

Test Report

As per

FCC Part 96 SAS requirements (CBRS Test Plan)

on the

**Ericsson Remote Radio Unit LTE KRC 161 711/1
Radio 2208 B48 (3550-3700MHz)**

Issued by:
**TÜV SÜD Canada
Inc.**
2972 Joseph-A-
Bombardier
Laval, QC, H7P 6E3
Canada
Ph: (450) 687-4976

Scott Drysdale.
Test Personnel



Abderrahmane Ferhat
Report Reviewer



Canada

**Choose certainty.
Add value.**

Testing produced for

Ericsson Canada

See Appendix A for
full client & EUT
details.



Testing Laboratory
Certificate #2955.02

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Table of Contents

Table of Contents	2
Report Scope	3
Summary	4
Test Results Summary	5
Notes, Justifications, or Deviations	14
Applicable Standards, Specifications and Methods	15
Document Revision Status	16
Definitions and Acronyms	17
Testing Facility	18
Calibrations and Accreditations	18
Testing Environmental Conditions and Dates	19
Detailed Test Results Section	20
Authorization transmit after it receives authorization from a SAS	21
Check the device registration and authorization with the SAS	31
Confirm that the device changes its operating power and/or channel in response to a command from the SAS and Confirm that the device correctly configures based on the different license classes.	31
Confirm that the device transmits at a power level less than or equal to the maximum power level approved by the SAS	54
WINNF Security Test Case Analysis	65
WINNF.FT.C.SCS.1	65
WINNF.FT.C.SCS.2	70
WINNF.FT.C.SCS.3	77
WINNF.FT.C.SCS.4	82
WINNF.FT.C.SCS.5	86
Appendix A – EUT & Client Provided Details	92
Technical Description	94
Appendix B – EUT, Peripherals, and Test Setup Photos	95

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Report Scope

This report addresses the EMC verification testing and test results of the **LTE KRC 161 711/1 Radio 2208 B48(3550-3700 MHz)** herein referred to as EUT (Equipment Under Test). The EUT was tested for compliance against the following standards:

FCC Part 96 SAS requirements (CBRS Test Plan)

. Test procedures, results, justifications, and engineering considerations, if any, follow later in this report.

For a more detailed list of the standards and the revision used, see the "Applicable Standards, Specifications and Methods" section of this report.

This report does not imply product endorsement by any government, accreditation agency, or TÜV SÜD Canada Inc.

Opinions or interpretations expressed in this report, if any, are outside the scope of TÜV SÜD Canada Inc accreditations. Any opinions expressed do not necessarily reflect the opinions of TÜV SÜD Canada Inc, unless otherwise stated.


Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Summary

The results contained in this report relate only to the item(s) tested.

Equipment Under Test (EUT)	LTE KRC 161 711/1 Radio 2208 B48(3550-3700 MHz)
EUT passed all tests performed	Yes
Tests conducted by	Scott Drysdale


For testing dates, see 'Testing Environmental Conditions and Dates'.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


Test Results Summary

Section as per Working Document WINNF-TS-0122


Section	CBS D	D P	Test Case ID	Test Case Title	RF Measurement Requirement	Pass / Fail
6.1.4.1.1	X	--	WINNF.FT.C.R EG.1	Multi-Step registration	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.1.2	--	X	WINNF.FT.D.R EG.2	Domain Proxy Multi-Step registration	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.1.3	X	--	WINNF.FT.C.R EG.3	Single-Step registration for Category A CBSD	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.1.4	--	X	WINNF.FT.D.R EG.4	Domain Proxy Single-Step registration for Cat A CBSD (Note: Mandatory for without CPI, if EUT will always have signed CPI – asked for email waiver)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.1.5	X	--	WINNF.FT.C.R EG.5	Single-Step registration for CBSD with CPI signed data	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.1.6	--	X	WINNF.FT.D.R EG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.1.7	X	X	WINNF.FT.C.R EG.7	Registration due to change of an installation parameter	Test waits until transmission starts, then trigger an	P

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

					installationParam change. <ul style="list-style-type: none"> Record time at which transmission stops. Time must be within 60 seconds of the installationParam change taking effect. 	
6.1.4.2.1	X	--	WINNF.FT.C.R EG.8	Missing Required parameters (responseCode 102)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.2.2	--	X	WINNF.FT.D.R EG.9	Domain Proxy Missing Required parameters (responseCode 102)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.2.3	X	--	WINNF.FT.C.R EG.10	Pending registration (responseCode 200)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.2.4	--	X	WINNF.FT.D.R EG.11	Domain Proxy Pending registration (responseCode 200)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.2.5	X	--	WINNF.FT.C.R EG.12	Invalid parameter (responseCode 103)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.2.6	--	X	WINNF.FT.D.R EG.13	Domain Proxy Invalid parameters (responseCode 103)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.2.7	X	--	WINNF.FT.C.R EG.14	Blacklisted CBSD (responseCode 101)	Monitor for 60 seconds after REG message sent. No	N/A

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

					transmission during test.	
6.1.4.2.8	--	X	WINNF.FT.D.R EG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.2.9	X	--	WINNF.FT.C.R EG.16	Unsupported SAS protocol version (responseCode 100)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.2.10	--	X	WINNF.FT.D.R EG.17	Domain Proxy Unsupported SAS protocol version responseCode 100)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.2.11	X	--	WINNF.FT.C.R EG.18	Group Error (responseCode 201)	Monitor for 60 seconds after REG message sent. No transmission during test.	N/A
6.1.4.2.12	--	X	WINNF.FT.D.R EG.19	Domain Proxy Group Error (responseCode 201)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.1.4.3.1	X	X	WINNF.FT.C.R EG.20	Category A CBSD location update		N/A
6.3.4.2.1	X	X	WINNF.FT.C.G RA.1 (TYPO FIXED D TO C)	Unsuccessful Grant responseCode=400 (INTERFERENCE)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.3.4.2.2	X	X	WINNF.FT.C.G RA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
6.4.4.1.1	X	--	WINNF.FT.C.H BT.1	Heartbeat Success Case (first Heartbeat Response)	Monitor RF from start of test. Ensure that: <ul style="list-style-type: none"> Transmission does not start until time of first 	N/A

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


					<p>heartbeat response or after.</p> <ul style="list-style-type: none"> • After transmission starts, measure that transmission is within the granted channel (frequencyLow, frequencyHigh) 	
6.4.4.1.2	--	X	WINNF.FT.D.H BT.2	Domain Proxy Heartbeat Success Case (first Heartbeat Response)	<p>Monitor RF from start of test. Ensure that:</p> <ul style="list-style-type: none"> • Transmission does not start until time of first heartbeat response or after. • After transmission starts, measure that transmission is within the granted channel (frequencyLow, frequencyHigh) 	P
6.4.4.2.1	X	X	WINNF.FT.C.H BT.3	Heartbeat responseCode=105 (DEREGISTER)	<p>Monitor RF transmission. Ensure that:</p> <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of the heartbeatResponse which contains 	P

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


					responseCode = 105	
6.4.4.2.2	X	--	WINNF.FT.C.H BT.4	Heartbeat responseCode=500 (TERMINATED_GRANT)		N/A
6.4.4.2.3	X	X	WINNF.FT.C.H BT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	Monitor RF transmission from start of test. Ensure there is no transmission during the test	p
6.4.4.2.4	X	X	WINNF.FT.C.H BT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of heartbeatResponse which contains responseCode=501 	p
6.4.4.2.5	X	X	WINNF.FT.C.H BT.7	Heartbeat responseCode=502 (UNSYNC_OPERATION)	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of heartbeatResponse which contains responseCode=502 	p
6.4.4.2.6	--	X	WINNF.FT.D.H BT.8	Domain Proxy Heartbeat responseCode=500 (TERMINATED_GRANT)	Monitor RF transmission. CBSDs will have different behavior: <ul style="list-style-type: none"> • CBSD1: will continue to transmit to end of test 	P

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


					<p>(this is not a pass/fail criteria, but check)</p> <ul style="list-style-type: none"> • CBSD2: must stop transmission within 60 seconds of being sent heartbeatResponse with responseCode = 500 	
6.4.4.3.1	X	X	WINNF.FT.C.H BT.9	Heartbeat Response Absent (First Heartbeat)	Monitor RF from start of test to 60 seconds after last heartbeatResponse message was sent. CBSD should not transmit at any time during test	P
6.4.4.3.2	X	X	WINNF.FT.C.H BT.10	Heartbeat Response Absent (Subsequent Heartbeat)	Monitor RF transmission. Verify: <ul style="list-style-type: none"> • CBSD must stop transmission within transmitExpirationTime+60 seconds, where transmitExpirationTime is from last successful heartbeatResponse message 	P
6.5.4.2.1	X	--	WINNF.FT.C.M ES.1	Registration Response contains measReportConfig	No RF monitoring	N/A
6.5.4.2.2	--	X	WINNF.FT.D.M ES.2	Domain Proxy Registration Response contains measReportConfig	No RF monitoring	P

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.5.4.2.3	X	X	WINNF.FT.C.M ES.3	Grant Response contains measReportConfig	No RF monitoring	P
6.5.4.2.4	X	--	WINNF.FT.C.M ES.4	Heartbeat Response contains measReportConfig	No RF monitoring	N/A
6.5.4.2.5	--	X	WINNF.FT.D.M ES.5	Domain Proxy Heartbeat Response contains measReportConfig	No RF monitoring	P
6.6.4.1.1	X	--	WINNF.FT.C.R LQ.1	Successful Relinquishment	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission at any time prior to sending the relinquishmentRequest message. 	N/A
6.6.4.1.2	--	X	WINNF.FT.D.R LQ.2	Domain Proxy Successful Relinquishment	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission at any time prior to sending the relinquishmentRequest message. 	P
6.7.4.1.1	X	--	WINNF.FT.C.D RG.1	Successful Deregistration	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission at any time prior to sending the relinquishmentRequest message or deregistrationRequest message (whichever is sent first) 	N/A


Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.7.4.1.2	--	X	WINNF.FT.D.D RG.2	Domain Proxy Successful Deregistration	Monitor RF transmission. Ensure : • CBSD stops transmission at any time prior to sending the relinquishmentReque st message or deregistrationReques t message (whichever is sent first)	P
6.8.4.1.1	X	X	WINNF.FT.C.SC S.1	Successful TLS connection between UUT and SAS Test Harness	No RF transmission during test Check the tcpdump for the TLS information	P
6.8.4.2.1	X	X	WINNF.FT.C.SC S.2	TLS failure due to revoked certificate	No RF transmission during test Check the tcpdump for the TLS information	P
6.8.4.2.2	X	X	WINNF.FT.C.SC S.3	TLS failure due to expired server certificate	No RF transmission during test Check the tcpdump for the TLS information	P
6.8.4.2.3	X	X	WINNF.FT.C.SC S.4	TLS failure when SAS Test Harness certificate is issue by unknown CA	No RF transmission during test Check the tcpdump for the TLS information	P
6.8.4.2.4	X	X	WINNF.FT.C.SC S.5	TLS failure when certificate at the SAS Test Harness is corrupted	No RF transmission during test Check the tcpdump for the TLS information	P
7.1.4.1.1	X	X	WINNF.PT.C.H BT	UUT RF Transmit Power Measurement	Power Spectral Density test case. Assume we use 1 carrier bandwidth	P

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

					(say, 5 or 10 MHz), one frequency (say middle channel in band) for test. Measure at max transmit power, and reduce in steps of 3 dB to minimum declared transmit power.	
--	--	--	--	--	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--

If the product as tested complies with the specification, the EUT is deemed to comply with the standard and is deemed a 'PASS' or 'P' grade. If not 'FAIL' grade is issued. Where 'N/A' is stated this means the test case is not applicable, and see Notes, Justifications or Deviations Section for details.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Notes, Justifications, or Deviations

The following notes, justifications for tests not performed or deviations from the above listed specifications apply:


A later revision of the standard may have been substituted in place of the previous dated referenced revision. The year of the specification used is listed under applicable standards. Using the later revision accomplishes the goal of ensuring compliance to the intent of the previous specification, while allowing the laboratory to incorporate the extensions and clarifications made available by a later revision.

For the N/A test cases, the following justifications apply:

- a. EUT is a CBSD with Domain Proxy
- b. EUT supports the following Conditional functionality from WINNF-TS-0122-V1.0.0, Table 6-2:
 - i. C1 – Multi-step registration (WINNF.FT.D.REG.2)
 - ii. C3 – Single step registration containing CPI-signed data in the registration message (WINNF.FT.D.REG.6)
 - iii. C4 – RECEIVED_POWER_WITHOUT_GRANT measurement report (WINNF.FT.D.MES.2)
 - iv. C5 – RECEIVED_POWER_WITH_GRANT measurement report (WINNF.FT.D.MES.3, WINNF.FT.D.MES.5)
 - v. C6 – UUT supports installation parameter change (WINNF.FT.C.REG.7)
- c. Optional test cases were not performed

Note, where graph sweeps are incomplete, this was used to set the time stamp of when the events occurred. This can be accomplished by determining the time at which the graph was captured and subtracting the remaining time. For example if there was a 30 second sweep, and 9 out of 10 is complete, that means the end occurred at the 27 second mark. If the time on the graph was 12:03:35, this means the graph started at 12:03:08. This allows us to co-ordinate graph with UTC in the logs.

Logs are kept on file.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


Applicable Standards, Specifications and Methods

ANSI C63.4:2014 Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

CFR47 FCC Part 96 Code of Federal Regulations – Citizens Broadband Radio Service

WINNF-TS-0122 Conformance and Performance Test Technical Specification;
Version V1.0.0 CBSD/DP as Unit Under Test (UUT)
19 December 2017 Working Document

ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


Document Revision Status

- Revision 000: August 13, 2018 First Draft

- Revision 001: August 14, 2018 Revisions as per customer request. Kept on file.

- Revision 002: August 15, 2018 Revisions as per customer request. Kept on file.

- Revision 003: August 16, 2018 Changed coloring of text and added revisions to EUT description as per customer request.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Definitions and Acronyms

The following definitions and acronyms are applicable in this report.
See also ANSI C63.14.

AE – Auxiliary Equipment. A digital accessory that feeds data into or receives data from another device (host) that in turn, controls its operation.

AM – Amplitude Modulation

Class A device – A device that is marketed for use in a commercial, industrial or business environment. A 'Class A' device should not be marketed for use by the general public and the instructions for use accompanying the product shall contain the following text:

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

Class B device – A device that is marketed for use in a residential environment and may also be used in a commercial, business or industrial environments.

EMC – Electro-Magnetic Compatibility. The ability of an equipment or system to function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment.

EMI – Electro-Magnetic Immunity. The ability to maintain a specified performance when the equipment is subjected to disturbance (unwanted) signals of specified levels.

Enclosure Port – Physical boundary of equipment through which electromagnetic fields may radiate or impinge.

EUT – Equipment Under Test. A device or system being evaluated for compliance that is representative of a product to be marketed.

LISN – Line Impedance Stabilization Network

NCR – No Calibration Required

NSA – Normalized Site Attenuation

RF – Radio Frequency

EMC Test Plan – An EMC test plan established prior to testing. See 'Appendix A – EUT & Client Provided Details'.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Testing Facility

Testing for EMC on the EUT was carried out at customer location as described in Appendix A.

Calibrations and Accreditations

TÜV SÜD Canada Inc is accredited to ISO/IEC 17025 by A2LA with Testing Certificate #2955.02. The laboratory's current scope of accreditation listing can be found as listed on the A2LA website. All measuring equipment is calibrated on an annual or bi-annual basis as listed for each respective test.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


Testing Environmental Conditions and Dates

Following environmental conditions were recorded in the facility during time of testing

Date	Test	Initials	Temperature (°C)	Humidity (%)	Pressure (kPa)
June 12, 2018	All	SD	20-23	40-55	96.106

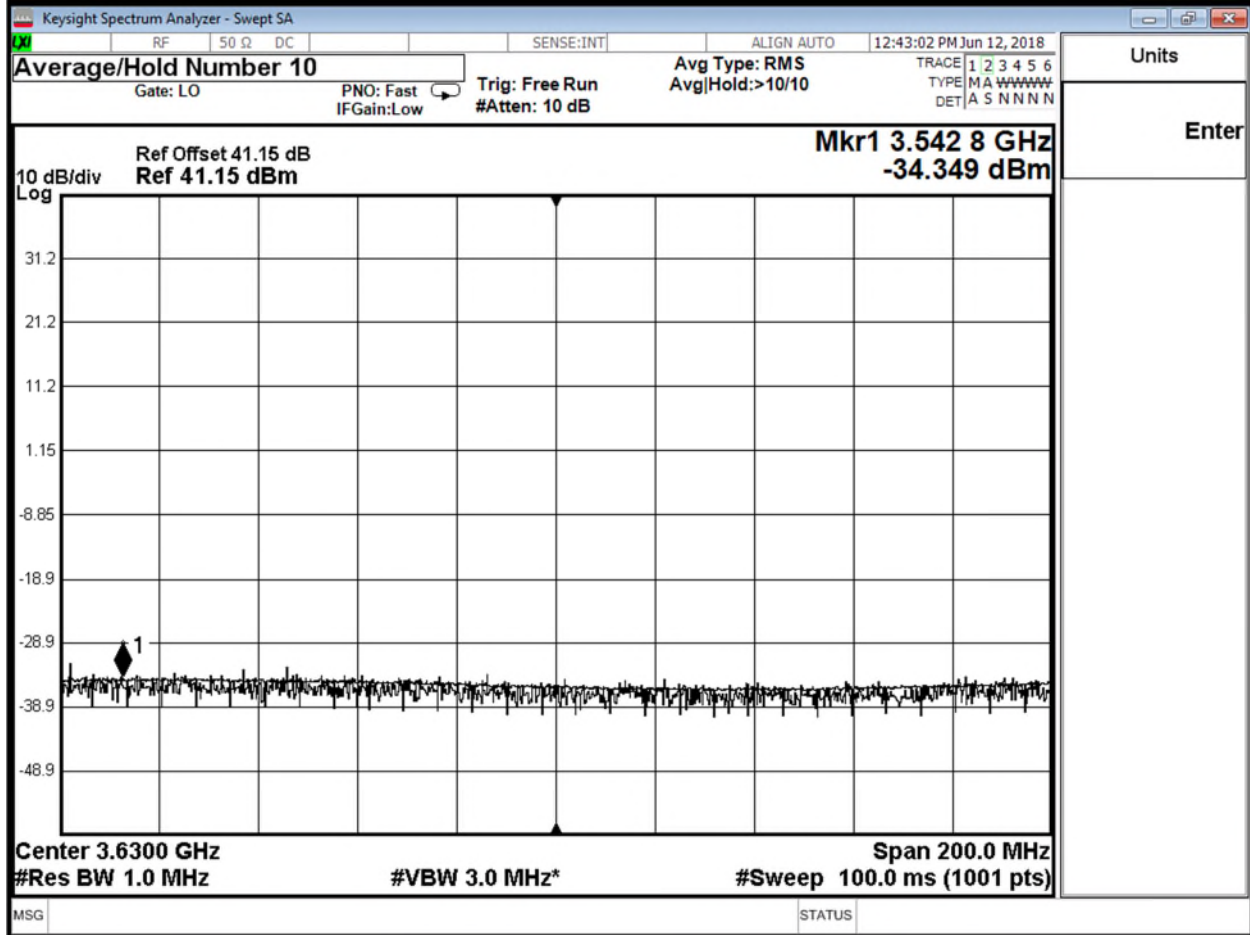
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


Detailed Test Results Section

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

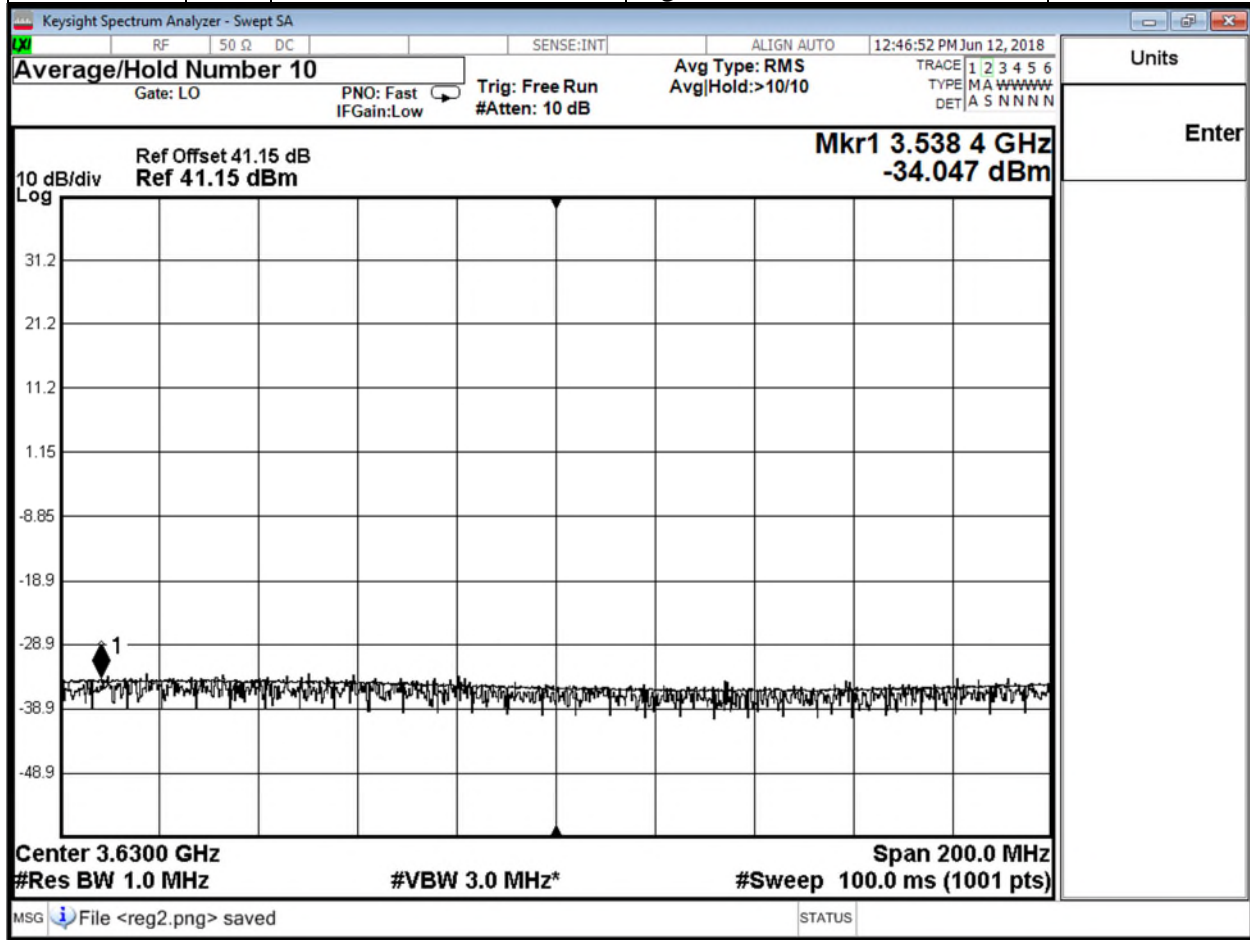
Authorization transmit after it receives authorization from a SAS.


