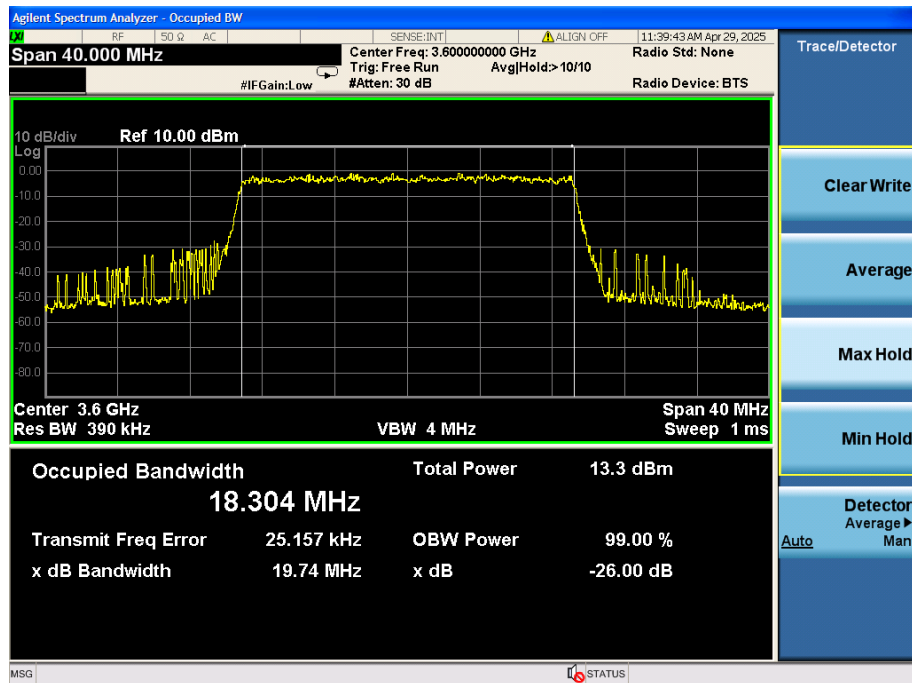
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9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: ● cbsdId = C ● grantId = G ● operationState = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = current UTC time + 200 seconds ● responseCode = 0	☒ Pass	☐ Fail
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	☐ Fail



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9.3.2 WINNF.FT.C.HBT.3

#	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"	--	--
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	☐ Fail



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9.3.3 WINNF.FT.C.HBT.4

#	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	☐ Fail
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	☐ Fail



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9.3.4 WINNF.FT.C.HBT.5

#	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	□ Fail
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: - cbsdId = C - grantId = G Monitor the RF output of the UUT. Verify: - UUT does not transmit at any time	■ Pass	□ Fail

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9.3.5 WINNF.FT.C.HBT.6

#	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	□ Fail
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: ● cbsdId = 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	□ Fail



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9.3.6 WINNF.FT.C.HBT.7

#	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	□ Fail
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: ○ cbsdId = 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	□ Fail



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9.3.7 WINNF.FT.C.HBT.9

#	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 ● operationState = "GRANTED"	■ Pass	□ Fail
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	□ Fail



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9.3.8 WINNF.FT.C.HBT.10

#	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	□ Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: ● cbsdId = C ● grantId = G ● transmitExpireTime = T = current UTC time + 200 seconds ● responseCode = 0	--	--
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 all transmission on RF interface within (transmitExpireTime + 60 seconds), using the transmitExpireTime sent in Step 3.	■ Pass	□ Fail



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9.4 CBSD Relinquishment Process

9.4.1 WINNF.FT.C.RLQ.1

#	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	□ Fail
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	□ Fail



9.5 CBSD Deregistration Process

9.5.1 WINNF.FT.C.DRG.1

#	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	☐ Fail
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	☐ Fail



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9.6 CBSD Security Validation

9.6.1 WINNF.FT.C.SCS.1

#	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	☐ Fail
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_SHA256 - TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 - TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256	☒ Pass	☐ Fail
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	☐ Fail
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	☐ Fail

