

## CBSD Test Report

**Report No.:** RFBEIH-WTW-P21110117-1

**FCC ID:** P27-SCO4255PA10

**Test Model:** SCO4255P-BC-A10

**Received Date:** Nov. 16, 2021

**Test Date:** Dec. 03, 2021 ~ Jan. 11, 2022

**Issued Date:** Jan. 20, 2022

**Applicant:** Sercomm Corp.

**Address:** 8F , No. 3-1, YuanQu St. , NanKang , Taipei 115 , Taiwan , R.O.C. (NanKang Software Park)

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**Test Location:** No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, Taiwan

**FCC Registration /  
Designation Number:** 788550 / TW0003



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### Release Control Record

Issue No.	Description	Date Issued
RFBEIH-WTW-P21110117-1	Original release	Jan. 20, 2022

## 1 Certificate of Conformity

**Product:** Englewood HGO

**Brand:** Sercomm

**Test Model:** SCO4255P-BC-A10

**Sample Status:** Engineering sample

**Applicant:** Sercomm Corp.

**Test Date:** Dec. 3, 2021 ~ Jan. 11, 2022

**Standards:** WINNF-TS-0122 V1.0.2  
CBRSA-TS-9001 V1.1.0

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 :**  , **Date:** Jan. 20, 2022  
Polly Chien / Specialist

**Approved by :**  , **Date:** Jan. 20, 2022  
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 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.

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	WINNF.FT.C.MES.1	Yes
C5	NA	No
C6	NA	No

## 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	NA
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	Pass
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

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Englewood HGO
Brand	Sercomm
Test Model	SCO4255P-BC-A10
Hardware Version	2.0
Firmware Version	TEST4921@211223
Status of EUT	Engineering sample
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	Adapter
Data Cable Supplied	NA

**Note:**

1. The EUT provides 4 completed transmitters and 4 receivers. The antennas provided to the EUT, please refer to the following table:

TX Antenna	Antenna Type	Antenna Connector	Antenna Gain (dBi)	Frequency Range
0	Patch array	IPEX	9.8	3550MHz - 3700MHz
1				
2				
3				

\*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2. The EUT uses following Adapter and PoE. (The PoE is for support unit only.)

Adapter	
Brand	MOSO POWER SUPPLY TECHNOLOGY CO.,LTD
Model	MS-T2500R120-030N0-N
Part Number	SB007-N0
AC Input	100Vac-240Vac
DC Output	12Vdc/2.5A
DC Cable	1.5m non-shielded cable

PoE (support unit only)	
Brand	ChenZhou Frecom Electronics Co., Ltd.
Model	PGOB24D01-560054
AC Input	100-240V, 0.7A, 50/60Hz
DC Output	56V, 0.536A
DC Cable	1.5m non-shielded cable

**Test Condition:**

Test Item	Environmental Conditions	Input Power	Tested By
WINNF-TS-0122	24deg. 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

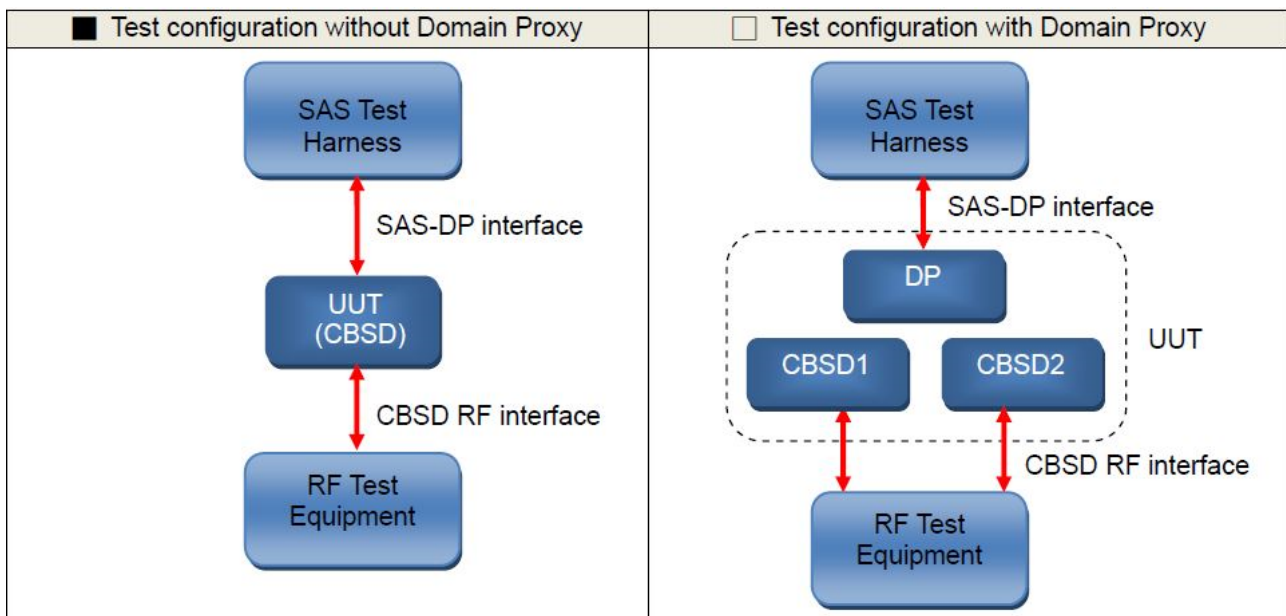
Test Harness Version	V1.0.0.3
Operating System	Microsoft Windows 10
TLS Version	1.2
Python	2.7.13

#### 4.4 Test Equipment

Description & Manufacturer	Model no.	Serial No.	Calibrated Date	Calibrated Until
ROHDE & SCHWARZ Signal Analyzer	FSV	E2-010642	May. 28, 2021	May. 27, 2022
Temperature & Humidity Chamber TERCHY	5098.00	E2-010117	Jan. 07, 2021	Jan. 06, 2022
			Jan. 07, 2022	Jan. 06, 2023
Laptop Lenovo	L470	PF-11H9B8	NA	NA

