



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR230600172804

Page: 1 of 60

TEST REPORT

Application No.: SZCR2306001728AT
Applicant: Edgenectar Inc.
Address of Applicant: 111 N, Market St. #300, San Jose, California 95113 United States
Manufacturer: Edgenectar Inc.
Address of Manufacturer: 111 N, Market St. #300, San Jose, California 95113 United States
Equipment Under Test (EUT):
EUT Name: Outdoor CAT-B intergrated
Model No.: Odge5000i
FCC ID: 2A9Z95GEMFOB01
Standard(s) : CBRSA-TS-9001-V1.2.1
WINNF-TS-0122-V1.0.2
FCC 47 CFR Part 96
KDB 940660 D01 V03
Date of Receipt: 2023-11-20
Date of Test: 2023-12-01 to 2023-12-10
Date of Issue: 2024-01-20

Test Result:

Pass*

* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu
EMC Laboratory Manager



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

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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2024-01-20		Original

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



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2 Test Summary

Multi-Step registration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.1	Pass
Single-Step registration for Category A CBSD	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.3	Pass
Single-Step registration for CBSD with CPI signed data	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.5	Pass
Registration due to change of an installation parameter	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.7	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
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
Category A CBSD location update	WINNF-TS-0122-V1.0.2	WINNF.FT.C.REG.20	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



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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 Grant Renewal in Heartbeat Test Case	WINNF-TS-0122-V1.0.2	WINNF.FT.C.HBT.11	Pass
Registration Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.C.MES.1	Pass
Grant Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.C.MES.3	Pass
Heartbeat Response contains measReportConfig	WINNF-TS-0122-V1.0.2	WINNF.FT.C.MES.4	Pass
Successful Relinquishment	WINNF-TS-0122-V1.0.2	WINNF.FT.C.RLQ.1	Pass
Deregistration responseCode=102	WINNF-TS-0122-V1.0.2	WINNF.FT.C.RLQ.3	Pass
Deregistration responseCode=103	WINNF-TS-0122-V1.0.2	WINNF.FT.C.RLQ.5	Pass
Successful Deregistration	WINNF-TS-0122-V1.0.2	WINNF.FT.C.DRG.1	Pass
Deregistration responseCode=102	WINNF-TS-0122-V1.0.2	WINNF.FT.C.DRG.3	Pass
Deregistration responseCode=103	WINNF-TS-0122-V1.0.2	WINNF.FT.C.DRG.5	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	Pass
SAS Version: 1.0.0.3			

Test standards:

CBRSA-TS-9001-V1.2.1

CBRS Alliance Certification Test Plan

WINNF-TS-0122-V1.0.2



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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.

Power supply:	DC48V
Sample Type:	Fixed device
CBSD Class:	B
Transmitter Frequency Band:	n48
Transmitter Frequency Range:	3550~3700MHz
Hardware Version:	5000i
Software Version:	iDAS_DRRU_R518_M1.1.B13S_ADED_20230824.zip for RRU; 5GNR_VPP_aa.tdd.fr1.2.2.3.462_r817_m693_V3.7SP05.pkg for BBU
Test sample:	b23090033P
Antenna Gain:	14dBi
MIMO supported	4*4 UL
Antenna Type:	External Antenna



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4.2 Description of CBSD/DP Support Features

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.	Y
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.	Y

Y: Supported

N: Not supported



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4.3 Summary of Test Results

WINNF-TS-0122			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT (CBSD, DP/CBSD)	36	36	100
PT (CBSD, DP/CBSD)	1	1	100
Total	37	37	100

Note:

1. Functional Test (FT): Test to validate the conformance of the Protocols and functionalities implemented in the CBSD/DP 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/DP 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.
Router	Ruijie	RG-PA1150P-F	G1L90YX000911
5GC	IPLOOP	intel M50CYP	/
5G USB Dongle	Askey	NDQ1300-SA	/



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4.6 Test Location

All tests were performed at:

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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.