Section	DP	Test Case ID	Test Case Title	Pass / Fail
6.1.4.1.2	X	WINNF.FT.D.REG.2	Domain Proxy Multi-Step registration	P



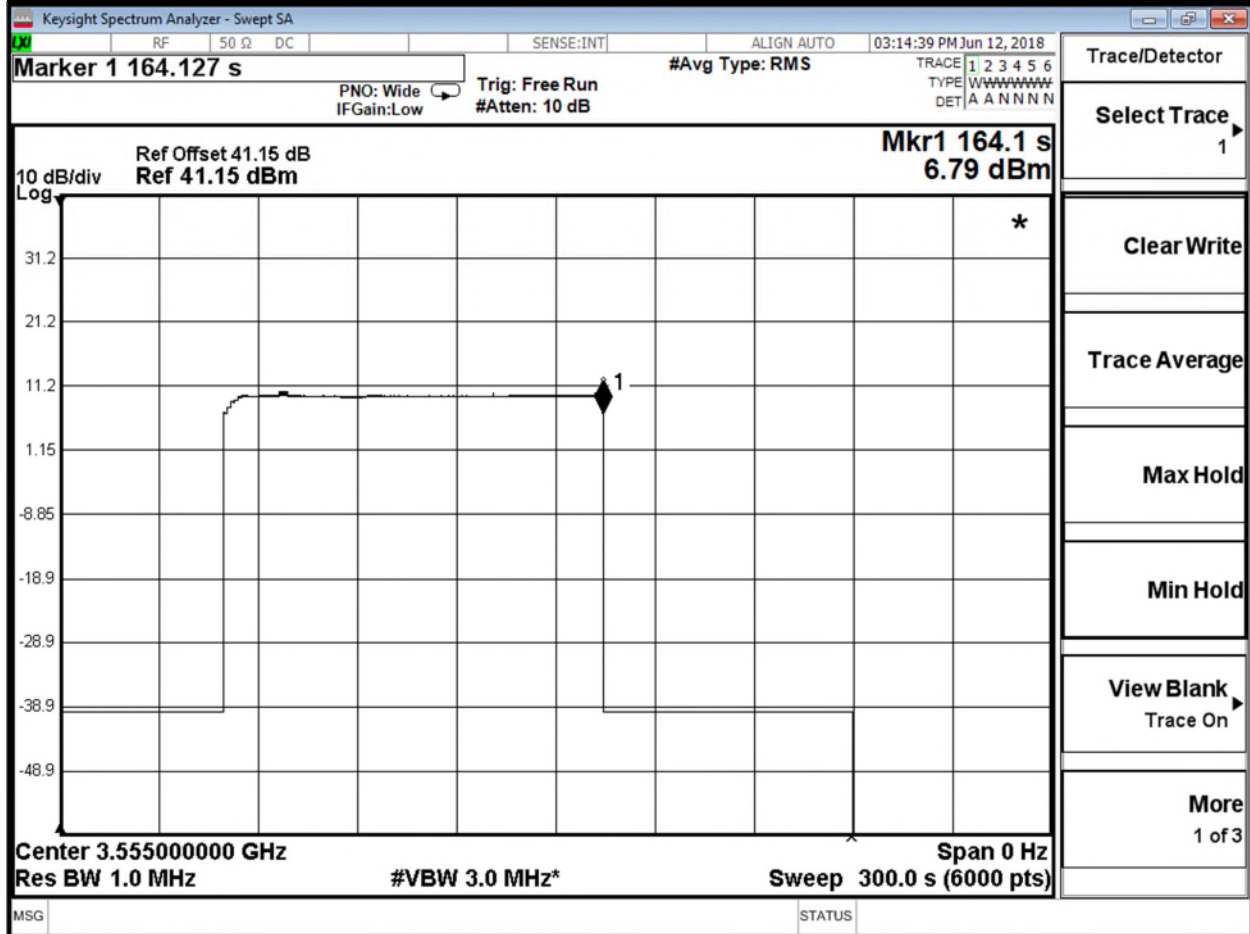
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


6.1.4.1.6	X	WINNF.FT.D.REG.6	Domain Proxy Single-Step registration for CBSD with CPI signed data	P
-----------	---	------------------	---------------------------------------------------------------------	---



Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.1.7	X	WINNF.FT.C.REG.7	Registration due to change of an installation parameter	P
-----------	---	------------------	---------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

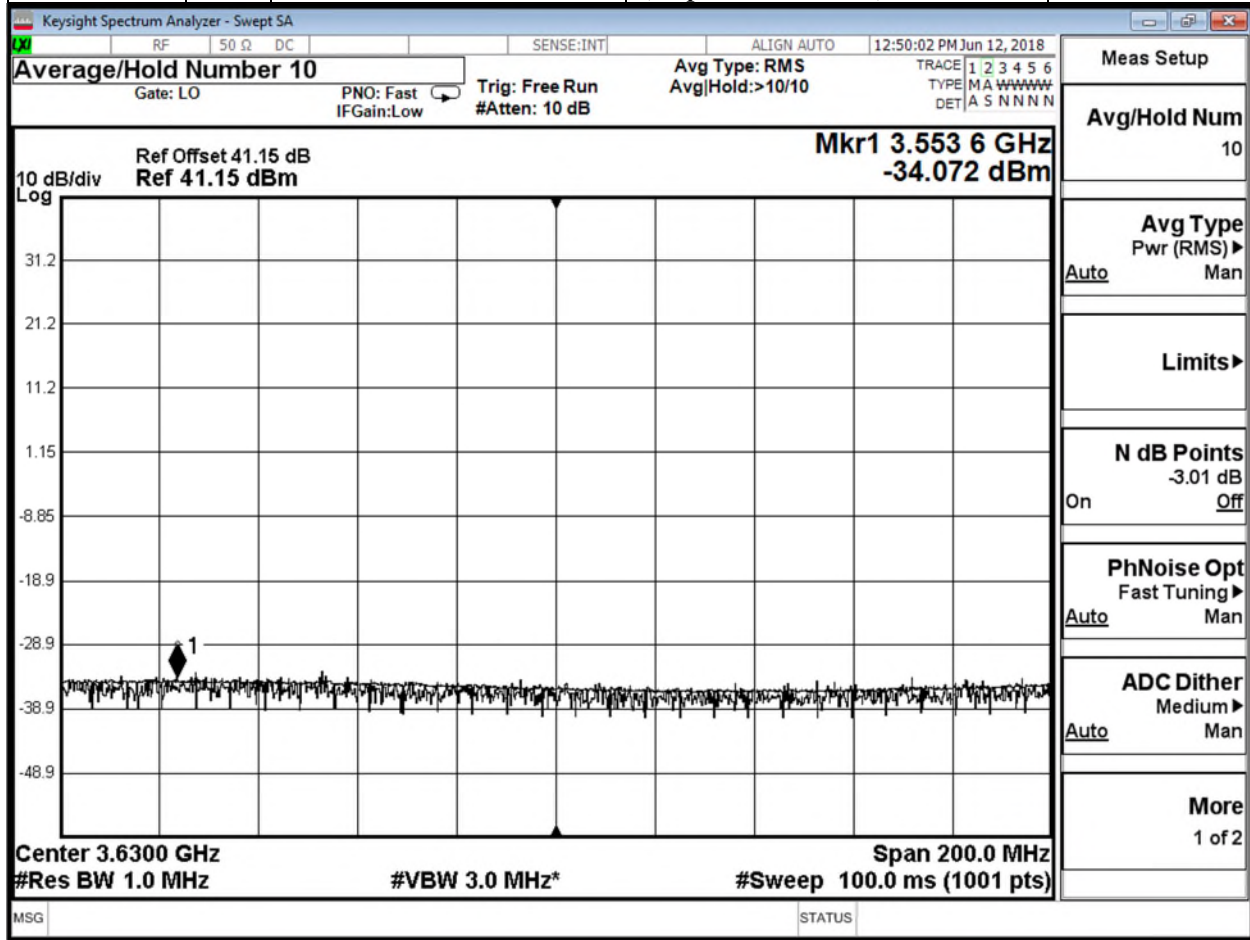
From Test Harness Logs:	
eventTime (from logs)	Comment
19:13:30	RLQ.request sent at 2018-06-12T19:13:30.108Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
REG.7	15:14:39	240	15:10:39 from DP logs (below)	164	15:13:23	19:13:23
						19:13:25

Note: DP log 19:13:25,898 INFO [com.ericsson.oss.sas.handler.network.cm.CMHandler] (EJB timerService - 1) Set the CbrsTxExpireTime on the cell:
SubNetwork=G2RBS,ManagedElement=OTENB5311,ENodeBFunction=1,EUtranCellTDD=1
to: -1 in DPS. Time taken: 2054

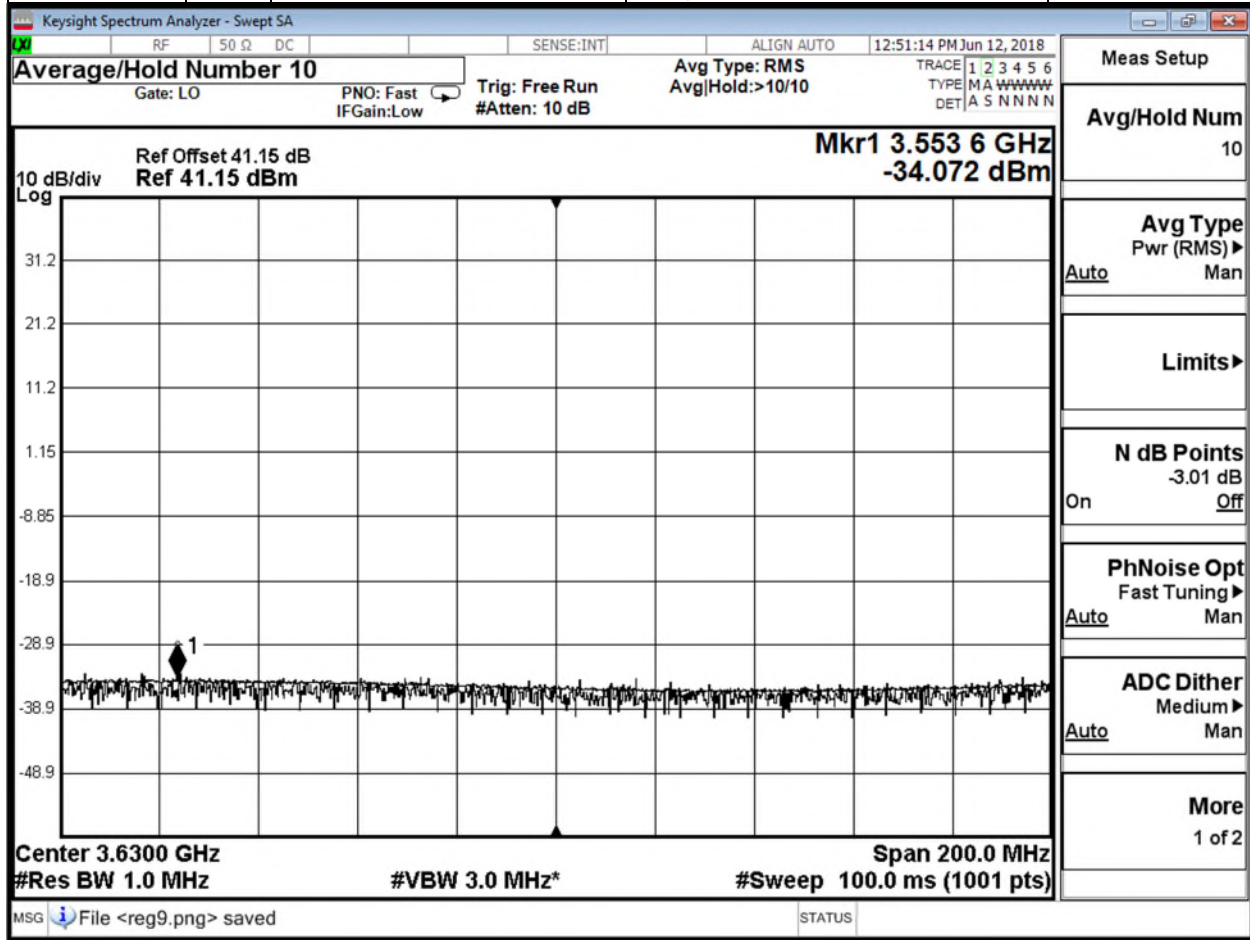
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.2.2	X	WINNF.FT.D.REG.9	Domain Proxy Missing Required parameters (responseCode 102)	P
-----------	---	------------------	-------------------------------------------------------------------	---

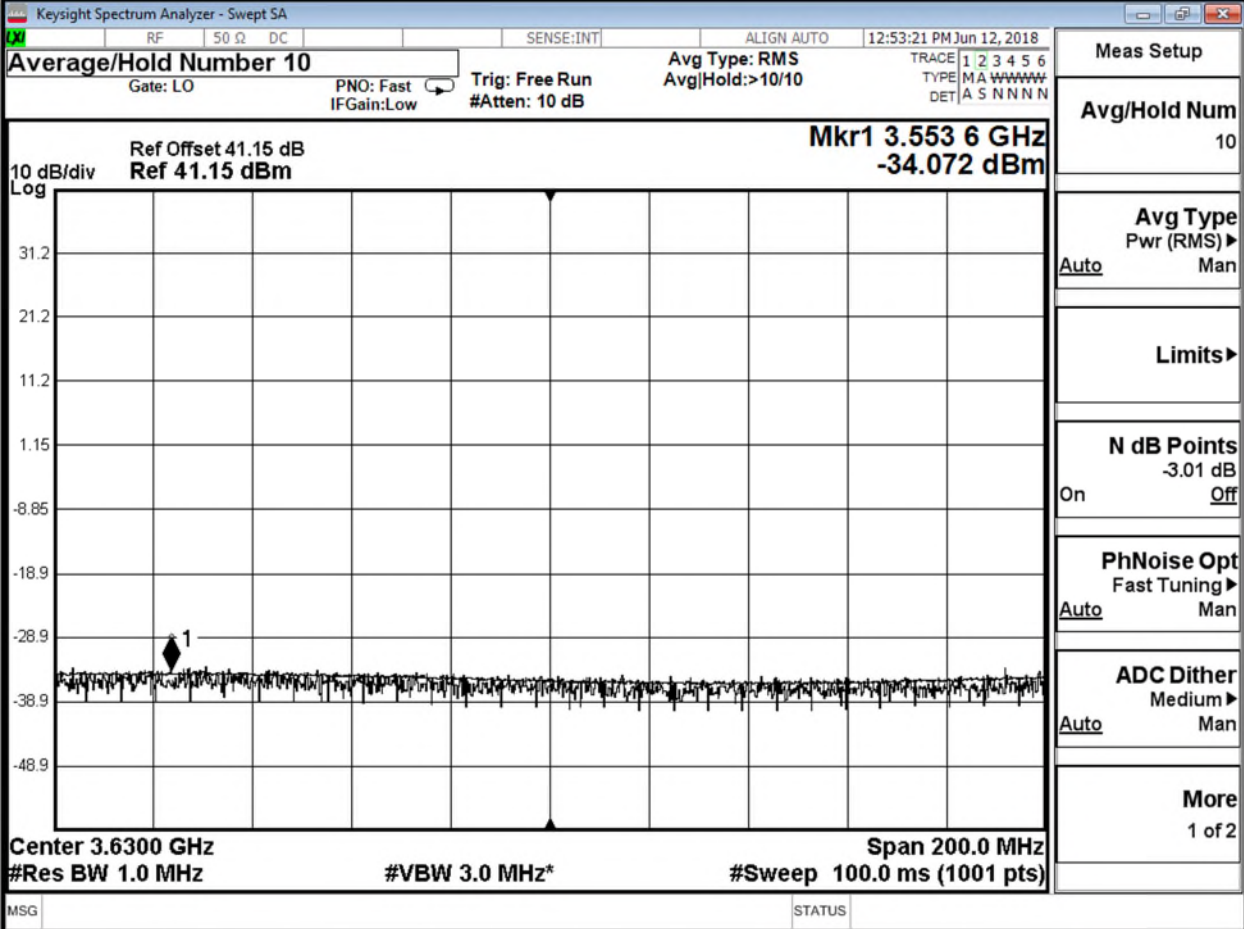


Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.2.4	X	WINNF.FT.D.REG.11	Domain Proxy Pending registration (responseCode 200)	P
-----------	---	-------------------	------------------------------------------------------	---

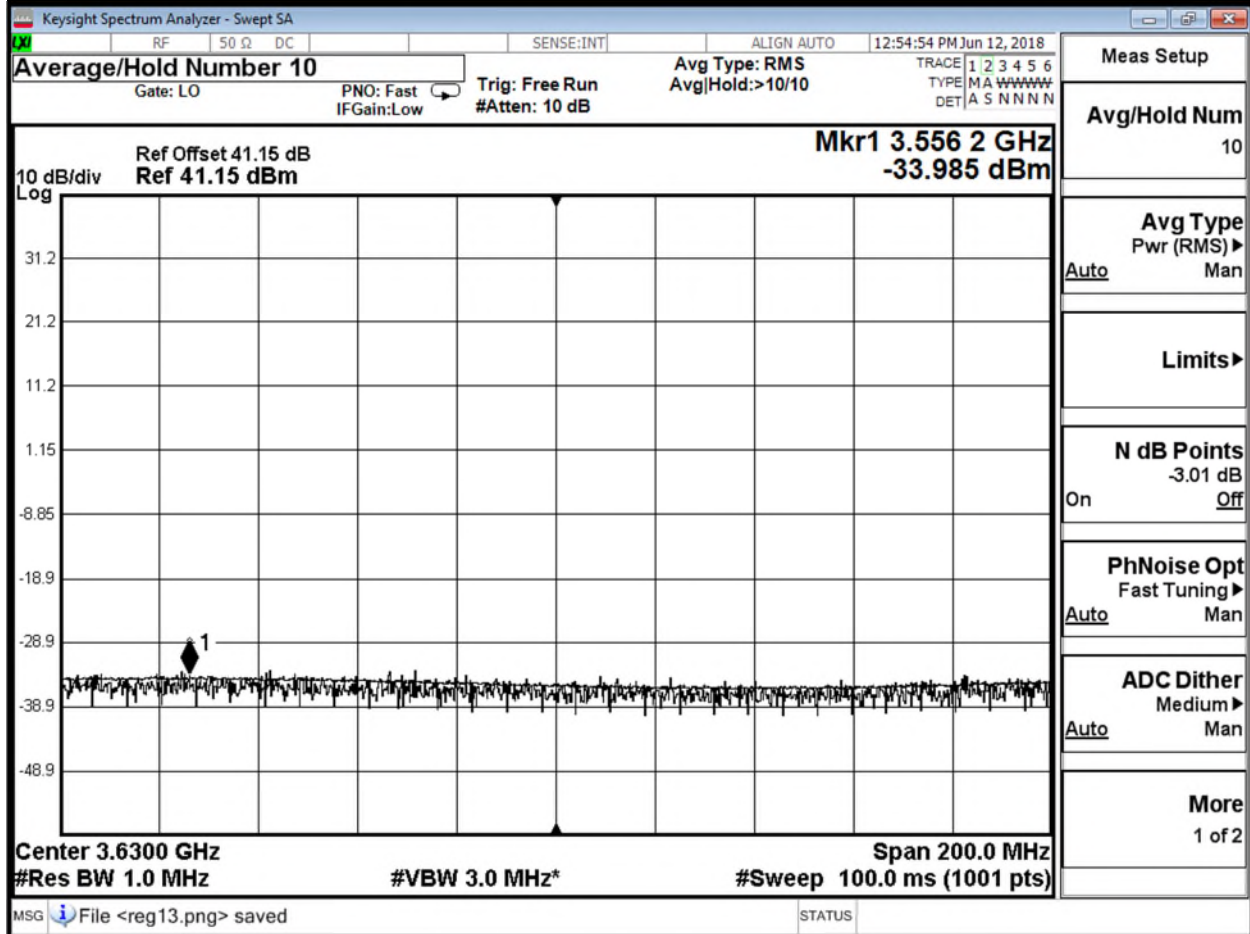



Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.2.6	X	WINNF.FT.D.REG.13	Domain Proxy Invalid parameters (responseCode 103)	P
 <p>The screenshot displays a Keysight Spectrum Analyzer interface. The main plot shows a spectrum with a noise floor around -34 dBm and a marker at 3.5536 GHz. The y-axis is labeled '10 dB/div Log' and ranges from -48.9 to 31.2 dBm. The x-axis is labeled 'Center 3.6300 GHz' and 'Span 200.0 MHz'. The plot shows a noisy signal with a peak at the marker location. The right-hand side of the interface contains a 'Meas Setup' panel with various settings: 'Average/Hold Number 10', 'Avg Type Pwr (RMS) Man', 'Limits', 'N dB Points -3.01 dB Off', 'PhNoise Opt Fast Tuning Man', and 'ADC Dither Medium Man'. The bottom status bar shows 'MSG' and 'STATUS'.</p>				

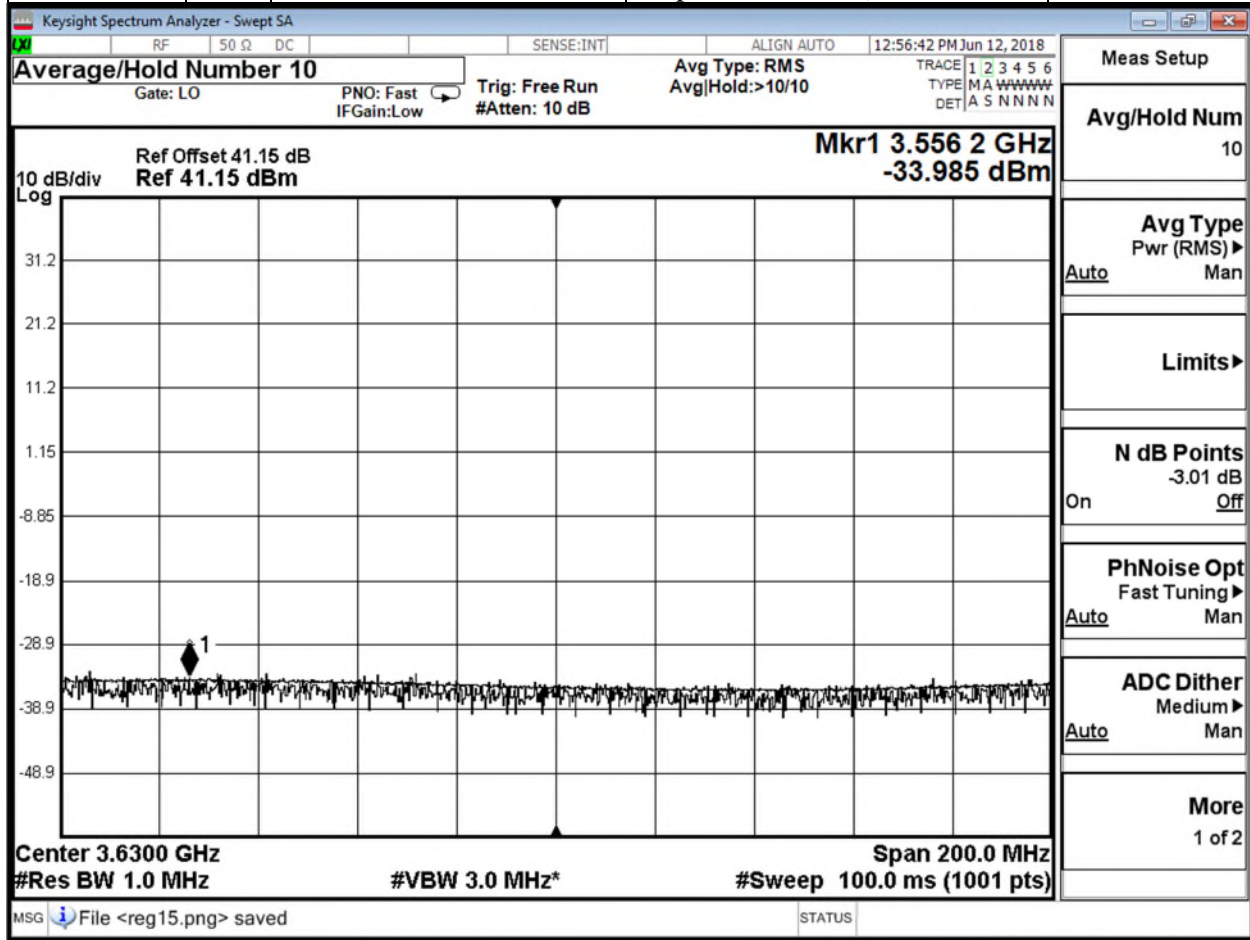
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


