

# **TEST REPORT**

CBSD-SAS Interoperability Test for of SJ-ORU4402-N48US Certification

APPLICANT SAMJI Elecronics Co., Ltd.

**REPORT NO.** HCT-OT-2412-SS002

DATE OF ISSUE December 13, 2024

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F-TP22-03(Rev.06)

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T E S T R E P O R T	REPORT NO. HCT-OT-2412-SS002 DATE OF ISSUE December 13, 2024
Applicant	SAMJI Elecronics Co., Ltd. 63-25, Geumgok-ro, Hwaseong-si, Gyeonggi-do, 18511, KOREA
Product Name Model Number	CBRS 5G n48 4T4R 4W Outdoor ORAN RU SJ-ORU4402-N48US
Date of Test	December 05, 2024 ~ December 09, 2024
Test Standard Used	FCC 47 CFR Part 96 ONGO-TS-9001-V1.3.0 WINNF-TS-0122 V1.2.0
Test Results	Refer to the attachment
Frequency range	3 550 MHz ~ 3 700 MHz
Manufacturer	SAMJI Elecronics Co., Ltd.
Location of Test	■ Permanent Testing Lab □ On Site Testing (Address: 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi- do, Republic of Korea)



### **REVISION HISTORY**

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	December 13, 2024	Initial Release

### Notice

Content
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The results shown in this test report only apply to the sample(s), as received, provided by the applicant, unless otherwise stated.

The test results have only been applied with the test methods required by the standard(s).

The laboratory is not accredited for the test results marked \*. Information provided by the applicant is marked \*\*. Test results provided by external providers are marked \*\*\*.

When confirmation of authenticity of this test report is required, please contact www.hct.co.kr

The test results in this test report are not associated with the ((KS Q) ISO/IEC 17025) accreditation by KOLAS (Korea Laboratory Accreditation Scheme) / A2LA (American Association for Laboratory Accreditation) that are under the ILAC (International Laboratory Accreditation Cooperation) Mutual Recognition Agreement (MRA).



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# **1. Applicant Information**

The EUT has been tested by request of

Company

SAMJI Elecronics Co., Ltd.

# 2. Equipment Under Test (EUT)

2.1 Identification of the EUT

Model	SJ-ORU4402-N48US
Serial Number	SJSP24100005
Hardware version	1.0
Software version	1.0
Firmware version	1.0
FCC ID	2BK6Y-GC457198
CBSD Category	Category B
Unit Under Test Type	BTS-CBSD
Transmitter Frequency Band	NR n48

### 2.2 Supported Features

	Conditional Test Case	Supported
C1	Mandatory for UUT which supports multi-step registration message	$\boxtimes$
C2	Mandatory for UUT which supports single-step registration with no CPI-signed data in the registration message. By definition, this is a subset of Category A devices which determine all registration information, including location, without CPI intervention.	
С3	Mandatory for UUT which supports single-step registration containing CPI-signed data in the registration message	
C4	Mandatory for UUT which supports RECEIVED_POWER_WITHOUT_GRANT measurement report type.	
C5	Mandatory for UUT which supports RECEIVED_POWER_WITH_GRANT measurement report type.	
C6	Mandatory for UUT which supports parameter change being made at the UUT and prior to sending a deregistration.	



# 3. Measurement Setup

### 3.1 Test Equipment

No.	Instrument	Model	Manufacturer	Serial No	Due to
	mstrument		Manufacturer	Senativo.	Calibration
1	Signal Analyzer	N9020A	Agilent	MY51240852	2025-01-25
2	SAS Test Harness Laptop	NT551XDA	SAMSUNG	KPXH99YR9003T4D	N/A
3	Hub switch	CSS610-8G-2S+IN	Mikrotik	HD808CH9128-243	N/A
4	UE	WD-H850P	WOORINET	0010192	N/A

# 3.2 Test Environment

SAS Test Harness version	V1.0.3
Operating System	Windows 10
TLS Version	V1.2
Python version	V2.7

### 3.3 Test Configuration





# 4. Test Summary

Section	Test Case ID	Test Case Title	Test Result
6.1.4.1.1	WINNF.FT.C.REG.1	Multi-Step registration	PASS
6.1.4.2.1	WINNF.FT.C.REG.8	Missing Required parameters (responseCode 102)	PASS
6.1.4.2.3	WINNF.FT.C.REG.10	Pending registration (responseCode 200)	PASS
6.1.4.2.5	WINNF.FT.C.REG.12	Invalid parameter (responseCode 103)	PASS
6.1.4.2.7	WINNF.FT.C.REG.14	Blacklisted CBSD (responseCode 101)	PASS
6.1.4.2.9	WINNF.FT.C.REG.16	Unsupported SAS protocol version (responseCode 100)	PASS
6.1.4.2.11	WINNF.FT.C.REG.18	Group Error (responseCode 201)	PASS
6.3.4.2.1	WINNF.FT.C.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
6.4.4.2.1	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
6.4.4.3.1	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
6.6.4.1.1	WINNF.FT.C.RLQ.1	Successful Relinquishment	PASS
6.6.4.2.1	WINNF.FT.C.RLQ.3	Unsuccessful Relinquishment, responseCode=102	PASS
6.6.4.3.1	WINNF.FT.C.RLQ.5	Unsuccessful Relinquishment, responseCode=103	PASS
6.7.4.1.1	WINNF.FT.C.DRG.1	Successful Deregistration	PASS
6.7.4.2.1	WINNF.FT.C.DRG.3	Deregistration responseCode=102	PASS
6.7.4.3.1	WINNF.FT.C.DRG.5	Deregistration responseCode=103	PASS
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.1	UUT RF Transmit Power Measurement	PASS

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# 5. Test Results

# 5.1 CBSD Registration Process

### 5.1.1 [WINNF.FT.D.REG.1] Multi-Step registration

#	Test Execution Steps		Results	
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <li>UUT has successfully completed SAS Discovery and Authentication with SAS Test Harness</li> <li>UUT is in the Unregistered state</li> </ul>			
2	<ul> <li>CBSD sends correct Registration request information, as specified in[n.5], to the SAS Test Harness:</li> <li>The required userId, fccId and cbsdSerialNumber 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> <li>Note: It is outside the scope of this document to test the Registration information that is supplied via another means.</li> </ul>	⊠PASS	□FAIL	
3	<ul> <li>SAS Test Harness sends a CBSD Registration Response as follows:</li> <li>cbsdld = Ci</li> <li>measReportConfig shall not be included</li> <li>responseCode = 0</li> </ul>			
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.			
5	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</li> <li>UUT shall not transmit RF</li> </ul>	⊠PASS	□FAIL	



# 5.1.2 [WINNF.FT.D.REG.8] Missing Required parameters (responseCode 102)

#	Test Execution Steps		ults
1	Ensure the following conditions are met for test entry:		
	Harness		
	UUT is in the Unregistered state		
2	CBSD sends a Registration request to SAS Test Harness.		
2	SAS Test Harness rejects the request by sending a CBSD Registration		
	Response as follows:		
5	- SAS response does not include a cbsdld.		
	- responseCode (R) = 102		
1	After completion of step 3, SAS Test Harness will not provide any positive response		
4	(responseCode=0) to further request messages from the UUT.		
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This		
	is the end of the test. Verify:	⊠PASS	□FAIL
	• UUT shall not transmit RF		



# 5.1.3 [WINNF.FT.D.REG.10] Pending registration (responseCode 200)

#	Test Execution Steps		ults
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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	<ul> <li>SAS Test Harness rejects the request by sending a CBSD Registration</li> <li>Response as follows: <ul> <li>SAS response does not include a cbsdld.</li> <li>responseCode (R) = 200</li> </ul> </li> </ul>		
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	-	-
5	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</li> <li>UUT shall not transmit RF</li> </ul>	⊠PASS	□FAIL



# 5.1.4 [WINNF.FT.D.REG.12] Invalid parameter (responseCode 103)

#	Test Execution Steps	Res	ults
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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	<ul> <li>SAS Test Harness rejects the request by sending a CBSD Registration</li> <li>Response as follows: <ul> <li>SAS response does not include a cbsdld.</li> <li>responseCode (R) = 103</li> </ul> </li> </ul>		
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.	-	
5	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</li> <li>UUT shall not transmit RF</li> </ul>	⊠PASS	□FAIL



