

CBSD Test Report

Report No.: RFBCUN-WTW-P25040590

FCC ID: H8NSCU2140

Test Model: NR xCell 46116A1F

Received Date: Jun. 11, 2025

Test Date: Jun. 11, 2025 ~ Jun. 20, 2025

Issued Date: Jul. 08, 2025

Applicant: Askey Computer Corp

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**FCC Registration/
Designation Number:** 281270 / TW0032



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Release Control Record

Issue No.	Description	Date Issued
RFBCUN-WTW-P25040590	Original release	Jul. 08, 2025

1 Certificate of Conformity

Product: 5G Small Cell

Brand: ASKEY

Test Model: NR xCell 46116A1F

Sample Status: Engineering sample

Applicant: Askey Computer Corp

Test Date: Jun. 11, 2025 ~ Jun. 20, 2025

Standards: WINNF-TS-0122 V1.0.2
ONGO-TS-9001 V1.3.0

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Jul. 08, 2025
Pettie Chen / Senior Specialist

Approved by : Jeremy Lin , **Date:** Jul. 08, 2025
Jeremy Lin / Project Engineer

2 Summary of Test Results

WINNF-TS-0122			
Classes	Test Case Items	Pass Items	Pass Rate (%)
FT(CBSD, DP/CBSD)	26	26	100
PT(CBSD, DP/CBSD)	1	1	100
Total	27	27	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 WINNF 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.

Supported Features in details:

WINNF-TS-0122 Test Case		
Definitions	Test Case ID	Supported
C1	WINNF.FT.C.REG.1	Yes
C2	NA	No
C3	WINNF.FT.C.REG.5	Yes
C4	NA	No
C5	NA	No
C6	WINNF.FT.C.REG.7	Yes

WINNF-TS-0122 Test Case

Section	Test Case ID	Test Case Title	Test Result
6.1.4.1.1	WINNF.FT.C.REG.1	Multi-Step registration	Pass
6.1.4.1.2	WINNF.FT.D.REG.2	Domain Proxy Multi-Step registration	NA
6.1.4.1.3	WINNF.FT.C.REG.3	Single-Step registration for Category A CBSD	NA
6.1.4.1.4	WINNF.FT.D.REG.4	Domain Proxy Single-Step registration for Cat A CBSD	NA
6.1.4.1.5	WINNF.FT.C.REG.5	Single-Step registration for CBSD with CPI signed data	Pass
6.1.4.1.6	WINNF.FT.D.REG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	NA
6.1.4.1.7	WINNF.FT.C.REG.7	Registration due to change of an installation parameter	Pass
6.1.4.2.1	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	Pass
6.1.4.2.2	WINNF.FT.D.REG.9	Domain Proxy Missing Required parameters (responseCode 102)	NA
6.1.4.2.3	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	Pass
6.1.4.2.4	WINNF.FT.D.REG.11	Domain Proxy Pending registration (responseCode 200)	NA
6.1.4.2.5	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	Pass
6.1.4.2.6	WINNF.FT.D.REG.13	Domain Proxy Invalid parameters (responseCode 103)	NA
6.1.4.2.7	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	Pass
6.1.4.2.8	WINNF.FT.D.REG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	NA
6.1.4.2.9	WINNF.FT.C.REG.16	Unsupported SAS protocol version (responseCode 100)	Pass
6.1.4.2.10	WINNF.FT.D.REG.17	Domain Proxy Unsupported SAS protocol version (responseCode 100)	NA
6.1.4.2.11	WINNF.FT.C.REG.18	Group Error (responseCode 201)	Pass
6.1.4.2.12	WINNF.FT.D.REG.19	Domain Proxy Group Error (responseCode 201)	NA
6.1.4.3.1	WINNF.FT.C.REG.20	Category A CBSD location update	NA

WINNF-TS-0122 Test Case			
Section	Test Case ID	Test Case Title	Test Result
6.3.4.2.1	WINNF.FT.D.GRA.1	Unsuccessful Grant responseCode=400 (INTERFERENCE)	Pass
6.3.4.2.2	WINNF.FT.C.GRA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	Pass
6.4.4.1.1	WINNF.FT.C.HBT.1	Heartbeat Success Case (first Heartbeat Response)	Pass
6.4.4.1.2	WINNF.FT.D.HBT.2	Domain Proxy Heartbeat Success Case (first Heartbeat Response)	NA
6.4.4.2.1	WINNF.FT.C.HBT.3	Heartbeat responseCode=105 (DEREGISTER)	Pass
6.4.4.2.2	WINNF.FT.C.HBT.4	Heartbeat responseCode=500 (TERMINATED_GRANT)	Pass
6.4.4.2.3	WINNF.FT.C.HBT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	Pass
6.4.4.2.4	WINNF.FT.C.HBT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	Pass
6.4.4.2.5	WINNF.FT.C.HBT.7	Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	Pass
6.4.4.2.6	WINNF.FT.D.HBT.8	Domain Proxy Heartbeat responseCode=500 (TERMINATED_GRANT)	NA
6.4.4.3.1	WINNF.FT.C.HBT.9	Heartbeat Response Absent (First Heartbeat)	Pass
6.4.4.3.2	WINNF.FT.C.HBT.10	Heartbeat Response Absent (Subsequent Heartbeat)	Pass
6.4.4.4.1	WINNF.FT.C.HBT.11	Successful Grant Renewal in Heartbeat Test Case	NA
6.5.4.2.1	WINNF.FT.C.MES.1	Registration Response contains measReportConfig	NA
6.5.4.2.2	WINNF.FT.D.MES.2	Domain Proxy Registration Response contains measReportConfig	NA
6.5.4.2.3	WINNF.FT.C.MES.3	Grant Response contains measReportConfig	NA
6.5.4.2.4	WINNF.FT.C.MES.4	Heartbeat Response contains measReportConfig	NA
6.5.4.2.5	WINNF.FT.D.MES.5	Domain Proxy Heartbeat Response contains measReportConfig	NA

WINNF-TS-0122 Test Case

Section	Test Case ID	Test Case Title	Test Result
6.6.4.1.1	WINNF.FT.C.RLQ.1	Successful Relinquishment	Pass
6.6.4.1.2	WINNF.FT.D.RLQ.2	Domain Proxy Successful Relinquishment	NA
6.6.4.2.1	WINNF.FT.C.RLQ.3	Unsuccessful Relinquishment, responseCode=102	NA
6.6.4.2.2	WINNF.FT.D.RLQ.4	Domain Proxy Unsuccessful Relinquishment, responseCode=102	NA
6.6.4.3.1	WINNF.FT.C.RLQ.5	Unsuccessful Relinquishment, responseCode=103	NA
6.6.4.3.2	WINNF.FT.D.RLQ.6	Domain Proxy Unsuccessful Relinquishment, responseCode=103	NA
6.7.4.1.1	WINNF.FT.C.DRG.1	Successful Deregistration	Pass
6.7.4.1.2	WINNF.FT.D.DRG.2	Domain Proxy Successful Deregistration	NA
6.7.4.2.1	WINNF.FT.C.DRG.3	Deregistration responseCode=102	NA
6.7.4.2.2	WINNF.FT.D.DRG.4	Domain Proxy Deregistration responseCode=102	NA
6.7.4.3.1	WINNF.FT.C.DRG.5	Deregistration responseCode=103	NA
6.8.4.1.1	WINNF.FT.C.SCS.1	Successful TLS connection between UUT and SAS Test Harness	Pass
6.8.4.2.1	WINNF.FT.C.SCS.2	TLS failure due to revoked certificate	Pass
6.8.4.2.2	WINNF.FT.C.SCS.3	TLS failure due to expired server certificate	Pass
6.8.4.2.3	WINNF.FT.C.SCS.4	TLS failure when SAS Test Harness certificate is issue by unknown CA	Pass
6.8.4.2.4	WINNF.FT.C.SCS.5	TLS failure when certificate at the SAS Test Harness is corrupted	Pass
7.1.4.1.1	WINNF.PT.C.HBT	UUT RF Transmit Power Measurement	Pass