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5 Equipment List

Test Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date
Laptop (With SAS Test harness)	Lenovo	T14s	/	/	/
Spectrum Analyzer	Keysight	N9020A	SEM004-21	2023-03-20	2024-03-19
Shield Room	SAEMC	MSR433	SEM001-11	2021-03-13	2024-03-12
Coaxial Cable	SGS	N/A	SEM031-01	2023-07-11	2024-07-10
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	2023-09-27	2024-09-26



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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

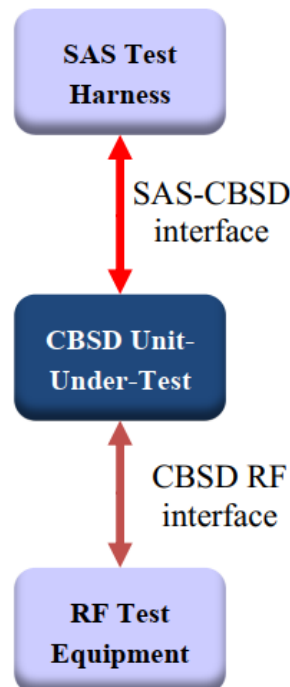
- Connect the UUT to SAS Test Harness system and RF Test instruments via the DP interface and RF components. The highest level is set to test configuration.
- UUT shall be UTC time synchronized
- The frequency band is granted and set as UUT supported Modulation and Channels, transmitted power of the 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

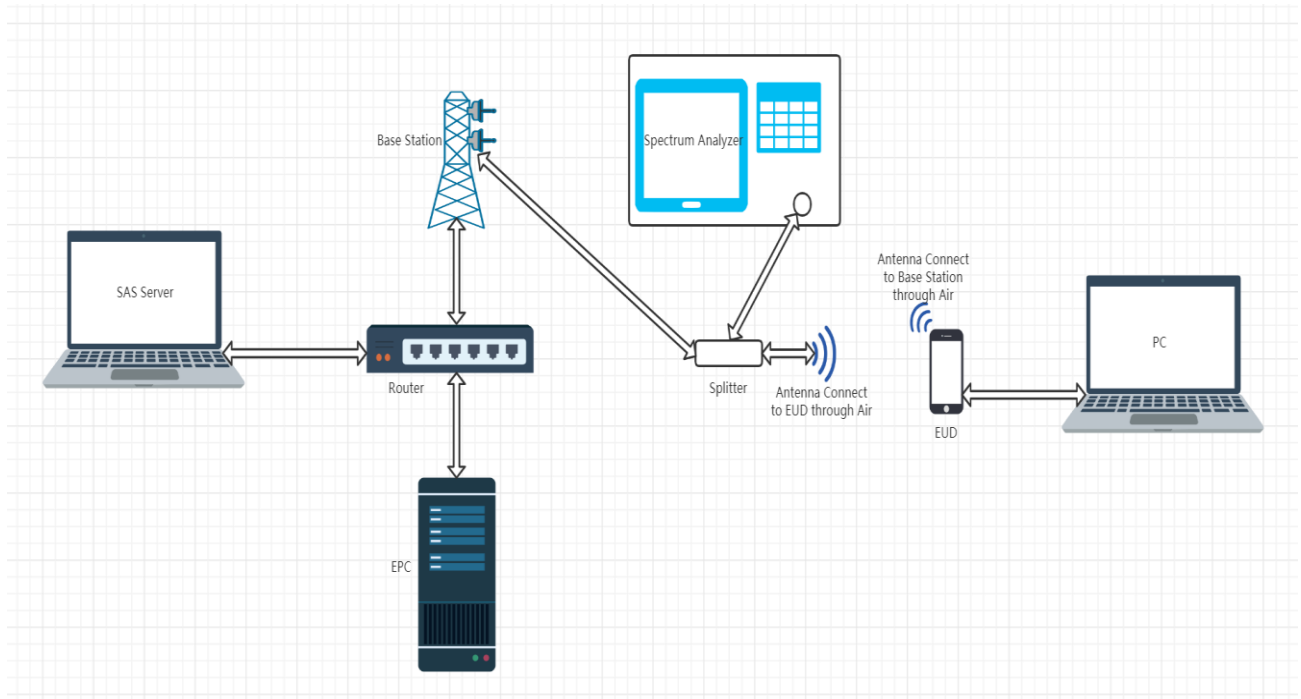
6.4 Test Setup

- 1) DP is deployed on the network management, and the registration of DP to SAS is to register with SAS according to the granularity of CBSD ID;
- 2) The DP and the network element communicate messages according to the cell granularity, and each CBSDID corresponds to a cell of an RRU which belongs to a base station.