# 5.1.5 [WINNF.FT.D.REG.14] Blacklisted CBSD (responseCode 101)

#	Test Execution Steps	Res	ults
	Ensure the following conditions are met for test entry:		
1	• 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.		
	SAS Test Harness rejects the request by sending a CBSD Registration		
3	Response as follows:		
5	- SAS response does not include a cbsdld.		
	- responseCode (R) = 101		
1	After completion of step 3, SAS Test Harness will not provide any positive response		
4	(responseCode=0) to further request messages from the UUT.		
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This		
	is the end of the test. Verify:	⊠PASS	□FAIL
	• UUT shall not transmit RF		





# 5.1.6 [WINNF.FT.D.REG.16] Unsupported SAS protocol version (responseCode 100)

#	Test Execution Steps	Results	
	Ensure the following conditions are met for test entry:		
1	• 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.		
	SAS Test Harness rejects the request by sending a CBSD Registration		
	Response as follows:		I
5	- SAS response does not include a cbsdld.		
	- responseCode (R) = 100		
4	After completion of step 3, SAS Test Harness will not provide any positive response		
4	(responseCode=0) to further request messages from the UUT.		
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This		
	is the end of the test. Verify:	⊠PASS	□FAIL
	• UUT shall not transmit RF		



# 5.1.7 [WINNF.FT.D.REG.18] Group Error (responseCode 201)

#	Test Execution Steps	Res	ults
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <li>UUT has successfully completed SAS Discovery and Authentication with SAS Test</li> </ul>		
_	<ul><li>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> <li>SAS response does not include a cbsdId.</li> <li>responseCode (R) = 201</li> </ul>		
4	After completion of step 3, SAS Test Harness will not provide any positive response (responseCode=0) to further request messages from the UUT.		
5	Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This		
	is the end of the test. Verify:	⊠PASS	□FAIL
	• UUT shall not transmit RF		



### 5.2 CBSD Spectrum Grant Process

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

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





# 5.2.2 [WINNF.FT.C.GRA.2] Unsuccessful Grant responseCode=401 (GRANT\_CONFLICT)

#	Test Execution Steps	Res	ults
	Ensure the following conditions are met for test entry:		
1	<ul> <li>UUT has registered successfully with SAS Test Harness, with cbsdld = C</li> </ul>		
2	UUT sends valid Grant Request.		
	SAS Test Harness sends a Grant Response message, including		
3	• cbsdld=C		
	• responseCode (R) = 401		
4	After completion of step 3, SAS Test Harness will not provide any positive response		
	(responseCode=0) to further request messages from the UUT.		
5	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This		
	is the end of the test. Verify:	⊠PASS	□FAIL
	• UUT shall not transmit RF		



### **5.3 CBSD Heart Beat Process**

### 5.3.1 [WINNF.FT.D.HBT.1] Heartbeat Success Case (first Heartbeat Response)

#	Test Execution Steps	Res	ults
1	Ensure the following conditions are met for test entry:		
T	• UUT has registered successfully with SAS Test Harness, with <i>cbsdld</i> = C		
	UUT sends a message:		
2	<ul> <li>If message is type Spectrum Inquiry Request, go to step 3, or</li> </ul>		
	• If message is type Grant Request, go to step 5		
	UUT sends Spectrum Inquiry Request. Validate:		
3	• <i>cbsdld</i> =C	⊠PASS	□FAIL
	• List of frequencyRange objects sent by UUT are within the CBRS frequency range		
	SAS Test Harness sends a Spectrum Inquiry Response message, including the following		
	parameters:		
4	• <i>cbsdld</i> =C		
	<ul> <li>availableChannel is an array of availableChannel objects</li> </ul>		
	<ul> <li>responseCode = 0</li> </ul>		
	UUT sends Grant Request message. Validate:		
5	• <i>cbsdld</i> =C		
	• maxEIRP is at or below the limit appropriate for CBSD category as defined by Part 96	MFA33	
	• operationFrequencyRange, F, sent by UUT is a valid range within the CBRS band		