Note: Section as per WINNF-TS-0122 If the product as tested complies with the specification, the UUT is deemed to comply with the standard and is deemed a "Pass" grade. If not "Fail" grade is issued. Where "NA" is stated this means the test case is not applicable.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the UUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Conducted Emissions above 1 GHz	1GHz ~ 18GHz	1 dB

2.2 Modification Record

Following the FCC KDB 940660 D02 CPE-CBSD Handshake Procedures v01, when running the test cases in WINNF-TS-0122 for CPE-CBSD device type, for the last execution step appearing in WINNF-TS-0122:

1. The Pass/Fail criteria "UUT shall not transmit RF" is replaced by "CPE-CBSD UUT shall not transmit user traffic".
2. The Pass/Fail criteria "UUT shall stop transmission" is replaced by CPE-CBSD UUT shall stop transmitting user traffic"

3 General Information

3.1 General Description of EUT

Product	5G Small Cell
Brand	ASKEY
Test Model	NR xCell 46116A1F
Hardware Version	REV3
Firmware Version	3.2.10
Status of EUT	Engineering sample
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT uses following accessories.

Item	Brand	Model	Specification
AC Adapter	TOPOW	TPA187-62480-T3	AC Input : 100-240V, 50/60Hz, 2.5A MAX DC Output : 48.0V, 1.3A, 62.4W Power Line : 0.57m
Power Cord	-	-	1.7m
GPS Antenna	-	-	7m

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
WINNF-TS-0122	25deg. C, 65%RH	120Vac, 60Hz	Matthew Yang

3.2 General Description of Applied Standards

The UUT is a BTS-CBSD product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test standard:

FCC 47 CFR Part 96

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 940660 D01 Part 96 CBRS Eqpt v03

All test items have been performed as a reference to the above KDB test guidance.

4 Measurement

4.1 CBSD Measurement

The CBSD shall validate and ensure that the Conformance and Performance Test results from compliance with SAS functional requirements.

4.2 CBSD Test Procedure

- a. 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.
- b. UUT shall be UTC time synchronized
- c. 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 Test Harness.
- d. Each test case results was recorded and validated by SAS Test Harness system and RF instruments test cases was recorded test results from SAS Test Harness system.

4.3 Test Environment

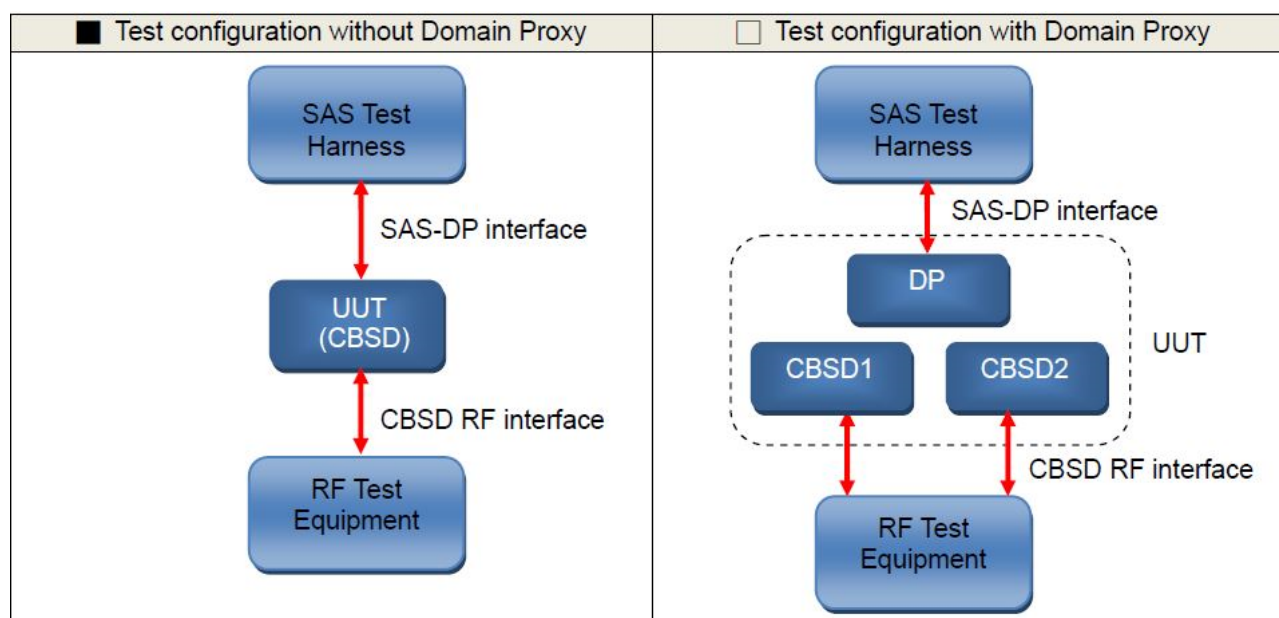
Test Harness Version	V1.0.0.3
Operating System	Microsoft Windows 10
TLS Version	1.2
Python	2.7.13

4.4 Test Equipment

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
ROHDE & SCHWARZ Signal Analyzer	FSV	E2-010642	May 29, 2024	May 28, 2026
Temperature & Humidity Chamber TERCHY	TFA 452019	E2-010883	Dec. 13, 2024	Dec. 12, 2025
Laptop Lenovo	P137G	P137G001	NA	NA

Note: 1. The test was performed in WM-OVEN Test Room.
 2. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5 Test Setup



4.6 Test Results

4.6.1 CBSD Registration Process

4.6.1.1 WINNF.FT.C.REG.1

☒ Test Case ID : WINNF.FT.C.REG.1
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> ● The required <i>userId</i>, <i>fcld</i> and <i>cbsdSerialNumber</i> 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.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> ● SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - <i>cbsdId</i> = C - <i>measReportConfig</i> shall not be included - <i>responseCode</i> = 0 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.2 WINNF.FT.C.REG.5

■ Test Case ID : WINNF.FT.C.REG.5 □ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● 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	<p>CBSD sends Registration request to the SAS Test Harness:</p> <ul style="list-style-type: none"> ● The required <i>userId</i>, <i>fcid</i> and <i>cbsdSerialNumber</i> and REG-Conditional <i>cbsdCategory</i>, <i>airInterface</i>, <i>measCapability</i> and <i>cpiSignatureData</i> 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. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> ● SAS Test Harness sends a CBSD Registration Response as follows: <ul style="list-style-type: none"> - <i>cbsdId</i> = C - <i>measReportConfig</i> shall not be included - <i>responseCode</i> = 0 	--	--
4	<p>After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i>=0) to further request messages from the UUT.</p>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
5	<p>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:</p> <ul style="list-style-type: none"> ● UUT shall not transmit RF 		

4.6.1.3 WINNF.FT.C.REG.7

☒ Test Case ID : WINNF.FT.C.REG.7
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● 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.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.4 WINNF.FT.C.REG.8

☒ Test Case ID : WINNF.FT.C.REG.8
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> SAS response does not include <i>cbsdId</i> <i>responseCode</i> = R = 102 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.5 WINNF.FT.C.REG.10

☒ Test Case ID : WINNF.FT.C.REG.10
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - SAS response does not include <i>cbsdId</i> - <i>responseCode</i> = R = 200 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.6 WINNF.FT.C.REG.12

☒ Test Case ID : WINNF.FT.C.REG.12
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - SAS response does not include <i>cbsdId</i> - <i>responseCode</i> = R = 103 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.7 WINNF.FT.C.REG.14

☒ Test Case ID : WINNF.FT.C.REG.14
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - SAS response does not include <i>cbsdId</i> - <i>responseCode</i> = R = 101 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.8 WINNF.FT.C.REG.16