CBSD as UUT





Test setup diagram for WINNF.PT.C.HBT Test case

7 Test Data

7.1 CBSD Registration Process

7.1.1 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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7.1.2 WINNF.FT.C.REG.3

#	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 Registration request to SAS Test Harness: all required and REG-Conditional parameter included (userId, fcId, cbsdSerialNumber, cbsdCategory, airInterface, installationParam, measCapability) for a Category A CBSD. - The required userId, fcId and cbsdSerialNumber and REG Conditional cbsdCategory, airInterface, installationParam, and measCapability 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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7.1.3 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, fcclId 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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7.1.4 WINNF.FT.C.REG.7

#	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	--	--
2	UUT has successfully registered with SAS Test Harness	--	--
3	Change an installation parameters at the UUT (time T) Tester needs to record the current time at which the parameter change is executed.	--	--
4	Monitor the SAS-CBSD interface. UUT sends a deregistrationRequest to the SAS Test Harness The deregistration request shall be sent within (T + 60 seconds) from step 3.	■ Pass	□ Fail



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7.1.5 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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7.1.6 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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7.1.7 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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7.1.8 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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7.1.9 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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7.1.10 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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7.1.11 WINNF.FT.C.REG.20

During the test, run WINNF.FT.C.REG.7 and successfully register on the SAS server. Change the location information manually and check that the device sends a deregistration request.



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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.	■ 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



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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.	■ 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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7.3 CBSD HeartBeat Process

7.3.1 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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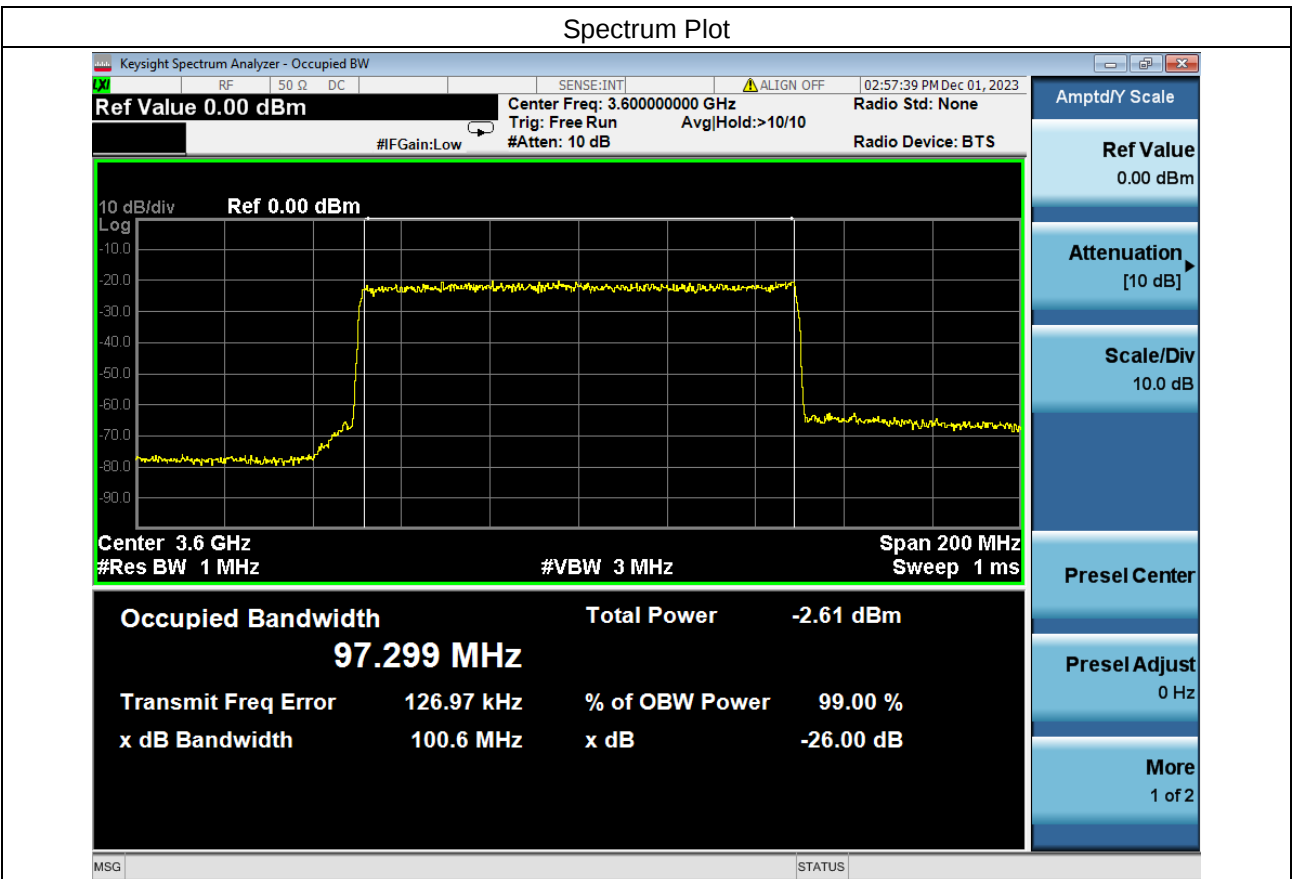
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9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: ● cbsdId = C ● grantId = G ● operationState = "AUTHORIZED" and SAS Test Harness responds with 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