SAS Test Harness sends a Grant Response message, including the parameters:       -       -         6       grantXd = G = a valid grant ID       -       -         9       grantExpireTime = UTC time greater than duration of the test       -       -         71       ecbsdId = C       BPASS       FAIL         9       grantId = G       BPASS       FAIL         8       grantId = G       -       -         9       and SAS Test Harness response Code = 0       -       -         9       and SAS Test Harness response the eurent UTC time + 200 seconds       -       -         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       -       -         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       -       -         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       -       -         9       and SAS Test Harnes responds with a Heartbeat Response message including the following parameters:       -       -         9       and SAS Test Harnes responds with a Heartbeat Response message including the following parameters:       -       -         9       and SAS Test Harnes responds with a Heartbeat Response message including the following para				
• responseCode=0       UUT sends a first Heartbeat Request message.         Verify Heartbeat Request message is formatted correctly, including:	6	<ul> <li>SAS Test Harness sends a Grant Response message, including the parameters:</li> <li><i>cbsdld</i> = C</li> <li><i>grantld</i> = G = a valid grant ID</li> <li>grantExpireTime = UTC time greater than duration of the test</li> </ul>		
UUT sends a first Heartbeat Request message.       Verify Heartbeat Request message is formatted correctly, including:       Image: PASS       Image: PA		• responseCode=0		
Verify Heartbeat Request message is formatted correctly, including:       IFAIL         7       • cbsdld= C       IFAIL         9       and SAS Test Harness response a Heartbeat Response message, with the following parameters:          8       grantld = G          9       and SAS Test Harness response correctly and the artbeat Response message including the following parameters:       IFAIL         9       and SAS Test Harness response correctly and the artbeat Response message including the following parameters:       IFAIL         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       IFAIL         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       IFAIL         10       Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:       IFAIL         10       World oes not transmit at any time prior to completion of the first heartbeat response       IFAIL		UUT sends a first Heartbeat Request message.		
7       • cbsdld=C       □ FAIL         9       and SAS Test Harness responds a Heartbeat Response message, with the following parameters:       • cbsdld=C         8       • grantld=G          9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       • cbsdld=C         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       • cbsdld=C         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       • cbsdld=C         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       □ FAIL         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       □ FAIL         10       Wonitor the RF output of the UUT from start of test until UUT transmission commences. Verify:       □ FAIL         10       • UUT does not transmit at any time prior to completion of the first heartbeat response       □ FAIL		Verify Heartbeat Request message is formatted correctly, including:		
●       grantId = G         ●       operationState = "GRANTED"         SAS Test Harness sends a Heartbeat Response message, with the following parameters:       -         ●       cbsdId = C         ●       grantId = G         ●       transmitExpireTime = current UTC time + 200 seconds         ●       responseCode = 0         For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and:       -         ●       cbsdId = C       grantId = G         ●       grantId = G       operationState = "AUTHORIZED"         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       □FAIL         ●       cbsdId = C       grantId = G       □FAIL         parameters:       cbsdId = C       grantId = G       □FAIL         10       Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:       □       □FAIL         10       Monitor the RF output of the UUT from start of test until UUT transmission is limited to within the bandwidth range F.       □FAIL	7	• <i>cbsdld</i> = C	⊠PASS	□FAIL
• operationState= "GRANTED"         SAS Test Harness sends a Heartbeat Response message, with the following parameters:         • cbsdld=C         8       grantId=G         • transmitExpireTime= current UTC time + 200 seconds         • responseCode=0         For further Heartbeat Request messages sent from UUT after completion of step 8, validate         message is sent within latest specified heartbeatInterval, and:         • cbsdld=C         • grantId=G         • operationState= "AUTHORIZED"         and SAS Test Harness responds with a Heartbeat Response message including the following parameters:         • cbsdld=C         • grantId=G         • operationState= "AUTHORIZED"         and SAS Test Harness responds with a Heartbeat Response message including the following parameters:         • cbsdld=C         • grantId=G         • transmitExpireTime= current UTC time + 200 seconds         • responseCode=0         Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         10       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.		• grantId=G		
SAS Test Harness sends a Heartbeat Response message, with the following parameters: <ul> <li>cbsd/d = C</li> <li>grant/d = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> <ul> <li>For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeat/interval, and:</li> <li>cbsd/d = C</li> <li>grant/d = G</li> <li>operationState = "AUTHORIZED"</li> </ul> <ul> <li>and SAS Test Harness responds with a Heartbeat Response message including the following parameters:</li> <li>cbsd/d = C</li> <li>grant/d = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> <ul> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</li> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> <ul> <li>Image: Complete to the to the</li></ul>		<i>operationState</i> ="GRANTED"		
8		SAS Test Harness sends a Heartbeat Response message, with the following parameters:		
8       • grantId = G             9       For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and:       •       cbsdId = C       •       grantId = G       •       FAIL         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       •       CbsdId = C       •       FAIL         9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       •       CbsdId = C       •       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       •       FAIL         10       UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.       S		• cbsdld=C		
•       transmitExpireTime = current UTC time + 200 seconds         •       responseCode = 0         For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and:       •         •       cbsdId = C       •         •       grantId = G       •         •       operationState = "AUTHORIZED"       •         and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       •       CbsdId = C         •       cbsdId = C       •       grantId = G         •       cbsdId = C       •       grantId = G         •       cbsdId = C       •       grantId = G         •       responseCode = 0       •       •         Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:       •       •         10       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.       •       •	8	• grantId=G		
• responseCode = 0       For further Heartbeat Request messages sent from UUT after completion of step 8, validate message is sent within latest specified heartbeatInterval, and:       • cbsdld = C       • grantld = G       • operationState = "AUTHORIZED"       • and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       • cbsdld = C       • grantld = G       • cbsdld = C       • cbsdld = C		<ul> <li>transmitExpireTime = current UTC time + 200 seconds</li> </ul>		
For further Heartbeat Request messages sent from UUT after completion of step 8, validate       message is sent within latest specified heartbeatInterval, and: <ul> <li>cbsdld=C</li> <li>grantld=G</li> <li>operationState= "AUTHORIZED"</li> </ul> and SAS Test Harness responds with a Heartbeat Response message including the following parameters: <ul> <li>cbsdld=C</li> <li>grantld=G</li> <li>transmitExpireTime= current UTC time + 200 seconds</li> <li>responseCode=0</li> </ul> Image: Complete the completion of the first heartbeat response for the first heartbeat response           10         Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify: <ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> Image: Complete the completent of the complete the complete the complete the compl		• responseCode=0		
message is sent within latest specified heartbeatInterval, and: <ul> <li>cbsdld=C</li> <li>grantld=G</li> <li>operationState="AUTHORIZED"</li> </ul> and SAS Test Harness responds with a Heartbeat Response message including the following parameters: <ul> <li>cbsdld=C</li> <li>grantld=G</li> <li>transmitExpireTime=current UTC time + 200 seconds</li> <li>responseCode=0</li> </ul> <ul> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</li> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> <ul> <li>PASS</li> <li>FAIL</li> </ul>		For further Heartbeat Request messages sent from UUT after completion of step 8, validate		
<ul> <li>cbsdid = C         <ul> <li>grantId = G</li> <li>operationState = "AUTHORIZED"</li> </ul> </li> <li>and SAS Test Harness responds with a Heartbeat Response message including the following parameters:         <ul> <li>cbsdId = C</li> <li>grantId = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> </li> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         <ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> </li> </ul>		message is sent within latest specified heartbeatInterval, and:		
<ul> <li>grantId = G</li> <li>operationState = "AUTHORIZED"</li> <li>and SAS Test Harness responds with a Heartbeat Response message including the following parameters:         <ul> <li>cbsdId = C</li> <li>grantId = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> </li> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         <ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> </li> </ul>		• <i>cbsdld</i> =C		
●       operationState = "AUTHORIZED"       ■       <		• $grant/d = G$		
9       and SAS Test Harness responds with a Heartbeat Response message including the following parameters:       □ FAIL         •       cbsdId = C       •         •       grant/d = G       •         •       transmitExpireTime = current UTC time + 200 seconds       •         •       responseCode = 0       •         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.       □ FAIL		<ul> <li>operationState = "AUTHORIZED"</li> </ul>		
parameters:       • cbsdId = C         • cbsdId = G       • grantId = G         • transmitExpireTime = current UTC time + 200 seconds       •         • responseCode = 0       •         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.	9	and SAS Test Harness responds with a Heartbeat Response message including the following	⊠PASS	□FAIL
<ul> <li>cbsdId = C         <ul> <li>grantId = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> </ul> </li> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         <ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> </li> </ul>		parameters:		
<ul> <li>grantId = G</li> <li>transmitExpireTime = current UTC time + 200 seconds</li> <li>responseCode = 0</li> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</li> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul>		• <i>cbsdld</i> =C		
<ul> <li>transmitExpireTime = current UTC time + 200 seconds         <ul> <li>responseCode = 0</li> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:</li> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> </li> </ul>		• $grantId = G$		
• responseCode = 0       Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         10       • 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.		<ul> <li>transmitExpireTime = current UTC time + 200 seconds</li> </ul>		
<ul> <li>Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:         <ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul> </li> </ul>		• responseCode = 0		
<ul> <li>UUT does not transmit at any time prior to completion of the first heartbeat response</li> <li>UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.</li> </ul>		Monitor the RF output of the UUT from start of test until UUT transmission commences. Verify:		
UUT transmits after step 8 is complete, and its transmission is limited to within the bandwidth range F.	10	• UUT does not transmit at any time prior to completion of the first heartbeat response	ΜΡΔςς	ΠFΔII
bandwidth range F.		• UUT transmits after step 8 is complete, and its transmission is limited to within the		
		bandwidth range F.		



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

#	Test Execution Steps	Res	ults
	Ensure the following conditions are met for test entry:		
	<ul> <li>UUT has registered successfully with SAS Test Harness</li> </ul>		
	• UUT has a valid single grant as follows:		
	<ul> <li>valid cbsdld = C</li> </ul>		
1	∘ valid grantId = G		
	<ul> <li>grant is for frequency range F, power P</li> </ul>		
	<ul> <li>grantExpireTime = UTC time greater than duration of the test</li> </ul>		
	<ul> <li>UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF</li> </ul>		
	interface		
	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:		
2	• cbsdld = C	⊠PASS	□FAIL
	• grantId = G		
	<ul> <li>operationState = "AUTHORIZED"</li> </ul>		
	SAS Test Harness sends a Heartbeat Response message, including the following parameters:		
	• cbsdld = C		
3	• grantId = G		
	<ul> <li>transmitExpireTime = T = Current UTC time</li> </ul>		
	<ul> <li>responseCode = 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: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	⊠PASS	□FAIL



# 5.3.3 [WINNF.FT.C.HBT.4] Heartbeat responseCode=500 (TERMINATED\_GRANT)

#	Test Execution Steps	Res	ults
	Ensure the following conditions are met for test entry:		
	<ul> <li>UUT has registered successfully with SAS Test Harness</li> </ul>		
	• UUT has a valid single grant as follows:		
	<ul> <li>valid cbsdld = C</li> </ul>		
1	<ul> <li>valid grantId = G</li> </ul>		
	<ul> <li>grant is for frequency range F, power P</li> </ul>		
	<ul> <li>grantExpireTime = UTC time greater than duration of the test</li> </ul>		
	<ul> <li>UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF</li> </ul>		
	interface		
	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:		
2	• cbsdld = C	⊠PASS	□FAIL
	• grantid = G		
	<ul> <li>operationState = "AUTHORIZED"</li> </ul>		
	SAS Test Harness sends a Heartbeat Response message, including the following parameters:		
	• cbsdld = C		
3	• grantId = G		
	<ul> <li>transmitExpireTime = T = Current UTC time</li> </ul>		
	<ul> <li>responseCode = 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: • UUT shall stop transmission within (T + 60 seconds) of completion of step 3	⊠PASS	□FAIL