☒ Test Case ID : WINNF.FT.C.REG.16
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> - SAS response does not include <i>cbsdId</i> - <i>responseCode</i> = R = 100 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> • UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.1.9 WINNF.FT.C.REG.18

☒ Test Case ID : WINNF.FT.C.REG.18
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● 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: <ul style="list-style-type: none"> - SAS response does not include <i>cbsdId</i> - <i>responseCode</i> = R = 201 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> ● UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.2 CBSD Spectrum Grant Process

4.6.2.1 WINNF.FT.C.GRA.1

☒ Test Case ID : WINNF.FT.C.GRA.1
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C 	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"> <i>cbsdId</i>=C <i>responseCode</i> = R = 400 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.2.2 WINNF.FT.C.GRA.2

☒ Test Case ID : WINNF.FT.C.GRA.2
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C 	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"> <i>cbsdId</i>=C <i>responseCode</i> = R = 401 	--	--
4	After completion of step 3, SAS Test Harness will not provide any positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.3 CBSD Heart Beat Process

4.6.3.1 WINNF.FT.C.HBT.1

■ Test Case ID : WINNF.FT.C.HBT.1 □ NA

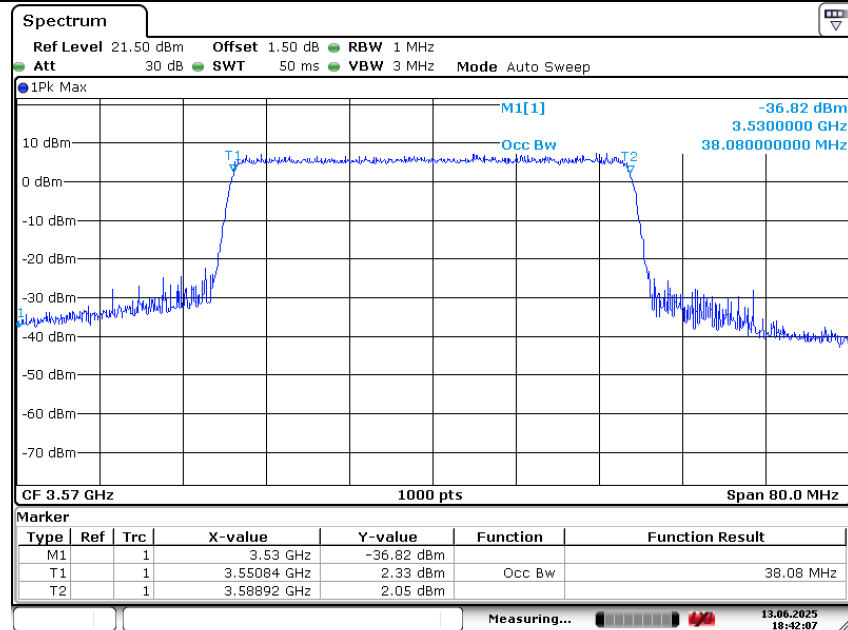
#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C	--	--
2	UUT sends a message: ● If message is type Spectrum Inquiry Request, go to step 3, or ● If message is type Grant Request, go to step 5	--	--
3	UUT sends Spectrum Inquiry Request. Validate: ● <i>cbsdId</i> = 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: ● <i>cbsdId</i> = C ● <i>availableChannel</i> is an array of availableChannel objects ● <i>responseCode</i> = 0	--	--
5	UUT sends Grant Request message. Validate: ● <i>cbsdId</i> = C ● <i>maxEIRP</i> is at or below the limit appropriate for CBSD category as defined by Part 96 ● <i>operationFrequencyRange</i> , 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: ● <i>cbsdId</i> = C ● <i>grantId</i> = G = a valid grant ID ● <i>grantExpireTime</i> = UTC time greater than duration of the test ● <i>responseCode</i> = 0	--	--
7	UUT sends a first Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED"	■ Pass	□ Fail
8	SAS Test Harness sends a Heartbeat Response message, with the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 0	--	--
9	For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" and SAS Test Harness responds with a Heartbeat Response message including the following parameters: ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = current UTC time + 200 seconds ● <i>responseCode</i> = 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

- UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)	
		F = 40MHz	
		Chain (0)	Chain (1)
Middle	3570	38.08	38.08

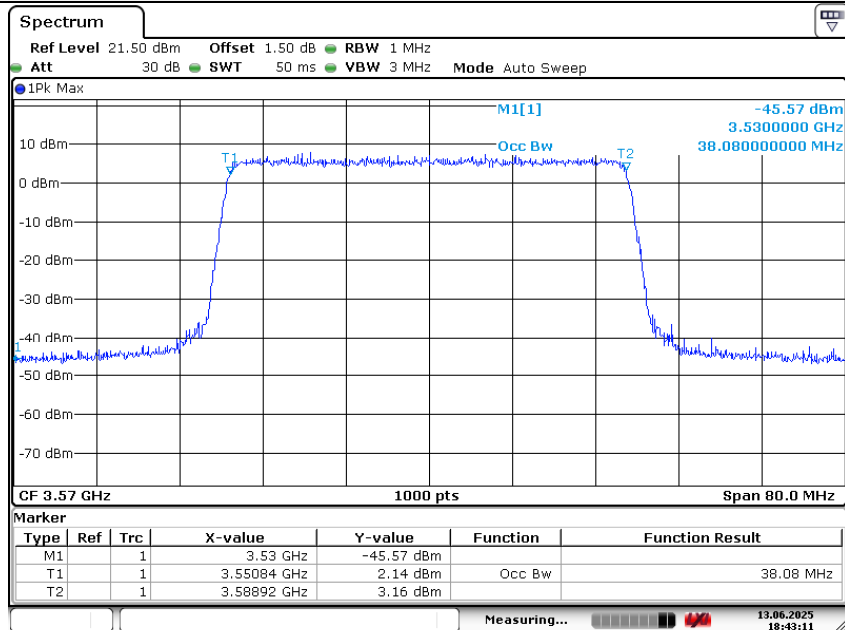
Spectrum Plot

Chain 0



Date: 13.JUN.2025 18:42:08

Chain 1



Date: 13.JUN.2025 18:43:11

4.6.3.2 WINNF.FT.C.HBT.3

■ Test Case ID : WINNF.FT.C.HBT.3 □ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" 	--	--
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = Current UTC time ● <i>responseCode</i> = 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: <ul style="list-style-type: none"> ● UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.3.3 WINNF.FT.C.HBT.4

■ Test Case ID : WINNF.FT.C.HBT.4 □ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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	<p>UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" 	■ Pass	□ Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 500 (TERMINATED_GRANT) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT shall stop transmission within (T + 60 seconds) of completion of step 3 	■ Pass	□ Fail

4.6.3.4 WINNF.FT.C.HBT.5

■ Test Case ID : WINNF.FT.C.HBT.5 □ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ? <i>responseCode</i> = 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: <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT does not transmit at any time 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.3.5 WINNF.FT.C.HBT.6

■ Test Case ID : WINNF.FT.C.HBT.6 □ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness sends a Heartbeat Response message, including the following parameters: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 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: <p>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT shall stop transmission within (T+60) seconds of completion of step 3 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.3.6 WINNF.FT.C.HBT.7

■ Test Case ID : WINNF.FT.C.HBT.7 □ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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	<p>UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" 	■ Pass	□ Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time ● <i>responseCode</i> = 502 (UNSYNC_OP_PARAM) 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the SAS-CBSD interface. Verify:</p> <ul style="list-style-type: none"> ● UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters: <ul style="list-style-type: none"> ○ <i>cbsdId</i> = C ○ <i>grantId</i> = G <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT shall stop transmission within (T+60) seconds of completion of step 3 	■ Pass	□ Fail