Note: 1. The test was performed in InfoSec Test Room.  
 2. The calibration interval of the above test instruments is 12 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
2	CBSD sends correct Registration request information, as specified in [n.5], to the SAS Test Harness: <ul style="list-style-type: none"> <li>● 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.</li> <li>● 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.</li> </ul> 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"> <li>● SAS Test Harness sends a CBSD Registration Response as follows:               <ul style="list-style-type: none"> <li>- <i>cbsdId</i> = C</li> <li>- <i>measReportConfig</i> shall not be included</li> <li>- <i>responseCode</i> = 0</li> </ul> </li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<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	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> <li>● All of the required and REG-Conditional parameters shall be configured and CPI signature provided</li> </ul>	--	--
2	CBSD sends Registration request to the SAS Test Harness: <ul style="list-style-type: none"> <li>● 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.</li> <li>● 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.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	<ul style="list-style-type: none"> <li>● SAS Test Harness sends a CBSD Registration Response as follows:               <ul style="list-style-type: none"> <li>- <i>cbsdId</i> = C</li> <li>- <i>measReportConfig</i> shall not be included</li> <li>- <i>responseCode</i> = 0</li> </ul> </li> </ul>	--	--
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.	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
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"> <li>● UUT shall not transmit RF</li> </ul>		

#### 4.6.1.3 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 102</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



#### 4.6.1.4 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 200</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.1.5 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 103</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.1.6 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 101</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.1.7 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 100</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.1.8 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT is in the Unregistered state</li> </ul>	--	--
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"> <li>- SAS response does not include <i>cbsdId</i></li> <li>- <i>responseCode</i> = R = 201</li> </ul>	--	--
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"> <li>● UUT shall not transmit RF</li> </ul>	<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"> <li>UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C</li> </ul>	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"> <li><i>cbsdId</i>=C</li> <li><i>responseCode</i> = R = 400</li> </ul>	--	--
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"> <li>UUT shall not transmit RF</li> </ul>	<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"> <li>UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C</li> </ul>	--	--
2	UUT sends valid Grant Request.	--	--
3	SAS Test Harness sends a Grant Response message, including <ul style="list-style-type: none"> <li><i>cbsdId</i>=C</li> <li><i>responseCode</i> = R = 401</li> </ul>	--	--
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"> <li>UUT shall not transmit RF</li> </ul>	<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

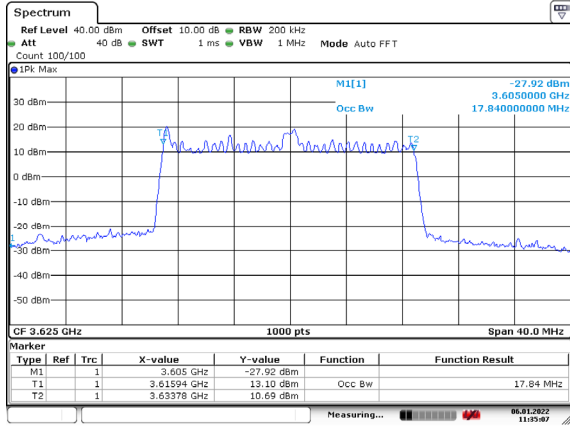
#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: ● UUT has registered successfully with SAS Test Harness, with <i>cbsdId</i> = C	--	--
2	UUT sends a message: ● If message is type Spectrum Inquiry Request, go to step 3, or ● If message is type Grant Request, go 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



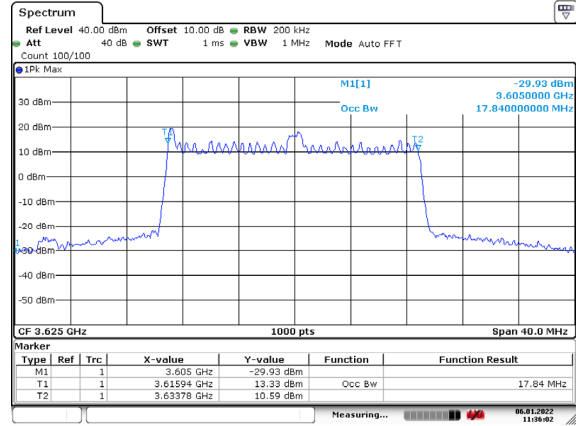
- UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.

Channel	Freq. (MHz)	OCP 99 Band Width (MHz)			
		F = 20MHz			
		Chain (0)	Chain (1)	Chain (2)	Chain (3)
Middle	3625	17.84	17.84	17.84	17.84

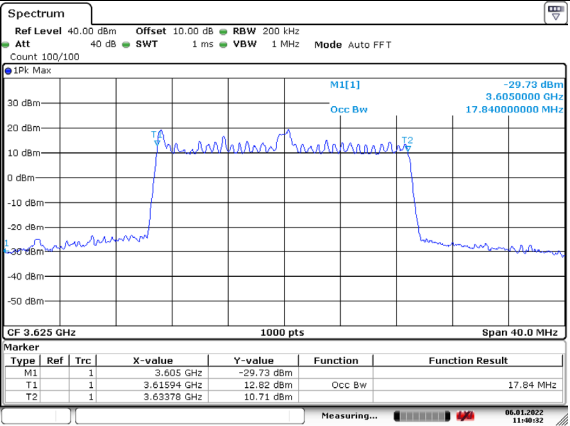
Spectrum Plot  
Chain (0 ~ 3)