# 5.3.4 [WINNF.FT.C.HBT.5] Heartbeat responseCode=501 (SUSPENDED\_GRANT) in First Heartbeat Response

□FAIL
□FAIL



# 5.3.5 [WINNF.FT.C.HBT.6] Heartbeat responseCode=501 (SUSPENDED\_GRANT) in Subsequent Heartbeat Response

#	Test Execution Steps	Res	ults
-	Ensure the following conditions are met for test entry:		
	<ul> <li>UUT has registered successfully with SAS Test Harness</li> </ul>		
	UUT has a valid single grant as follows:		
	• valid <i>cbsdld</i> = C		
1	∘ valid <i>grantId</i> = G		
	<ul> <li>grant is for frequency range F, power P</li> </ul>		
	<ul> <li>grantExpireTime = UTC time greater than duration of the test</li> </ul>		
	UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF		
	interface		
	UUT sends a Heartbeat Request message. Verify Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:		
2	• cbsdld = C	⊠PASS	□FAIL
	• grantId = G		
	<ul> <li>operationState = "AUTHORIZED"</li> </ul>		
	SAS Test Harness sends a Heartbeat Response message, including the following parameters:		
	• cbsdld = C		
3	• grantid = G		
	<ul> <li>transmitExpireTime = T = current UTC time</li> </ul>		
	<ul> <li>responseCode = 501 (SUSPENDED_GRANT)</li> </ul>		
4	After completion of step 3, SAS Test Harness shall not allow any further grants to the UUT.		
	<ul> <li>Monitor the SAS-CBSD interface. Verify either A OR B occurs:</li> <li>A. UUT sends a Heartbeat Request message. Ensure message is sent within latest specified heartbeatInterval, and is correctly formatted with parameters:</li> </ul>		
	• cbsdld = C		
	• grantId = G		
5	<ul> <li>operationState = "GRANTED"</li> </ul>	MDVCC	
5	B. UUT sends a Relinquishment Request message. Ensure message is correctly formatted with parameters:		
	• cbdsld = C		
	• grantld = G		
	INONITOR THE K⊢ OUTPUT OF THE UUT. VERITY:		
	UUI shall stop transmission within (1 + 60 seconds) of completion of step 3		



# 5.3.6 [WINNF.FT.C.HBT.7] Heartbeat responseCode=502 (UNSYNC\_OP\_PARAM)

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



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

#	Test Execution Steps	Results	
	Ensure the following conditions are met for test entry:		
	<ul> <li>UUT has registered successfully with SAS Test Harness</li> </ul>		
	• UUT has a valid single grant as follows:		
	• valid <i>cbsdld</i> = C		
1	• valid <i>grantId</i> = G		
	<ul> <li>grant is for frequency range F, power P</li> </ul>		
	• grantExpireTime = UTC time greater than duration of the test		
	UUT is in GRANTED, but not AUTHORIZED state (i.e. has not performed its first Heartbeat		
	Request)		
	UUT sends a Heartbeat Request message. Ensure Heartbeat Request message is sent within latest specified heartbeatInterval, and is formatted correctly, including:		
2	• cbsdld = C	⊠PASS	□FAIL
	• grantId = G		
	<ul> <li>operationState = "GRANTED"</li> </ul>		
3	After completion of Step 2, SAS Test Harness does not respond to any further messages from UUT to simulate loss of network connection		
1	Monitor the RF output of the UUT from start of test to 60 seconds after step 3. Verify:	⊠PASS	
4	<ul> <li>At any time during the test, UUT shall not transmit on RF interface</li> </ul>		



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

#	Test Execution Steps	Results	
	Ensure the following conditions are met for test entry:		
	UUT has registered successfully with SAS Test Harness		
	• UUT has a valid single grant as follows:		
	• valid <i>cbsdld</i> =C		
1	• valid <i>grantId</i> = G		
	<ul> <li>grant is for frequency range F, power P</li> </ul>		
	<ul> <li>grantExpireTime = UTC time greater than duration of the test</li> </ul>		
	• UUT is in AUTHORIZED state and is transmitting within the grant bandwidth F on RF		
	interface		
	UUT sends a Heartbeat Request message.	⊠PASS	
	Verify Heartbeat Request message is sent within the latest specified		
2	heartbeatInterval, and is formatted correctly, including:		ΓΕΔΙΙ
L	• <i>cbsdld</i> =C		
	• $grant/d = G$		
	<ul> <li>operationState = "AUTHORIZED"</li> </ul>		
	SAS Test Harness sends a Heartbeat Response message, with the following parameters:		
	• $cbsdld=C$		
3	• $grantId = G$		
	<ul> <li>transmitExpireTime = current UTC time + 200 seconds</li> </ul>		
	• responseCode = 0		
4	After completion of Step 3, SAS Test Harness does not respond to any further messages from UUT		
	Monitor the RF output of the UUT. Verify:		
5	• UUT shall stop all transmission on RF interface within ( <i>transmitExpireTime</i> + 60	⊠PASS	□FAIL
	seconds), using the transmitExpireTime sent in Step 3.		



# 5.4 CBSD Relinquishment Process

### 5.4.1 [WINNF.FT.D.RLQ.1] Successful Relinquishment

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





# 5.4.2 [WINNF.FT.D.RLQ.3] Unsuccessful Relinquishment, responseCode=102

#	Test Execution Steps	Results	
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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>cbsdld</i>=C</li> <li>UUT has received a valid grant with <i>grantld</i> = G</li> <li>UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> <li>nvoke trigger to Relinquish UUT Grant from the SAS Test Harness</li> </ul>		
2	<ul> <li>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</li> <li><i>cbsdld</i> = C</li> <li><i>grantld</i> = G</li> </ul>		
3	<ul> <li>SAS Test Harness shall send a Relinquishment Response message with parameters:</li> <li><i>cbsdld</i> = C</li> <li>No <i>grantld</i></li> <li><i>responseCode</i> = R</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	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</li> <li>UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</li> </ul>	⊠PASS	□FAIL





# 5.4.3 [WINNF.FT.D.RLQ.5] Unsuccessful Relinquishment, responseCode=103

#	Test Execution Steps	Results	
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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>cbsdld</i>=C</li> <li>UUT has received a valid grant with <i>grantld</i> = G</li> <li>UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> <li>nvoke trigger to Relinquish UUT Grant from the SAS Test Harness</li> </ul>	-	
2	<ul> <li>UUT sends a Relinquishment Request message. Verify message contains all required parameters properly formatted, and specifically:</li> <li><i>cbsdld</i> = C</li> <li><i>grantld</i> = G</li> </ul>		
3	<ul> <li>SAS Test Harness shall send a Relinquishment Response message with parameters:</li> <li><i>responseCode</i> (R) = 103</li> <li><i>responseData</i> = "grantId"</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	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify:</li> <li>UUT stopped RF transmission at any time between triggering the relinquishment and UUT sending the relinquishment request</li> </ul>	⊠PASS	□FAIL



# **5.5 CBSD Deregistration Process**

### 5.5.1 [WINNF.FT.D.DRG.1] Successful Deregistration

#	Test Execution Steps	Results	
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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>cbsdld</i>=C</li> <li>UUT has received a valid grant with <i>grantld</i> = G</li> <li>UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> <li>Invoke trigger to deregister each UUT from the SAS Test Harness</li> </ul>		
2	UUT may send a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0		
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdld</i> = C		
4	<pre>SAS Test Harness shall approve the request with a Deregistration Response message with parameters:</pre>		
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	<ul> <li>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:</li> <li>UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:</li> <li>A. UUT sending a Registration Request message, as this is not mandatory</li> <li>B. UUT sending a Deregistration Request message</li> </ul>	⊠PASS	□FAIL



# 5.5.2 [WINNF.FT.D.DRG.3] Deregistration responseCode=102

#	Test Execution Steps	Res	ults
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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>cbsdld</i>=C</li> <li>UUT has received a valid grant with <i>grantld</i> = G</li> <li>UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> <li>Invoke trigger to deregister UUT from the SAS Test Harness</li> </ul>		
2	UUT may send a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0		
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdld</i> =C		
4	<ul> <li>The SAS Test Harness sends the Deregistration Response Message to UUT with:</li> <li>No <i>cbsdld</i></li> <li><i>responseCode</i> = 102</li> </ul>		
5	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.		
6	<ul> <li>Monitor the RF output of each UUT from start of test until 60 seconds after Step 4 is complete. This is the end of the test. Verify:</li> <li>UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:</li> <li>A. UUT sending a Registration Request message, as this is not mandatory</li> <li>B. UUT sending a Deregistration Request message</li> </ul>	⊠PASS	□FAIL



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

#	Test Execution Steps	Results	
1	<ul> <li>Ensure the following conditions are met for test entry:</li> <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>cbsdld</i>=C</li> <li>UUT has received a valid grant with <i>grantld</i> = G</li> <li>UUT is in Grant State AUTHORIZED and is actively transmitting within the bounds of its grant.</li> <li>Invoke trigger to deregister UUT from the SAS Test Harness</li> </ul>		
2	UUT may send a Relinquishment request and receives Relinquishment response with <i>responseCode</i> =0		
3	UUT sends Deregistration Request to SAS Test Harness with <i>cbsdld</i> = C		
4	<ul> <li>The SAS Test Harness sends the Deregistration Response Message to UUT with:</li> <li><i>responseCode</i> (R) = 103</li> <li><i>reponseData</i> = "cbsdld"</li> </ul>		
5	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.		
6	<ul> <li>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:</li> <li>UUT stopped RF transmission at any time between triggering the deregistration and either A OR B occurs:</li> <li>A. UUT sending a Registration Request message, as this is not mandatory</li> <li>B. UUT sending a Deregistration Request message</li> </ul>	⊠PASS	□FAIL