4.6.3.7 WINNF.FT.C.HBT.9

☒ Test Case ID : WINNF.FT.C.HBT.9
 ☐ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "GRANTED" 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> ● At any time during the test, UUT shall not transmit on RF interface 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.3.8 WINNF.FT.C.HBT.10

■ Test Case ID : WINNF.FT.C.HBT.10 □ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has registered successfully with SAS Test Harness ● UUT has a valid single grant as follows: <ul style="list-style-type: none"> ○ valid <i>cbsdId</i> = C ○ valid <i>grantId</i> = G ○ grant is for frequency range F, power P ○ <i>grantExpireTime</i> = 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	<p>UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>operationState</i> = "AUTHORIZED" 	■ Pass	□ Fail
3	<p>SAS Test Harness sends a Heartbeat Response message, including the following parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G ● <i>transmitExpireTime</i> = T = current UTC time + 200 seconds ● <i>responseCode</i> = 0 	--	--
4	<p>After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.</p>	--	--
5	<p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> ● UUT shall stop all transmission on RF interface within (<i>transmitExpireTime</i> + 60 seconds), using the <i>transmitExpireTime</i> sent in Step 3. 	■ Pass	□ Fail

4.6.4 CBSD Relinquishment Process

4.6.4.1 WINNF.FT.C.RLQ.1

■ Test Case ID : WINNF.FT.C.RLQ.1 □ NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C ● UUT has received a valid grant with <i>grantId</i> = 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: <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>grantId</i> = G 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness shall approve the request with a Relinquishment Response message with parameters: <ul style="list-style-type: none"> - <i>cbsdId</i> = C - <i>grantId</i> = G - <i>responseCode</i> = 0 	--	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode</i> =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: <ul style="list-style-type: none"> ● UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

4.6.5 CBSD Deregistration Process

4.6.5.1 WINNF.FT.C.DRG.1

■ Test Case ID : WINNF.FT.C.DRG.1 □ NA

#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness ● UUT has successfully registered with SAS Test Harness, with <i>cbsdId</i>=C ● UUT has received a valid grant with <i>grantId</i> = G ● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant. <p>Invoke trigger to deregister UUT from the SAS Test Harness</p>	--	--
2	UUT sends a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0	--	--
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdId</i> = C.	■ Pass	□ Fail
4	<p>SAS Test Harness shall approve the request with a Deregistration Response message with parameters:</p> <ul style="list-style-type: none"> ● <i>cbsdId</i> = C ● <i>responseCode</i> = 0 	--	--
5	After completion of step 3, SAS Test Harness will not provide any additional positive response (<i>responseCode</i> =0) to further request messages from the UUT.	--	--
6	<p>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:</p> <ul style="list-style-type: none"> ● UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs: <ul style="list-style-type: none"> A. UUT sending a Registration Request message, as this is not mandatory B. UUT sending a Deregistration Request message 	■ Pass	□ Fail

4.6.6 CBSD Security Validation

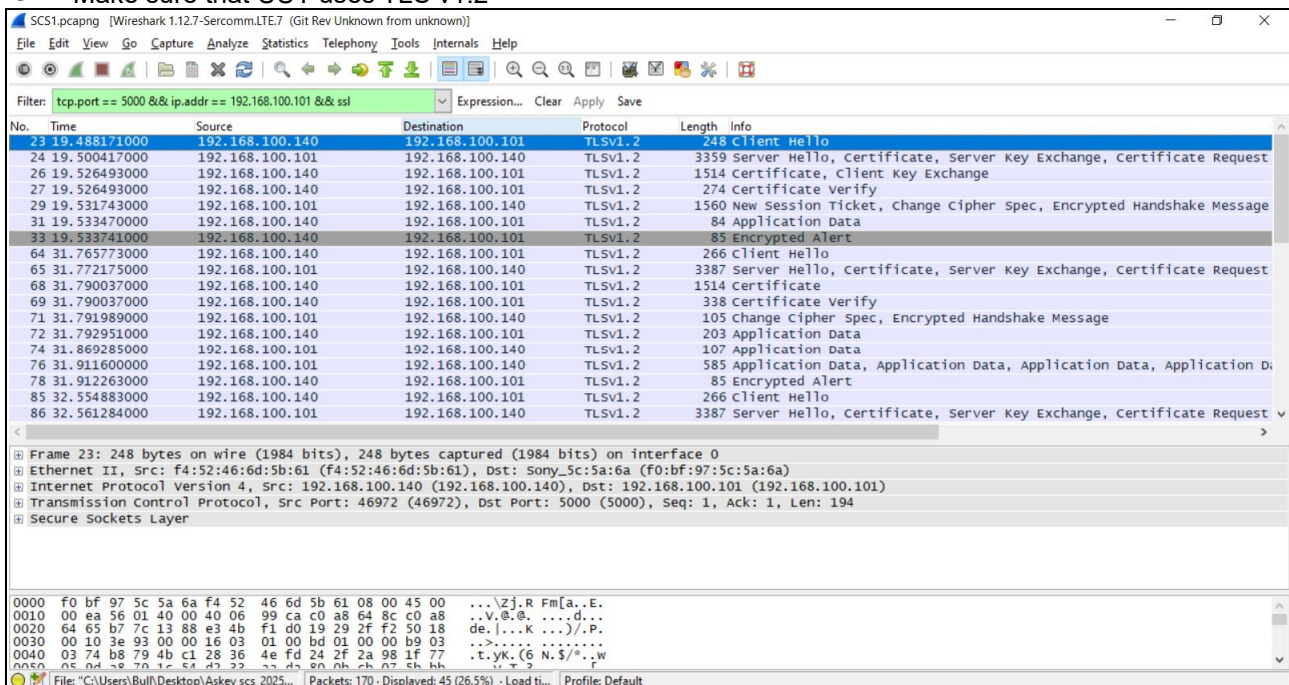
4.6.6.1 WINNF.FT.C.SCS.1

■ Test Case ID : WINNF.FT.C.SCS.1 □ NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> 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 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> 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, <ul style="list-style-type: none"> 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 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<p>A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability.</p> <ul style="list-style-type: none"> UUT sends a registration request to the SAS Test Harness and the SAS Test Harness sends a Registration Response with <i>responseCode</i> = 0 and <i>cbsdId</i>. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
4	<p>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:</p> <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS1.pcapng [Wireshark 1.12.7-SercommLTE7 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: tcp.port == 5000 && ip.addr == 192.168.100.101 && ssl Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
23	19.488171000	192.168.100.140	192.168.100.101	TLSv1.2	248	Client Hello
24	19.500417000	192.168.100.101	192.168.100.140	TLSv1.2	3359	Server Hello, Certificate, Server Key Exchange, Certificate Request
26	19.526493000	192.168.100.140	192.168.100.101	TLSv1.2	1514	Certificate, Client Key Exchange
27	19.526493000	192.168.100.140	192.168.100.101	TLSv1.2	274	Certificate Verify
29	19.531743000	192.168.100.101	192.168.100.140	TLSv1.2	1560	New Session Ticket, change cipher spec, Encrypted Handshake Message
31	19.533470000	192.168.100.140	192.168.100.101	TLSv1.2	84	Application Data
33	19.533741000	192.168.100.140	192.168.100.101	TLSv1.2	85	Encrypted Alert
64	31.765773000	192.168.100.140	192.168.100.101	TLSv1.2	266	Client Hello
65	31.772175000	192.168.100.101	192.168.100.140	TLSv1.2	3387	Server Hello, Certificate, Server Key Exchange, Certificate Request
68	31.790037000	192.168.100.140	192.168.100.101	TLSv1.2	1514	Certificate
69	31.790037000	192.168.100.140	192.168.100.101	TLSv1.2	338	Certificate Verify
71	31.791989000	192.168.100.101	192.168.100.140	TLSv1.2	105	change cipher spec, Encrypted Handshake Message
72	31.792951000	192.168.100.140	192.168.100.101	TLSv1.2	203	Application Data
74	31.869285000	192.168.100.101	192.168.100.140	TLSv1.2	107	Application Data
76	31.911600000	192.168.100.101	192.168.100.140	TLSv1.2	585	Application Data, Application Data, Application Data, Application Data
78	31.912263000	192.168.100.140	192.168.100.101	TLSv1.2	85	Encrypted Alert
85	32.554883000	192.168.100.140	192.168.100.101	TLSv1.2	266	Client Hello
86	32.561284000	192.168.100.101	192.168.100.140	TLSv1.2	3387	Server Hello, Certificate, Server Key Exchange, Certificate Request