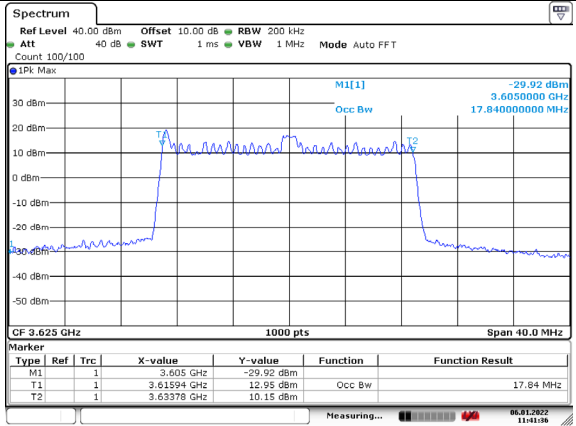
Date: 6.JAN.2022 11:35:08



Date: 6.JAN.2022 11:36:02



Date: 6.JAN.2022 11:40:33



Date: 6.JAN.2022 11:41:37

#### 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"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = Current UTC time</li> <li>● <i>responseCode</i> = 105 (DEREGISTER)</li> </ul>	--	--
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"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<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	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time</li> <li>● <i>responseCode</i> = 500 (TERMINATED_GRANT)</li> </ul>	--	--
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"> <li>● UUT shall stop transmission within (T + 60 seconds) of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat Request)</li> </ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is formatted correctly, including: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time</li> <li>? <i>responseCode</i> = 501 (SUSPENDED GRANT)</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul> <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> </ul> <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT does not transmit at any time</li> </ul>	<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"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time</li> <li>● <i>responseCode</i> = 501 (SUSPENDED_GRANT)</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul> <p>B. UUT sends a Relinquishment request message. Ensure message is correctly formatted with parameters:</p> <ul style="list-style-type: none"> <li>● <i>cbdsId</i> = C</li> <li>● <i>grantId</i> = G</li> </ul> <p>Monitor the RF output of the UUT. Verify:</p> <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T+60) seconds of completion of step 3</li> </ul>	<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	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time</li> <li>● <i>responseCode</i> = 502 (UNSYNC_OP_PARAM)</li> </ul>	--	--
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: <ul style="list-style-type: none"> <li>● UUT sends a Grant Relinquishment Request message. Verify message is correctly formatted with parameters:               <ul style="list-style-type: none"> <li>○ <i>cbsdId</i> = C</li> <li>○ <i>grantId</i> = G</li> </ul> </li> </ul> Monitor the RF output of the UUT. Verify: <ul style="list-style-type: none"> <li>● UUT shall stop transmission within (T+60) seconds of completion of step 3</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> 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"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in GRANTED, but not AUTHORIZED state(i.e. has not performed its first Heartbeat Request)</li> </ul>	--	--
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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "GRANTED"</li> </ul>	<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"> <li>● At any time during the test, UUT shall not transmit on RF interface</li> </ul>	<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	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>● UUT has registered successfully with SAS Test Harness</li> <li>● UUT has a valid single grant as follows:               <ul style="list-style-type: none"> <li>○ valid <i>cbsdId</i> = C</li> <li>○ valid <i>grantId</i> = G</li> <li>○ grant is for frequency range F, power P</li> <li>○ <i>grantExpireTime</i> = UTC time greater than duration of the test</li> </ul> </li> <li>● UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF interface</li> </ul>	--	--
2	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including: <ul style="list-style-type: none"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>operationState</i> = "AUTHORIZED"</li> </ul>	<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"> <li>● <i>cbsdId</i> = C</li> <li>● <i>grantId</i> = G</li> <li>● <i>transmitExpireTime</i> = T = current UTC time + 200 seconds</li> <li>● <i>responseCode</i> = 0</li> </ul>	--	--
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"> <li>● UUT shall stop all transmission on RF interface within (<i>transmitExpireTime</i> + 60 seconds), using the <i>transmitExpireTime</i> sent in Step 3.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail



#### 4.6.4 CBSD Measurement Report

##### 4.6.4.1 WINNF.FT.C.MES.1

Test Case ID : WINNF.FT.C.MES.1  NA

#	Test Execution Steps	Results	
1	Ensure the following conditions are met for test entry: <ul style="list-style-type: none"> <li>UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> </ul>	--	--
2	UUT sends a Registration Request message. Validate the Registration Request message is formatted correctly, including: <i>userId</i> is present and correct <ul style="list-style-type: none"> <li><i>fcld</i> is present and correct</li> <li><i>cbsdSerialNumber</i> is present and correct</li> <li><i>measCapability</i> = "RECEIVED_POWER_WITHOUT_GRANT"</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
3	SAS Test Harness sends a Registration Response message, with the following parameters: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C = valid <i>cbsdId</i> for this UUT</li> <li><i>measReportConfig</i>= "RECEIVED_POWER_WITHOUT_GRANT"</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
4	UUT sends a message: <ul style="list-style-type: none"> <li>If message is type Spectrum Inquiry Request, go to step 5, or</li> <li>If message is type Grant Request, go to step 7</li> </ul>	--	--
5	UUT sends message type Spectrum Inquiry Request. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
6	SAS Test Harness sends a Spectrum Inquiry Response, with the following parameters: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>availableChannel</i> is an array of <i>availableChannel</i> objects</li> <li><i>responseCode</i> = 0</li> </ul>	--	--
7	UUT sends message type Grant Request message. Verify message contains all required parameters properly formatted, and specifically: <ul style="list-style-type: none"> <li><i>cbsdId</i> = C</li> <li><i>measReport</i> is present, and is a properly formatted <i>rcvdPowerMeasReport</i>.</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.5 CBSD Relinquishment Process

##### 4.6.5.1 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>● UUT has successfully registered with SAS Test Harness, with <i>cbsdId=C</i></li> <li>● UUT has received a valid grant with <i>grantId = G</i></li> <li>● UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> </ul> 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"> <li>● <i>cbsdId = C</i></li> <li>● <i>grantId = G</i></li> </ul>	<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"> <li>- <i>cbsdId = C</i></li> <li>- <i>grantId = G</i></li> <li>- <i>responseCode = 0</i></li> </ul>	--	--
4	After completion of step 3, SAS Test Harness will not provide any additional positive response ( <i>responseCode=0</i> ) 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"> <li>● UUT shall stop RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