9.6.2 WINNF.FT.C.SCS.2

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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9.6.3 WINNF.FT.C.SCS.3

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail

9.6.4 WINNF.FT.C.SCS.4

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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9.6.5 WINNF.FT.C.SCS.5

#	Test Execution Steps	Results	
1	UUT shall start CBSD-SAS communication with the security procedures	☒ Pass	☐ Fail
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	☐ Fail
3	UUT may retry for the security procedure which shall fail.	☒ Pass	☐ Fail
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	☐ Fail



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9.7 CBSD RF Power Measurement

9.7.1 WINNF.PT.C.HBT

#	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 = FL, highFrequency = FH, maxEirp = Pi}, 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	--	--
3	Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill 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	☐ Fail



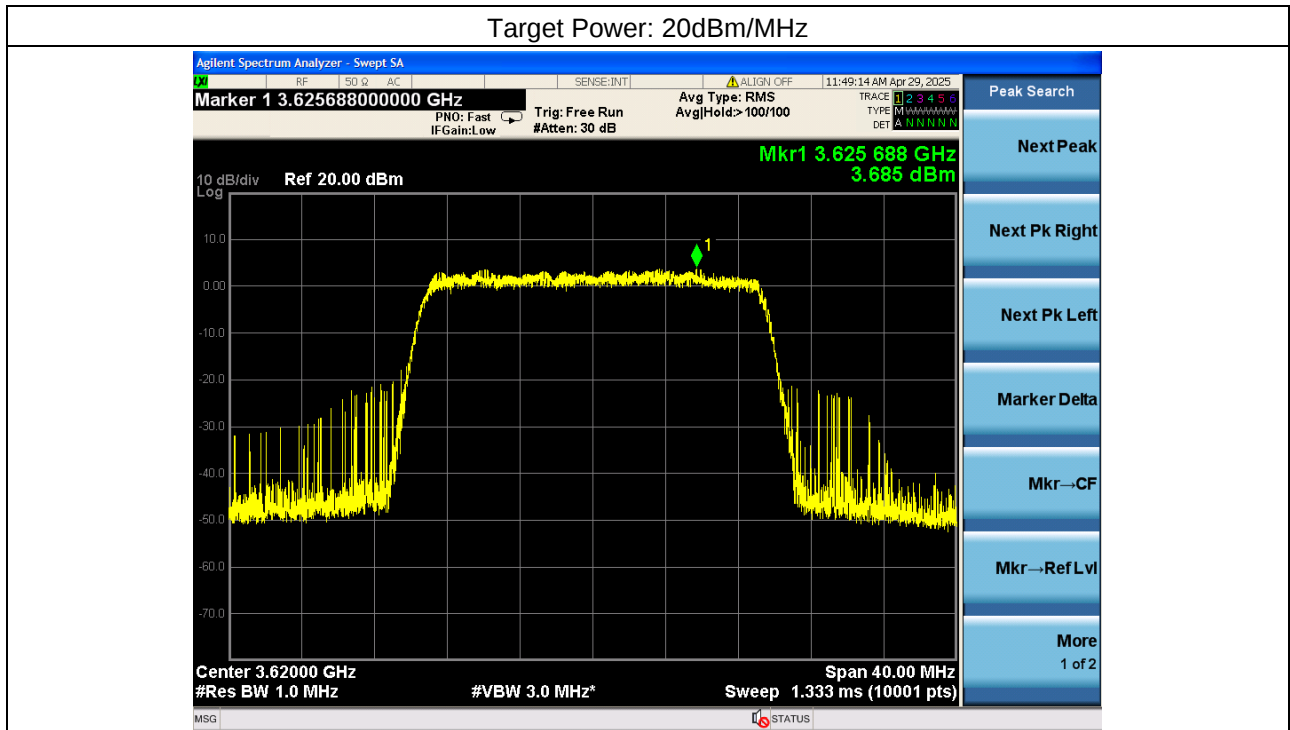
RF measurement plot for Test Case:

- Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.