6.1.4.2.8	X	WINNF.FT.D.REG.15	Domain Proxy Blacklisted CBSD (responseCode 101)	P
-----------	---	-------------------	-----------------------------------------------------	---

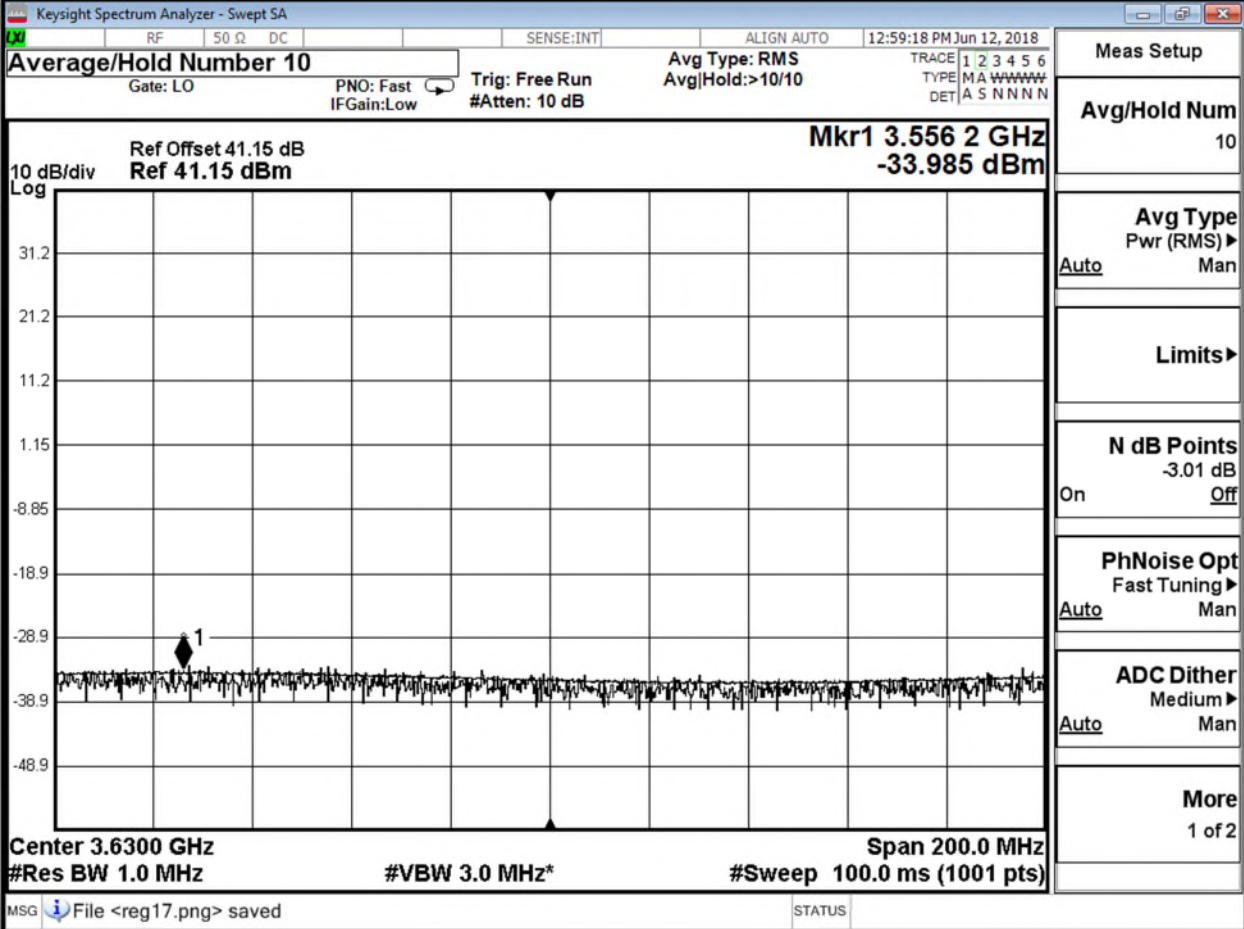


Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.2.10	X	WINNF.FT.D.REG.17	Domain Proxy Unsupported SAS protocol version responseCode 100)	P
------------	---	-------------------	-----------------------------------------------------------------	---



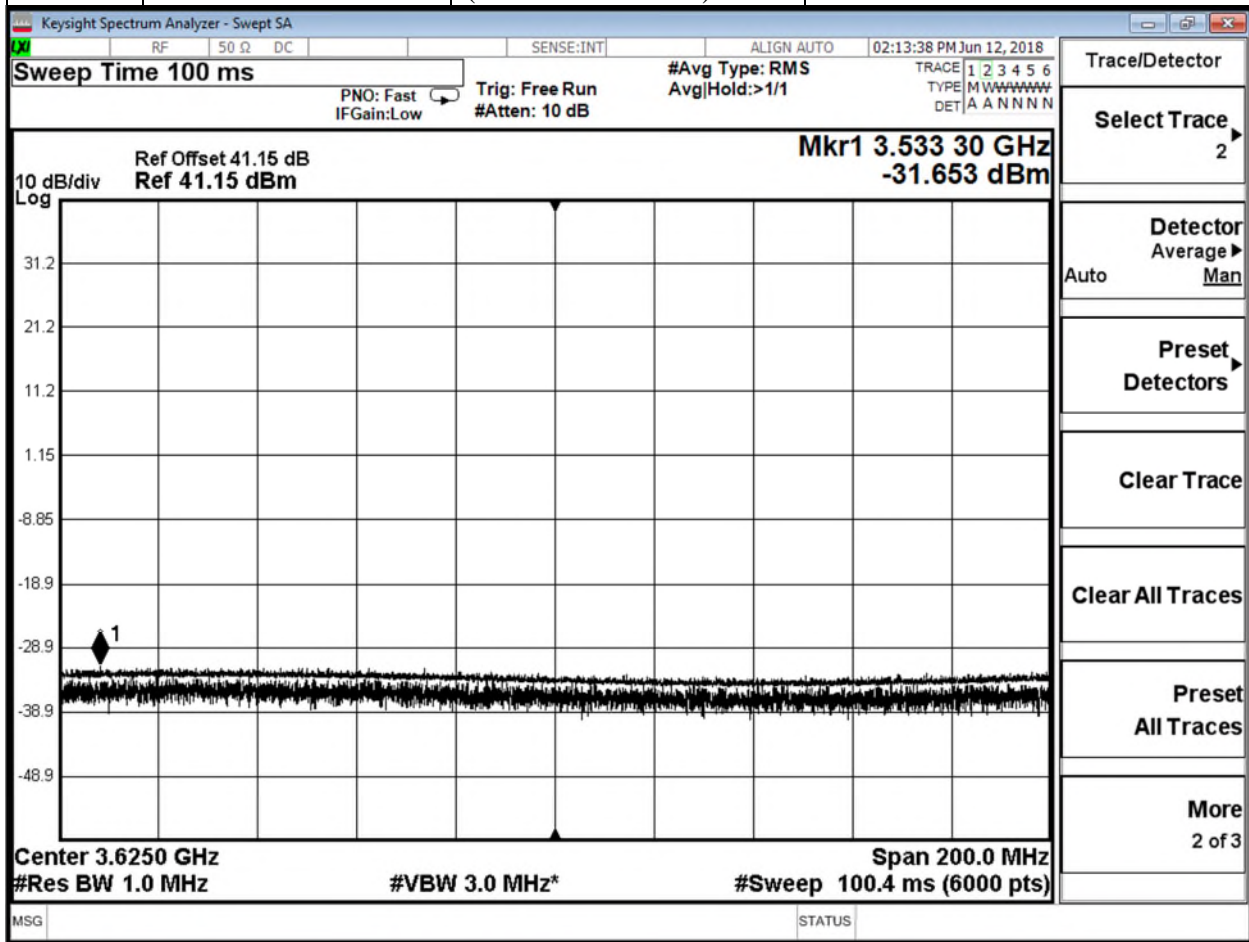
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.1.4.2.12	X	WINNF.FT.D.REG.19	Domain Proxy Group Error (responseCode 201)	P
 <p>The screenshot shows a Keysight Spectrum Analyzer interface. The main display is a log-scale plot with a center frequency of 3.6300 GHz and a span of 200.0 MHz. A marker is placed at 3.5562 GHz with a power level of -33.985 dBm. The plot shows a noisy baseline around -38.9 dBm. The interface includes various control panels on the right for measurement setup, averaging, limits, and noise options.</p>				

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

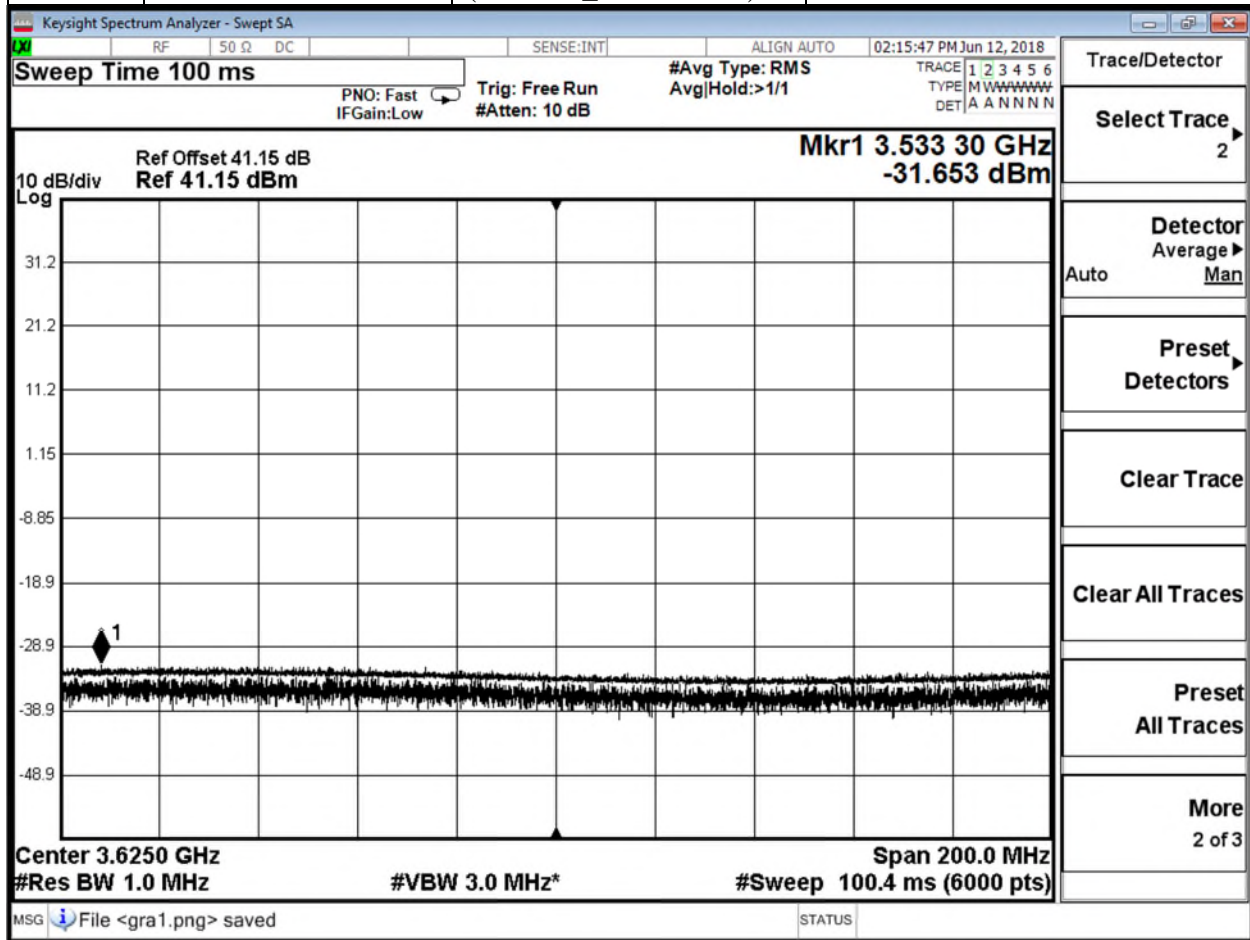
Check the device registration and authorization with the SAS, Confirm that the device changes its operating power and/or channel in response to a command from the SAS and Confirm that the device correctly configures based on the different license classes.

6.3.4.2.1	WINNF.FT.C.GRA.1	Unsuccessful Grant responseCode=400 (INTERFERENCE)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
-----------	------------------	----------------------------------------------------	-----------------------------------------------------------------------------	---



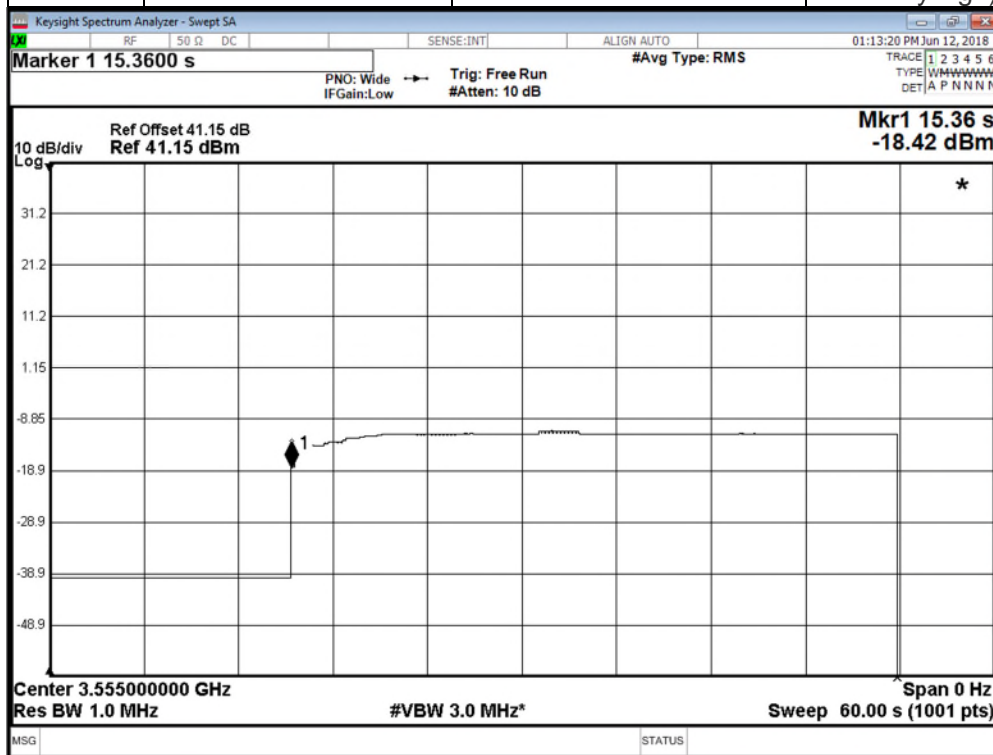
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.3.4.2.2	WINNF.FT.C.GRA.2	Unsuccessful Grant responseCode=401 (GRANT_CONFLICT)	Monitor for 60 seconds after REG message sent. No transmission during test.	P
-----------	------------------	------------------------------------------------------	-----------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.4.4.1.2	WINNF.FT.D.HBT.2	Domain Proxy Heartbeat Success Case (first Heartbeat Response)	Monitor RF from start of test. Ensure that: <ul style="list-style-type: none"> • Transmission does not start until time of first heartbeat response or after. • After transmission starts, measure that transmission is within the granted channel (frequencyLow, frequencyHigh) 	P
-----------	------------------	----------------------------------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---



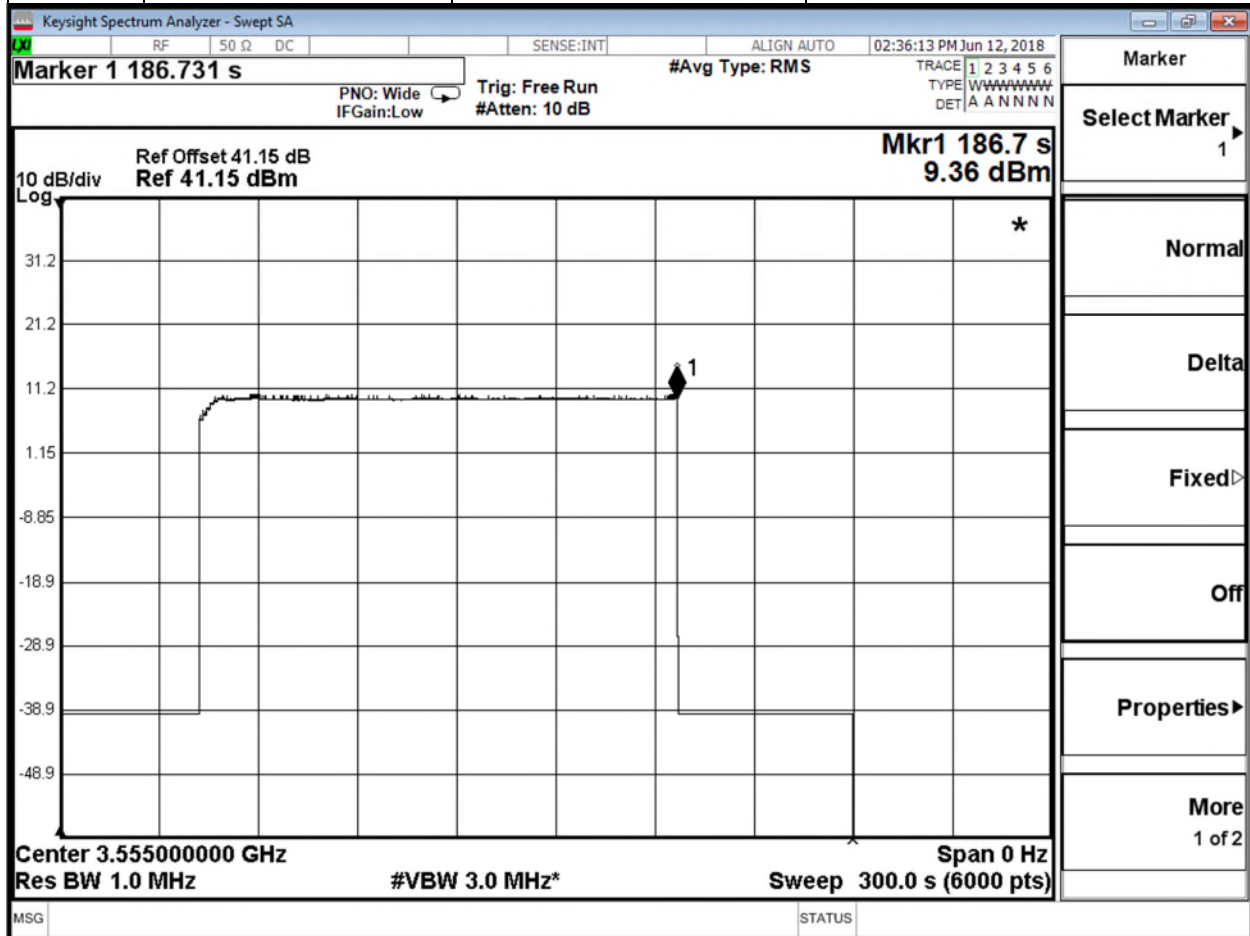
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

From Test Harness Logs:	
eventTime (from logs)	Comment
17:12:38	first HBT.response sent at 2018-06-12T17:12:38.221Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.2	13:13:20	54	13:12:26	15.36	13:12:41	17:12:41

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.4.4.2.1	WINNF.FT.C.HBT.3	Heartbeat responseCode=105 (DEREGISTER)	Monitor RF transmission. Ensure that: <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of the heartbeatResponse which contains responseCode = 105 	P
-----------	------------------	-----------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---




Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

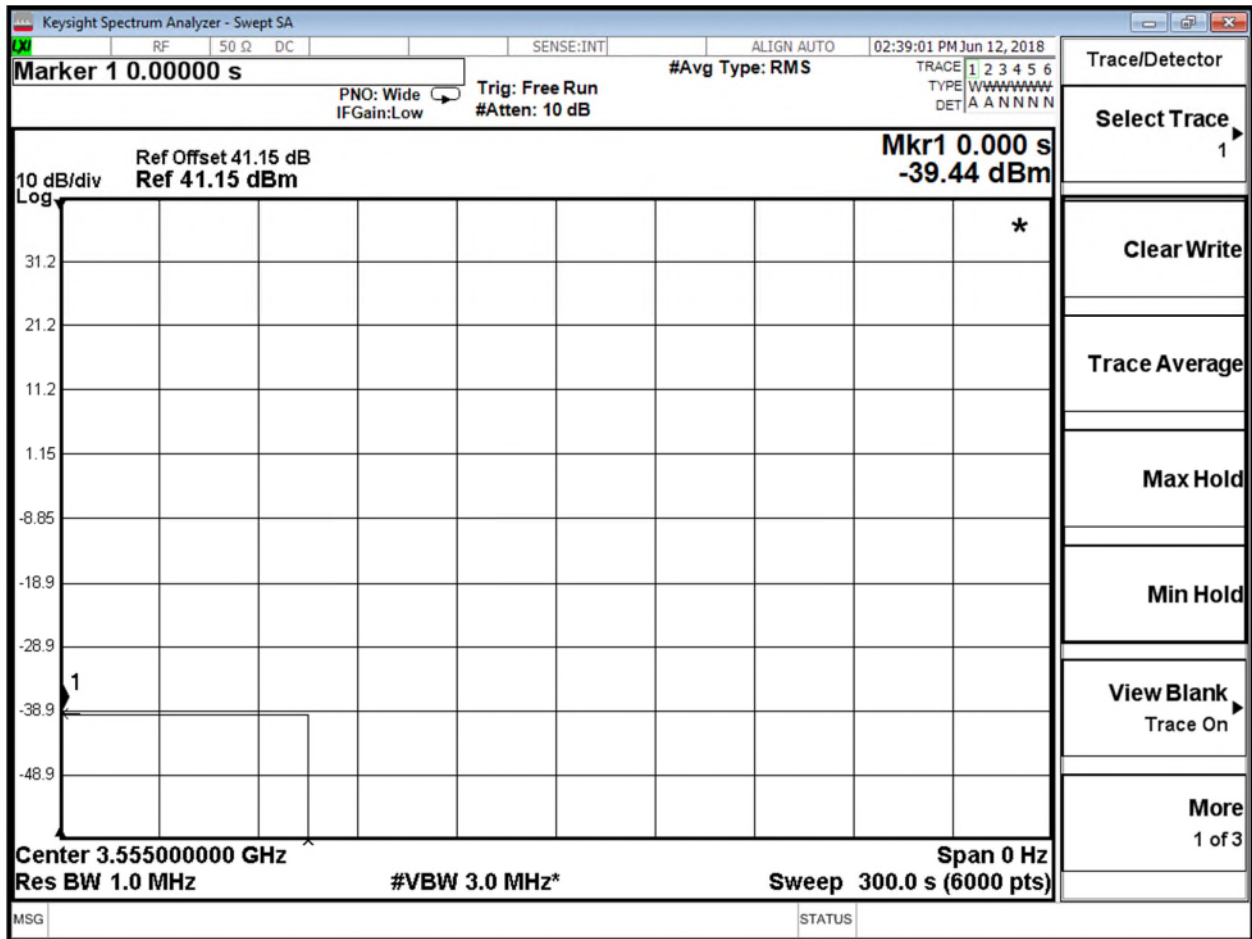
From Test Harness Logs:	
eventTime (from logs)	Comment
18:35:19	HBT.response with respCode=105 sent at: 2018-06-12T18:35:19.737Z