#### 4.6.6 CBSD Deregistration Process

##### 4.6.6.1 WINNF.FT.C.DRG.1

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

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

## 4.6.7 CBSD Security Validation

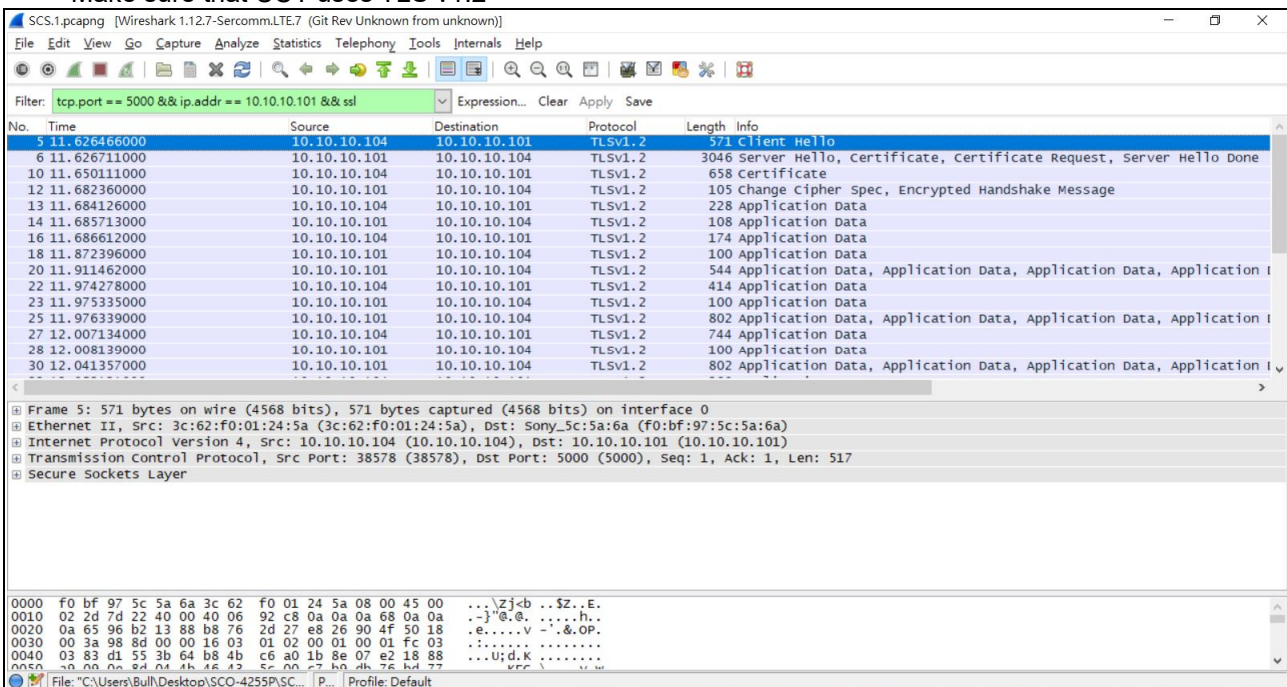
### 4.6.7.1 WINNF.FT.C.SCS.1

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

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>UUT shall start CBSD-SAS communication with the security procedure</li> <li>The UUT shall establish a TLS handshake with the SAS Test Harness using configured certificate.</li> <li>Configure the SAS Test Harness to accept the security procedure and establish the connection</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> <li>Make sure that Mutual authentication happens between UUT and the SAS Test Harness.</li> <li>Make sure that UUT uses TLS v1.2</li> <li>Make sure that cipher suites from one of the following is selected,               <ul style="list-style-type: none"> <li>TLS_RSA_WITH_AES_128_GCM_SHA256</li> <li>TLS_RSA_WITH_AES_256_GCM_SHA384</li> <li>TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256</li> <li>TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384</li> <li>TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li> </ul> </li> </ul>	<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"> <li>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>cbstdId</i>.</li> </ul>	<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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.1.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
5	11.626466000	10.10.10.104	10.10.10.101	TLSv1.2	571	Client Hello
6	11.626711000	10.10.10.101	10.10.10.104	TLSv1.2	3046	Server Hello, certificate, certificate Request, Server Hello Done
10	11.650111000	10.10.10.104	10.10.10.101	TLSv1.2	658	certificate
12	11.682360000	10.10.10.101	10.10.10.104	TLSv1.2	105	change Cipher Spec, Encrypted Handshake Message
13	11.684126000	10.10.10.104	10.10.10.101	TLSv1.2	228	Application Data
14	11.685713000	10.10.10.101	10.10.10.104	TLSv1.2	108	Application Data
16	11.686612000	10.10.10.104	10.10.10.101	TLSv1.2	174	Application Data
18	11.872396000	10.10.10.101	10.10.10.104	TLSv1.2	100	Application Data
20	11.911462000	10.10.10.101	10.10.10.104	TLSv1.2	544	Application Data, Application Data, Application Data, Application Data
22	11.974278000	10.10.10.104	10.10.10.101	TLSv1.2	414	Application Data
23	11.975335000	10.10.10.101	10.10.10.104	TLSv1.2	100	Application Data
25	11.976339000	10.10.10.101	10.10.10.104	TLSv1.2	802	Application Data, Application Data, Application Data, Application Data
27	12.007134000	10.10.10.104	10.10.10.101	TLSv1.2	744	Application Data
28	12.008139000	10.10.10.101	10.10.10.104	TLSv1.2	100	Application Data
30	12.041357000	10.10.10.101	10.10.10.104	TLSv1.2	802	Application Data, Application Data, Application Data, Application Data

Frame 5: 571 bytes on wire (4568 bits), 571 bytes captured (4568 bits) on interface 0