Frame 23: 248 bytes on wire (1984 bits), 248 bytes captured (1984 bits) on interface 0

Ethernet II, Src: F4:52:46:6d:5b:61 (F4:52:46:6d:5b:61), Dst: Sony_5c:5a:6a (f0:bf:97:5c:5a:6a)

Internet Protocol Version 4, Src: 192.168.100.140 (192.168.100.140), Dst: 192.168.100.101 (192.168.100.101)

Transmission Control Protocol, Src Port: 46972 (46972), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 194

Secure Sockets Layer

0000 f0 bf 97 5c 5a 6a f4 52 46 6d 5b 61 08 00 45 00 ...Zj.R Fm[a..E.

0010 00 ea 56 01 40 00 40 06 99 ca c0 a8 64 8c c0 a8 ..V.@.d...

0020 64 65 b7 7c 13 88 e3 4b f1 d0 19 29 2f f2 50 18 de.[...K ...).P.

0030 00 10 3e 93 00 00 16 03 01 00 bd 01 00 00 b9 03 ..>.....

0040 03 74 b8 79 4b c1 28 36 4e fd 24 2f 2a 98 1f 77 .T.yk.(6 N.\$/%.w

0050 65 04 08 70 1c 54 d2 22 33 d3 80 dh ch a7 5b hh .U.T.2

File: "C:\Users\Bull\Desktop\Askey scs_2025..." Packets: 170 · Displayed: 45 (26.5%) · Load ti... Profile: Default

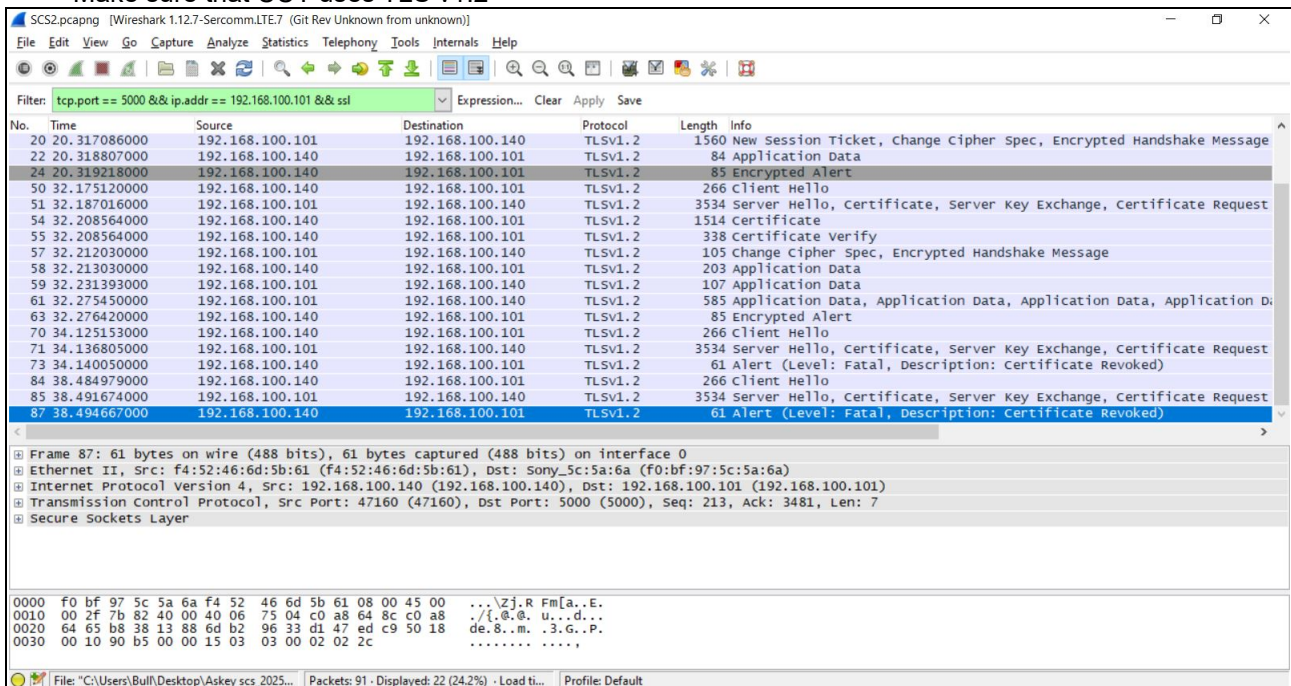
4.6.6.2 WINNF.FT.C.SCS.2

Test Case ID : WINNF.FT.C.SCS.2 ☐ NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> UUT shall start CBSD-SAS communication with the security procedures 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> 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. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The image shows a Wireshark capture of a TLS v1.2 handshake between two hosts. The filter is set to 'tcp.port == 5000 && ip.addr == 192.168.100.101 && ssl'. The capture shows the following frames:

- 20: 20.317086000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 1560 New Session Ticket, Change Cipher Spec, Encrypted Handshake Message
- 22: 20.318807000: 192.168.100.101 → 192.168.100.101: TLSv1.2, 84 Application Data
- 24: 20.319218000: 192.168.100.101 → 192.168.100.101: TLSv1.2, 85 Encrypted Alert
- 50: 32.175120000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 266 Client Hello
- 51: 32.187016000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 3534 Server Hello, Certificate, Server Key Exchange, Certificate Request
- 54: 32.208564000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 1514 Certificate
- 55: 32.208564000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 338 Certificate Verify
- 57: 32.212030000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 105 Change Cipher Spec, Encrypted Handshake Message
- 58: 32.213030000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 203 Application Data
- 59: 32.231393000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 107 Application Data
- 61: 32.275450000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 585 Application Data, Application Data, Application Data, Application Data
- 63: 32.276420000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 85 Encrypted Alert
- 70: 34.125153000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 266 Client Hello
- 71: 34.136805000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 3534 Server Hello, Certificate, Server Key Exchange, Certificate Request
- 73: 34.140050000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 61 Alert (Level: Fatal, Description: Certificate Revoked)
- 84: 38.484979000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 266 Client Hello
- 85: 38.491674000: 192.168.100.101 → 192.168.100.140: TLSv1.2, 3534 Server Hello, Certificate, Server Key Exchange, Certificate Request
- 87: 38.494667000: 192.168.100.140 → 192.168.100.101: TLSv1.2, 61 Alert (Level: Fatal, Description: Certificate Revoked)

The packet details for frame 87 are shown below:

- Frame 87: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface 0
- Ethernet II, Src: F4:52:46:6d:5b:61 (F4:52:46:6d:5b:61), Dst: Sony_5c:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 192.168.100.140 (192.168.100.140), Dst: 192.168.100.101 (192.168.100.101)
- Transmission Control Protocol, Src Port: 47160 (47160), Dst Port: 5000 (5000), Seq: 213, Ack: 3481, Len: 7
- Secure Sockets Layer

The packet bytes are shown in hexadecimal and ASCII:

```

0000 f0 bf 97 5c 5a 6a f4 52 46 6d 5b 61 08 00 45 00 ... \Zj.R Fm[a..E.
0010 00 2f 7b 82 40 00 40 06 75 04 c0 a8 64 8c c0 a8 ./i.@. u...d...
0020 64 65 b8 38 13 88 6d b2 96 33 d1 47 ed c9 50 18 de.8..m. .3.G..P.
0030 00 10 90 b5 00 00 15 03 03 00 02 02 2c ..... ,