### 5.6 CBSD Security Validation

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

#	Test Execution Steps	Res	ults
1	<ul> <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>	⊠PASS	□FAIL
2	<ul> <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> <li>TLS_RSA_WITH_AES_128_GCM_SHA256</li> <li>TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA2 56</li> <li>TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA3 84</li> <li>TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256</li> </ul> </li> </ul>	⊠PASS	□FAIL
3	<ul> <li>A successful registration is accomplished using one of the test cases described in section 6.1.4.1, depending on CBSD capability.</li> <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>cbsdld</i>.</li> </ul>	⊠PASS	□FAIL
4	Monitor the RF output of the UUT from start of test until 60 seconds after Step 3 is complete. This is the end of the test. Verify: <ul> <li>UUT shall not transmit RF</li> </ul>	⊠PASS	□FAIL

#### Wireshark Capture Example for Test Case:

WIN A	INF.FT.C.SCS.1.pcapng				- 0		×
파일(F	) 편십(E) 보기(V) 이동(G) 겹쳐(	(C) 문식(A) 동계(S) 선호	파(Y) 부선(W) 노구(T) 노움말(H)	)			
	1 Z 🛛 🖡 🗎 🖄 🖸 🤇 🖛 🖷	* 🖆 🕈 🛨 📃 📃 🍳	. લ લ 🏨				
<u>,</u> 현/	레 필터: tls						+
No.	Time	Source	Destination	Protocol	Lengti Info		- ^
4	144 2024-12-05 15:13:33.481129	172.21.130.50	172.21.130.15	TLSv1.2	430 Client Hello		Ξ.
	145 2024-12-05 15:13:33.496146	172.21.130.15	172.21.130.50	TLSv1.2	1464 Server Hello		
+	147 2024-12-05 15:13:33.496146	172.21.130.15	172.21.130.50	TLSv1.2	591 Certificate, Server Key Exchange, Certificate Request, Server Hello Done		
	150 2024-12-05 15:13:33.500250	172.21.130.50	172.21.130.15	TLSv1.2	1169 Certificate		
	151 2024-12-05 15:13:33.501184	172.21.130.50	172.21.130.15	TLSv1.2	129 Client Key Exchange		
	152 2024-12-05 15:13:33.501184	172.21.130.50	172.21.130.15	TLSv1.2	323 Certificate Verify		
	153 2024-12-05 15:13:33.501184	172.21.130.50	172.21.130.15	TLSv1.2	60 Change Cipher Spec		
	154 2024-12-05 15:13:33.501184	172.21.130.50	172.21.130.15	TLSv1.2	99 Encrypted Handshake Message		
	156 2024-12-05 15:13:33.504571	172.21.130.15	172.21.130.50	TLSv1.2	105 Change Cipher Spec, Encrypted Handshake Message		
	157 2024-12-05 15:13:33.506938	172.21.130.50	172.21.130.15	TLSv1.2	702 Application Data		
	158 2024-12-05 15:13:33.541747	172.21.130.15	172.21.130.50	TLSv1.2	100 Application Data		
	160 2024-12-05 15:13:33.587963	172.21.130.15	172.21.130.50	TLSv1.2	545 Application Data, Application Data, Application Data, Application Data, Application Data	, A	
	162 2024-12-05 15:13:33.589003	1/2.21.130.50	1/2.21.130.15	TLSv1.2	85 Encrypted Alert		
	1/0 2024-12-05 15:13:33.625580	1/2.21.130.50	1/2.21.130.15	TLSv1.2	430 Client Hello		
	171 2024-12-05 15:13:33.641346	172.21.130.15	172.21.130.50	TLSv1.2	1464 Server Hello		
	173 2024-12-05 15:13:33.641346	172.21.130.15	172.21.130.50	TLSv1.2	591 Certificate, Server Key Exchange, Certificate Request, Server Hello Done		
	176 2024-12-05 15:13:33.645145	172.21.130.50	172.21.130.15	TLSv1.2	1169 Certificate		
	1// 2024-12-05 15:13:33.645145	1/2.21.130.50	1/2.21.130.15	TLSV1.2	129 Client Key Exchange		
	1/8 2024-12-05 15:13:33.645145	1/2.21.130.50	1/2.21.130.15	TLSv1.2	323 Certificate Verity		
	179 2024-12-05 15:13:33.645145	172.21.130.50	172.21.130.15	TLSVI.2	ob change cloner spec		
<	180 2024-12-05 15:15:33.645145	1/2.21.130.50	1/2.21.130.15	11591.2	99 Encrypted Handshake Hessage	>	- *
	Length: 89				A 2000 CP 69 70 21 00 00 01 FF 01 00 01 00 00 00 00 00 01		
	Handshake Protocol: Server He	110			0090 03 00 01 02 16 03 03 0b 35 0b 00 0b 31 00 0b 2e 51		
	Handshake Type: Server Hel	10 (2)			00a0 00 05 17 30 82 05 13 30 82 02 fb a0 03 02 01 0200		
	Length: 85				00b0 02 14 26 ce 45 9e 2a 97 8c e7 a2 2a 98 48 0a 7c ····8·E·*· ···*·H-		
	Version: TLS 1.2 (0x0303)						
	> Random: 96b6e2a41e623e1af2	246fdf6b8148191555023edt	0821c34052808fb9d149299		00e0 13 02 55 53 31 12 30 10 06 03 55 04 0a 0c 09 57 ··US1-0···UV		
	Session ID Length: 32				00f0 49 6e 6e 46 6f 72 75 6d 31 18 30 16 06 03 55 04 InnForum 1.0U		
	Session ID: ab35bf38708ad9	2cde626fe2933f102218ddd8	868bc4d4d8992f4c89ddecace69		0100 06 0c 0f 52 53 41 20 52 4f 4f 54 20 43 41 39 30 ····RSA R 00T CA90		
	Cipher Suite: TLS_ECDHE_RS	A WITH AES 128 GCM SHA25	56 (0xc02f)		910 30 31 31 16 30 16 00 03 53 04 05 06 15 37 49 06 011 0 Win		
	Compression Method: null (	0)			0130 43 41 30 1e 17 0d 32 34 31 31 30 35 30 32 31 31 CA024 11050211		
	Extensions Length: 13				0140 35 31 5a 17 0d 32 35 30 35 30 34 30 32 31 31 35 512-250 50402115		
	> Extension: renegotiation_i	nfo (len=1)			0150 31 5a 30 5b 31 0b 30 09 06 03 55 04 06 13 02 55 120[1-0U		
	> Extension: ec_point_format	s (len=4)			0100 55 51 12 30 10 00 05 55 04 00 00 95 74 90 00 06 51 0 0 0 0 0 0 0 0 0		
	[JA3S Fullstring: 771,4919	9,65281-11]			0180 52 53 41 20 52 4f 4f 54 20 43 41 39 30 30 31 31 RSA ROOT CA90011		
	[JA3S: 303951d4c50efb2e991	652225a6f02b1]			0190 1e 30 1c 06 03 55 04 03 0c 15 57 49 6e 6e 46 6f •0•••U•• •WInnFo		
	TLS segment data (1316 bytes)				01a0 72 75 6d 20 52 53 41 20 52 6f 6f 74 20 43 41 30 rum RSA Root CA0		
1							
	Ciphor Suite (the bandshake sinhers	uite) 2HF01E			一 前打 合, 222、東川県, 36/9 19(1)、上計駅, 0/0.09(1) 東京	a 10. p.	fault
0	Cipher Suite (us.nandsnake.cipherst	nice), zeror			백것 구: 322 · 표시점: 20(6.1%) · 구락점: 0(0.0%) 프크	2 E. De	adult