- Ethernet II, Src: 3c:62:f0:01:24:5a (3c:62:f0:01:24:5a), Dst: Sony\_5c:5a:6a (f0:bf:97:5c:5a:6a)
- Internet Protocol Version 4, Src: 10.10.10.104 (10.10.10.104), Dst: 10.10.10.101 (10.10.10.101)
- Transmission Control Protocol, Src Port: 38578 (38578), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 517
- Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a 3c 62 f0 01 24 5a 08 00 45 00  ...zj-cb..$.E.
0010 02 2d 7d 22 40 00 40 06 92 c8 0a 0a 0a 68 0a 0a  -} "@. ....h.
0020 0a 65 96 b2 13 88 b8 76 2d 27 e8 26 90 4f 50 18  .e.....v-'.&.OP.
0030 00 3a 98 8d 00 00 16 03 01 02 00 01 00 01 fc 03  .....K.....
0040 03 83 d1 55 3b 64 b8 4b c6 a0 1b 8e 07 e2 18 88  ...U;d.K.....
0050 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00  .....
  
```

File: "C:\Users\Bull\Desktop\SCO-4255P\SC... [P... Profile: Default

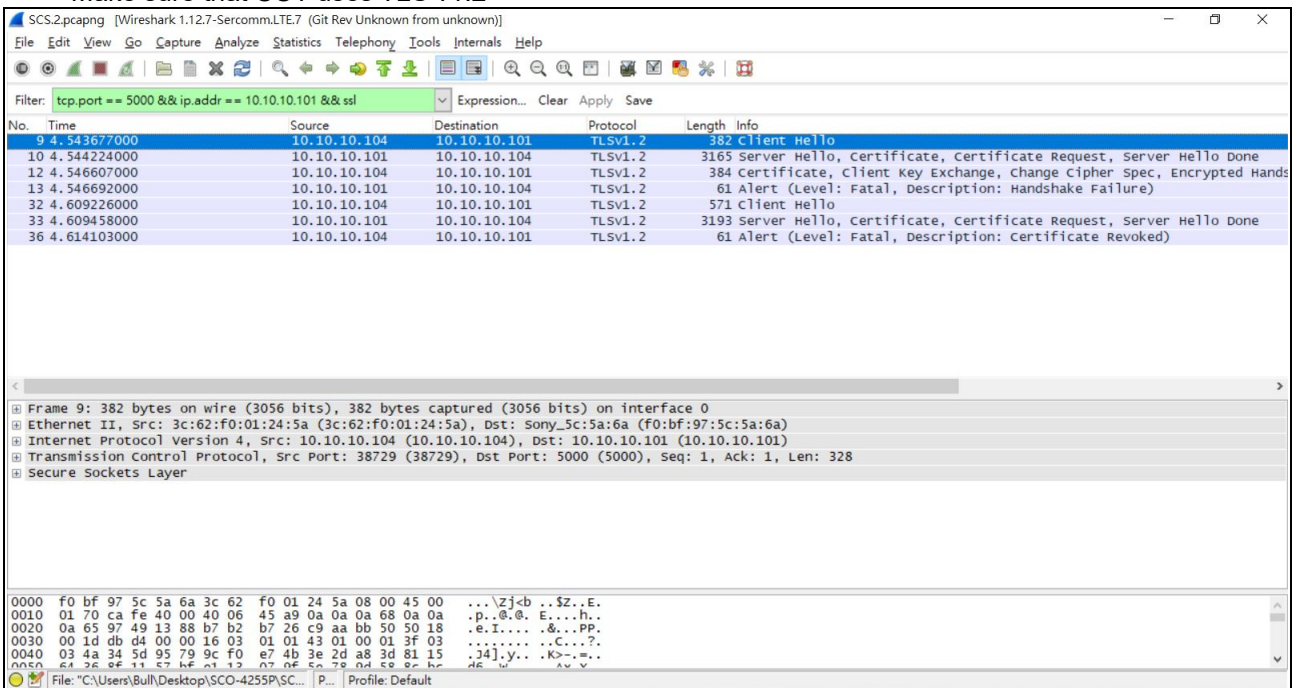
#### 4.6.7.2 WINNF.FT.C.SCS.2

Test Case ID : WINNF.FT.C.SCS.2  NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> <li>Make sure that UUT uses TLS v1.2 for security establishment.</li> <li>Make sure UUT selects the correct cipher suite.</li> <li>UUT shall use CRL or OCSP to verify the validity of the server certificate.</li> <li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li> </ul>	<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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.2.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
9	4.543677000	10.10.10.104	10.10.10.101	TLSv1.2	382	Client Hello
10	4.544224000	10.10.10.101	10.10.10.104	TLSv1.2	3165	Server Hello, Certificate, Certificate Request, Server Hello Done
12	4.546607000	10.10.10.104	10.10.10.101	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
13	4.546692000	10.10.10.101	10.10.10.104	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
32	4.609226000	10.10.10.104	10.10.10.101	TLSv1.2	571	Client Hello
33	4.609458000	10.10.10.101	10.10.10.104	TLSv1.2	3193	Server Hello, Certificate, Certificate Request, Server Hello Done
36	4.614103000	10.10.10.104	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Revoked)

Frame 9: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

Ethernet II, Src: 3c:62:f0:01:24:5a (3c:62:f0:01:24:5a), Dst: Sony\_5c:5a:6a (f0:bf:97:5c:5a:6a)

Internet Protocol Version 4, Src: 10.10.10.104 (10.10.10.104), Dst: 10.10.10.101 (10.10.10.101)

Transmission Control Protocol, Src Port: 38729 (38729), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328

Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a 3c 62 f0 01 24 5a 08 00 45 00 ... \zj-cb ..$Z..E.
0010 01 70 ca fe 40 00 40 06 45 a9 0a 0a 0a 68 0a 0a .p..@.@. E...h.
0020 0a 65 97 49 13 88 b7 b2 b7 26 c9 aa bb 50 50 18 .e.I.... &...PP.
0030 00 1d db d4 00 00 16 03 01 01 43 01 00 01 3f 03 ..... .C...?.
0040 03 4a 34 5d 95 79 9c f0 e7 4b 3e 2d a8 3d 81 15 .34]y... .k>-...
0050 64 26 ef 11 57 bf a1 12 07 0f 5c 78 0d 58 8c bc d6 ..
  