Spectrum Plot



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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"	--	--
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.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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7.3.4 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

7.3.5 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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7.3.6 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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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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7.3.9 WINNF.FT.C.HBT.11

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: - UUT has registered successfully with SAS Test Harness - UUT has a valid single grant as follows: - valid cbsdId = C - valid grantId = G - grant is for frequency range F, power P - UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface. - Grant has the following parameters at the start of the test: - grantExpireTime = UTC time equal to time at start of test + 300 seconds = Tgrant_expire - transmitExpireTime = UTC time equal to time at start of test + 200 seconds - heartbeatInterval = 60 seconds	--	--
2	UUT sends a Heartbeat Request message. If Heartbeat Request message contains grantRenew = TRUE, go to Step 6, else go to Step 3.	--	--
3	Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: - cbsdId = C - grantId = G - operationState = "AUTHORIZED"	☒ Pass	☐ Fail
4	SAS Test Harness sends a Heartbeat Response message, with the following parameters: - cbsdId = C - grantId = G - transmitExpireTime = current UTC + 200 seconds - grantExpireTime = same as Step 1 - responseCode = 0	--	--
5	Go to Step 2	--	--
6	Verify Heartbeat Request message is sent within the latest specified heartbeatInterval, and is formatted correctly, including: - cbsdId = C - grantId = G - operationState = "AUTHORIZED" - grantRenew = TRUE	☒ Pass	☐ Fail
7	SAS Test Harness sends a Heartbeat Response message, with the following parameters: - cbsdId = C - grantId = G - grantExpireTime = UTC time set far in the future - transmitExpireTime = current UTC time + 200 seconds - responseCode = 0	--	--
8	Continue to respond to any subsequentHeartbeat Request from CBSD with Heartbeat Response with the following parameters: cbsdId = C	--	--

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	● grantId = G ● transmitExpireTime = same as Step 7 ● responseCode = 0		
9	Monitor RF transmission of UUT from start of test until Tgrant_expire + 60 seconds and ensure UUT continues to transmit throughout the time period.	☒ Pass	☐ Fail



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7.4 CBSD Measurement Report

7.4.1 WINNF.FT.C.MES.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	--	--
2	UUT sends a Registration Request message. Validate the Registration Request message is formatted correctly, including: ● userId is present and correct ● fcId is present and correct ● cbsdSerialNumber is present and correct ● measCapability = "RECEIVED_POWER_WITHOUT_GRANT"	■ Pass	□ Fail
3	SAS Test Harness sends a Registration Response message, with the following parameters: ● cbsdId = C = valid cbsdId for this UUT ● measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" ● responseCode = 0	--	--
4	SAS Test Harness sends a Registration Response message, with the following parameters: ● cbsdId = C = valid cbsdId for this UUT ● measReportConfig= "RECEIVED_POWER_WITHOUT_GRANT" ● responseCode = 0	--	--
5	UUT sends message type Spectrum Inquiry Request. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● measReport is present, and is a properly formatted rcvdPowerMeasReport	■ Pass	□ Fail
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: ● cbsdId = C ● availableChannel is an array of availableChannel objects ● responseCode = 0	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: ● cbsdId = C ● 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	--	--



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7.4.3 WINNF.FT.C.MES.4

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

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7.5 CBSD Relinquishment Process

7.5.1 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



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7.5.2 WINNF.FT.C.RLQ.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 - UUT has received a valid grant with grantId = G - UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to relinquish UUT Grant from the SAS Test Harness	--	--
2	UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically: - cbsdId = C - grantId = G	--	--
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: - cbsdId = C - grantId = G - responseCode = R	--	--
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



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7.5.3 WINNF.FT.C.RLQ.5

The same steps provided for WINNF.FT.C.RLQ.3 shall be executed for this test, with the exception that the Relinquishment response contains responseCode (R) = 103 and responseData = "grantId".



7.6 CBSD Deregistration Process

7.6.1 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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7.6.2 WINNF.FT.C.DRG.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 - UUT has received a valid grant with grantId = G - UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. Invoke trigger to deregister UUT from the SAS Test Harness	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with responseCode=0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with cbsdId = C.	--	--
4	The SAS Test Harness sends the Deregistration Response Message to UUT with: - No cbsdId - responseCode = 102	--	--
5	After completion of step 3, SAS Test Harness will not provide any 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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7.6.3 WINNF.FT.C.DRG.5

The same steps provided for WINNF.FT.C.DRG.3 shall be executed for this test, with the exception that the Deregistration response contains responseCode (R) = 103 and responseData = "cbsdld".