From Domain Proxy Logs:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.3	14:36:13	240	14:32:13	186.7	14:35:19	18:35:19

ok

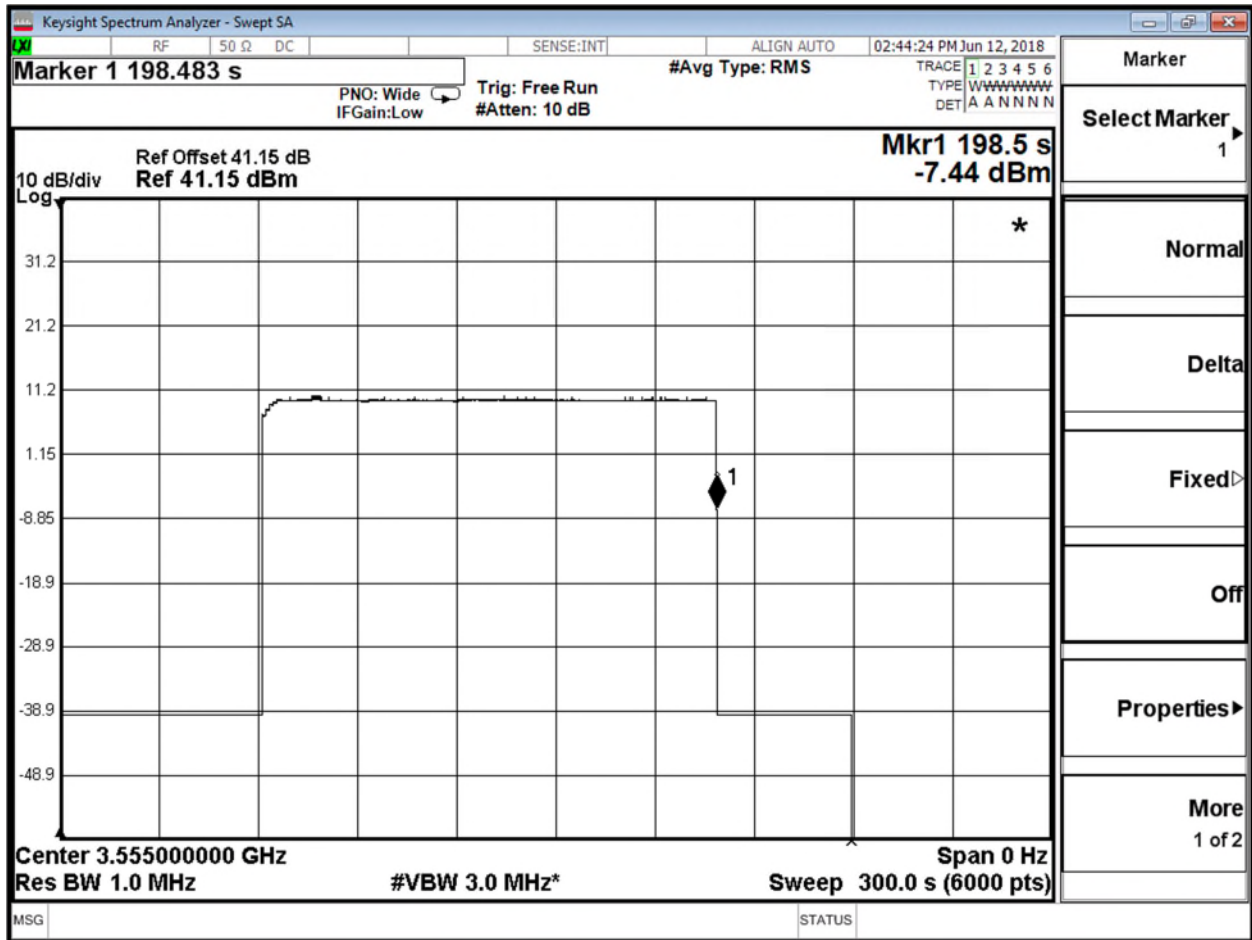
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


6.4.4.2.3	WINNF.FT.C.HBT.5	Heartbeat responseCode=501 (SUSPENDED_GRANT) in First Heartbeat Response	Monitor RF transmission from start of test. Ensure there is no transmission during the test	p
-----------	------------------	--------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.4.4.2.4	WINNF.FT.C.HBT.6	Heartbeat responseCode=501 (SUSPENDED_GRANT) in Subsequent Heartbeat Response	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of heartbeatResponse which contains responseCode=501 	p
-----------	------------------	-------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---




Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

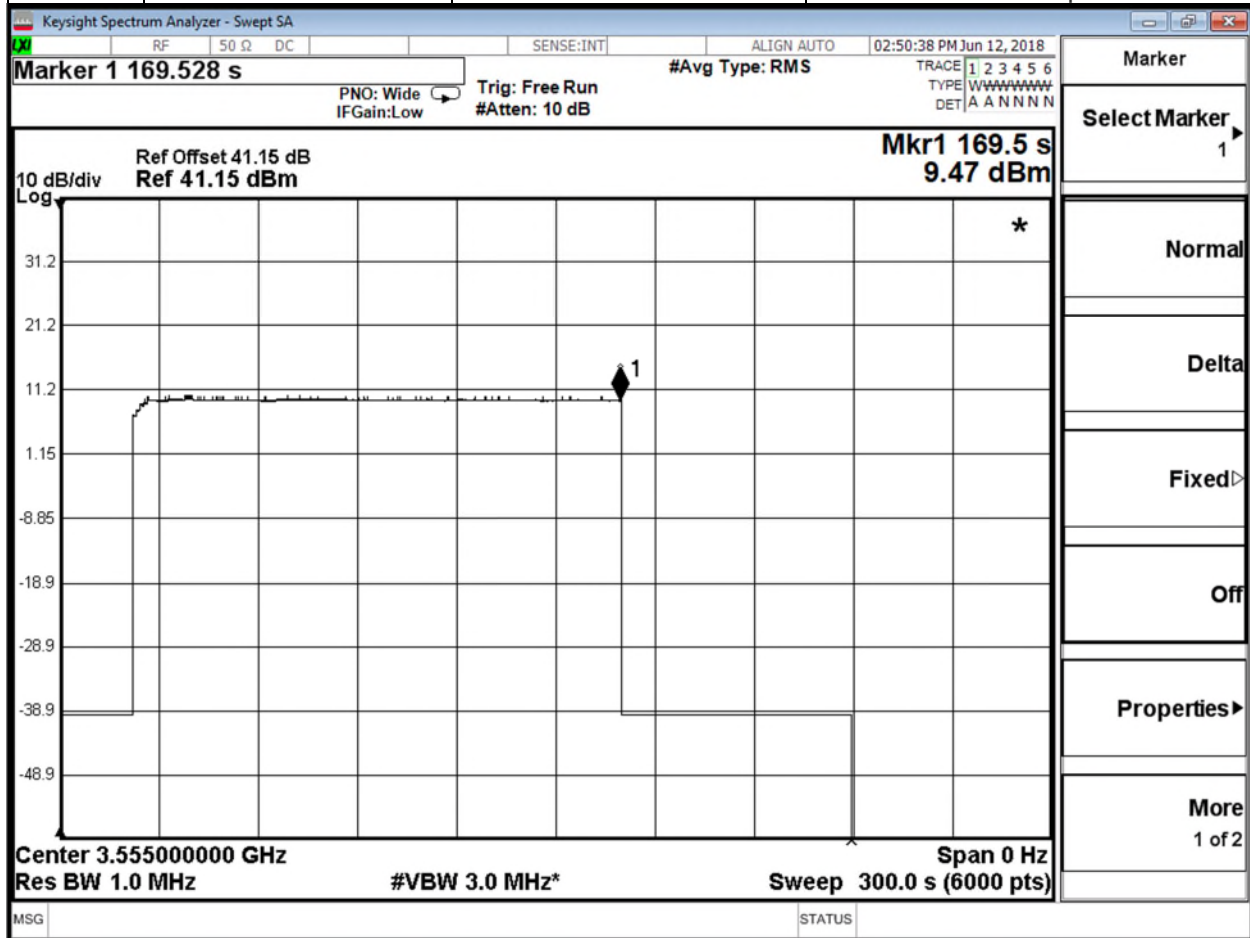
From Test Harness Logs:	
eventTime (from logs)	Comment
18:43:42	HBT.response with respCode=501 sent at: 2018-06-12T18:43:42.239Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.6	14:44:24	240	14:40:24	198.5	14:43:42	18:43:42

ok

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.4.4.2.5	WINNF.FT.C.HBT.7	Heartbeat responseCode=502 (UNSYNC_OP_PARAM)	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission within 60 seconds of heartbeatResponse which contains responseCode=502 	p
-----------	------------------	--------------------------------------------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---




Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

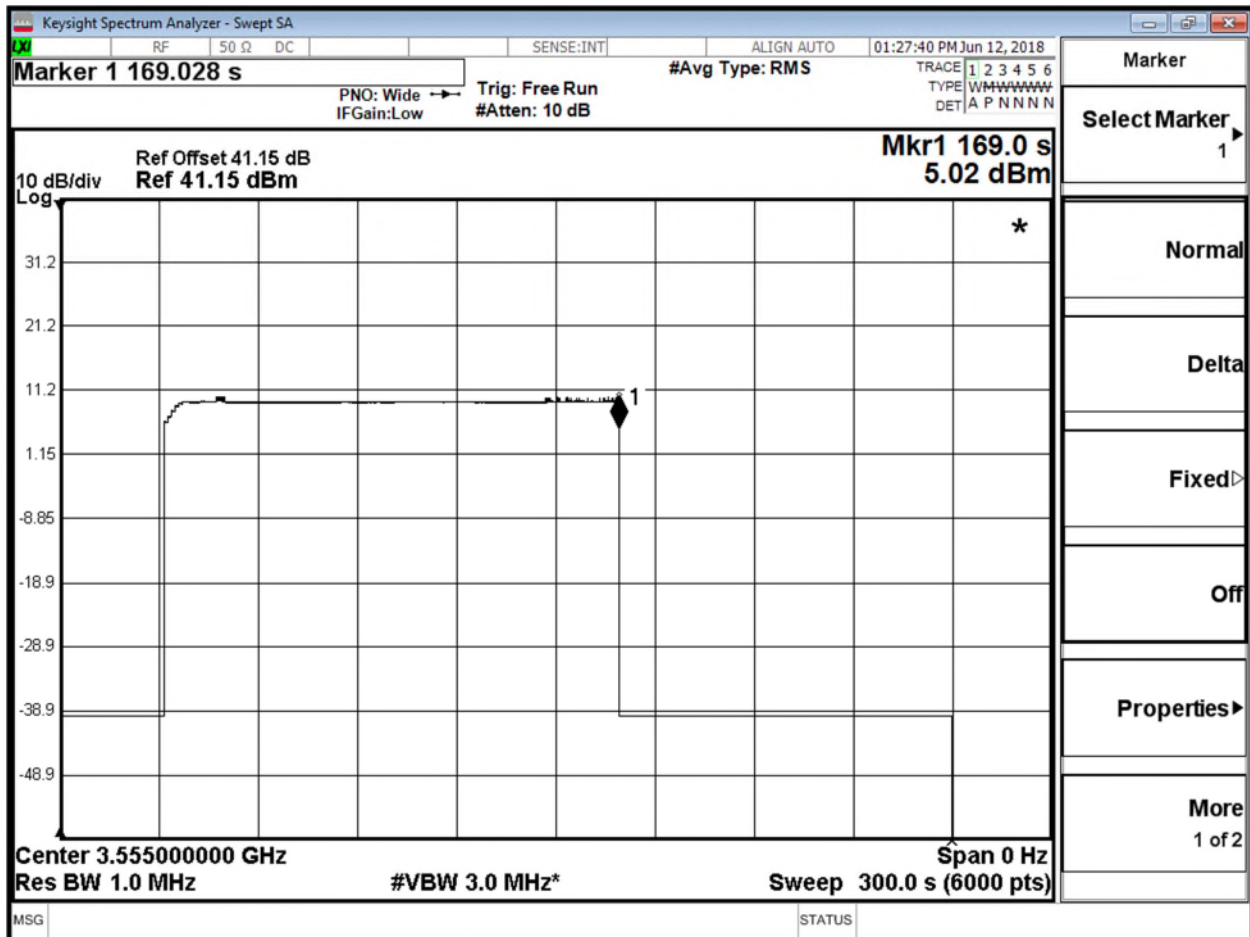
From Test Harness Logs:	
eventTime (from logs)	Comment
18:49:26	HBT.response with respCode=502 send at: 2018-06-12T18:49:24.686Z, RLQ.request sent at: 2018-06-12T18:49:26.323Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.7	14:50:38	239	14:46:39	169.5	14:49:28	18:49:28 ok

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.4.4.2.6	--	X	WINNF.FT.D.H BT.8	Domain Proxy Heartbeat responseCode=500 (TEMINATED_GRANT)	Monitor RF transmission. CBSDs will have different behavior: <ul style="list-style-type: none"> • CBSD1: will continue to transmit to end of test (this is not a pass/fail criteria, but check) • CBSD2: must stop transmission within 60 seconds of being sent heartbeatResponse with responseCode = 500 	P
-----------	----	---	-------------------	--------------------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

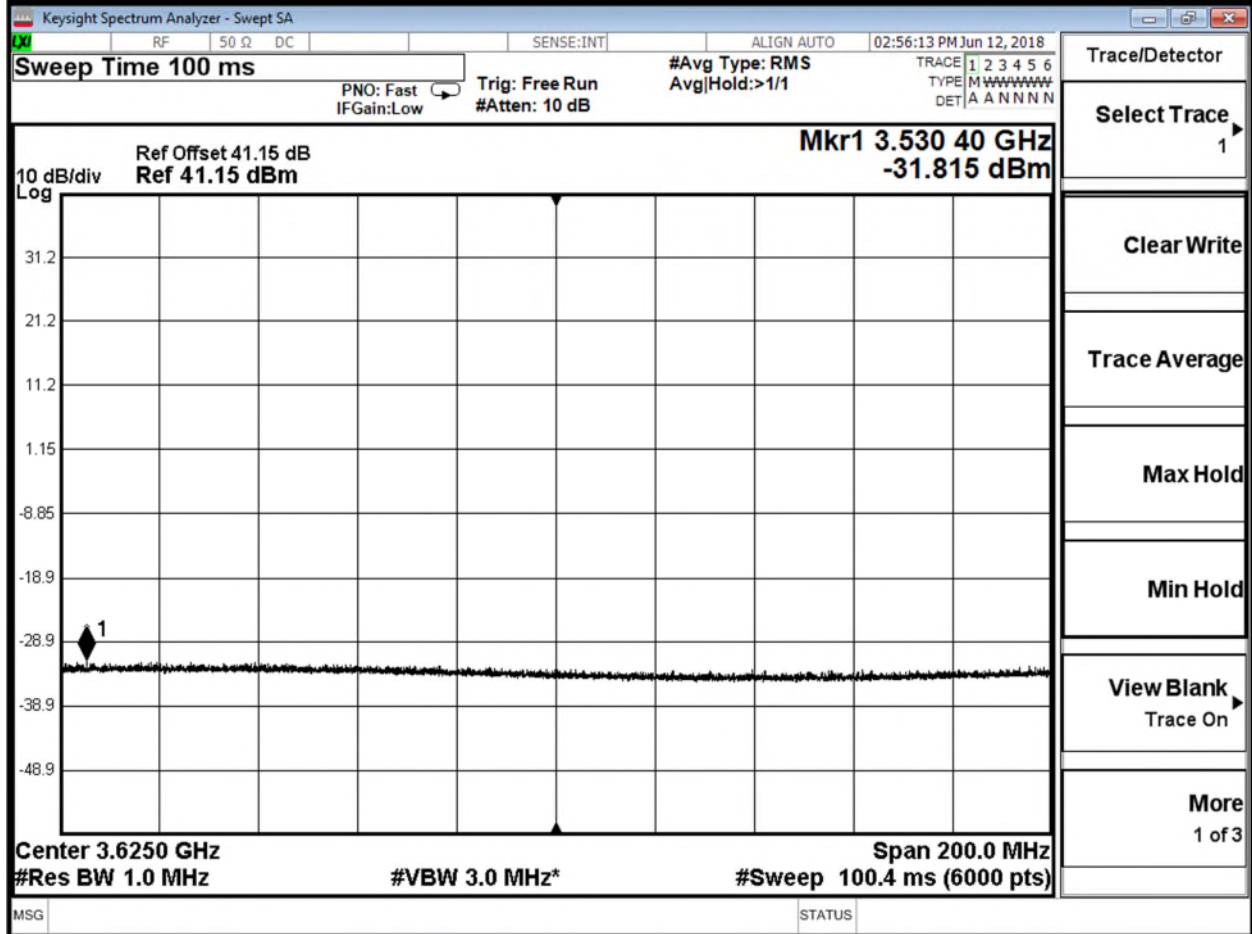



From Test Harness Logs:	
eventTime (from logs)	Comment
17:25:57	HBT.response with respCode= 500 sent at: 2018-06-12T17:25:57.004Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.8	13:27:40	270	13:23:10	169	13:25:59	17:25:59

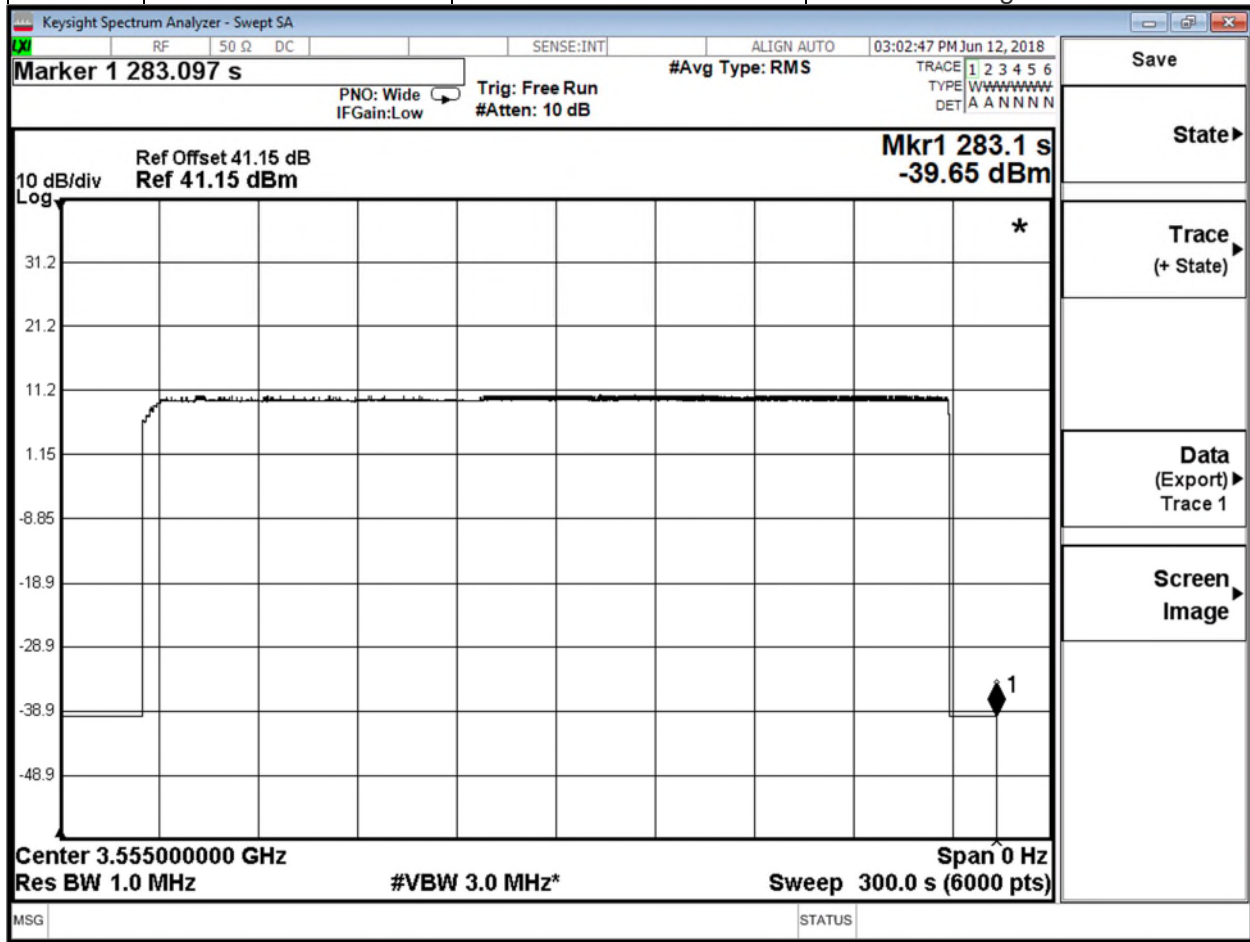
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


6.4.4.3.1	WINNF.FT.C.HBT.9	Heartbeat Response Absent (First Heartbeat)	Monitor RF from start of test to 60 seconds after last heartbeatResponse message was sent. CBSD should not transmit at any time during test	P
-----------	------------------	---------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


6.4.4.3.2	WINNF.FT.C.HBT.10	Heartbeat Response Absent (Subsequent Heartbeat)	Monitor RF transmission. Verify: <ul style="list-style-type: none"> • CBSD must stop transmission within transmitExpireTime+60 seconds, where transmitExpireTime is from last successful heartbeatResponse message 	P
-----------	-------------------	--------------------------------------------------	-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