```

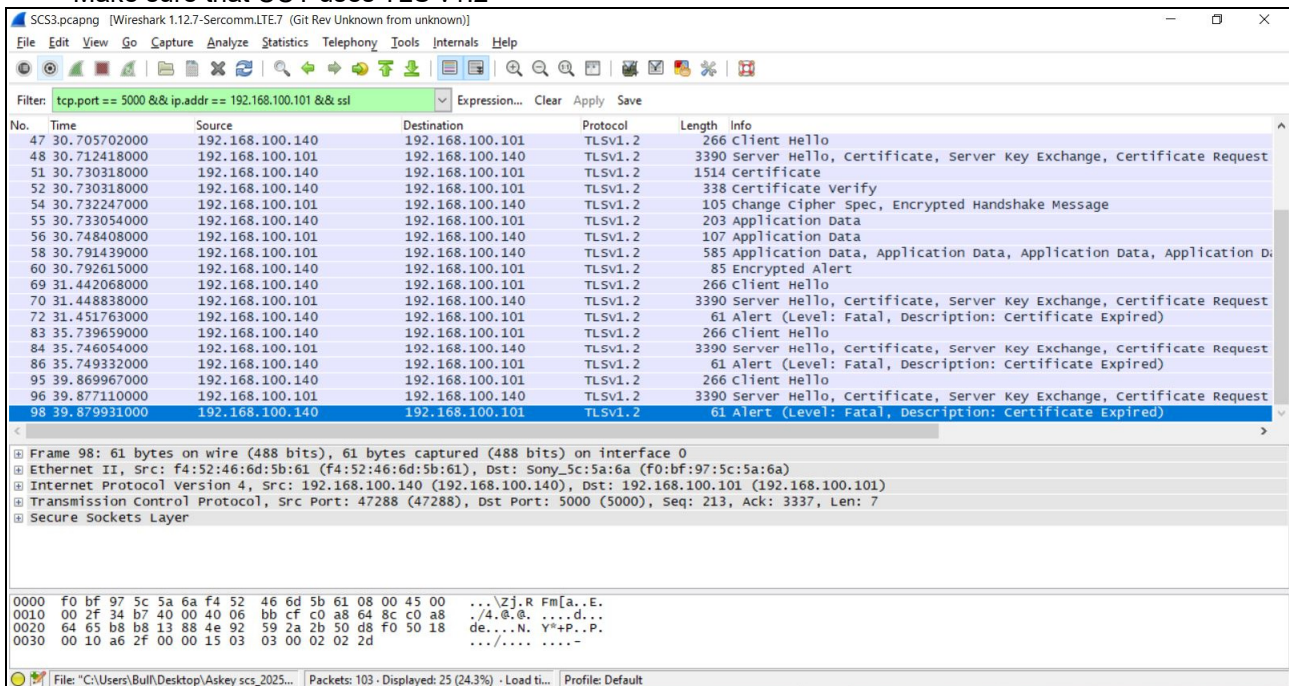

4.6.6.3 WINNF.FT.C.SCS.3

Test Case ID : WINNF.FT.C.SCS.3 ☐ NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> UUT shall start CBSD-SAS communication with the security procedures 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> 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. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



Wireshark capture example showing TLS v1.2 communication between 192.168.100.140 and 192.168.100.101. The capture shows a Client Hello, Server Hello, Certificate, Server Key Exchange, Certificate Request, Certificate Verify, Change Cipher Spec, Encrypted Handshake Message, Application Data, Encrypted Alert, and a final Alert (Level: Fatal, Description: Certificate Expired).

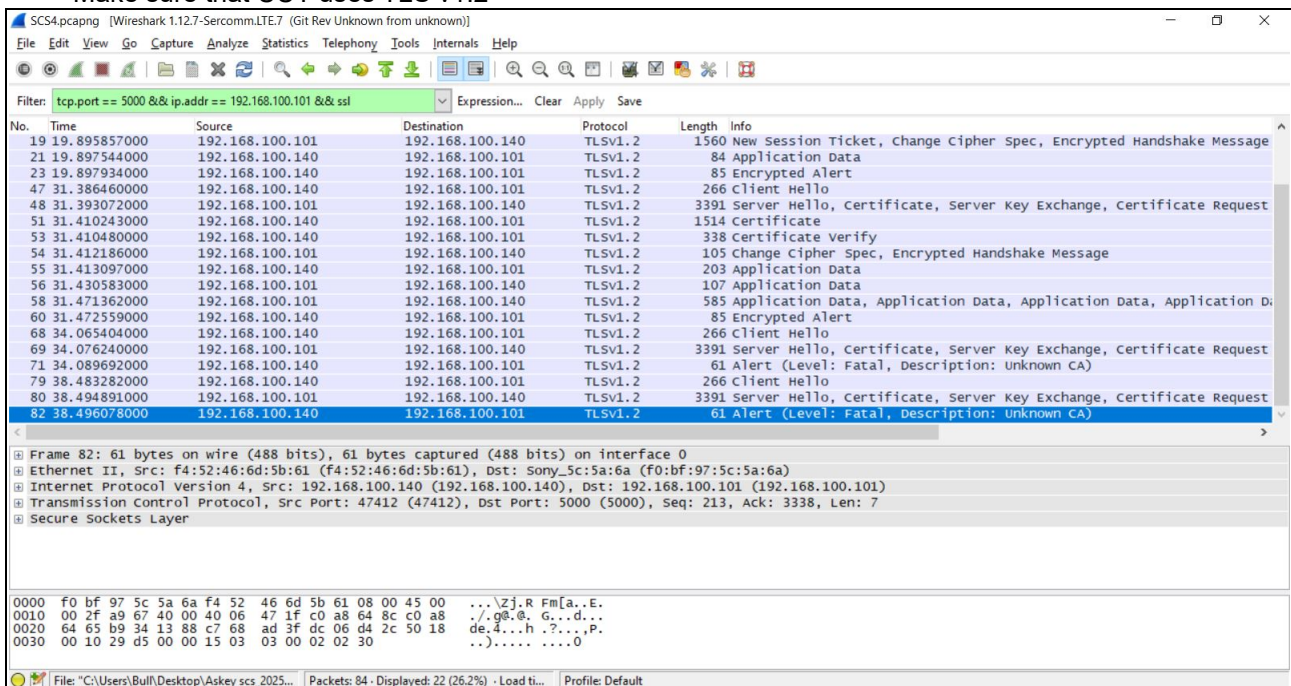
4.6.6.4 WINNF.FT.C.SCS.4

Test Case ID : WINNF.FT.C.SCS.4 ☐ NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> UUT shall start CBSD-SAS communication with the security procedures 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> 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. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS4.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: tcp.port == 5000 && ip.addr == 192.168.100.101 && ssl Expression... Clear Apply Save