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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. C. 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	D. 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	E. 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	F. 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	G. 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

#	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. H. 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

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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.

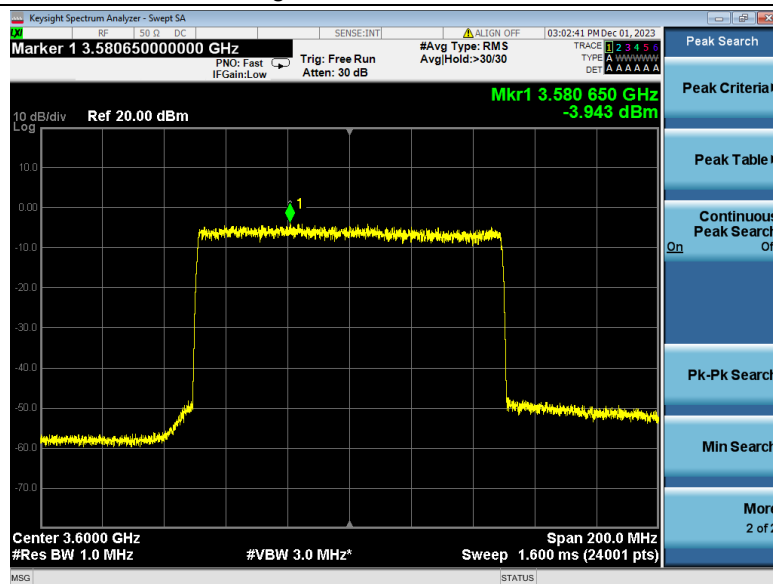
Frequency (MHz)	Channel Bandwidth (MHz)	Granted maxEIRP (dBm/MHz)	Conducted PSD (dBm/MHz)		Antenna Gain (dBi)	Directional Gain (dB)	Cable Loss (dB)	maxEIRP (dBm/MHz)
			Ant. 0	Ant. 1				
3600	100	37	-3.943	/	14	6.02	20	36.077
3600	100	22	-19.036	/	14	6.02	20	20.984
3600	100	12	-30.193	/	14	6.02	20	9.827

Note:

1. maxEIRP= Conducted PSD+ Antenna Gain+ Directional Gain+ Cable loss

2. Directional Gain=10log(n), n=2 for this test case.

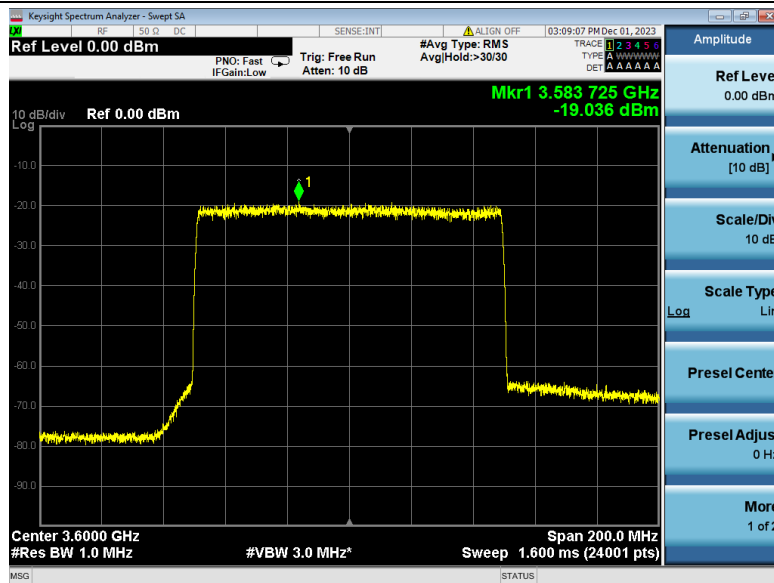
Target Power: 37 dBm/MHz



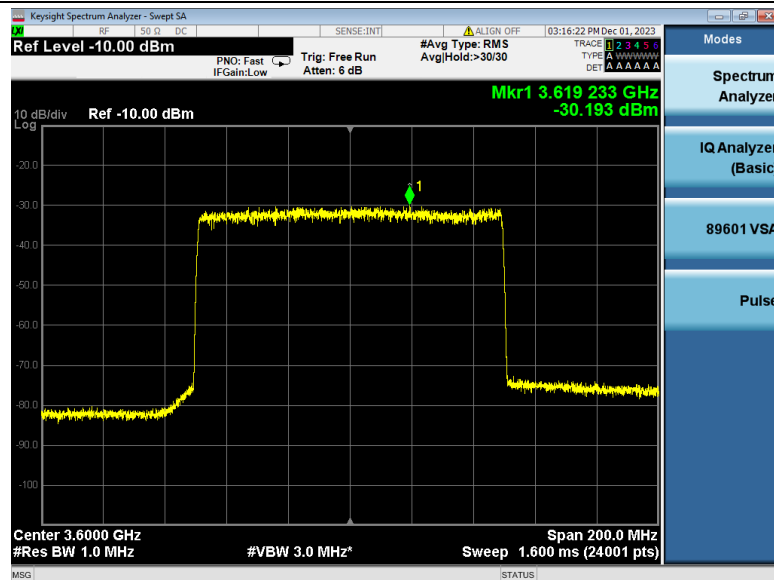
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Target Power: 22 dBm/MHz



Target Power: 12 dBm/MHz





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8 Test Data Log

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

8.1 WINNF.FT.C.SCS.1

The image displays a Wireshark network traffic capture. The top pane shows a list of captured packets, with the selected packet being a TLSv2.0 Record Layer: Handshake Protocol: Server Hello. The middle pane shows the packet details, including the TLSv2.0 Record Layer: Handshake Protocol: Server Hello, and the TLSv2.0 Record Layer: Handshake Protocol: Server Hello. The bottom pane shows the raw packet data in hexadecimal and ASCII.



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8.2 WINNF.FT.C.SCS.2

No.	Time	Source	Destination	Protocol	Length	Info
570	679.982228	192.168.5.216	192.168.5.183	HTTP	1168	GET /cgi-bin/crserver.cgi HTTP/1.1
572	679.915155	192.168.5.183	192.168.5.216	HTTP	1118	HTTP/1.1 200 OK

No.	Time	Source	Destination	Protocol	Length	Info
47	31.818637	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
48	31.821878	192.168.5.183	192.168.5.216	TLSv1.2	3627	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
52	31.825189	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)
57	31.837768	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
58	31.840286	192.168.5.183	192.168.5.216	TLSv1.2	3627	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
62	31.844131	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)
67	31.857616	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
68	31.862397	192.168.5.183	192.168.5.216	TLSv1.2	3627	Server Hello, Certificate, Server Key Exchange, Certificate Request, Server Hello Done
72	31.864477	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)



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8.3 WINNF.FT.C.SCS.3

The screenshot displays a Wireshark network traffic capture. The packet list on the left shows several TLSv2 records. The selected packet (No. 131) is a TLSv2 record from 192.168.5.103 to 192.168.5.103. The packet details pane on the right shows the structure of the TLSv2 record, including the Handshake Protocol, Server Hello, and various extensions like Random, Session ID, Cipher Suites, and Extensions Length. The packet bytes pane at the bottom shows the raw data of the packet.



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8.4 WINNF.FT.C.SCS.4

No.	Time	Source	Destination	Protocol	Length	Info
18	6.4807400	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
19	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	1514	Server Hello
20	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
21	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
25	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
30	6.4807392	192.168.5.183	192.168.5.216	TLSv1.2	1514	Server Hello
31	6.4807392	192.168.5.183	192.168.5.216	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
33	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
42	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
43	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
49	6.4807392	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

Frame 18: 571 bytes on wire (4568 bits), 571 bytes captured (4568 bits) on interface \Device\NPF_{15B0E0C7-8A07-4F96-9F84-78F8AD2F3E85}, Id 8

Ethernet II, Src: Xerox_E154126 (00:00:00:01:54:12:6), Dst: 36:aa:ab:00:32:f8 (36:aa:ab:00:32:f8)

Internet Protocol Version 4, Src: 192.168.5.183, Dst: 192.168.5.216

Transmission Control Protocol, Src Port: 5080, Dst Port: 4848, Seq: 1, Ack: 518, Len: 1460

Transport Layer Security

TLSv1.2 Record Layer: Handshake Protocol: Server Hello

Content Type: Handshake (22)

Version: TLS 1.2 (0x0303)

Length: 85

Handshake Type: Server Hello (2)

Length: 85

Version: TLS 1.2 (0x0303)

Random: 6d2a7f6118081a6d8c78a2a538074c8b41d8c55da70b8b8d64d80

Session ID Length: 32

Session ID: f6108209771a040406080c0a2c00050a0370070d047c5d0e7d0e39187f8906

Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)

Compression Method: null (0)

Extensions Length: 13

Extension: renegotiation_info (len=1)