Freq. (MHz)	Conducted PSD (dBm/MHz)	Path Loss (dB)	Antenna Gain (dBi)	Array Gain (dB)	EIRP PSD (dBm/MHz)	Limit (dBm/MHz)	Verdict
3620	3.685	8	3.5	3.01	18.195	20	Pass
3600	-6.754	8	3.5	3.01	7.756	10	Pass

Note:

- Array Gain=10log(n), n is the antenna number, for this test the n=2
- EIRP PSD= Conducted PSD+ Path Loss+ Antenna Gain+ Array Gain



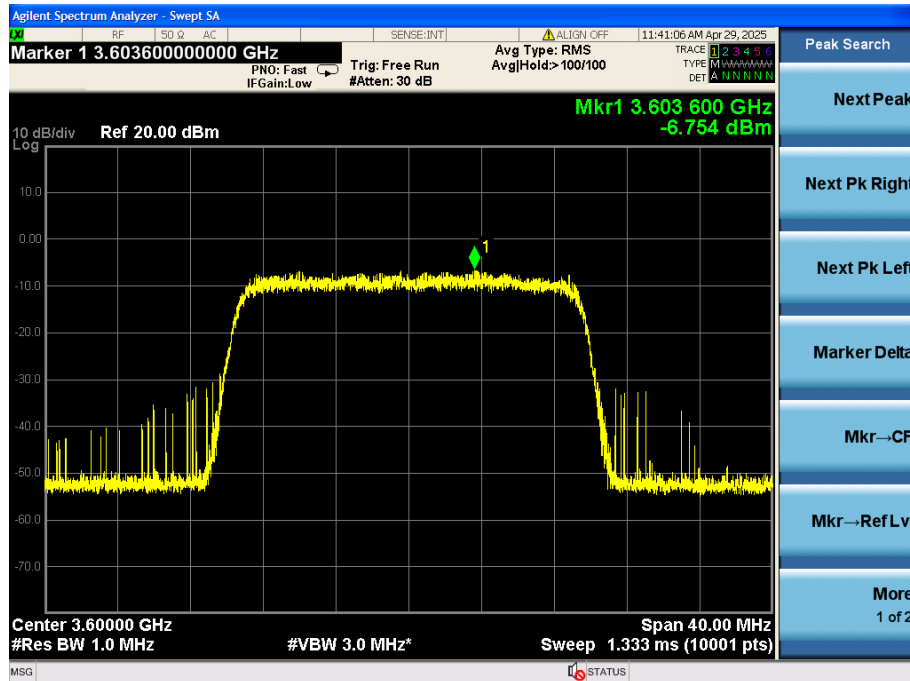
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Target Power: 10dBm/MHz



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10 Test Data Log For Standalone CBSD

Test data log refer to log files (Log files appendix) except for securitytest cases which shows below.