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

#	Test Execution Steps							Results				
1	● (	JUT shall start CBS	SD-SAS comm	nunicatio	n with	the s	ecurity p	rocedur	es		⊠PASS	□FAIL
	• •	/lake sure that UU	T uses TLS v1	.2 for sec	urity e	establ	ishment.					
	• •	/lake sure UUT sel	ects the corre	ect ciphe	r suite.							
2	● (	JUT shall use CRL	or OCSP to ve	erify the v	/alidity	/ of th	e server	certifica	te.		⊠PASS	□FAIL
	• •	lake sure that Mu	tual authentio	cation do	oes not	: happ	oen betw	een UUT	and the	SAS Test		
	ŀ	larness.										
3	UUT may re	etry for the securit	y procedure v	which sha	all fail						⊠PASS	
4	SAS Test-H	arness shall not re	ceive any Reg	gistratior	n requ	est or	any appl	ication o	lata.			
	Monitor the	e RF output of the	UUT from sta	rt of test	until 6	i0 sec	onds afte	er Step 3	is comp	lete. This		
5	is the end c	of the test. Verify:									⊠PASS	□FAIL
	● (	JUT shall not trans	smit RF									
WINNE.FT.C.SC3           파일(F)         편집(E)           교         값         ②           표시 필터 적용         No.         Time           188 2024-1         182 2024-1         183 2024-1           182 2024-1         183 2024-1         184 2024-1           185 2024-1         185 2024-1         185 2024-1	S2pcapng ±7(\\) 0\€(G) 23 <sup>4</sup> ■ 2 2 (\) 0\€(G) 23 <sup>4</sup> ■ 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	(C) 분석(A) 통계(S) 전화(Y) 두 Source 172, 21, 130, 50 172, 21, 130, 50 172, 21, 130, 15 172, 21, 130, 15	선(W) 도구(T) 도움멓(H) 표 Destination 172. 21. 136. 15 172. 21. 136. 50 172. 21. 136. 50 172. 21. 136. 50 172. 21. 136. 50 172. 21. 136. 51	Protocol TCP TLSv1.2 TLSv1.2 TCP TLSv1.2 TCP	Length Infe 60 165 571 CLi 1464 See 738 Cer 60 165	) 79 → 5000 ent Hello ver Hello 0 → 16579 tificate, 79 → 5000	[ACK] Seq=1 Ack [ACK] Seq=1411 A Server Key Exch [ACK] Seq=518 A	1 Win=65536 Le Lck−518 Win=130 unge, Certifica Lck−111 Win=686	n=0 560 Len=1410 [] te Request, Ser 88 Len=0	ICP segment of a ri vver Hello Done	eassembled PDU]	- • ×
188 2024-1 187 2024-1 188 2024-1	12-09 10:12:33.718166 12-09 10:12:33.718166 12-09 10:12:33.718166	172.21.130.50 172.21.130.50 172.21.130.50	172.21.130.15 172.21.130.15 172.21.130.15	TLSv1.2 TCP	61 Ale	rt (Level 79 + 5000	Fatal, Descript [RST, ACK] Seq=	ion: Certifica	te Revoked) n=72704 Len=0			
190 2024-7 191 2024-1 193 2024-1 193 2024-1 195 2024-1 195 2024-1 195 2024-1 195 2024-1 197 2024-1 200 2024-2 201 2024-2 201 2024-2 202 2024-2 201 2024-2 202 2024-2 203 2024-2 205 2024-1 205 205-1 205	12-00 10:12:34.497202 12-00 10:12:34.497202 12-00 10:12:35.00511 12-00 10:12:35.00511 12-00 10:12:35.00514 12-00 10:12:35.00514 12-00 10:12:35.00510 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00520 12-00 10:12:35.00505 12-00 10:12:35.00505 12-00 10:12:35.00505 12-00 10:12:35.00550 12-00 10:12:35.00550 13-05 10:12:35.00555 15-05 10:05	RealtekSenic_f1:35:9e 0.0.00 SuperMicroCo_de:09:1da SuperMicroCo_de:09:1da RealtekSenic_f1:35:9e 0.00.00 SuperMicroCo_de:09:1da RealtekSenic_f1:35:9e 0.00.00 SuperMicroCo_de:09:1da RealtekSenic_f1:35:9e 172.21:130.55 172.21:150.55 172.21:150.55 172.21:150.55 172.21:150.55 172.21:150.55 172.21:15	Broadcast 255,255,255,255 Broadcast Broadcast Broadcast Broadcast Broadcast Broadcast Broadcast Broadcast 172,21,180,50 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,21,20 172,20	ARP DHCP ARP ARP ARP ARP ARP ARP ARP DHCP TCP TCP TCP TCP TCP TCP TCP T	60         Mhc           342         DHC           60         Mhc           71         485           65         595           64         485           71         1146           57         124           738         Cer           64         485           771         0	has 172.; P Discover has 172.; has 172.; has 172.; has 172.; has 172.; has 172.; has 172.; has 172.; has 172.; S5 = \$000 0 + 48555 55 = \$000 00 + 48555 555 = \$000 00 + 48555 555 = \$000 00 + 48555 151 151 161 00 + 48555 161 161 00 + 48555 161 161 00 + 48555 161 161 00 + 48555 161 161 161 00 + 48555 161 161 161 161 161 161 161 161 161	1.130.17 Fell 13 . Transaction 1 1.130.17 Fell 13 1.130.17 Fell 13 (ACK) Seq=1464 (ACK) Seq=1464 (ACK) Seq=1464 Server Kay Exch. (ACK) Seq=1411 Server Kay Exch. (ACK) Server Kay Exch. (AC	2,21,10,51 (0 beab3433) 2,21,10,59 2,21,10,59 2,21,10,59 2,21,10,51 2,21,10,51 2,21,10,51 2,21,10,51 2,21,10,51 0,000343431 2,21,10,51 0,000343431 2,21,10,51 10,000343431 2,21,10,51 10,000343431 2,21,10,51 10,0003431 2,21,10,51 10,0003431 10,	S-1410 SACK PE n=0 8832 Len-1410 to Request, So 1 I==0 1 & 0 & 0 & 0 & 0 1 & 0 & 0 & 0 & 0 & 0 1 & 0 & 0 & 0 & 0 & 0 1 & 0 & 0 & 0 & 0 & 0 & 0 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &	H TSval=123569987 160 kS=256 Sack_PFI 1709 segment of a 1 ver Hello Done 171922 - S2 	9 TSecn-0 WS+512 00	
<	FT.C.SCS.2.pcapng				>				패킷 수: 232 ·	표시됨: 232(100.0%) ·	누락됨: 0(0.0%)	프로필: Default