```

File: "C:\Users\Bull\Desktop\SCO-4255P\SC..." Profile: Default

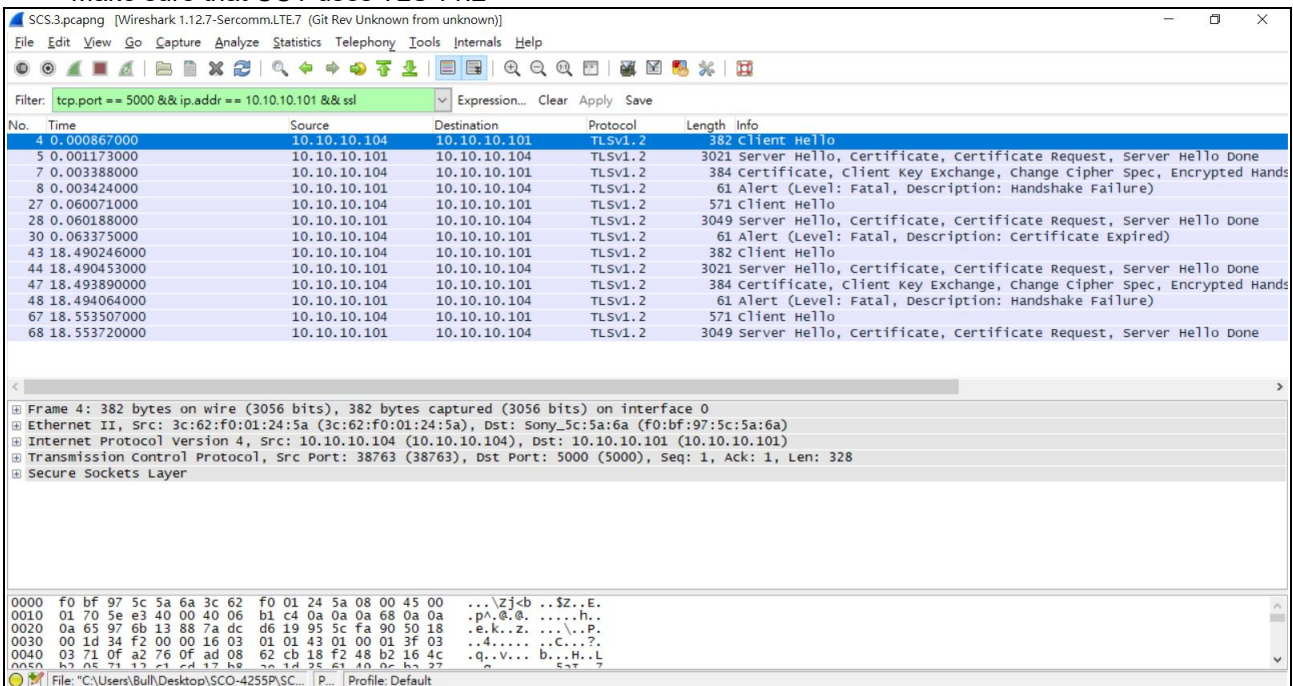
### 4.6.7.3 WINNF.FT.C.SCS.3

Test Case ID : WINNF.FT.C.SCS.3  NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> <li>Make sure that UUT uses TLS v1.2 for security establishment.</li> <li>Make sure UUT selects the correct cipher suite.</li> <li>UUT shall use CRL or OCSP to verify the validity of the server certificate.</li> <li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li> </ul>	<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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.3.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
4	0.000867000	10.10.10.104	10.10.10.101	TLSv1.2	382	Client Hello
5	0.001173000	10.10.10.101	10.10.10.104	TLSv1.2	3021	Server Hello, Certificate, Certificate Request, Server Hello Done
7	0.003388000	10.10.10.104	10.10.10.101	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
8	0.003424000	10.10.10.101	10.10.10.104	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
27	0.060071000	10.10.10.104	10.10.10.101	TLSv1.2	571	Client Hello
28	0.060188000	10.10.10.101	10.10.10.104	TLSv1.2	3049	Server Hello, Certificate, Certificate Request, Server Hello Done
30	0.063375000	10.10.10.104	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: Certificate Expired)
43	18.490246000	10.10.10.104	10.10.10.101	TLSv1.2	382	Client Hello
44	18.490453000	10.10.10.101	10.10.10.104	TLSv1.2	3021	Server Hello, Certificate, Certificate Request, Server Hello Done
47	18.493890000	10.10.10.104	10.10.10.101	TLSv1.2	384	Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
48	18.494064000	10.10.10.101	10.10.10.104	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
67	18.553507000	10.10.10.104	10.10.10.101	TLSv1.2	571	Client Hello
68	18.553720000	10.10.10.101	10.10.10.104	TLSv1.2	3049	Server Hello, Certificate, Certificate Request, Server Hello Done

Frame 4: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

Ethernet II, Src: 3c:62:f0:01:24:5a (3c:62:f0:01:24:5a), Dst: Sony\_5c:5a:6a (f0:bf:97:5c:5a:6a)

Internet Protocol Version 4, Src: 10.10.10.104 (10.10.10.104), Dst: 10.10.10.101 (10.10.10.101)

Transmission Control Protocol, Src Port: 38763 (38763), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328

Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a 3c 62 f0 01 24 5a 08 00 45 00 ... \zj-cb ..$Z..E.
0010 01 70 5e e3 40 00 40 06 b1 c4 0a 0a 0a 68 0a 0a .pA.@.@. ....h.
0020 0a 65 97 6b 13 88 7a dc d6 19 95 3c fa 90 50 18 .e.k..z. ....P.
0030 00 1d 34 f2 00 00 16 03 01 01 43 01 00 01 3f 03 ..4.... .C...?.
0040 03 71 0f a2 76 0f ad 08 62 cb 18 f2 48 b2 16 4c .q..V... b...H..L
0050 k2 05 71 12 c1 cd 17 b8 20 1d 25 61 40 0c b3 27 .
  
```

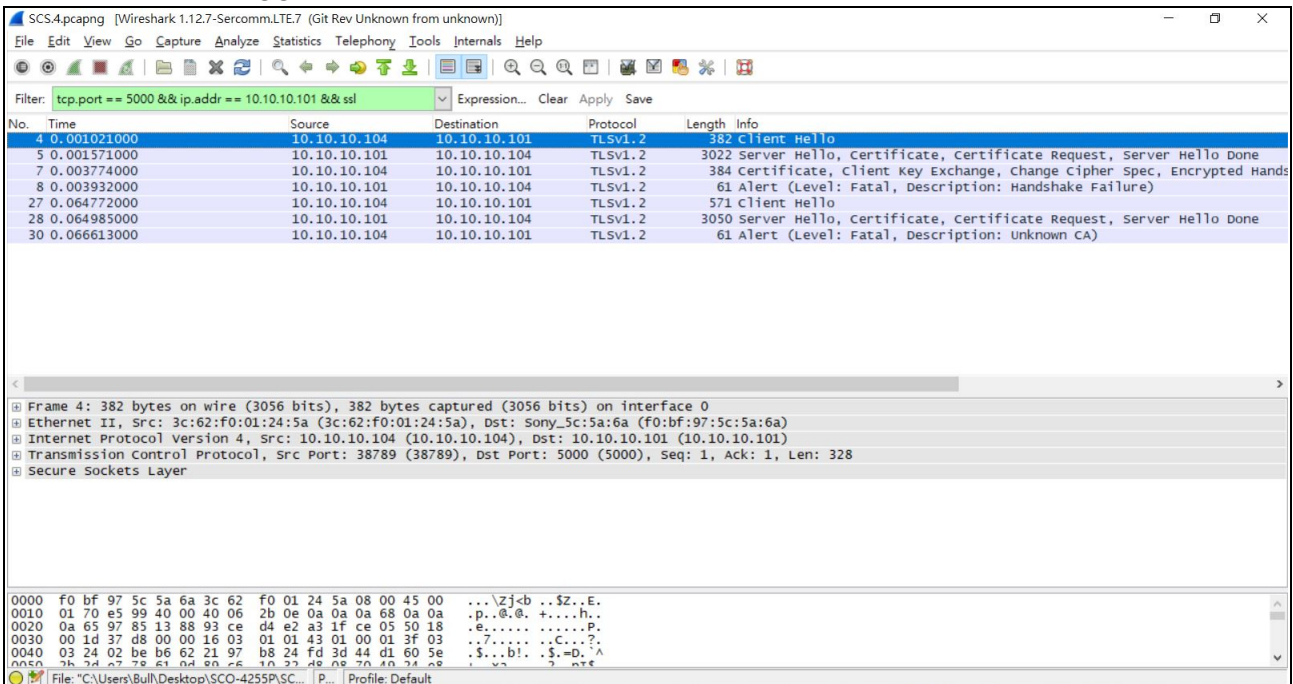
#### 4.6.7.4 WINNF.FT.C.SCS.4

Test Case ID : WINNF.FT.C.SCS.4  NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> <li>Make sure that UUT uses TLS v1.2 for security establishment.</li> <li>Make sure UUT selects the correct cipher suite.</li> <li>UUT shall use CRL or OCSP to verify the validity of the server certificate</li> <li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li> </ul>	<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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



SCS.4.pcapng [Wireshark 1.12.7-Sercomm.LTE.7 (Git Rev Unknown from unknown)]

Filter: tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl

No.	Time	Source	Destination	Protocol	Length	Info
4	0.001021000	10.10.10.104	10.10.10.101	TLSv1.2	382	Client Hello
5	0.001571000	10.10.10.101	10.10.10.104	TLSv1.2	3022	Server Hello, Certificate, Certificate Request, Server Hello Done
7	0.003774000	10.10.10.104	10.10.10.101	TLSv1.2	384	certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake
8	0.003932000	10.10.10.101	10.10.10.104	TLSv1.2	61	Alert (Level: Fatal, Description: Handshake Failure)
27	0.064772000	10.10.10.104	10.10.10.101	TLSv1.2	571	client Hello
28	0.064985000	10.10.10.101	10.10.10.104	TLSv1.2	3050	Server Hello, Certificate, Certificate Request, Server Hello Done
30	0.066613000	10.10.10.104	10.10.10.101	TLSv1.2	61	Alert (Level: Fatal, Description: unknown CA)

Frame 4: 382 bytes on wire (3056 bits), 382 bytes captured (3056 bits) on interface 0

Ethernet II, Src: 3c:62:f0:01:24:5a (3c:62:f0:01:24:5a), Dst: Sony\_Sc:5a:6a (f0:bf:97:5c:5a:6a)

Internet Protocol Version 4, Src: 10.10.10.104 (10.10.10.104), Dst: 10.10.10.101 (10.10.10.101)

Transmission Control Protocol, Src Port: 38789 (38789), Dst Port: 5000 (5000), Seq: 1, Ack: 1, Len: 328

Secure Sockets Layer