From Test Harness Logs:	
eventTime (from logs)	Comment
19:02:33	Last HBT.response that set TxExpire time @ 2018-06-12T18:59:13.048Z, transmitExpireTime = 2018-06-12T19:02:33Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
HBT.10	15:02:47	283	14:58:04	267	15:02:31	19:02:31 ok

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.5.4.2.2	WINNF.FT.D.MES.2	Domain Proxy Registration Response contains measReportConfig	No RF monitoring	P
-----------	------------------	--------------------------------------------------------------	------------------	---

Pass saw “measreportconfig” in logs

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.5.4.2.3	WINNF.FT.C.MES.3	Grant Response contains measReportConfig	No RF monitoring	P
-----------	------------------	------------------------------------------	------------------	---

Pass saw “measreportconfig” in logs

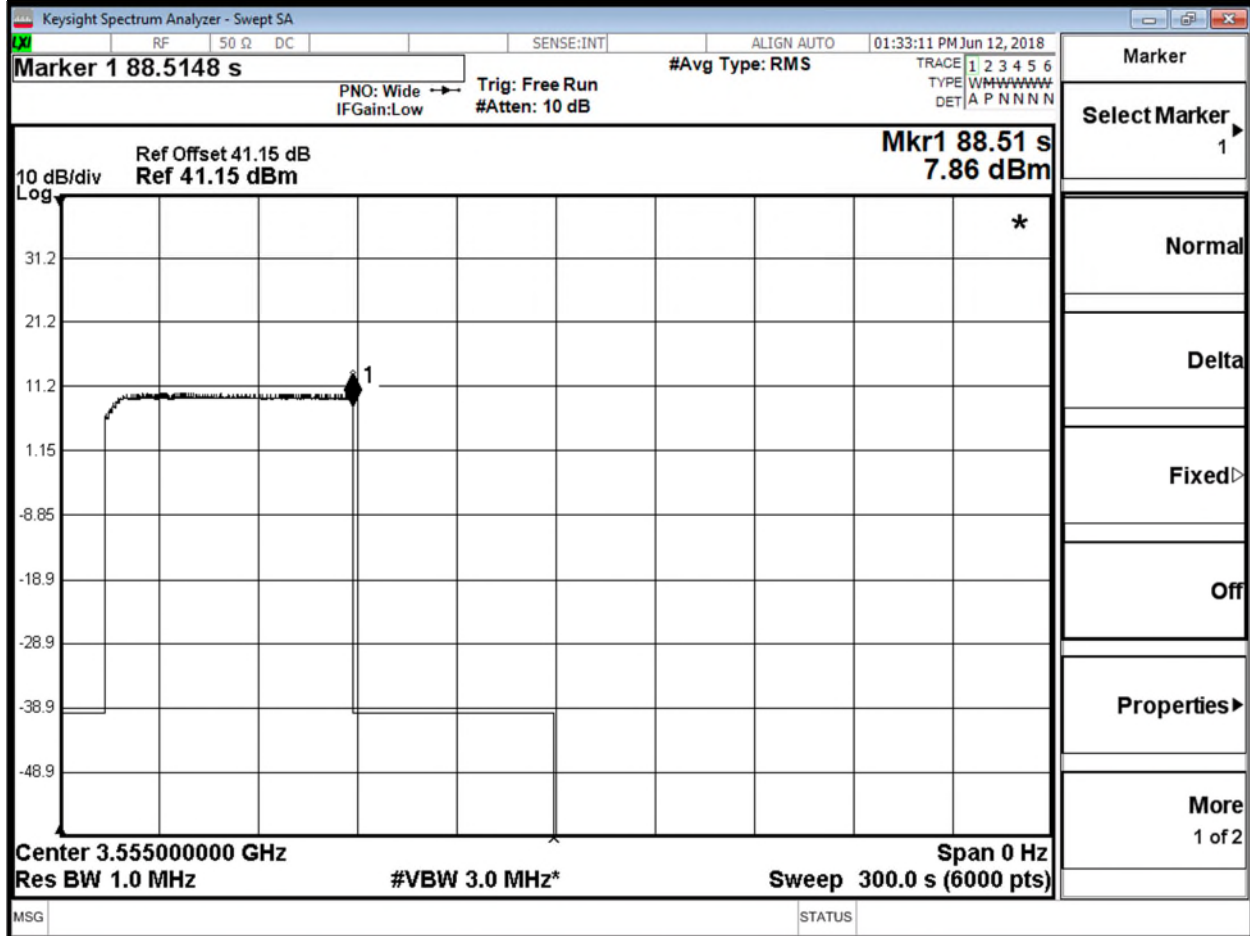
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.5.4.2.5	WINNF.FT.D.MES.5	Domain Proxy Heartbeat Response contains measReportConfig	No RF monitoring	P
-----------	------------------	-----------------------------------------------------------	------------------	---

Pass saw “measreportconfig” in logs

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.6.4.1.2	WINNF.FT.D.RLQ.2	Domain Proxy Successful Relinquishment	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission at any time prior to sending the relinquishmentRequest message. 	P
-----------	------------------	----------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

From Test Harness Logs:	
eventTime (from logs)	Comment
17:32:16	RLQ.request sent at: 2018-06-12T17:32:16.822Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
RLQ.2	13:33:11	147	13:30:44	88.51	13:32:12	17:32:12
			from DP logs (below)			17:32:14
						ok from DP logs

RLQ.2

17:32:12,723 INFO [com.ericsson.oss.sas.handler.network.cm.CMHandler] (EJB timerService - 6) Set the CbrsTxExpireTime on the cell:

SubNetwork=G2RBS,ManagedElement=OTENB5311,ENodeBFunction=1,EUtranCellTDD=2 to: -1 in DPS. Time taken: 2030

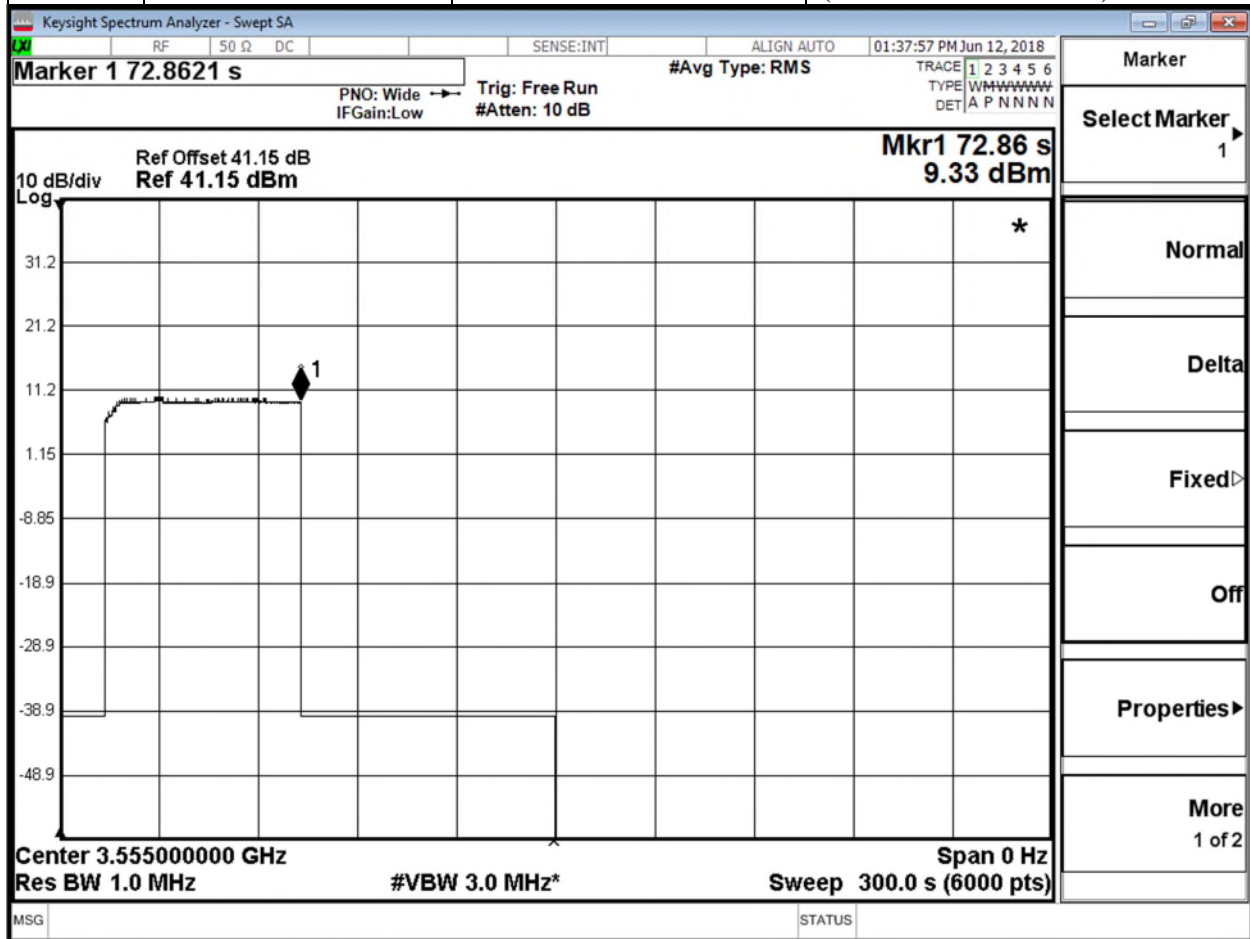
17:32:14,524 INFO [com.ericsson.oss.sas.handler.network.cm.CMHandler] (EJB timerService - 6) Set the CbrsTxExpireTime on the cell:


SubNetwork=G2RBS,ManagedElement=OTENB5311,ENodeBFunction=1,EUtranCellTDD=1 to: -1 in DPS. Time taken: 1781

Note: shutdown time taken from Domain Proxy logs, and shutdown confirmed by RF monitoring.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

6.7.4.1.2	WINNF.FT.D.DRG.2	Domain Proxy Successful Deregistration	Monitor RF transmission. Ensure: <ul style="list-style-type: none"> • CBSD stops transmission at any time prior to sending the relinquishmentRequest message or deregistrationRequest message (whichever is sent first) 	P
-----------	------------------	----------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---



Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

From Test Harness Logs:	
eventTime (from logs)	Comment
17:36:45	RLQ.request sent at: 2018-06-12T17:36:45.269Z, DRG.request sent at: 2018-06-12T17:36:49.337Z

From Spectrum Analyzer Capture:						
Test	plot time [h:m:s]	sweep [s]	plot start time [h:m:s]	mrk [s]	event time [h:m:s]	eventTime UTC
DRG.2	13:37:57	150	13:35:27	72.86	13:36:39	17:36:39
			from DP logs (below)			17:36:44

DRG.2


17:36:42,605 INFO [com.ericsson.oss.sas.handler.network.cm.CMHandler] (EJB timerService - 6) Set the CbrsTxExpireTime on the cell:

SubNetwork=G2RBS,ManagedElement=OTENB5311,ENodeBFunction=1,EUtranCellTDD=2 to: -1 in DPS. Time taken: 1912

17:36:44,399 INFO [com.ericsson.oss.sas.handler.network.cm.CMHandler] (EJB timerService - 6) Set the CbrsTxExpireTime on the cell:


SubNetwork=G2RBS,ManagedElement=OTENB5311,ENodeBFunction=1,EUtranCellTDD=1 to: -1 in DPS. Time taken: 1773

Note: shutdown time taken from Domain Proxy logs, and shutdown confirmed by RF monitoring.


Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

Confirm that the device transmits at a power level less than or equal to the maximum power level approved by the SAS.

7.1.4.1.1	X	X	WINNF.PT.C.H BT	UUT RF Transmit Power Measurement	Power Spectral Density test case. Assume we use 1 carrier bandwidth (say, 5 or 10 MHz), one frequency (say middle channel in band) for test. Measure at max transmit power, and reduce in steps of 3 dB to minimum declared transmit power.	P
-----------	---	---	--------------------	--------------------------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

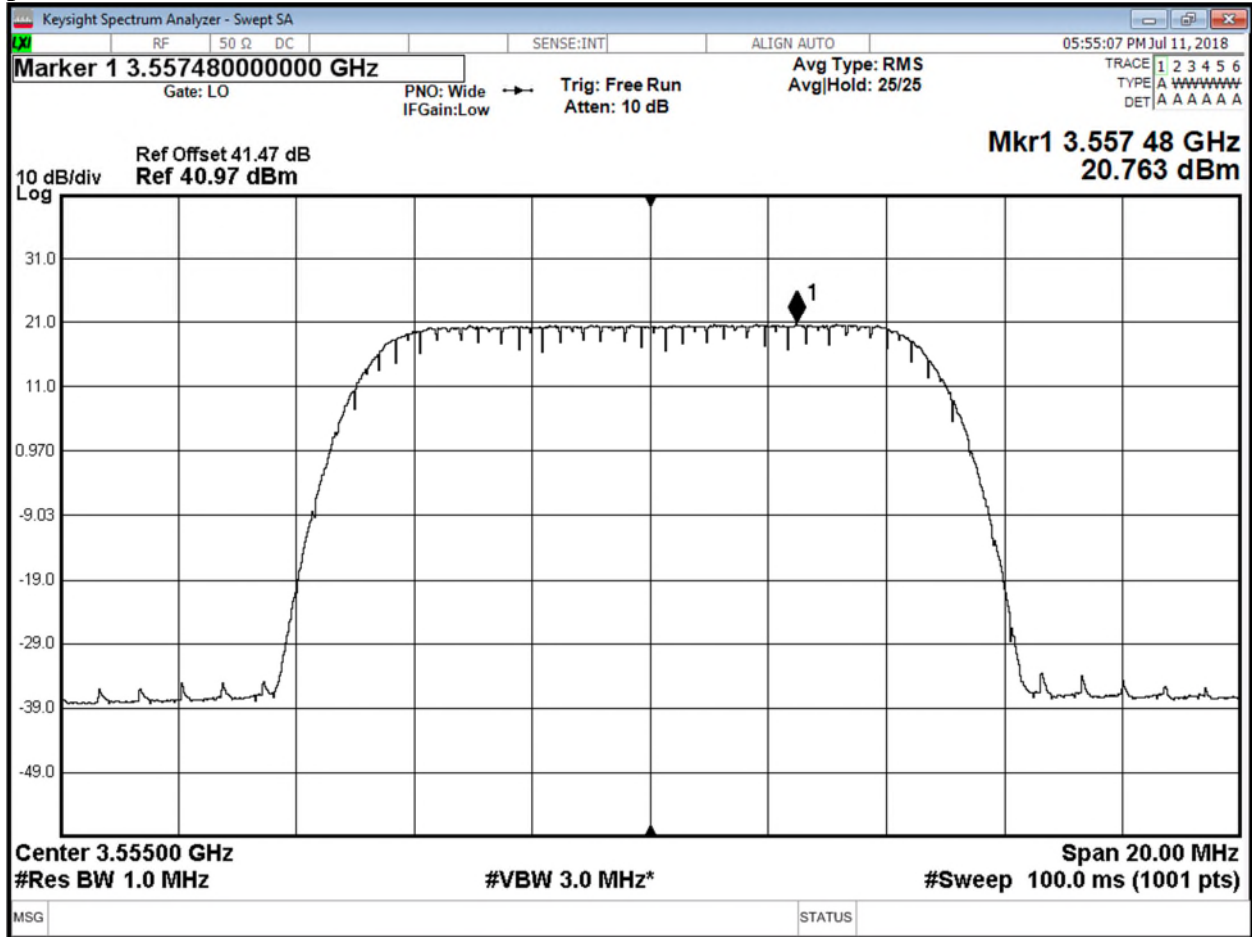
Log file name	Information from grantRequest			
	lowFrequency (MHz)	highFrequency (MHz)	Grant Center Freq (MHz)	maxEirp (dBm/MHz)
PowerMeasTest_2018-07-11T21.48.50Z	3550	3560	3555	35.55273
PowerMeasTest_2018-07-11T22.12.42Z	3550	3560	3555	17.47158
PowerMeasTest_2018-07-11T22.30.50Z	3625	3635	3630	17.47158
PowerMeasTest_2018-07-11T22.44.08Z	3625	3635	3630	23.49218
PowerMeasTest_2018-07-11T22.49.19Z	3625	3635	3630	29.28389
PowerMeasTest_2018-07-11T22.56.45Z	3625	3635	3630	35.55273
PowerMeasTest_2018-07-11T23.03.41Z	3690	3700	3695	35.55273
PowerMeasTest_2018-07-11T23.10.19Z	3690	3700	3695	17.47158

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

	plot			single port, conducted	Offset used on spectrum analyzer	Actual Calibration Offset from calibration curve	total PSD EIRP, measured [dBm/MHz]	Ma rgin
plot name	time		Freq [MHz]	PSD [dBm/MHz]	[dB]	[dB]		
psd low ch 37dbm 1mhz_2	5:55:07	9:55:07	3555	20.763	41.47	41.16	35.5	0.1
psd low ch 20dbm 1mhz_2	6:16:49	10:16:49	3555	2.682	41.47	41.16	17.4	0.1
psd mid ch 20dbm 1mhz_2	6:38:47	10:38:47	3630	1.902	41.47	41.2	16.6	0.8
psd mid ch 24.9dbm 1mhz_2	6:46:51	10:46:51	3630	8.073	41.47	41.2	22.8	0.7
psd mid ch 30.9dbm 1mhz_2	6:51:53	10:51:53	3630	13.865	41.47	41.2	28.6	0.7
psd mid ch 37dbm 1mhz_2	6:59:07	10:59:07	3630	19.975	41.47	41.2	34.7	0.8
psd high ch 37dbm 1mhz_2	7:06:54	11:06:54	3695	19.679	41.47	41.47	34.7	0.9
psd high ch 20dbm 1mhz_2	7:16:09	11:16:09	3695	1.787	41.47	41.47	16.8	0.7

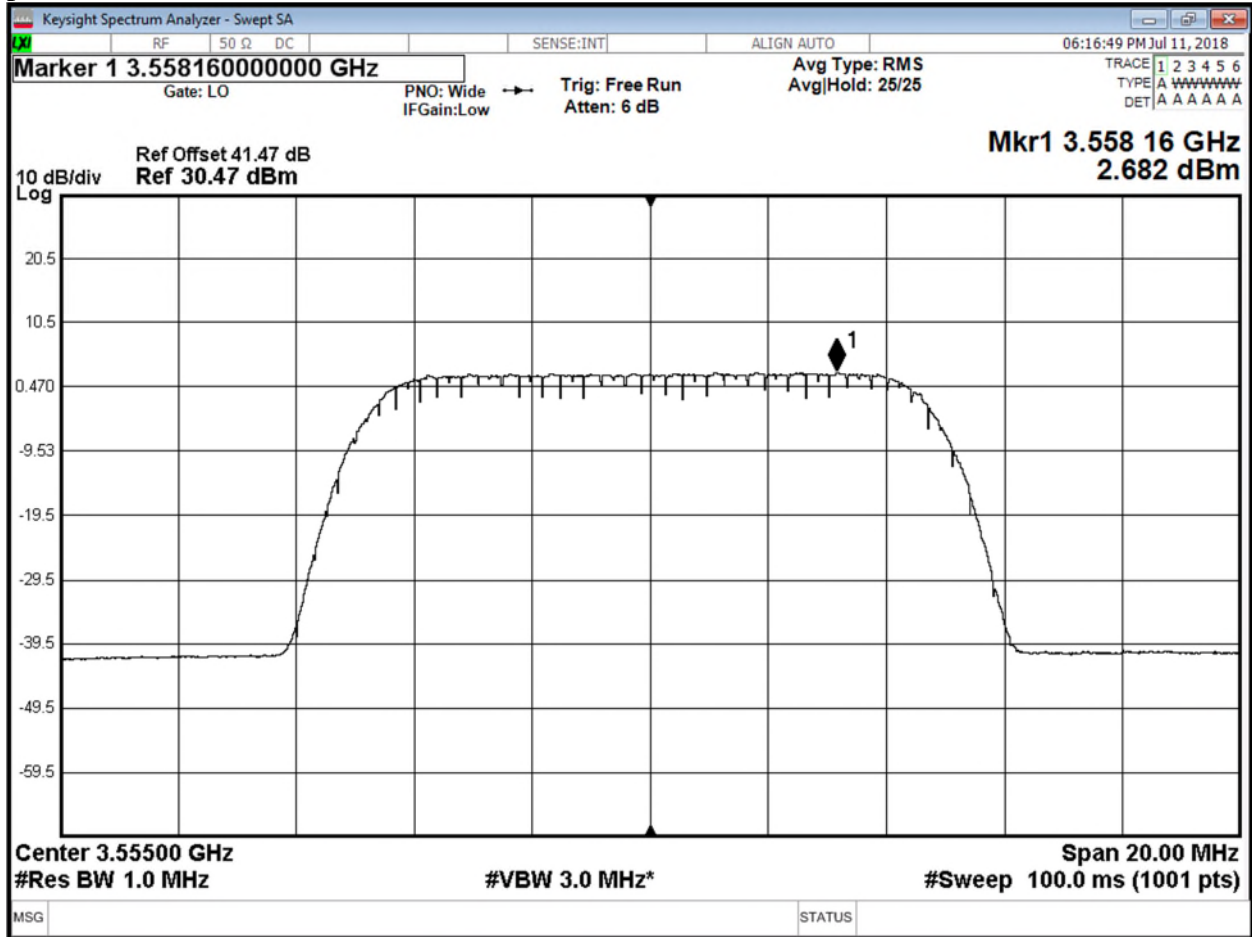
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