No.	Time	Source	Destination	Protocol	Length	Info
19	19.895857000	192.168.100.101	192.168.100.140	TLSv1.2	1560	New Session Ticket, Change cipher Spec, Encrypted Handshake Message
21	19.897544000	192.168.100.140	192.168.100.101	TLSv1.2	84	Application Data
23	19.897934000	192.168.100.140	192.168.100.101	TLSv1.2	85	Encrypted Alert
47	31.386460000	192.168.100.140	192.168.100.101	TLSv1.2	266	Client Hello
48	31.393072000	192.168.100.101	192.168.100.140	TLSv1.2	3391	Server Hello, Certificate, Server Key Exchange, Certificate Request
51	31.410243000	192.168.100.140	192.168.100.101	TLSv1.2	1514	Certificate
53	31.410480000	192.168.100.140	192.168.100.101	TLSv1.2	338	Certificate Verify
54	31.412186000	192.168.100.101	192.168.100.140	TLSv1.2	105	Change cipher Spec, Encrypted Handshake Message
55	31.413097000	192.168.100.140	192.168.100.101	TLSv1.2	203	Application Data
56	31.430583000	192.168.100.101	192.168.100.140	TLSv1.2	107	Application Data
58	31.471362000	192.168.100.101	192.168.100.140	TLSv1.2	585	Application Data, Application Data, Application Data, Application Data
60	31.472559000	192.168.100.140	192.168.100.101	TLSv1.2	85	Encrypted Alert
68	34.065404000	192.168.100.140	192.168.100.101	TLSv1.2	266	Client Hello
69	34.076240000	192.168.100.101	192.168.100.140	TLSv1.2	3391	Server Hello, Certificate, Server Key Exchange, Certificate Request
71	34.089692000	192.168.100.140	192.168.100.101	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)
79	38.483282000	192.168.100.140	192.168.100.101	TLSv1.2	266	Client Hello
80	38.494891000	192.168.100.101	192.168.100.140	TLSv1.2	3391	Server Hello, Certificate, Server Key Exchange, Certificate Request
82	38.496078000	192.168.100.140	192.168.100.101	TLSv1.2	61	Alert (Level: Fatal, Description: Unknown CA)

Frame 82: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface 0
 Ethernet II, Src: F4:52:46:6d:5b:61 (F4:52:46:6d:5b:61), Dst: Sony_Sc:5a:6a (F0:b7:97:5c:5a:6a)
 Internet Protocol Version 4, Src: 192.168.100.140 (192.168.100.140), Dst: 192.168.100.101 (192.168.100.101)
 Transmission Control Protocol, Src Port: 47412 (47412), Dst Port: 5000 (5000), Seq: 213, Ack: 3338, Len: 7
 Secure Sockets Layer

0000 f0 bf 97 5c 5a 6a f4 52 46 6d 5b 61 08 00 45 00 ...Zj.R Fm[a..E.
 0010 00 2f a9 67 40 00 00 06 47 1f c0 a8 64 8c c0 a8 .../.g@.G...d...
 0020 64 65 b9 34 13 88 c7 68 ad 3f dc 06 d4 2c 50 18 de4...h.?...P.
 0030 00 10 29 d5 00 00 15 03 03 00 02 02 30 ..).....0

File: "C:\Users\Bull\Desktop\Askey_scs_2025..." Packets: 84 - Displayed: 22 (26.2%) - Load ti... Profile: Default

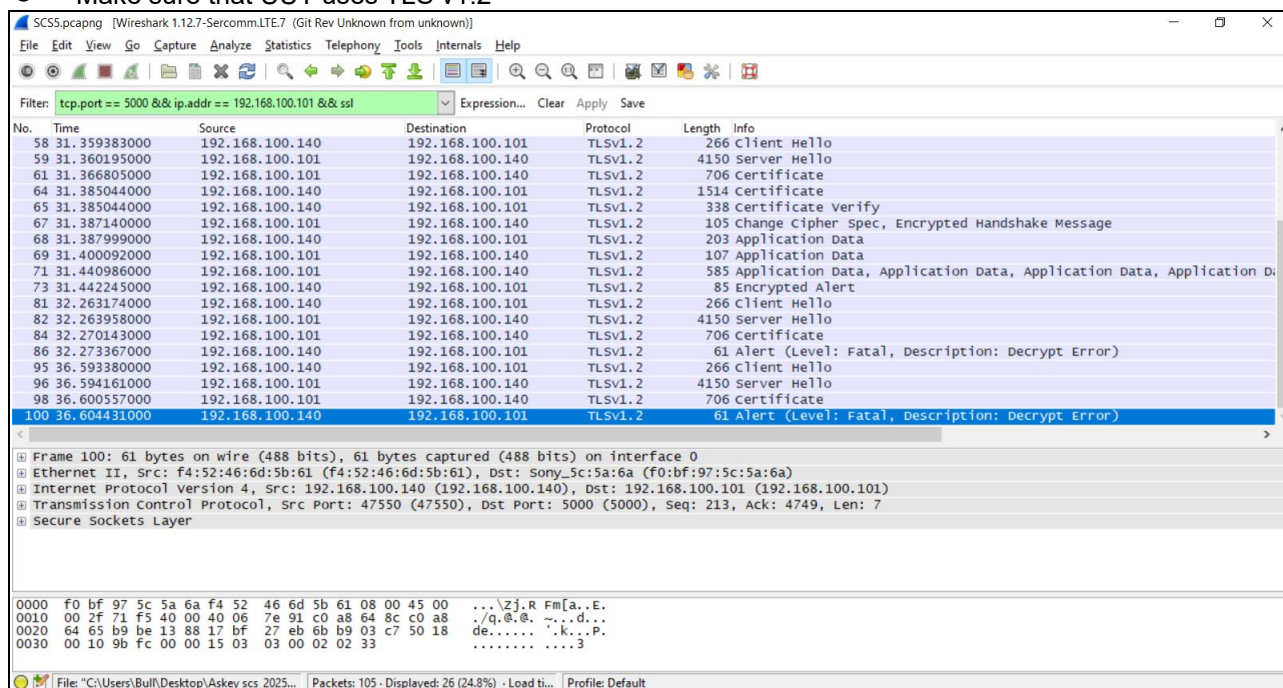
4.6.6.5 WINNF.FT.C.SCS.5

Test Case ID : WINNF.FT.C.SCS.5 ☐ NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> UUT shall start CBSD-SAS communication with the security procedures 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> 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. 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	UUT may retry for the security procedure which shall fail.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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: <ul style="list-style-type: none"> UUT shall not transmit RF 	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The image shows a Wireshark capture of a TLS v1.2 handshake between two devices. The filter is set to 'tcp.port == 5000 && ip.addr == 192.168.100.101 && ssl'. The capture shows the following packets:

- 58: Client Hello (266 bytes)
- 59: Server Hello (4150 bytes)
- 61: Certificate (706 bytes)
- 64: Certificate (1514 bytes)
- 65: Certificate Verify (338 bytes)
- 67: Change Cipher Spec, Encrypted Handshake Message (105 bytes)
- 68: Application Data (203 bytes)
- 69: Application Data (107 bytes)
- 71: Application Data, Application Data, Application Data, Application Data (585 bytes)
- 73: Encrypted Alert (85 bytes)
- 81: Client Hello (266 bytes)
- 82: Server Hello (4150 bytes)
- 84: Certificate (706 bytes)
- 86: Alert (Level: Fatal, Description: Decrypt Error) (61 bytes)
- 95: Client Hello (266 bytes)
- 96: Server Hello (4150 bytes)
- 98: Certificate (706 bytes)
- 100: Alert (Level: Fatal, Description: Decrypt Error) (61 bytes)

The packet details for packet 100 show the following structure:

- Frame 100: 61 bytes on wire (488 bits), 61 bytes captured (488 bits) on interface 0
- Ethernet II, Src: f4:52:46:6d:5b:61 (f4:52:46:6d:5b:61), Dst: Sony_Sc:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 192.168.100.140 (192.168.100.140), Dst: 192.168.100.101 (192.168.100.101)
- Transmission Control Protocol, Src Port: 47550 (47550), Dst Port: 5000 (5000), Seq: 213, Ack: 4749, Len: 7
- Secure Sockets Layer

The packet bytes show the following hex and ASCII representation:

```

0000 f0 bf 97 5c 5a 6a f4 52 46 6d 5b 61 08 00 45 00 ...Zj.R Fm[a.e.
0010 00 2f 71 f5 40 00 00 06 7e 91 c0 a8 64 8c c0 a8 ./q.@. ~.d...
0020 64 65 b9 be 13 88 17 bf 27 eb 6b b9 03 c7 50 18 de.....k..P.
0030 00 10 9b fc 00 00 15 03 03 00 02 02 33 .....3
  