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

#		Results					
1	• UI	JT shall start CBS	SD-SAS comm	nunicatio	on with the security procedures	⊠PASS	□FAIL
	• Make sure that UUT uses TLS v1.2 for security establishment.						
	• M	ake sure UUT sele	ects the corre	ect cipher	r suite.		
2	• UI	JT shall use CRL	or OCSP to ve	erify the v	alidity of the server certificate.	⊠PASS	□FAIL
	• M	ake sure that Mut	tual authenti	cation do	bes not happen between UUT and the SAS		
	Te						
3	UUT may ret	⊠PASS	□FAIL				
4	SAS Test-Ha	rness shall not re	ceive any Re	gistratior	n request or any application data.		
	Monitor the	RF output of the	UUT from sta	rt of test	until 60 seconds after Step 3 is complete. This		
5	is the end of	the test. Verify:				⊠PASS	□FAIL
	• UI	JT shall not trans	smit RF				
Wiresha *이더넷 파일(F) 편집(E) 표시 찍더 전 표시 찍더 전		Example for Tes 문석(A) 통계(S) 전화(M) 무 호 후 호 호 (도) 등 역 역 역	et Case: 선(w) 도구(T) 도용말(H) 표	)			- • ×
No.         Time           1 70 2034.         171 2024.           1 72 2024.         173 2024.           1 73 2024.         173 2024.           1 75 2024.         176 2024.           1 76 2024.         177 2024.           1 78 2024.         179 2024.           1 78 2024.         180 2024.           1 80 2024.         183 2024.           1 83 2024.         185 2024.           1 85 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024.           1 90 2024.         190 2024	12-09 10:27:30.853367 12-09 10:27:40.862552 12-09 10:27:40.862552 12-09 10:27:44.86653 12-09 10:27:44.86653 12-09 10:27:44.86653 12-09 10:27:44.86653 12-09 10:27:44.969139 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.91074 12-09 10:27:42.92133 12-09 10:27:42.92133 12-09 10:27:42.92133 12-09 10:27:42.92134 12-09 10:27:42.921434 12-09 10:27:42.921434 12-09 10:27:42.93146 12-09 10:27:42.93146 12-09 10:27:42.93146 12-09 10:27:42.93147 12-09 10:27:42.9	Source SuperHiterCo_det:01:da SuperHiterCo_det:01:da SuperHiterCo_det:01:da SuperHiterCo_det:01:da SuperHiterCo_det:01:da 177.21.130.50 177.21.21.21.21.21.21.21.21.21.21.21.21.21.	Desthation           Broadcast           Broadcast <t< td=""><td>Protocol ARP ARP ARP ARP ARP ARP TCP TCP TCP TCS TCP TCS TCP TLSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCP TCSV1.2 TCP TCP TCP TCP TCP TCP TCP TCP TCP TCP</td><td>Lengt Info 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.17 Tell 172.21.130.50 61 Who has 172.21.130.17 Tell 172.21.130.50 62 Who has 172.21.130.17 Tell 172.21.130.50 63 Who has 172.21.130.17 Tell 172.21.130.50 64 Who has 172.21.130.17 Tell 172.21.130.50 74 6333 = 5000 [CK] Seq=0 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 65 5000 + 6333 [SW, CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 65 5000 + 66 5033 [CW, CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 75 Clinth Hello 1645 5000 + 66333 [CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 66 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 67 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged 66 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged 67 6033 - 5000 [ACK] Seq=513 Atch NumeS555 Lenged 67 60 Who has 172.21.130.17 Tell 172.21.130.50 68 Who has 172.21.130.17 Tell 172.21.130.50 69 Who has 172.21.130.17 Tell 172.21.130.50 69 Who has 172.21.130.17 Tell 172.21.130.50 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.17 Tell 172.21.130.50 60 Who has 172.21.130.167 Tel</td><td>S TSecr=0 MS=512 M reassembled PDU] 3 TSecr=0 MS=512 M</td><td></td></t<>	Protocol ARP ARP ARP ARP ARP ARP TCP TCP TCP TCS TCP TCS TCP TLSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCSV1.2 TCP TCP TCP TCSV1.2 TCP TCP TCP TCP TCP TCP TCP TCP TCP TCP	Lengt Info 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.17 Tell 172.21.130.50 61 Who has 172.21.130.17 Tell 172.21.130.50 62 Who has 172.21.130.17 Tell 172.21.130.50 63 Who has 172.21.130.17 Tell 172.21.130.50 64 Who has 172.21.130.17 Tell 172.21.130.50 74 6333 = 5000 [CK] Seq=0 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 65 5000 + 6333 [SW, CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 65 5000 + 66 5033 [CW, CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 75 Clinth Hello 1645 5000 + 66333 [CK] Seq=1 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 66 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged MSS-1420 SACK_PEM Tsval=323660409 67 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged 66 6033 - 5000 [ACK] Seq=13 Atch NumeS555 Lenged 67 6033 - 5000 [ACK] Seq=513 Atch NumeS555 Lenged 67 60 Who has 172.21.130.17 Tell 172.21.130.50 68 Who has 172.21.130.17 Tell 172.21.130.50 69 Who has 172.21.130.17 Tell 172.21.130.50 69 Who has 172.21.130.17 Tell 172.21.130.50 60 Who has 172.21.130.167 Tell 172.21.130.50 60 Who has 172.21.130.17 Tell 172.21.130.50 60 Who has 172.21.130.167 Tel	S TSecr=0 MS=512 M reassembled PDU] 3 TSecr=0 MS=512 M	
<						- 85 85. 0/0 09/3	T ARL D. C - L



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

#		Results						
1	• L	JUT shall start CB	SD-SAS commu	unicatio	on with the security procedures	⊠PASS	□FAIL	
2	• M • M • L	<ul> <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</li> </ul>						
3	T LILIT may re	MDASS						
			.y procedure w					
4	SAS Test-Ha	arness shall not re	eceive any Regi	stratior	n request or any application data.			
5	Monitor the is the end o ● U	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> <li>UUT shall not transmit RF</li> </ul>						
Wiresha *이더넷 파일(F) 편집(E) ( 표시 필터 적용	ark Capture 보기(M) 이동(G) 접체 	Example for Te	st Case: Pd(w) 도구(t) 도용발(H) 표				- • ×	
No.         Time           61 2024.         62 2024.           62 2024.         66 2024.           64 2024.         66 2024.           65 2024.         66 2024.           65 2024.         66 2024.           66 2024.         68 2024.           70 2024.         77 2024.           71 2024.         72 2024.           72 2024.         73 2024.           73 2024.         78 2024.           82 2024.         82 2024.           83 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           85 2024.         82 2024.           9 Frame 75:         6           9 Frame 75:         6           9 Frame 75:         6           9 Framer 51:         1      1	12-09 10:29:55.128776 12-09 10:29:55.128776 12-09 10:29:55.934926 12-09 10:29:55.934926 12-09 10:29:55.935976 12-09 10:29:55.94524 12-09 10:29:55.94524 12-09 10:29:55.94524 12-09 10:29:55.94524 12-09 10:29:55.94524 12-09 10:29:55.93564 12-09 10:29:55.93564 12-09 10:29:55.931967 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.959 12-09 10:29:55.956 12-09 10:29:55.956 1	Source SuperHitcroCo_der:09:da SuperHitcroCo_der:09:da SuperHitcroCo_der:09:da SuperHitcroCo_der:09:da SuperHitcroCo_der:09:da 172.21.130.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.230.50 172.21.250 172.250 172.250 172.250 172.250 172.250 172.250 172.250 172.250	Destination Broadcast Broadcast Broadcast Broadcast SuperNicroCo_de:09:da 172,21,130,15 172,21,130,15 172,21,130,15 172,21,130,15 172,21,130,50 172,21,130,50 172,21,130,50 172,21,130,50 172,21,130,15 172,21,20,20 172,21,20,20 172,21,20,20 1	Protocol ARP ARP ARP CP TCP TCP TCP TCP TCP TCP TCP TCP TCP	Length Info 6 Who has 172, 21, 130, 127 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 157 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 167 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50 6 Who has 172, 21, 130, 17 Tell 172, 21, 130, 50	i TSecr-0 MS-512 M Passembled POU] I TSecr-0 MS=512 M		
<	ark_이더넷ERNAY2.pcapng				→ 패킷 수: 96 · 표시된: 96/100.0%) · ル=	락됨: 0(0.0%)	프로필: Default	



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

#		Results						
1	• U	⊠PASS	□FAIL					
	• M	ake sure that UU	T uses TLS v1.2	for se	curity establishment.			
	• M							
2	• U	⊠PASS	□FAIL					
	• M	ake sure that Mu	tual authentica	tion d	oes not happen between UUT and the SAS			
	T	est Harness.						
3	UUT may re	try for the securi	ty procedure wl	hich sh	nall fail.	⊠PASS	□FAIL	
4	SAS Test-Ha	rness shall not r	eceive any Regi	stratio	n request or any application data.			
	Monitor the	RF output of the	UUT from start	oftes	t until 60 seconds after Step 3 is complete. This			
5	5 is the end of the test. Verify:							
	• U	UT shall not tran	smit RF					
Wiresha	ark Capture	Example for Te	st Case:					
▲*이더넷 파일/도) 편징/(E)	. 비기스스 이동(G) 캐처	- - 보서(A) 토계(C) 저하(A) -					- • ×	
▲ ■ ∠ ⊙	📕 🛅 🖹 🙆 🍳 👄 🖬	• = • • = = = • • •	₹ II					
표시 필터 적용	<del>8</del> <ctrl-></ctrl->							
No. Time		Source	Destination	Protocol	Length Info		^	
103 2024-	-12-09 10:33:03.327610	0.0.0.0 SuperMicroCo.de:d9:da	255.255.255.255 Broadcast	DHCP	342 DHCP Discover - Transaction ID 0x7e88edle			
105 2024-	-12-09 10:33:03.839083	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who has 172.21.130.15? Tell 172.21.130.50			
106 2024-	12-09 10:33:03.839146	SamsungElect_1d:a9:77	SuperMicroCo_de:d9:da	ARP	42 172.21.130.15 is at 8c:b0:e9:1d:a9:77			
107 2024-	12-09 10:33:03.840720	172.21.130.50	172.21.130.15	TCP	74 30069 + 5000 [SYN] Seq=0 Win=65535 Len=0 MSS=1410 SACK_PERM TSval=3236925026	TSecr=0 WS=512		
109 2024-	-12-09 10:33:03.843132	172.21.130.19	172.21.130.15	TCP	60 30069 + 5000 [SIN] ACK] Seq=0 ACK=1 Win=65536 Len=0	n		
110 2024-	12-09 10:33:03.847609	172.21.130.50	172.21.130.15	TLSv1.2	571 Client Hello			
111 2024-	4-12-09 10:33:03.856957 172.21.130.15 172.21.130.50 TLSv1.2 1464 Server Hello							
112 2024-	-12-09 10:33:03.856957 122.21.130.15 172.21.130.50 TCP 1464 5000 - 30069 [ACK] Seq=1411 Ack=518 Win=130560 Len=1410 [TCP segment of a r							
114 2024-	-12-09 10:33:03.859341	172.21.130.50	172.21.130.15	тср	60 30069 → 5000 [ACK] Seq-518 Ack-1411 Win-68608 Len-0			
115 2024-	12-09 10:33:03.859341	172.21.130.50	172.21.130.15	TCP	60 30069 → 5000 [ACK] Seq-518 Ack-2821 Win-71680 Len-0			
116 2024-	-12-09 10:33:03.859341	172.21.130.50	172.21.130.15	TCP	60 30069 + 5000 [ACK] Seq=518 Ack=3358 Win=74240 Len=0			
11/ 2024- 118 2024-	-12-09 10:33:03.860186	172.21.130.50	172.21.130.15	TCP	60 30069 + 5000 [RST. ACK] Seg=525 Ack=3358 Win=74240 Len+8			
119 2024-	-12-09 10:33:04.799284	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who has 172.21.130.1? Tell 172.21.130.50			
120 2024-	12-09 10:33:05.765184	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who has 172.21.130.16? Tell 172.21.130.50			
121 2024-	4-12-09 10:35:05.82305 SUPPMICROCO_de:09:da Broadcast APP 60 Who has 172.21.130.17 Tell 172.21.130.50 A1.1.00 10:31:06.78179 SuperMicroCo_de:09:da Broadcast APP 60 Who has 172.21.130.17 Tell 172.31.170.51							