psd low ch 37dbm 1mhz_2



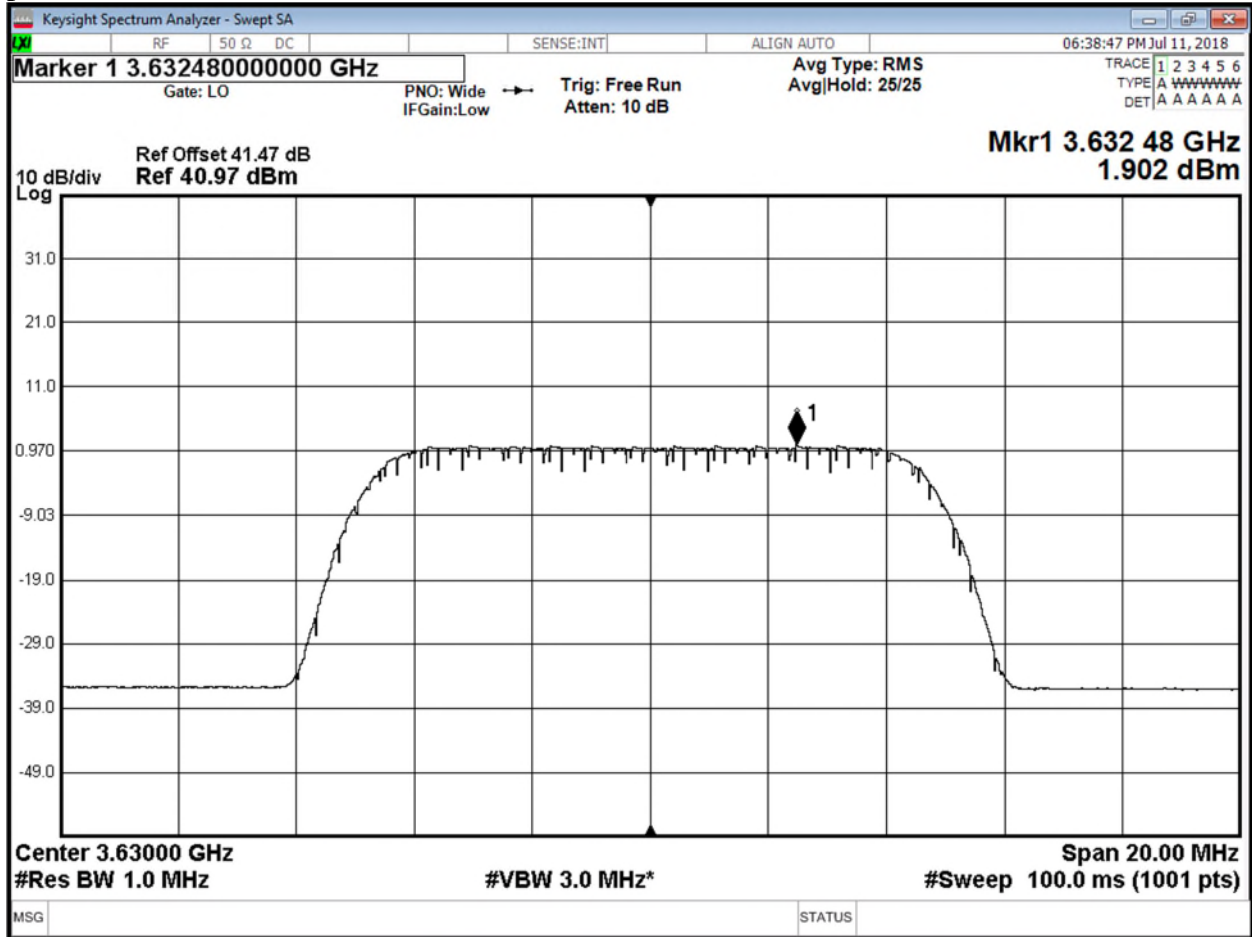
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

psd low ch 20dbm 1mhz_2



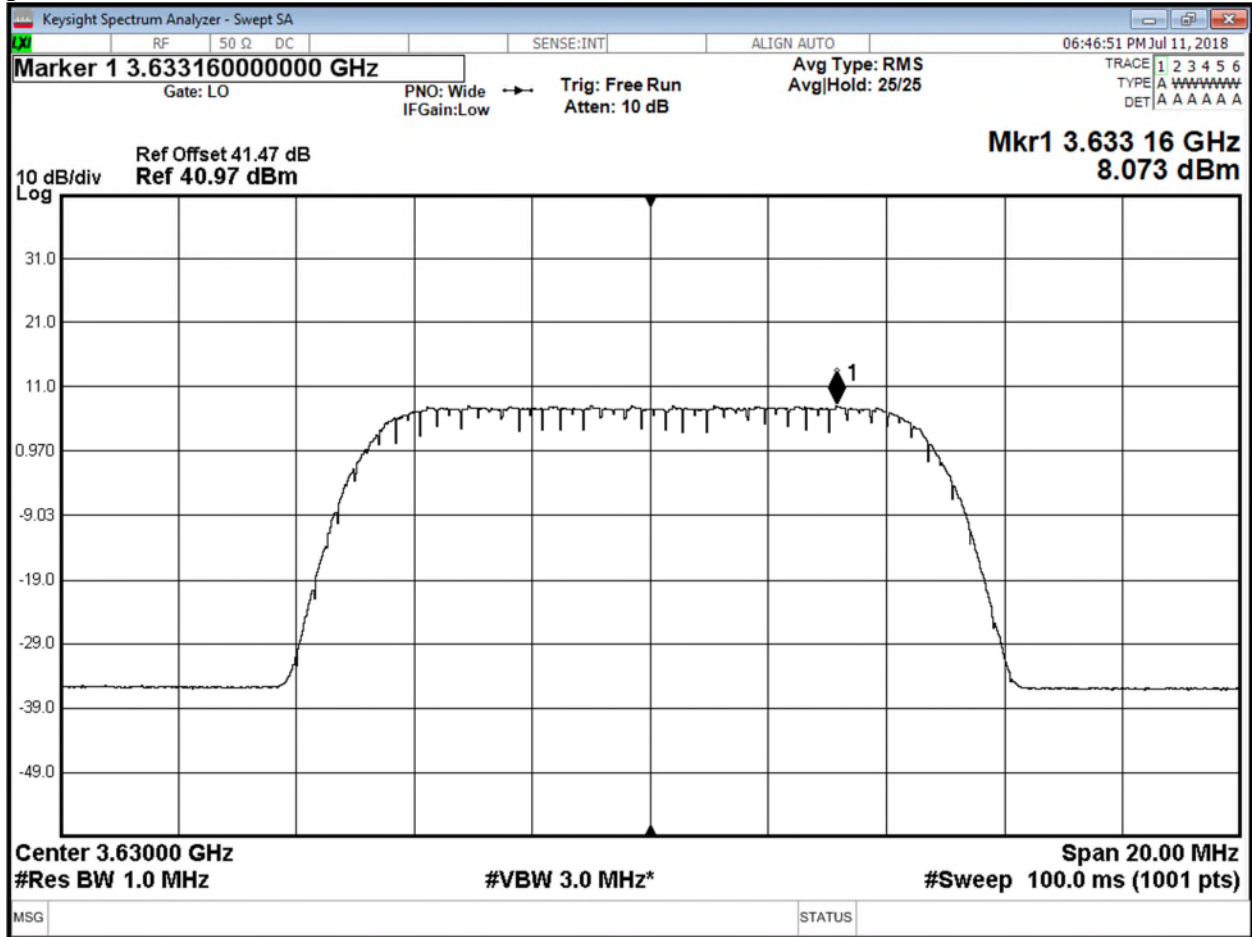
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


psd mid ch 20dbm 1mhz_2



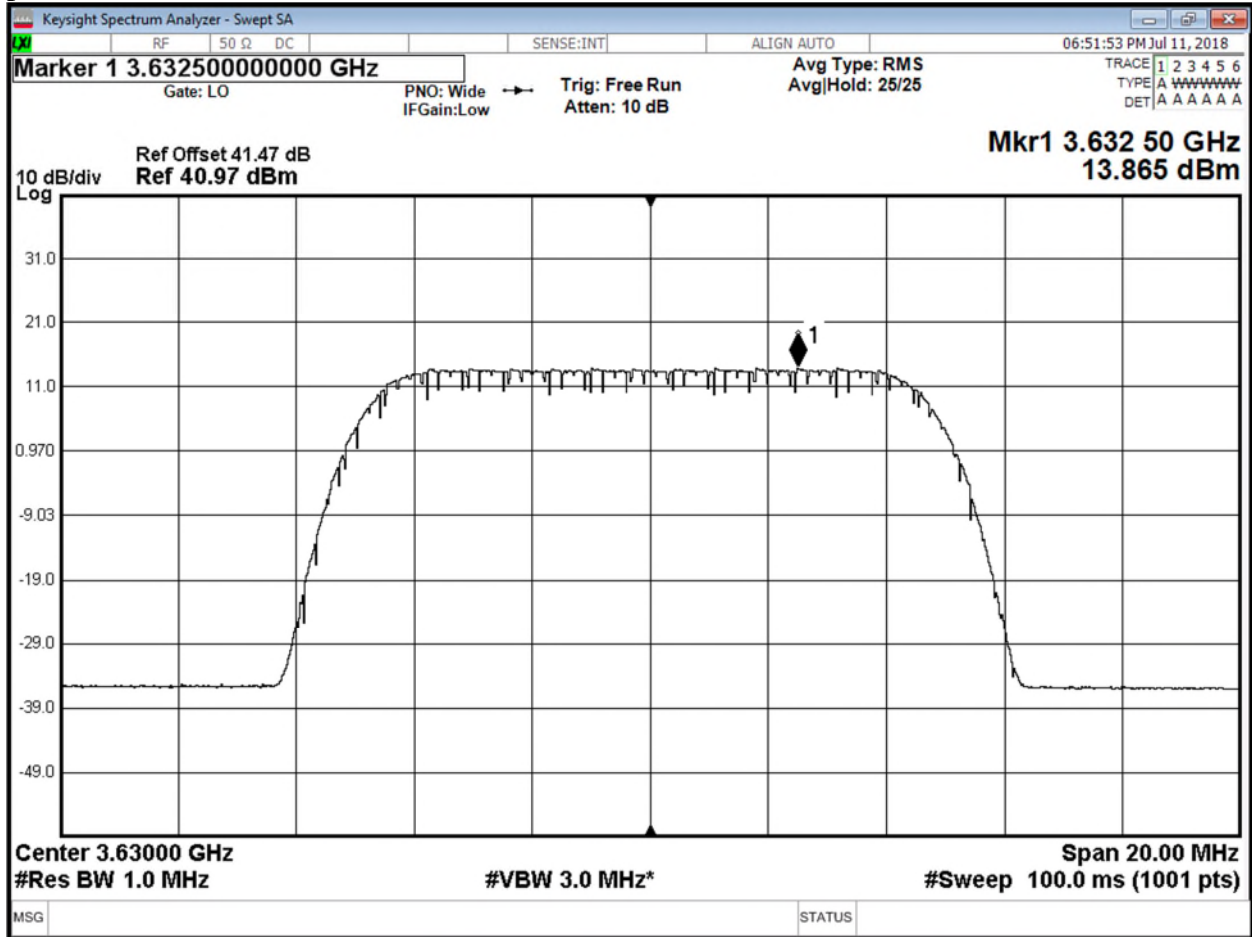
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


psd mid ch 24.9dbm 1mhz_2



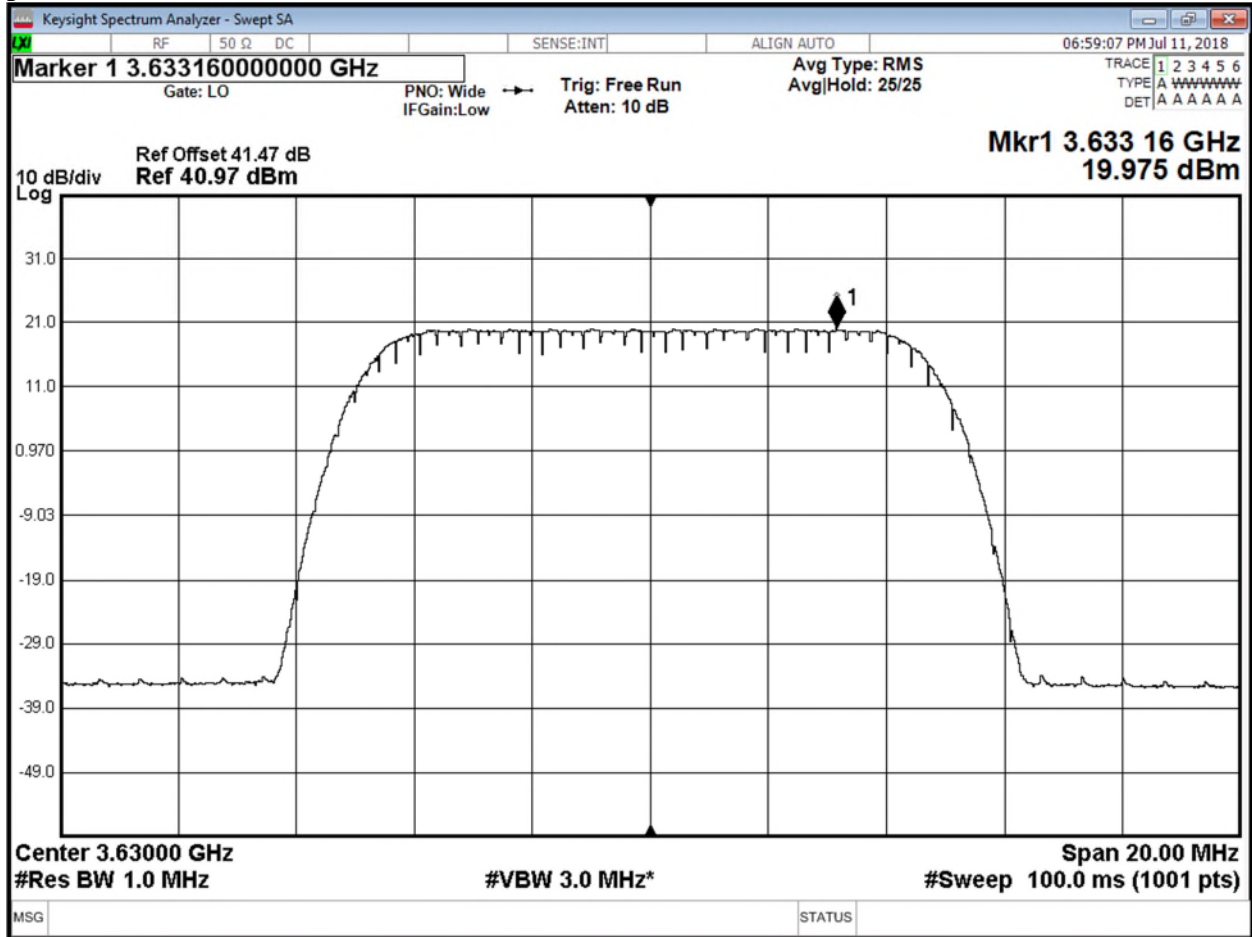
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


psd mid ch 30.9dbm 1mhz_2



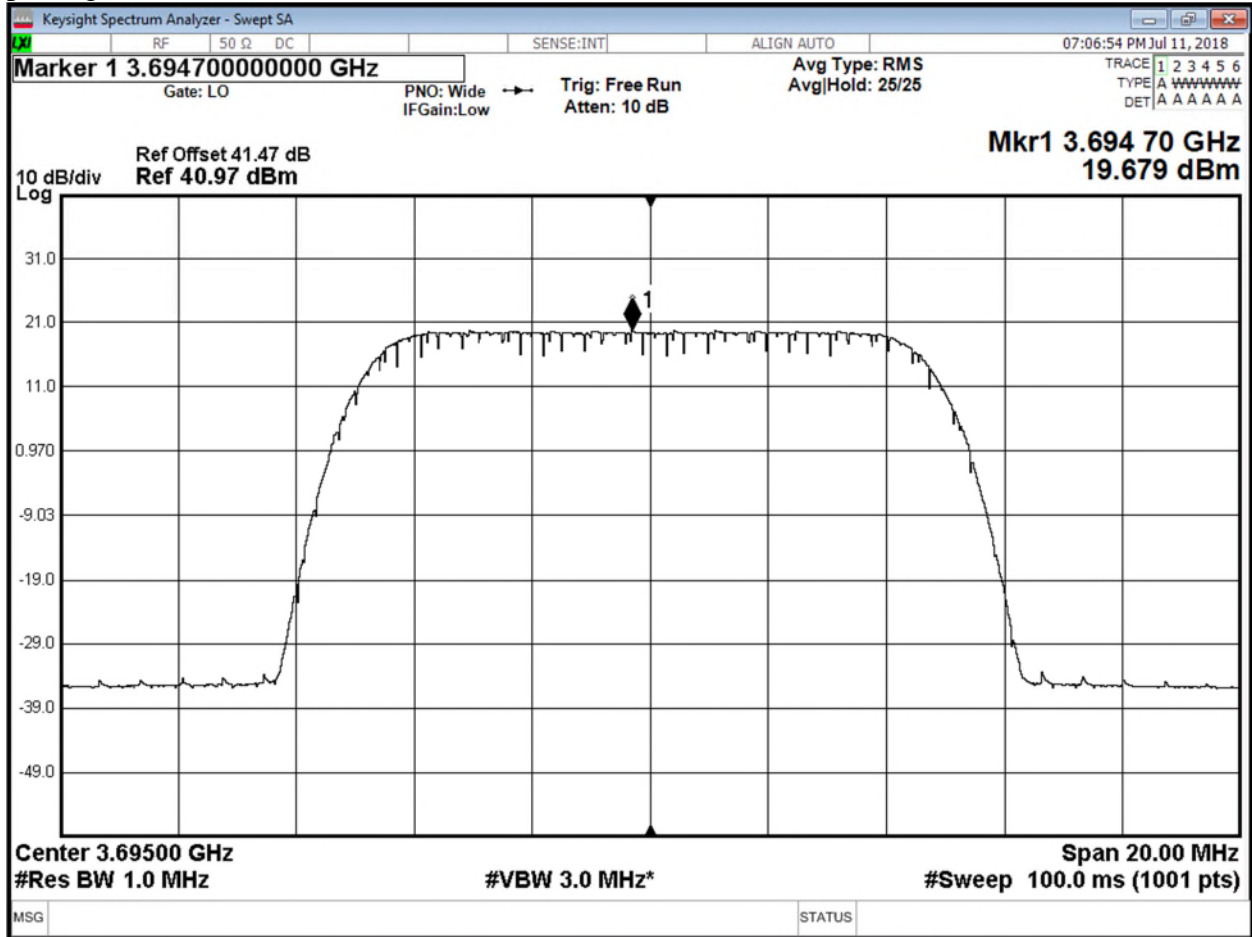
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	


psd mid ch 37dbm 1mhz_2



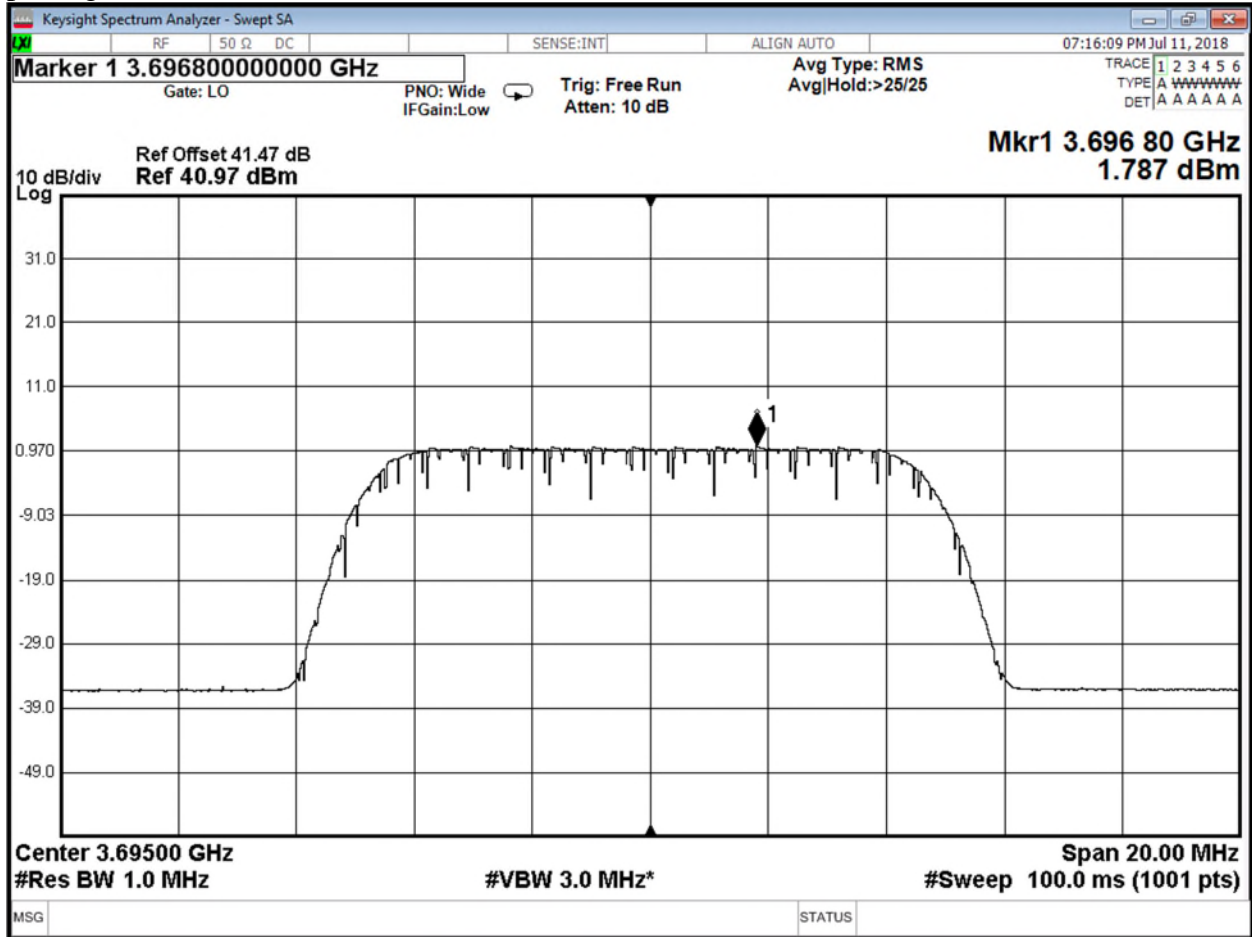
Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

psd high ch 37dbm 1mhz_2



Client	Ericsson	 Canada
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

psd high ch 20dbm 1mhz_2



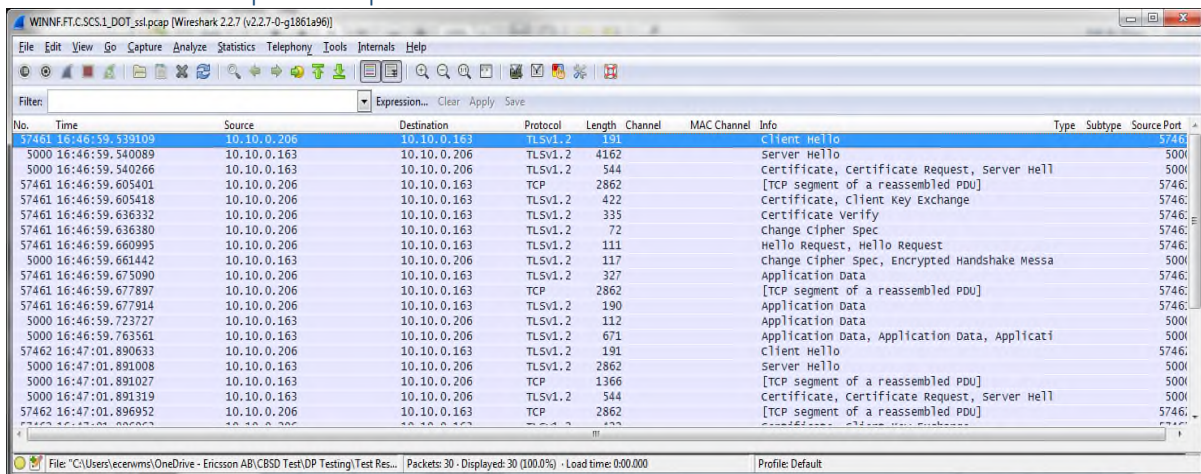
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