```


4.6.7 CBSD RF Power Measurement

4.6.7.1 WINNF.PT.C.HBT.1

■ Test Case ID : WINNF.PT.C.HBT.1 □ NA

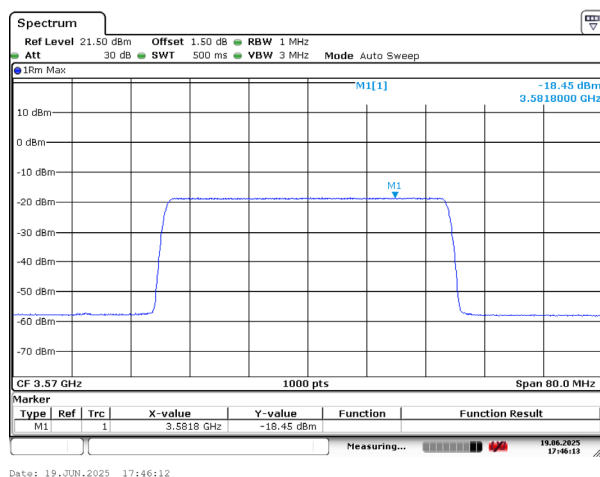
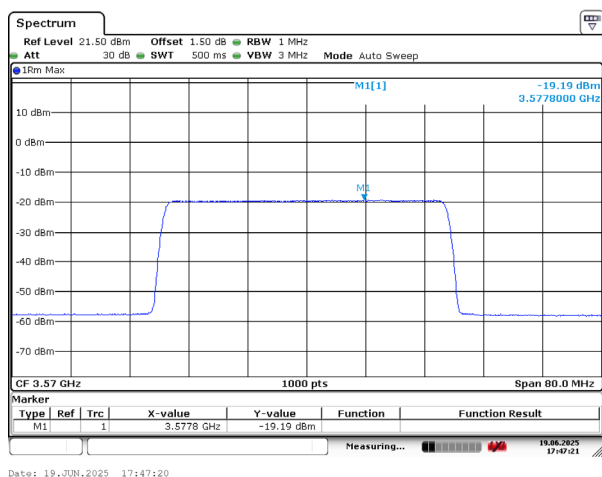
#	Test Execution Steps	Results	
1	<p>Ensure the following conditions are met for test entry:</p> <ul style="list-style-type: none"> ● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness ● UUT has registered with the SAS, with CBSD ID = C ● UUT has a single valid 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 <p><i>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</i></p>	--	--
2	<p>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:</p> <ul style="list-style-type: none"> ● UUT sends Heartbeat Request, including: <ul style="list-style-type: none"> ○ cbsdId = C ○ grantId = G ● SAS Test Harness responds with Heartbeat Response, including: <ul style="list-style-type: none"> ○ cbsdId = C ○ grantId = G ○ transmitExpireTime = current UTC time + 200 seconds ○ responseCode = 0 	--	--
3	<p>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.</p> <p><i>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.</i></p>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

RF measurement plot for Test Case :

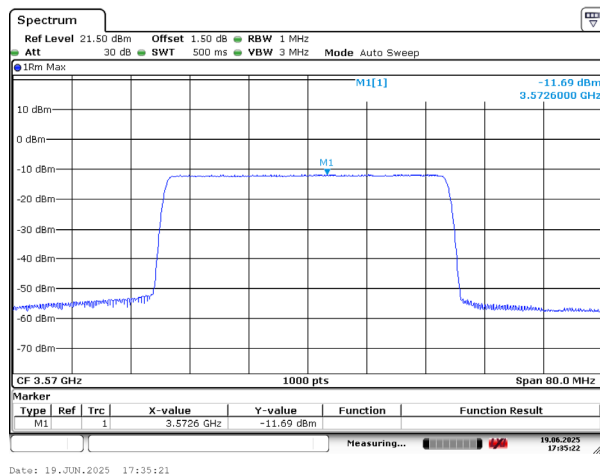
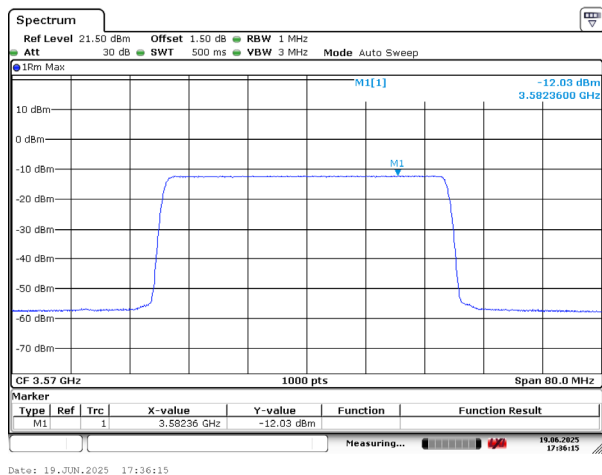
- Tester performs power measurement on RF interface(s) of UUT, and verifies it complies with the maxEirp setting, Pi. The RF measurement method is out of scope of this document, but may include additional configuration of the UUT, as required, to fulfill the requirements of the power measurement method.

Channel	Freq. (MHz)	40MHz				Limit	Pass / Fail
		Conducted Power Density (dBm/MHz)		Gain(dBi)	14.45		
		Chain 0	Chain 1	Total	EIRP (dBm/MHz)		
Middle	3570	-19.19	-18.45	-15.85	-1.40	5	Pass
Middle	3570	-12.03	-11.69	-8.83	5.62	12	Pass
Middle	3570	-5.00	-4.59	-1.78	12.67	19	Pass

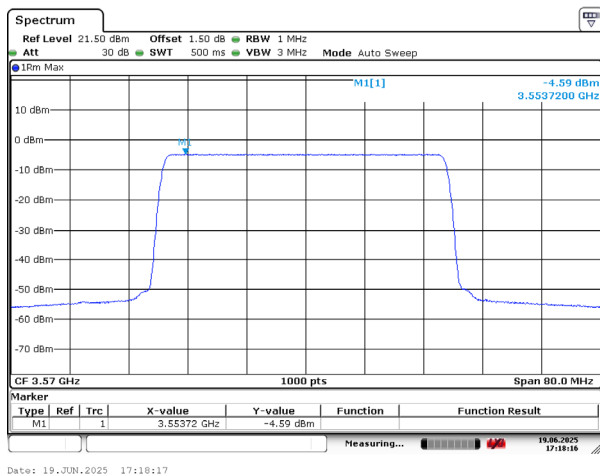
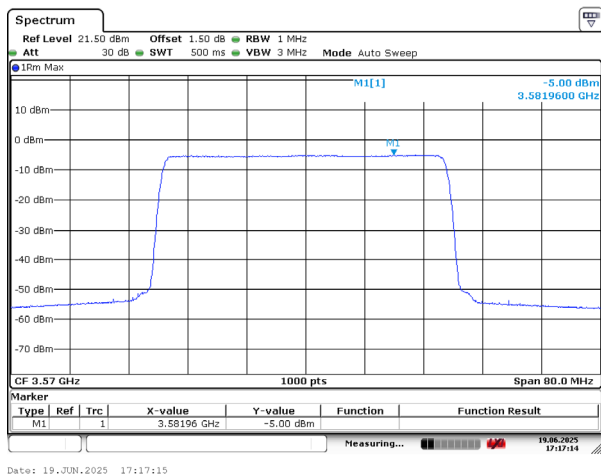
maxEirp = 5 dBm/MHz



maxEirp = 12 dBm/MHz



maxEirp = 19 dBm/MHz



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

6 WinnForum Logs

Please refer to the attached file (Test Logs).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@tw.bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

The address and road map of all our labs can be found in our web site also.

--- END ---