```

0000 f0 bf 97 5c 5a 6a 3c 62 f0 01 24 5a 08 00 45 00 ... \zj-cb ..$.E.
0010 01 70 e5 99 40 00 40 06 2b 0e 0a 0a 0a 68 0a 0a .p..@.@. +...h..
0020 0a 65 97 85 13 88 93 ce d4 e2 a3 1f ce 05 50 18 .&.....P.
0030 00 1d 37 d8 00 00 16 03 01 01 43 01 00 01 3f 03 ..7.....!C...?.
0040 03 24 02 be b6 62 21 97 b8 24 fd 3d 44 d1 60 5e .$...b!.$..=..^
  
```

File: "C:\Users\Bull\Desktop\SCO-4255P\SC... | Profile: Default

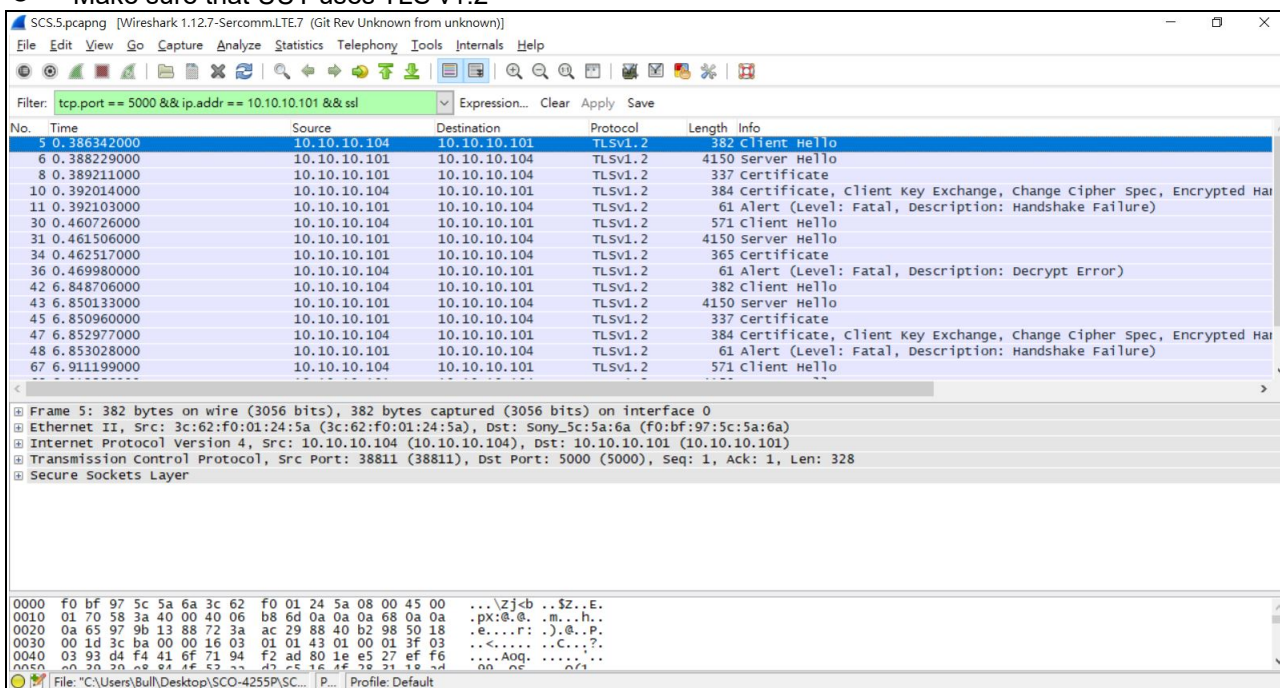
#### 4.6.7.5 WINNF.FT.C.SCS.5

Test Case ID : WINNF.FT.C.SCS.5  NA

#	Test Execution Steps	Results	
1	<ul style="list-style-type: none"> <li>UUT shall start CBSD-SAS communication with the security procedures</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail
2	<ul style="list-style-type: none"> <li>Make sure that UUT uses TLS v1.2 for security establishment.</li> <li>Make sure UUT selects the correct cipher suite.</li> <li>UUT shall use CRL or OCSP to verify the validity of the server certificate</li> <li>Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness.</li> </ul>	<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"> <li>UUT shall not transmit RF</li> </ul>	<input checked="" type="checkbox"/> Pass	<input type="checkbox"/> Fail

Wireshark Capture Example for Test Case :

- Make sure that UUT uses TLS v1.2



The screenshot shows a Wireshark capture of a TLS handshake. The filter is set to 'tcp.port == 5000 && ip.addr == 10.10.10.101 && ssl'. The capture shows the following sequence of events:

- Frame 5: Client Hello (382 bytes)
- Frame 6: Server Hello (4150 bytes)
- Frame 8: Certificate (337 bytes)
- Frame 10: Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message (384 bytes)
- Frame 11: Alert (Level: Fatal, Description: Handshake Failure) (61 bytes)
- Frame 30: Client Hello (571 bytes)
- Frame 31: Server Hello (4150 bytes)
- Frame 34: Certificate (365 bytes)
- Frame 36: Alert (Level: Fatal, Description: Decrypt Error) (61 bytes)
- Frame 42: Client Hello (382 bytes)
- Frame 43: Server Hello (4150 bytes)
- Frame 45: Certificate (337 bytes)
- Frame 47: Certificate, Client Key Exchange, Change Cipher Spec, Encrypted Handshake Message (384 bytes)
- Frame 48: Alert (Level: Fatal, Description: Handshake Failure) (61 bytes)
- Frame 67: Client Hello (571 bytes)

The packet details for Frame 5 (Client Hello) are expanded, showing the Ethernet II, Internet Protocol Version 4, Transmission Control Protocol, and Secure Sockets Layer layers.



#### 4.6.8 CBSD RF Power Measurement

##### 4.6.8.1 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"> <li>● UUT has successfully completed SAS Discovery and Authentication with the SAS Test Harness</li> <li>● UUT has registered with the SAS, with CBSD ID = C</li> <li>● 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</li> </ul> <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"> <li>● UUT sends Heartbeat Request, including:             <ul style="list-style-type: none"> <li>○ cbsdId = C</li> <li>○ grantId = G</li> </ul> </li> <li>● SAS Test Harness responds with Heartbeat Response, including:             <ul style="list-style-type: none"> <li>○ cbsdId = C</li> <li>○ grantId = G</li> <li>○ transmitExpireTime = current UTC time + 200 seconds</li> <li>○ responseCode = 0</li> </ul> </li> </ul>	--	--
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)	10MHz				Directional Gain(dBi)	15.82	Limit	Pass / Fail
		Conducted Power Density (dBm/MHz)							
		Chain 0	Chain 1	Chain 2	Chain 3	Power Density	maxEirp(dBm)=Pi		
Middle	3625	-24.17	-24.95	-25.23	-25.29	-18.86	-2	Pass	
Middle	3625	-6.04	-6.25	-5.86	-6.09	-0.04	17	Pass	
Middle	3625	12.36	12.22	12.62	12.11	18.35	36	Pass	

Note: Directional gain = 9.8dBi + 10log(4) = 15.82 dBi

maxEirp = -2 dBm/MHz