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10.1 WINNF.FT.C.SCS.1

No.	Time	Source	Destination	Protocol	Length	Info
144	27.649572	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
145	27.649706	192.168.24.103	192.168.24.101	TLSv1.2	3162	Server Hello, Certificate, Certificate Request, Server Hello Done
150	27.679790	192.168.24.101	192.168.24.103	TLSv1.2	1514	Certificate
152	27.671296	192.168.24.101	192.168.24.103	TLSv1.2	624	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
153	27.677195	192.168.24.103	192.168.24.101	TLSv1.2	105	Change Cipher Spec, Encrypted Handshake Message
154	27.679698	192.168.24.101	192.168.24.103	TLSv1.2	559	Application Data
155	27.691985	192.168.24.103	192.168.24.101	TLSv1.2	100	Application Data
157	27.736679	192.168.24.103	192.168.24.101	TLSv1.2	548	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
159	27.739943	192.168.24.101	192.168.24.103	TLSv1.2	85	Encrypted Alert
160	32.818054	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
167	32.811164	192.168.24.103	192.168.24.101	TLSv1.2	3162	Server Hello, Certificate, Certificate Request, Server Hello Done
192	32.835931	192.168.24.101	192.168.24.103	TLSv1.2	1514	Certificate
200	32.836405	192.168.24.101	192.168.24.103	TLSv1.2	624	Client Key Exchange, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message
205	32.841581	192.168.24.103	192.168.24.101	TLSv1.2	105	Change Cipher Spec, Encrypted Handshake Message
206	32.844748	192.168.24.101	192.168.24.103	TLSv1.2	494	Application Data
207	32.846091	192.168.24.103	192.168.24.101	TLSv1.2	100	Application Data
209	32.888218	192.168.24.103	192.168.24.101	TLSv1.2	543	Application Data, Application Data, Application Data, Application Data, Application Data, Application Data, Application Data
211	32.893323	192.168.24.101	192.168.24.103	TLSv1.2	85	Encrypted Alert
300	47.908661	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello

Frame 145: 3162 bytes on wire (25296 bits), 3162 bytes captured (25296 bits) on interface \Device\NPF_{0793A805-D987-4C13-944F-E670914520D4}, id 0
 Ethernet II, Src: RealtekMiniC_33:10:10:10:10:10, Dst: RealtekMiniC_33:10:10:10:10:10 (48:bf:74:3f:3f:81)
 Internet Protocol Version 4, Src: 192.168.24.103, Dst: 192.168.24.101
 Transmission Control Protocol, Src Port: 5000, Dst Port: 58278, Seq: 1, Ack: 518, Len: 3108
 Transport Layer Security
 TLSv1.2 Record Layer: Handshake Protocol: Server Hello
 Content Type: Handshake (22)
 Version: TLS 1.2 (0x0303)
 Length: 46
 Handshake Protocol: Server Hello (2)
 Handshake Type: Server Hello (2)
 Length: 82
 Version: TLS 1.2 (0x0303)
 Random: a3e2b3a9e29ea19163e06056721d59ebd6f6a288bd7c081567e9e41caeb58
 Session ID Length: 32
 Session ID: 70b16929f49308bf570e18e6cda00001c14487f65b81cd8f8a5173e0008
 Cipher Suite: TLS_RSA_WITH_AES_256_GCM_SHA384 (0x009d)
 Compression Method: null (0)
 Extensions Length: 10
 Extension: renegotiation_info (len=1)
 Extension: heartbeat (len=1)
 [JA3S Fullstring: 771,157,65281-15]
 [JA3S: 6d37b1b338d6a9f975658a8be74b4f]
 TLSv1.2 Record Layer: Handshake Protocol: Certificate
 TLSv1.2 Record Layer: Handshake Protocol: Multiple Handshake Messages



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10.2 WINNF.FT.C.SCS.2

The image shows a Wireshark packet capture for a TLSv1.2 connection. The packet list shows a fatal alert (level: Fatal, description: Certificate Revoked) at sequence number 61. The packet details pane shows the alert message structure.

No.	Time	Source	Destination	Protocol	Length	Info
7	1.558809	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
8	1.559754	192.168.24.103	192.168.24.101	TLSv1.2	3296	Server Hello, Certificate, Certificate Request, Server Hello Done
12	1.562826	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)
132	21.604750	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
133	21.604873	192.168.24.103	192.168.24.101	TLSv1.2	3296	Server Hello, Certificate, Certificate Request, Server Hello Done
137	21.607929	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)
168	26.622014	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
169	26.622120	192.168.24.103	192.168.24.101	TLSv1.2	3296	Server Hello, Certificate, Certificate Request, Server Hello Done
173	26.625321	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)