DOT CBRS Radio: WINNF / Security Test Case Analysis

WINNF Security Test Case Analysis

WINNF.FT.C.SCS.1

Packet Capture Sequence



No.	Time	Source	Destination	Protocol	Length	Channel	MAC Channel	Info	Type	Subtype	Source Port
57461	16:46:59.539109	10.10.0.206	10.10.0.163	TLSv1.2	191			Client Hello			5746
5000	16:46:59.540089	10.10.0.163	10.10.0.206	TLSv1.2	4162			Server Hello			5000
5000	16:46:59.540266	10.10.0.163	10.10.0.206	TLSv1.2	544			Certificate, Certificate Request, Server Hell			5000
57461	16:46:59.605401	10.10.0.206	10.10.0.163	TCP	2862			[TCP segment of a reassembled PDU]			5746
57461	16:46:59.605418	10.10.0.206	10.10.0.163	TLSv1.2	422			Certificate, Client Key Exchange			5746
57461	16:46:59.636332	10.10.0.206	10.10.0.163	TLSv1.2	335			Certificate Verify			5746
57461	16:46:59.636380	10.10.0.206	10.10.0.163	TLSv1.2	72			Change Cipher Spec			5746
57461	16:46:59.660995	10.10.0.206	10.10.0.163	TLSv1.2	111			Hello request, Hello request			5746
5000	16:46:59.661442	10.10.0.163	10.10.0.206	TLSv1.2	117			Change Cipher Spec, Encrypted Handshake Messa			5000
57461	16:46:59.675090	10.10.0.206	10.10.0.163	TLSv1.2	327			Application Data			5746
57461	16:46:59.677897	10.10.0.206	10.10.0.163	TCP	2862			[TCP segment of a reassembled PDU]			5746
57461	16:46:59.677914	10.10.0.206	10.10.0.163	TLSv1.2	190			Application Data			5746
5000	16:46:59.723727	10.10.0.163	10.10.0.206	TLSv1.2	112			Application Data			5000
5000	16:46:59.763561	10.10.0.163	10.10.0.206	TLSv1.2	671			Application data, Application Data, Applicati			5000
57462	16:47:01.890633	10.10.0.206	10.10.0.163	TLSv1.2	191			Client Hello			5746
5000	16:47:01.891008	10.10.0.163	10.10.0.206	TLSv1.2	2862			Server Hello			5000
5000	16:47:01.891027	10.10.0.163	10.10.0.206	TCP	1366			[TCP segment of a reassembled PDU]			5000
5000	16:47:01.891319	10.10.0.163	10.10.0.206	TLSv1.2	544			Certificate, Certificate Request, Server Hell			5000
57462	16:47:01.896952	10.10.0.206	10.10.0.163	TCP	2862			[TCP segment of a reassembled PDU]			5746

WINNF test requirements:

WINNF test requirements from WINNF-TS-0122-V1.0.0 CBRS CBSD Test Specification:

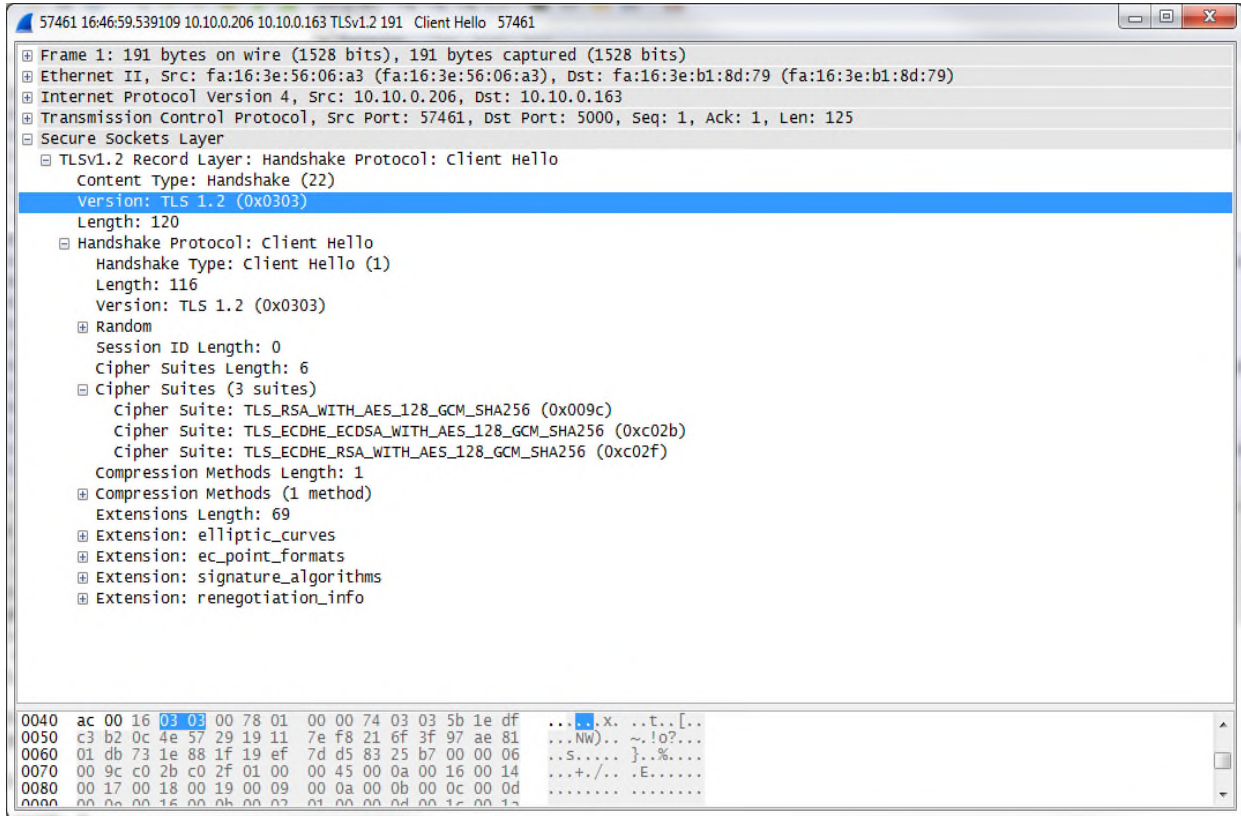
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

2	<ul style="list-style-type: none"> • Make sure that Mutual authentication happens between UUT and the SAS Test Harness. • Make sure that UUT uses TLS v1.2 • Make sure that cipher suites from one of the following is selected, <ul style="list-style-type: none"> • TLS_RSA_WITH_AES_128_GCM_SHA256 • TLS_RSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256 • TLS_ECDHE_ECDSA_WITH_AES_256_GCM_SHA384 • TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256 	PASS	FAIL
---	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------	------

Analysis of WINNF Test Requirements

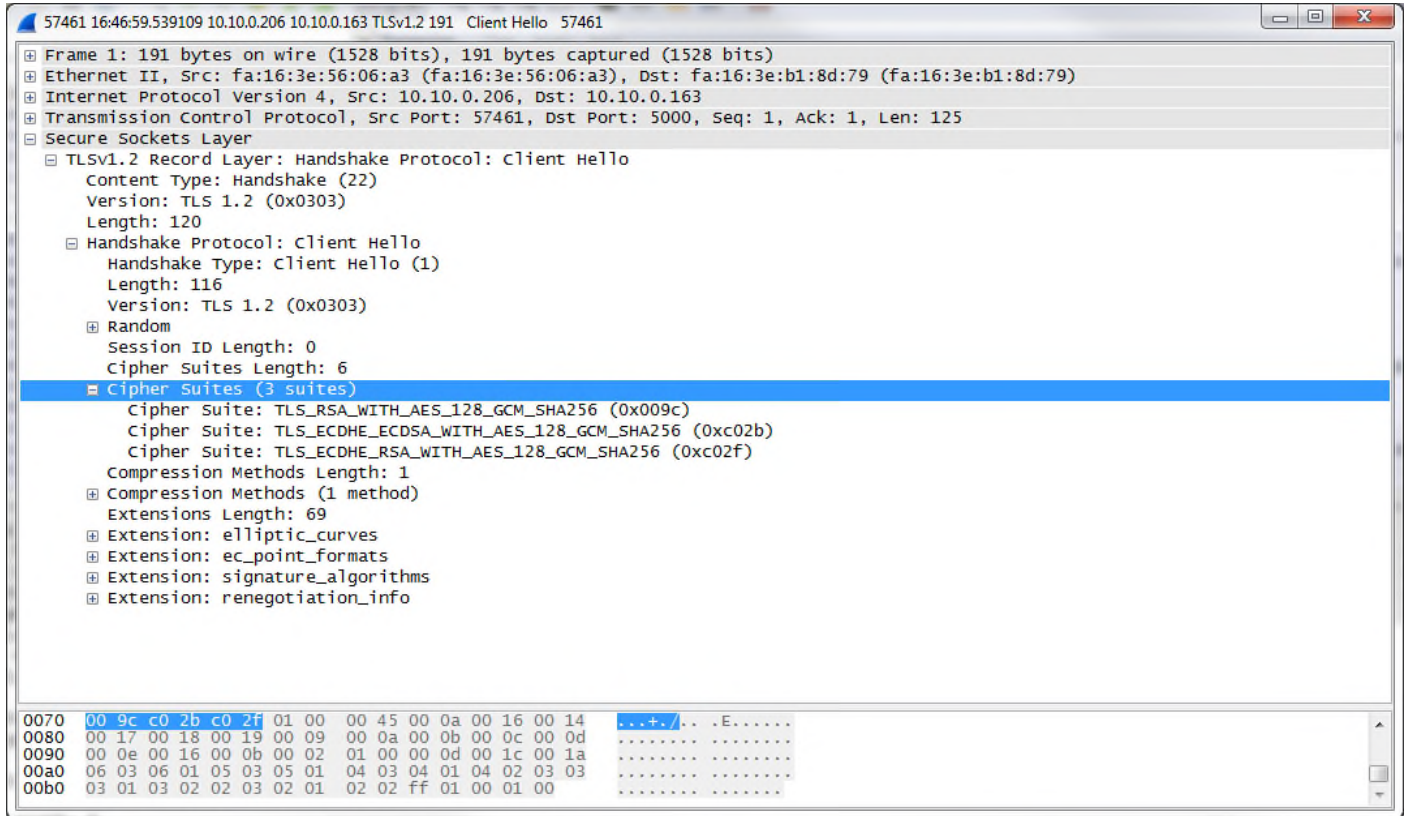
1. From Client Hello: TLS version = TLS 1.2

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	



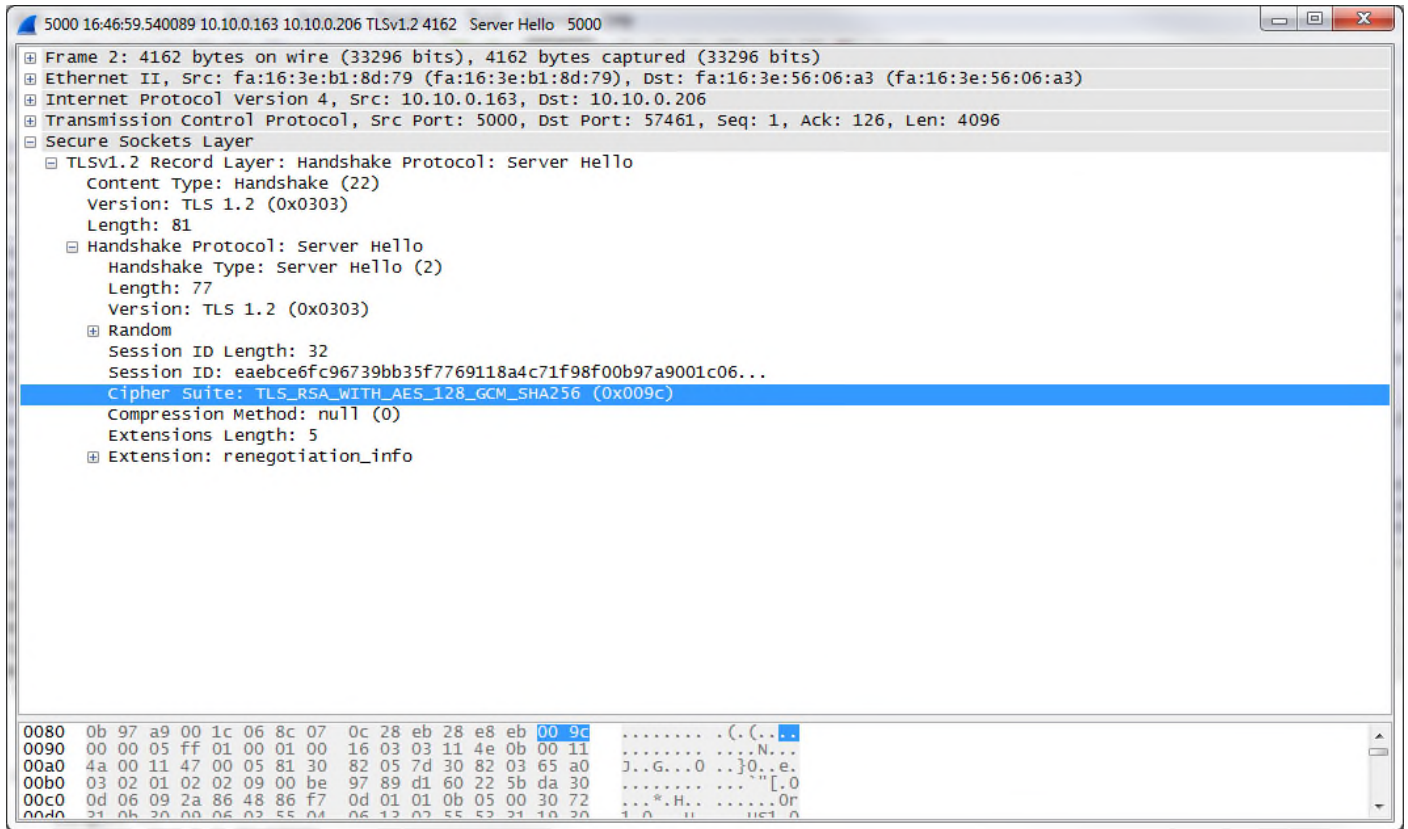
2. Cipher suite list from Client Hello is from WINNF approved list:
 TLS_RSA_WITH_AES_128_GCM_SHA25
 TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	



3. Cipher suite chosen (from Server Hello):
 TLS_RSA_WITH_AES_128_GCM_SHA256

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

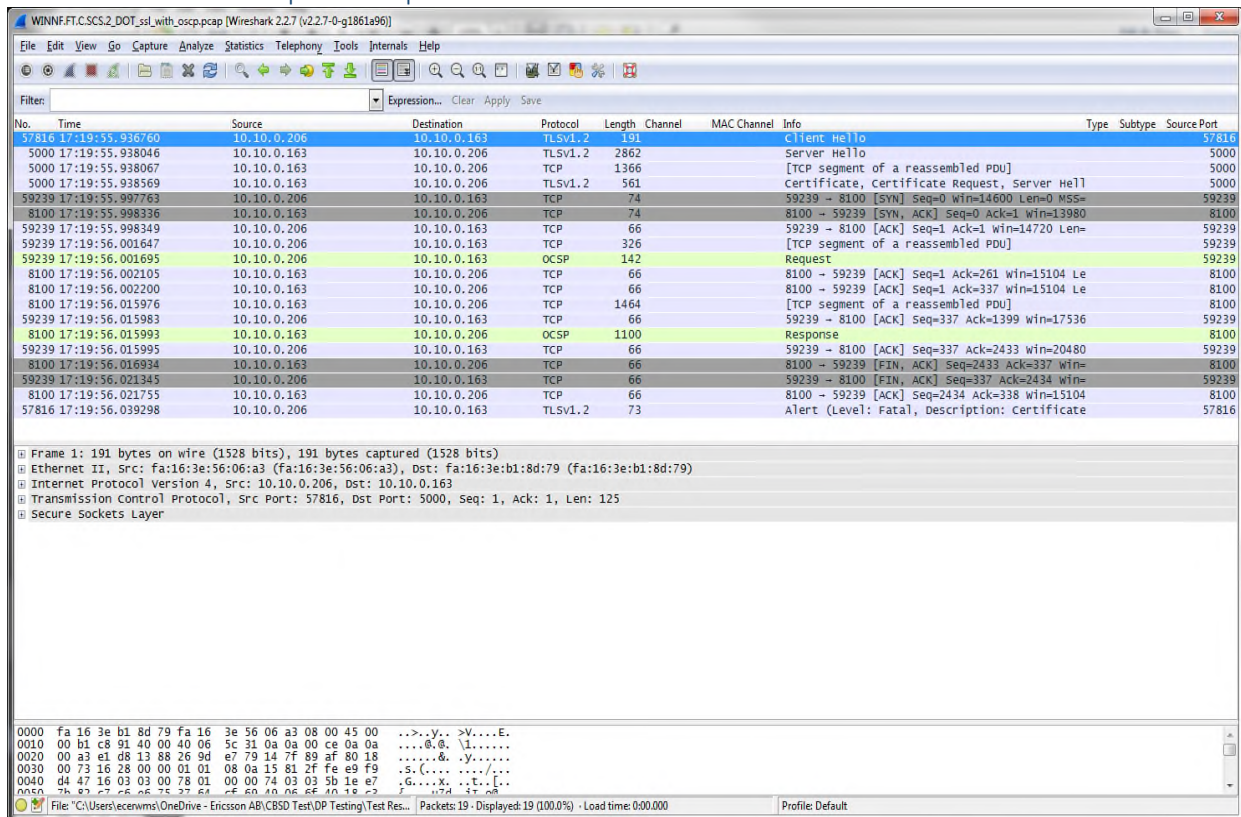


4. The Registration request message arrived at the Test Harness, so authentication was completed.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

WINNF.FT.C.SCS.2

Packet Capture Sequence



The screenshot shows a packet capture sequence in Wireshark. The main pane displays a list of packets with columns for No., Time, Source, Destination, Protocol, Length, Channel, MAC Channel, Info, Type, Subtype, and Source Port. The sequence starts with a Client Hello (No. 57816) and continues through a Server Hello, Certificate, OCSP Request, and OCSP Response. The final packet is an Alert (Level: Fatal, Description: Certificate) at No. 57816.

Below the packet list, the details pane shows the structure of the selected packet (No. 191):

- Frame 1: 191 bytes on wire (1528 bits), 191 bytes captured (1528 bits)
- Ethernet II, Src: fa:16:3e:56:06:a3 (Fa:16:3e:b1:8d:79 (Fa:16:3e:b1:8d:79))
- Internet Protocol Version 4, Src: 10.10.0.206, Dst: 10.10.0.163
- Transmission Control Protocol, Src Port: 57816, Dst Port: 5000, Seq: 1, Ack: 1, Len: 125
- Secure Sockets Layer

The hex dump at the bottom shows the raw data of the packet.

WINNF Test Requirements:

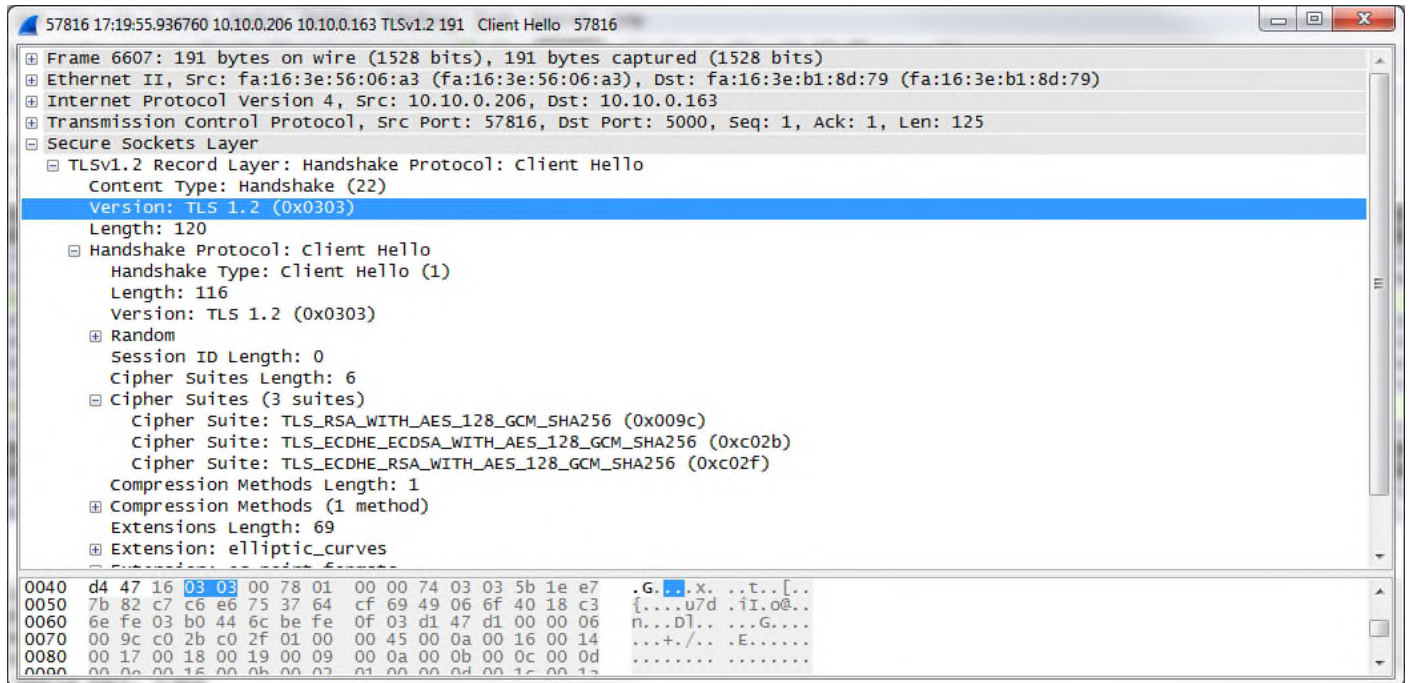
WINNF test requirements from WINNF-TS-0122-V1.0.0 CBRS CBSD Test Specification:

2	<ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. 	PASS	FAIL
---	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------	------