Extension: ec_point_formats (len=4)

[3030] FullPrivacy [71,09,09,0,0,0,0,1]

[3035] 3035164c50f7b3d99185225a8f02d1

TLS segment data (1366 bytes)

No.	Time	Source	Destination	Protocol	Length	Info
18	6.4807400	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
19	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	1514	Server Hello
20	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
21	6.4807273	192.168.5.183	192.168.5.216	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
25	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
30	6.4807392	192.168.5.183	192.168.5.216	TLSv1.2	1514	Server Hello
31	6.4807392	192.168.5.183	192.168.5.216	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
33	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
42	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	571	Client Hello
43	6.4808900	192.168.5.216	192.168.5.183	TLSv1.2	562	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
49	6.4807392	192.168.5.216	192.168.5.183	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

Frame 25: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface \Device\NPF_{15B0E0C7-8A07-4F96-9F84-78F8AD2F3E85}, Id 8

Ethernet II, Src: 36:aa:ab:00:32:f8 (36:aa:ab:00:32:f8), Dst: Xerox_E154126 (00:00:00:01:54:12:6)

Internet Protocol Version 4, Src: 192.168.5.216, Dst: 192.168.5.183

Transmission Control Protocol, Src Port: 4848, Dst Port: 5080, Seq: 518, Ack: 3429, 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

Level: Fatal (2)

Description: Unknown CA (48)



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SZEMC-TRF-01 Rev. A/0 Aug01,2022

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8.5 WINNF.FT.C.SCS.5

No.	Time	Source	Destination	Protocol	Length	Info
66	64.892786	192.168.5.216	192.168.5.183	TLSv2	371	Client Hello
67	64.898735	192.168.5.183	192.168.5.216	TLSv2	1514	Server Hello
68	64.898735	192.168.5.183	192.168.5.216	TLSv2	561	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
73	64.708015	192.168.5.216	192.168.5.183	TLSv2	61	Alert (Level: Fatal, Description: Decrypt error)
78	64.726321	192.168.5.216	192.168.5.183	TLSv2	571	Client Hello
79	64.731859	192.168.5.183	192.168.5.216	TLSv2	1514	Server Hello
81	64.731859	192.168.5.183	192.168.5.216	TLSv2	561	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
85	64.734189	192.168.5.216	192.168.5.183	TLSv2	61	Alert (Level: Fatal, Description: Decrypt error)
98	64.749039	192.168.5.216	192.168.5.183	TLSv2	571	Client Hello
91	64.750531	192.168.5.183	192.168.5.216	TLSv2	1514	Server Hello
93	64.750531	192.168.5.183	192.168.5.216	TLSv2	561	Certificate, Server Key Exchange, Certificate Request, Server Hello Done
97	64.752736	192.168.5.216	192.168.5.183	TLSv2	61	Alert (Level: Fatal, Description: Decrypt error)

> Frame 67: 1514 bytes on wire (12112 bits), 1514 bytes captured (12112 bits) on Interface 'Device\NPF_{1580EC07-8407-4F96-9F84-78F8AD2F1E05}', Id 8

> Ethernet II, Src: Xerox_8154126 (00:00:00:01:54:20), Dst: 36:aa:ab:00:32:f8 (36:aa:ab:00:32:f8)

> Internet Protocol Version 4, Src: 192.168.5.183, Dst: 192.168.5.216

> Transmission Control Protocol, Src Port: 5080, Dst Port: 48476, Seq: 1, Ack: 518, Len: 1460

> Transport Layer Security

 < TLSv2 Record Layer: Handshake Protocol: Server Hello

 Content Type: Handshake (22)

 Version: TLS 1.2 (0x0303)

 Length: 85

 < Handshake Protocol: Server Hello

 Handshake Type: Server Hello (2)

 Length: 85

 Version: TLS 1.2 (0x0303)

 Random: 1c4b6f0c98b0c77b6ebcf7a78bdc918c73b6c4084c4df12e767b8665f65c68

 Session ID Length: 32

 Session ID: c40809f0b089a080f0c7a3a4a084c2e7d47a7b6f0b0e7a0f40b7a080

 Cipher Suite: TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 (0xc02f)

 Compression Method: null (0)

 Extensions Length: 15

 < Extension: renegotiation_info (len=1)

 < Extension: ec_point_formats (len=4)

 [3a35: FullPr-1eg: 771,09109,05281,1]

 [3a35: 3039514a:50efb299105225a0f0201]

 TLS segment data (1366 bytes)