	121 2024-12-09 10:33:05.823095	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who h	has 172.21.130.1? Tell 172.21.130.50	
	122 2024-12-09 10:33:06.781729	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who h	has 172.21.130.167 Tell 172.21.130.50	
	123 2024-12-09 10:33:06.847089	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who h	has 172.21.130.1? Tell 172.21.130.50	-
	124 2024-12-09 10:33:07.534517	RealtekSemic_f1:35:9e	Broadcast	ARP	60 Who h	has 172.21.130.1? Tell 172.21.130.51	
	125 2024-12-09 10:33:07.805713	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who h	has 172.21.130.16? Tell 172.21.130.50	-
	126 2024-12-09 10:33:07.870976	SuperMicroCo_de:d9:da	Broadcast	ARP	60 Who h	has 172.21.130.1? Tell 172.21.130.50	
	127 2024-12-09 10:33:08.518347	RealtekSemic_f1:35:9e	Broadcast	ARP	60 Who h	has 172.21.130.1? Tell 172.21.130.51	-
	128 2024-12-09 10:33:08.830109	172.21.130.50	172.21.130.15	TCP	74 28688	8 → 5000 [SYN] Seq=0 Win=65535 Len=0 MSS=1410 SACK_PERM TSval=3236930018 TSecr=0 WS=512	
	129 2024-12-09 10:33:08.830335	172.21.130.15	172.21.130.50	TCP	66 5000	) → 28688 [SYN, ACK] Seq=0 Ack=1 Win=65535 Len=0 MSS=1460 WS=256 SACK_PERM	-
	130 2024_12_00 10+33+08 831050	170 01 130 50	172 21 130 15	TCP	60 28688	12 + 5000 FACK1 San=1 Ark=1 Win=65536 Lan=0	~
<						>	
>	Frame 117: 61 bytes on wire (488 bits)	, 61 bytes captured (488 bits)	on interface \Device\NF	F {887DE53D-0660-4	47F! 000	00 8c b0 e9 1d a9 77 3c ec ef de d9 da 08 00 45 00 ·····w<· ····E·	
5	Ethernet II. Src: SuperMicroCo de:d9:d	da (3c:ec:ef:de:d9:da), Dst: Sam	sungElect 1d:a9:77 (8c:	b0:e9:1d:a9:77)	001	10 00 2f 59 92 40 00 3f 06 85 ca ac 15 82 32 ac 15 -/Y.@.?2	
5	Internet Protocol Version 4, Src: 172.	21.130.50. Dst: 172.21.130.15			002	20 82 0f 75 75 13 88 ce 1c 22 94 a0 f9 c5 98 50 18	
5	Transmission Control Protocol, Src Por	t: 30069, Dst Port: 5000, Seg:	518. Ack: 3358. Len: 7		003	30 00 91 25 82 00 00 15 03 03 00 02 02 33 ··· <b>ホ</b> ·································	
5	Transport Laver Security		,,				
<					>		

wireshark\_이터넷J7HRY2.pcapng

패킷 수: 144 · 표시됨: 144(100.0%) · 누락됨: 0(0.0%) 프로필: Default



### 5.7 CBSD RF Power Measurement

# 5.7.1 [WINNF.PT.C.HBT.1] UUT RF Transmit Power Measurement

#	Test Execution Steps	Results	
	Ensure the following conditions are met for test entry:		
	• UUT has successfully completed SAS Discovery and Authentication with the SAS Test		
	Harness		
	<ul> <li>UUT has registered with the SAS, with CBSD ID = C</li> </ul>		
	• 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		
1	far past the duration of this test case		
	Note: in order for the UUT to request a grant with the parameters		
	<i>{lowFrequency, highFrequency, maxEirp), the SAS Test Harness may need to provide appropriate</i>		
	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.	<u> </u>	
	UUT and SAS Test Harness perform a series of Heartbeat Request/Response cycles, which		
	continues until the other test steps are complete. Messaging for each cycle is as follows:		
	• UUT sends Heartbeat Request, including:		
	• <i>cbsdld</i> =C		
2	∘ <i>grantId</i> = G		
	<ul> <li>SAS Test Harness responds with Heartbeat Response, including:</li> </ul>		
	• <i>cbsdld</i> =C		
	• grant/d=G		
	<ul> <li>transmitExpireTime = current UTC time + 200 seconds</li> </ul>		
	• responseCode=0		
	rester performs power measurement on RF interface(s) of 001, and verifies it complies with the		
	induce additional configuration of the UUT, as required to fulfil the requirements of the neuron		
	measurement method		
3	measurement method.	⊠PASS	□FAIL
	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.		



#### • RF Power Measurements

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

Frequency [MHz]				Cond						
	Bandwidth [MHz]	Granted maxEIRP [dBm/MHz]	Tx1 Conducted PSD [dBm/MHz]	Tx2 Conducted PSD [dBm/MHz	Tx3 Conducted PSD [dBm/MHz	Tx4 Conducted PSD [dBm/MHz]	Total Conducted PSD [dBm/MHz]	Duty Cycle Factor (dB)	Antenna Gain [dBi]	maxEIRP [dBm/MHz]
3624.99	40	37	10.968	11.656	11.287	11.242	17.32	1.60	14.00	35.93
3624.99	40	31	5.642	5.696	5.837	5.502	11.69	1.60	14.00	30.30
3624.99	40	25	0.255	0.332	0.297	0.247	6.30	1.60	14.00	24.91



#### • Plots of RF Power Measurements









More 1 of 2

er 3.62499 GHz BW 1.0 MHz

#VBW 3.0 MHz

Span 80.00 MH reep 10.00 ms (1001 pt

# Granted max EIRP = 31 dBm/MHz

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enter 3.62499 GHz tes BW 1.0 MHz

#VBW 3.0 MHz

More 1 of 2

Span 80.00 MHz eep 10.00 ms (1001 pts





More 1 of 2

Span 80.00 MH p 10.00 ms (1001 pt nter 3.62499 GHz es BW 1.0 MHz

#VBW 3.0 M

Granted max EIRP = 25 dBm/MHz

enter 3.62499 GHz es BW 1.0 MHz

#VBW 3.0 MH:

More 1 of 2

Span 80.00 Mi ep 10.00 ms (1001 pt



# **6. TEST LOGS**

Please refer to the attached file named 'Test Logs'



# 7. TEST SETUP PHOTOGRAPHS



- End -

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