Frame 12: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface \Device\NPF_{0793A805-D987-4C13-944F-E67091452004}, id 0
> Ethernet II, Src: RealtekTech_2f:3f:81 (48:bf:74:2f:3f:81), Dst: RealtekSemi_33:10:58 (08:00:4c:33:10:58)
> Internet Protocol Version 4, Src: 192.168.24.101, Dst: 192.168.24.103
> Transmission Control Protocol, Src Port: 36102, Dst Port: 5000, Seq: 518, Ack: 3243, Len: 7
> Transport Layer Security
 > TLSv1.2 Record Layer: Alert (Level: Fatal, Description: Certificate Revoked)
 Content Type: Alert (21)
 Version: TLS 1.2 (0x0303)
 Length: 2
 > Alert Message

The image shows a Wireshark packet capture for an HTTP connection. The packet list shows a 200 OK response at sequence number 118. The packet details pane shows the HTTP response structure.

No.	Time	Source	Destination	Protocol	Length	Info
118	20.744662	192.168.24.101	192.168.24.103	HTTP	208	GET /cbid.cr HTTP/1.1
120	20.753078	192.168.24.103	192.168.24.101	HTTP	1134	HTTP/1.1 200 OK

Frame 118: 208 bytes on wire (1664 bits), 208 bytes captured (1664 bits) on interface \Device\NPF_{0793A805-D987-4C13-944F-E67091452004}, id 0
> Ethernet II, Src: RealtekTech_2f:3f:81 (48:bf:74:2f:3f:81), Dst: RealtekSemi_33:10:58 (08:00:4c:33:10:58)
> Internet Protocol Version 4, Src: 192.168.24.101, Dst: 192.168.24.103
> Transmission Control Protocol, Src Port: 59862, Dst Port: 8080, Seq: 1, Ack: 1, Len: 154
> Hypertext Transfer Protocol



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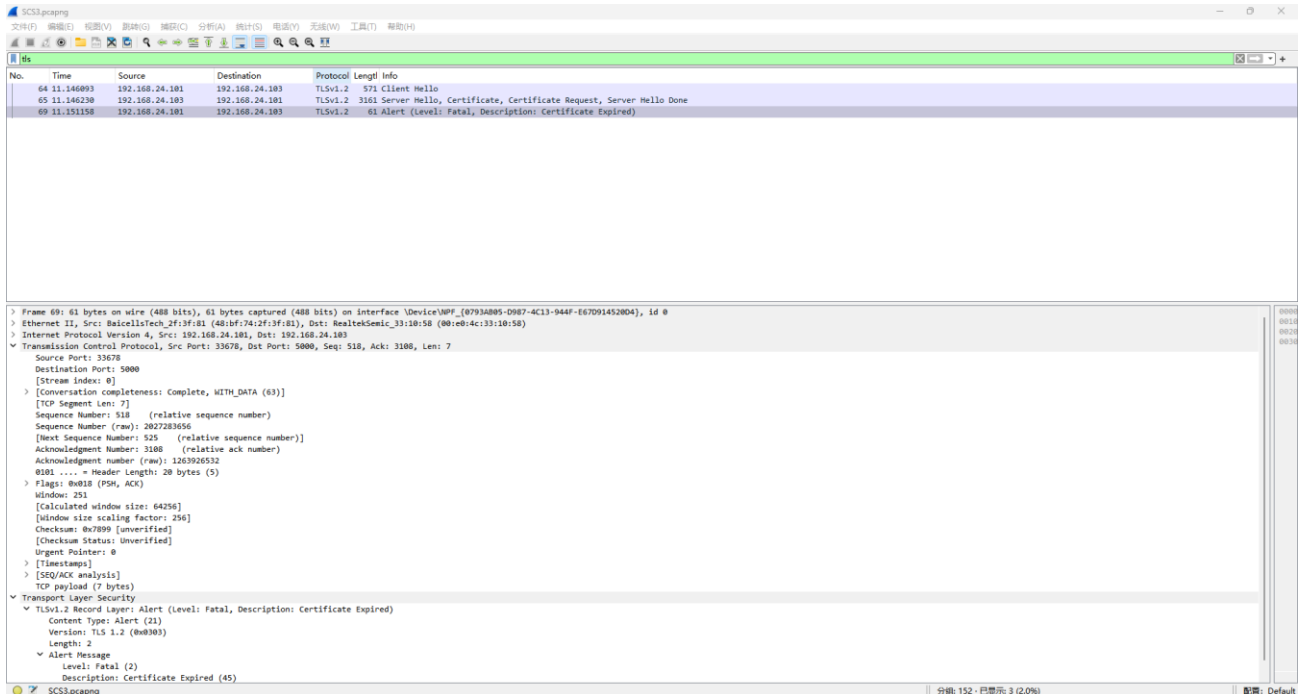
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10.3 WINNF.FT.C.SCS.3