0000 36 aa ab 00 32 f8 00 00 00 01 54 20

0010 05 00 00 00 00 00 00 00 00 00 00

0020 05 00 13 00 00 00 00 00 00 00 00

0030 01 ff ff 00 00 00 00 00 00 00 00

0040 01 54 20 00 00 00 00 00 00 00 00

0050 01 54 20 00 00 00 00 00 00 00 00

0060 01 54 20 00 00 00 00 00 00 00 00

0070 01 54 20 00 00 00 00 00 00 00 00

0080 01 54 20 00 00 00 00 00 00 00 00

0090 01 54 20 00 00 00 00 00 00 00 00

00a0 01 54 20 00 00 00 00 00 00 00 00

00b0 01 54 20 00 00 00 00 00 00 00 00

00c0 01 54 20 00 00 00 00 00 00 00 00

00d0 01 54 20 00 00 00 00 00 00 00 00

00e0 01 54 20 00 00 00 00 00 00 00 00

00f0 01 54 20 00 00 00 00 00 00 00 00

0100 01 54 20 00 00 00 00 00 00 00 00

0110 01 54 20 00 00 00 00 00 00 00 00

0120 01 54 20 00 00 00 00 00 00 00 00

0130 01 54 20 00 00 00 00 00 00 00 00

0140 01 54 20 00 00 00 00 00 00 00 00

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0170 01 54 20 00 00 00 00 00 00 00 00

0180 01 54 20 00 00 00 00 00 00 00 00

0190 01 54 20 00 00 00 00 00 00 00 00

01a0 01 54 20 00 00 00 00 00 00 00 00

01b0 01 54 20 00 00 00 00 00 00 00 00

01c0 01 54 20 00 00 00 00 00 00 00 00

01d0 01 54 20 00 00 00 00 00 00 00 00

01e0 01 54 20 00 00 00 00 00 00 00 00

01f0 01 54 20 00 00 00 00 00 00 00 00

0200 01 54 20 00 00 00 00 00 00 00 00

0210 01 54 20 00 00 00 00 00 00 00 00

0220 01 54 20 00 00 00 00 00 00 00 00

0230 01 54 20 00 00 00 00 00 00 00 00

0240 01 54 20 00 00 00 00 00 00 00 00

0250 01 54 20 00 00 00 00 00 00 00 00

0260 01 54 20 00 00 00 00 00 00 00 00

0270 01 54 20 00 00 00 00 00 00 00 00

0280 01 54 20 00 00 00 00 00 00 00 00

0290 01 54 20 00 00 00 00 00 00 00 00

02a0 01 54 20 00 00 00 00 00 00 00 00

02b0 01 54 20 00 00 00 00 00 00 00 00

02c0 01 54 20 00 00 00 00 00 00 00 00

02d0 01 54 20 00 00 00 00 00 00 00 00

02e0 01 54 20 00 00 00 00 00 00 00 00

02f0 01 54 20 00 00 00 00 00 00 00 00

0300 01 54 20 00 00 00 00 00 00 00 00

0310 01 54 20 00 00 00 00 00 00 00 00

0320 01 54 20 00 00 00 00 00 00 00 00

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0a90 01 54 20 00 00 00 00 00 00 00 00

0aa0 01 54 20 00 00 00 00 00 00 00 00

0ab0 01 54 20 00 00 00 00 00 00 00 00

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0ae0 01 54 20 00 00 00 00 00 00 00 00

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0c70 01 54 20 00 00 00 00 00 00 00 00

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0c90 01 54 20 00 00 00 00 00 00 00 00

0ca0 01 54 20 00 00 00 00 00 00 00 00

0cb0 01 54 20 00 00 00 00 00 00 00 00

0cc0 01 54 20 00 00 00 00 00 00 00 00

0cd0 01 54 20 00 00 00 00 00 00 00 00

0ce0 01 54 20 00 00 00 00 00 00 00 00

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0dc0 01 54 20 00 00 00 00 00 00 00 00

0dd0 01 54 20 00 00 00 00 00 00 00 00

0de0 01 54 20 00 00 00 00 00 00 00 00

0df0 01 54 20 00 00 00 00 00 00 00 00

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0e80 01 54 20 00 00 00 00 00 00 00 00

0e90 01 54 20 00 00 00 00 00 00 00 00

0ea0 01 54 20 00 00 00 00 00 00 00 00

0eb0 01 54 20 00 00 00 00 00 00 00 00

0ec0 01 54 20 00 00 00 00 00 00 00 00

0ed0 01 54 20 00 00 00 00 00 00 00 00

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9 Photographs

9.1 EUT Constructional Details (EUT Photos)

Please Refer to external and internal photos for details.

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