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10.4 WINNF.FT.C.SCS.4

No.	Time	Source	Destination	Protocol	Length	Info
458	95.714553	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
459	95.714701	192.168.24.103	192.168.24.101	TLSv1.2	3163	Server Hello, Certificate, Certificate Request, Server Hello Done
463	95.715589	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
482	100.724399	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
483	100.724553	192.168.24.103	192.168.24.101	TLSv1.2	3163	Server Hello, Certificate, Certificate Request, Server Hello Done
487	100.725515	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
528	105.733568	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
529	105.733728	192.168.24.103	192.168.24.101	TLSv1.2	3163	Server Hello, Certificate, Certificate Request, Server Hello Done
533	105.734675	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
552	110.742856	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
553	110.743000	192.168.24.103	192.168.24.101	TLSv1.2	3163	Server Hello, Certificate, Certificate Request, Server Hello Done
557	110.743935	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

> Frame 463: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface \Device\NPF_{8793AB05-D987-4C13-944F-E67D91452804}, id 0
 > Ethernet II, Src: RealtekTech_21:09:11 (48:00:74:2F:3F:82), Dst: RealtekSemi_33:10:10 (00:e0:4c:33:10:10)
 > Internet Protocol Version 4, Src: 192.168.24.101, Dst: 192.168.24.103
 > Transmission Control Protocol, Src Port: 33804, Dst Port: 5000, Seq: 518, Ack: 3110, Len: 7
 > Transport Layer Security
 > TLSv1.2 Record Layer: Alert (Level: Fatal, Description: Unknown CA)
 > Content Type: Alert (21)
 > Version: TLS 1.2 (0x0303)
 > Length: 2
 > Alert Message

10.5 WINNF.FT.C.SCS.5

No.	Time	Source	Destination	Protocol	Length	Info
1326	262.389374	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
1327	262.389679	192.168.24.103	192.168.24.101	TLSv1.2	3162	Server Hello, Certificate, Certificate Request, Server Hello Done
1333	262.394265	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)
1366	267.483214	192.168.24.101	192.168.24.103	TLSv1.2	571	Client Hello
1367	267.483457	192.168.24.103	192.168.24.101	TLSv1.2	3162	Server Hello, Certificate, Certificate Request, Server Hello Done
1373	267.488335	192.168.24.101	192.168.24.103	TLSv1.2	61	Alert (Level: Fatal, Description: Decrypt Error)

Frame 1371: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface \Device\NPF{0793A805-D867-4C13-944F-E67D914528D4}, id 0
 Ethernet II, Src: RealtekTech_20:0F:01:00:00:00, Dst: RealtekGiga_33:10:10:00:00:00 (00:00:00:00:00:00)
 Internet Protocol Version 4, Src: 192.168.24.101, Dst: 192.168.24.103
 Transmission Control Protocol, Src Port: 35432, Dst Port: 5000, Seq: 518, Ack: 3109, Len: 7
 Transport Layer Security
 TLSv1.2 Record Layer: Alert (Level: Fatal, Description: Decrypt Error)
 Content Type: Alert (21)
 Version: TLS 1.2 (0x0303)
 Length: 2
 Alert Message

11 Photographs

11.1 EUT Constructional Details (EUT Photos)

Please Refer to Integral and internal photos for details.

- End of the Report -