Analysis of WINNF Test Requirements

1. From Client Hello can read: TLS version = TLS 1.2

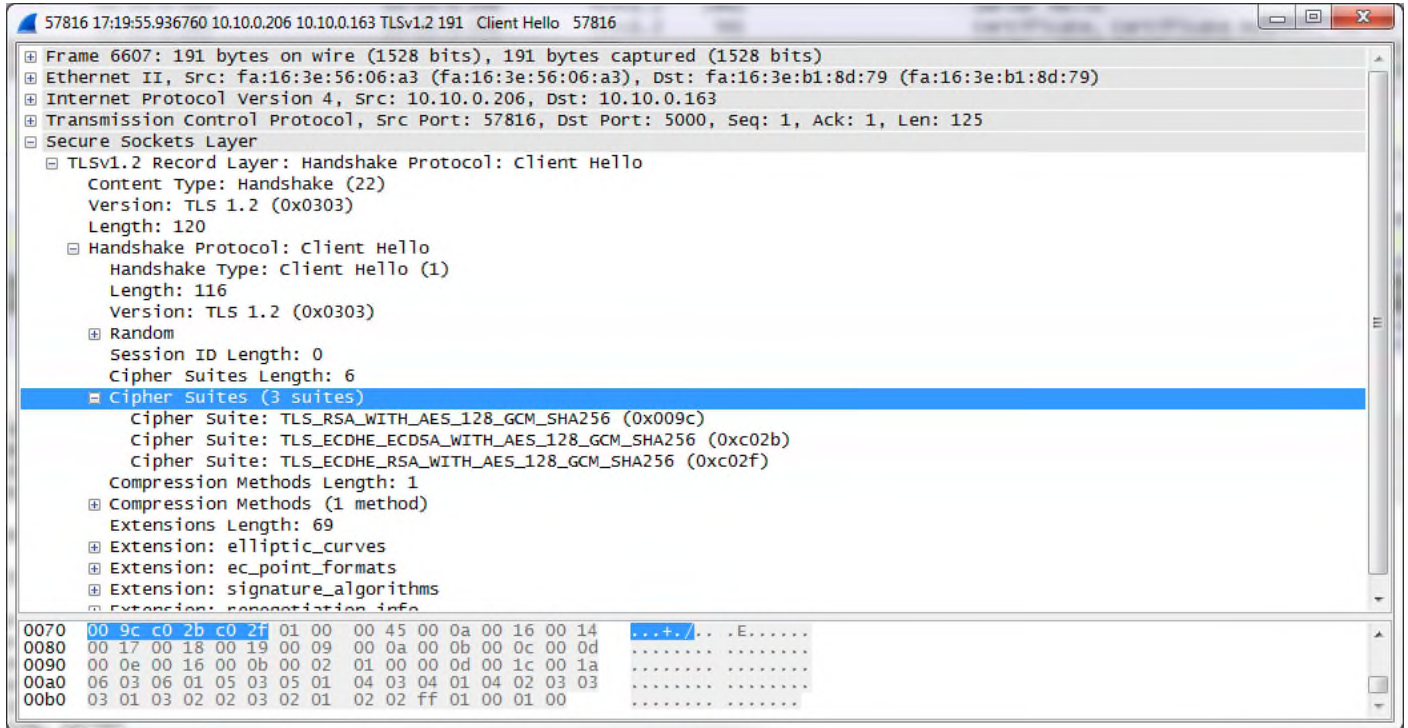
Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	



2. From Client Hello, cipher suite list is from WINNF approved list:

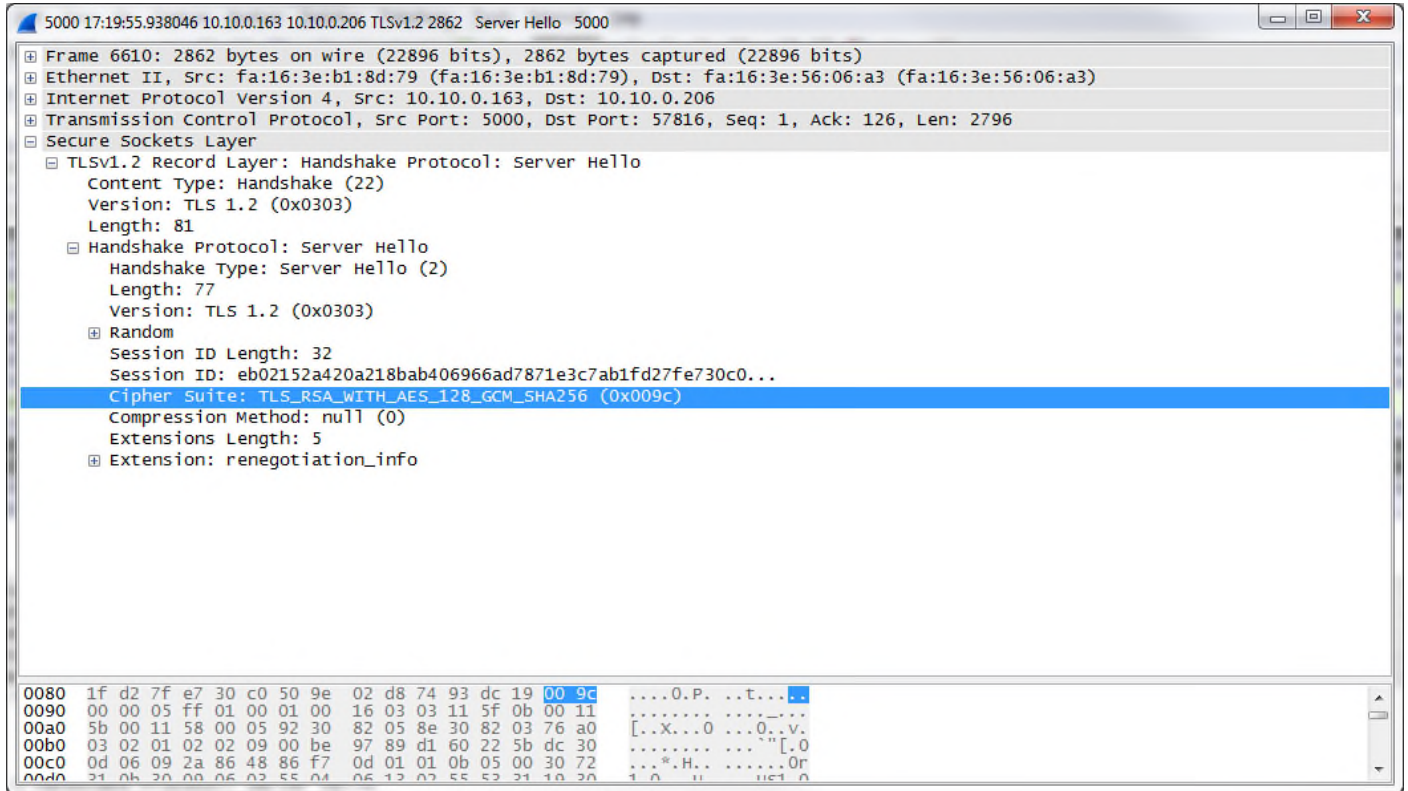
TLS_RSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	




- From Server Hello, cipher suite chosen:
TLS_RSA_WITH_AES_128_GCM_SHA256

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	



4. Read OSCP Request/Response to/from server:

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	

59239 17:19:56.001695 10.10.0.206 10.10.0.163 OCSP 142 Request 59239

- ⊕ Frame 6631: 142 bytes on wire (1136 bits), 142 bytes captured (1136 bits)
- ⊕ Ethernet II, Src: fa:16:3e:56:06:a3 (fa:16:3e:56:06:a3), Dst: fa:16:3e:b1:8d:79 (fa:16:3e:b1:8d:79)
- ⊕ Internet Protocol Version 4, Src: 10.10.0.206, Dst: 10.10.0.163
- ⊕ Transmission Control Protocol, Src Port: 59239, Dst Port: 8100, Seq: 261, Ack: 1, Len: 76
- ⊕ [2 Reassembled TCP Segments (336 bytes): #6630(260), #6631(76)]
- ⊕ Hypertext Transfer Protocol
- ⊕ Online Certificate Status Protocol
 - ⊖ tbsRequest
 - ⊖ requestList: 1 item
 - ⊖ Request
 - ⊖ reqCert
 - ⊖ hashAlgorithm (SHA-1)
 - Algorithm Id: 1.3.14.3.2.26 (SHA-1)
 - issuerNameHash: 5368d21d2529427538588c5ccb4c4e6f3b96641
 - issuerKeyHash: 28dfa5dc7e01810db98617066e4d66400f514713
 - serialNumber: 13733597121043651548

```

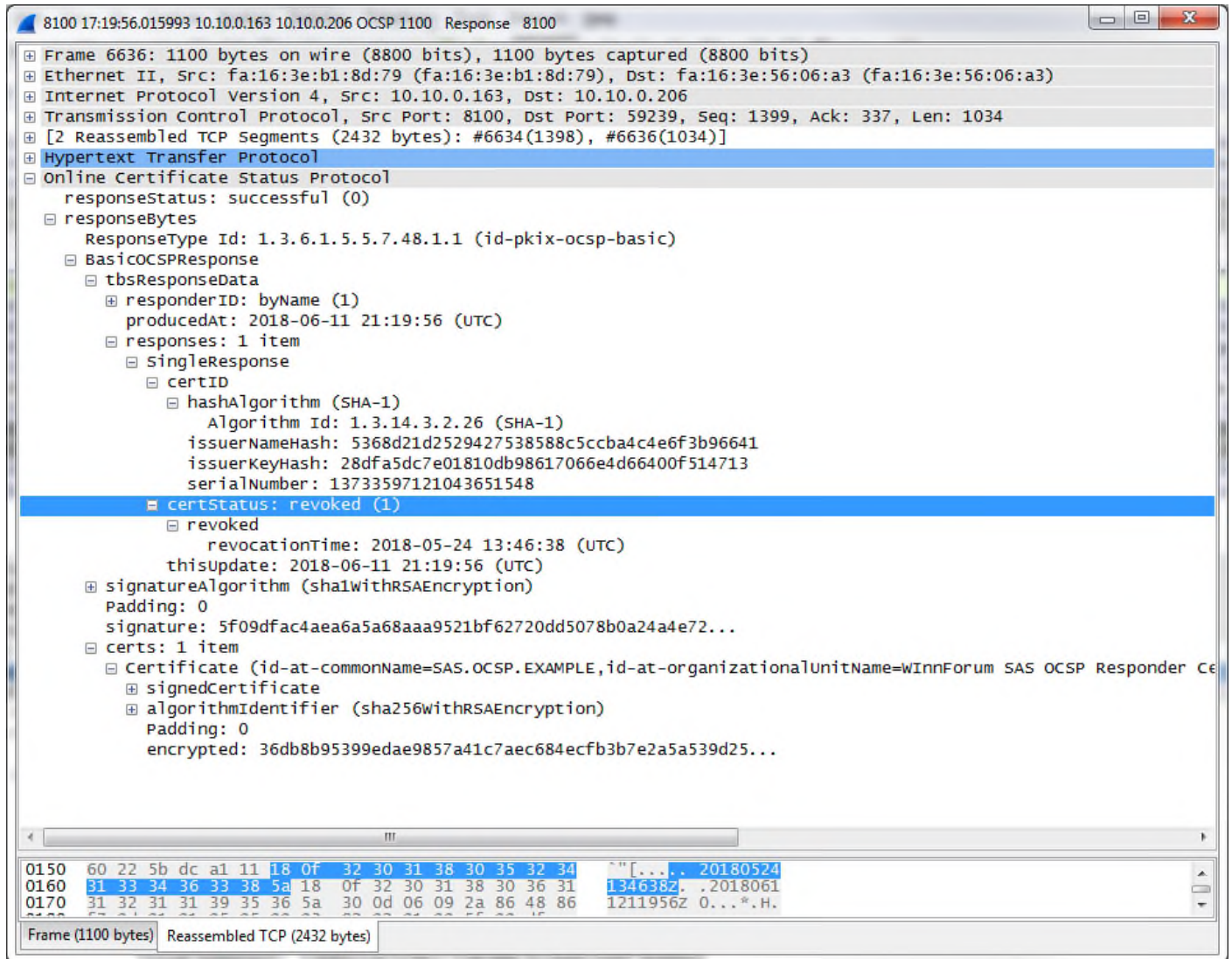
0100  0d 0a 0d 0a 30 4a 30 48 30 46 30 44 30 42 30 09  ....0J0H 0F0D0B0.
0110  06 05 2b 0e 03 02 1a 05 00 04 14 53 68 d2 1d 25  ..+..... ..sh..%
0120  29 42 75 38 58 8c 5c cb a4 c4 e6 f3 b9 66 41 04  )Bu8X.\. ....fA.

```

Frame (142 bytes) Reassembled TCP (336 bytes)

© TÜV SÜD Canada Inc. This test report shall not be reproduced except in full, without written approval of TÜV SÜD Canada Inc.

Client	Ericsson	
Product	LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz)	
Standard(s)	FCC Part 96 SAS requirements (CBRS Test Plan)	



8100 17:19:56.015993 10.10.0.163 10.10.0.206 OCSP 1100 Response 8100

- Frame 6636: 1100 bytes on wire (8800 bits), 1100 bytes captured (8800 bits)
- Ethernet II, Src: fa:16:3e:b1:8d:79 (fa:16:3e:b1:8d:79), Dst: fa:16:3e:56:06:a3 (fa:16:3e:56:06:a3)
- Internet Protocol Version 4, Src: 10.10.0.163, Dst: 10.10.0.206
- Transmission Control Protocol, Src Port: 8100, Dst Port: 59239, Seq: 1399, Ack: 337, Len: 1034
- [2 Reassembled TCP Segments (2432 bytes): #6634(1398), #6636(1034)]
- Hypertext Transfer Protocol
- Online Certificate Status Protocol
 - responsestatus: successful (0)
 - responseBytes
 - ResponseType Id: 1.3.6.1.5.5.7.48.1.1 (id-pkix-ocsp-basic)
 - BasicOCSPResponse
 - tbsResponseData
 - responderID: byName (1)
 - producedAt: 2018-06-11 21:19:56 (UTC)
 - responses: 1 item
 - SingleResponse
 - certID
 - hashAlgorithm (SHA-1)
 - Algorithm Id: 1.3.14.3.2.26 (SHA-1)
 - issuerNameHash: 5368d21d2529427538588c5ccba4c4e6f3b96641
 - issuerKeyHash: 28dfa5dc7e01810db98617066e4d66400f514713
 - serialNumber: 13733597121043651548
 - certStatus: revoked (1)
 - revoked
 - revocationTime: 2018-05-24 13:46:38 (UTC)
 - thisUpdate: 2018-06-11 21:19:56 (UTC)
 - signatureAlgorithm (sha1withRSAEncryption)
 - Padding: 0
 - signature: 5f09dfac4aea6a5a68aaa9521bf62720dd5078b0a24a4e72...
 - certs: 1 item
 - Certificate (id-at-commonName=SAS.OCSP.EXAMPLE,id-at-organizationalUnitName=WinnForum SAS OCSP Responder Ce
 - signedCertificate
 - algorithmIdentifier (sha256withRSAEncryption)
 - Padding: 0
 - encrypted: 36db8b95399edae9857a41c7aec684ecfb3b7e2a5a539d25...

0150 60 22 5b dc a1 11 18 0f 32 30 31 38 30 35 32 34 ~"[...].20180524

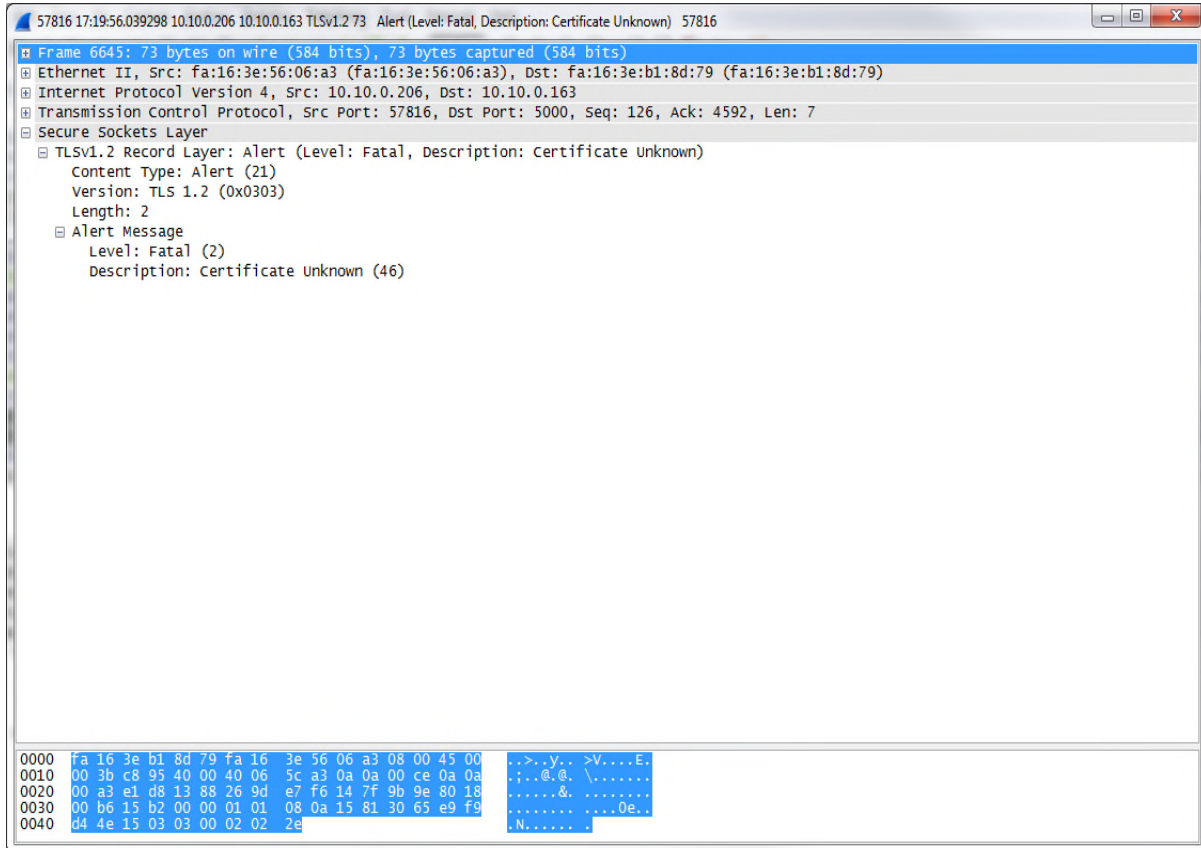
0160 31 33 34 36 33 38 5a 18 0f 32 30 31 38 30 36 31 134638Z].2018061

0170 31 32 31 31 39 35 36 5a 30 0d 06 09 2a 86 48 86 1211956Z 0...*.H.

Frame (1100 bytes) Reassembled TCP (2432 bytes)

5. Authentication exchange ends with TLS Alert message (i.e. authentication fails):

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

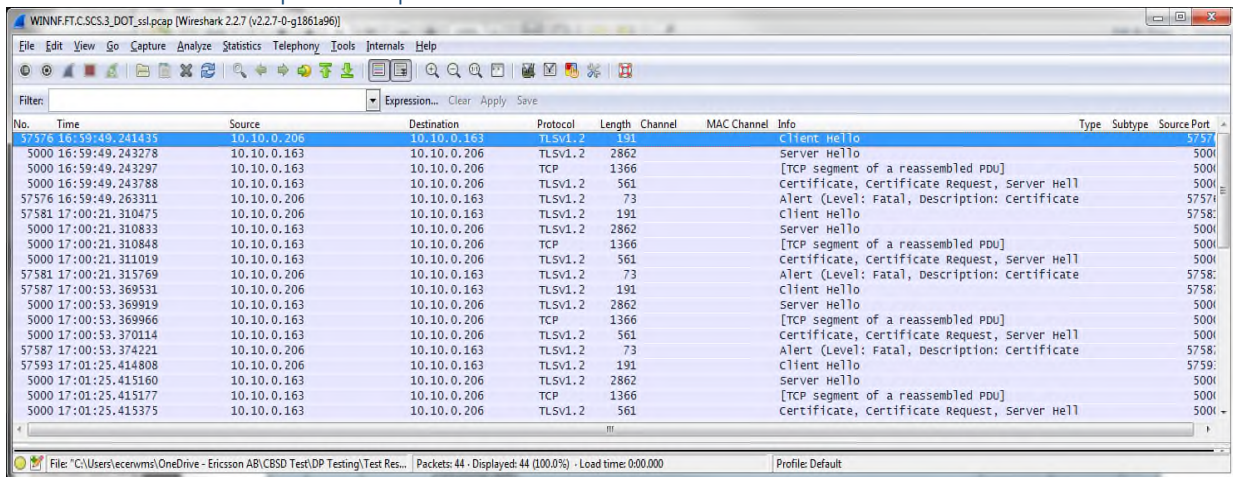


6. Registration request message is not received at Test Harness (authentication fails)

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

WINNF.FT.C.SCS.3

Packet Capture Sequence



WINNF Test Requirements:

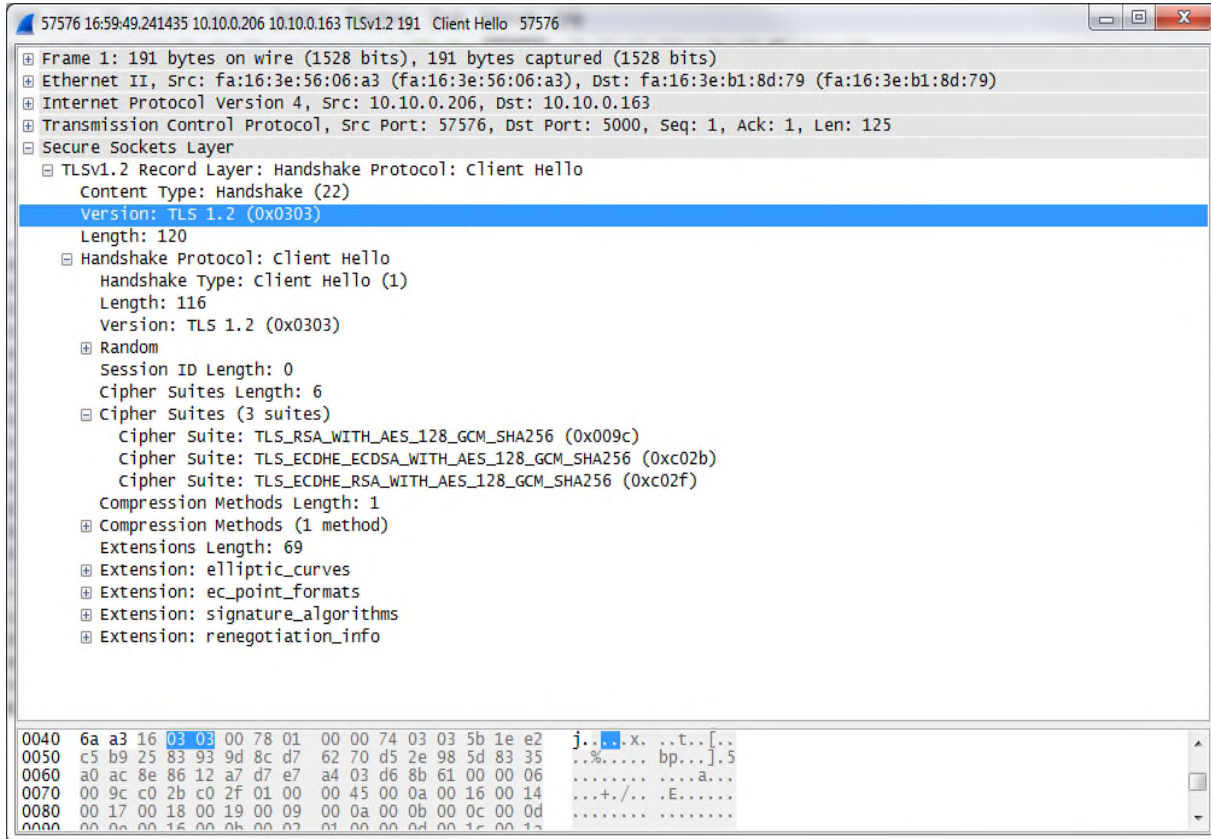
WINNF test requirements from WINNF-TS-0122-V1.0.0 CBRS CBSB Test Specification:

| | | | |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| 2 | <ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. | PASS | FAIL |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|

Analysis of WINNF Test Requirements

1. From Client Hello can read: TLS version = TLS 1.2

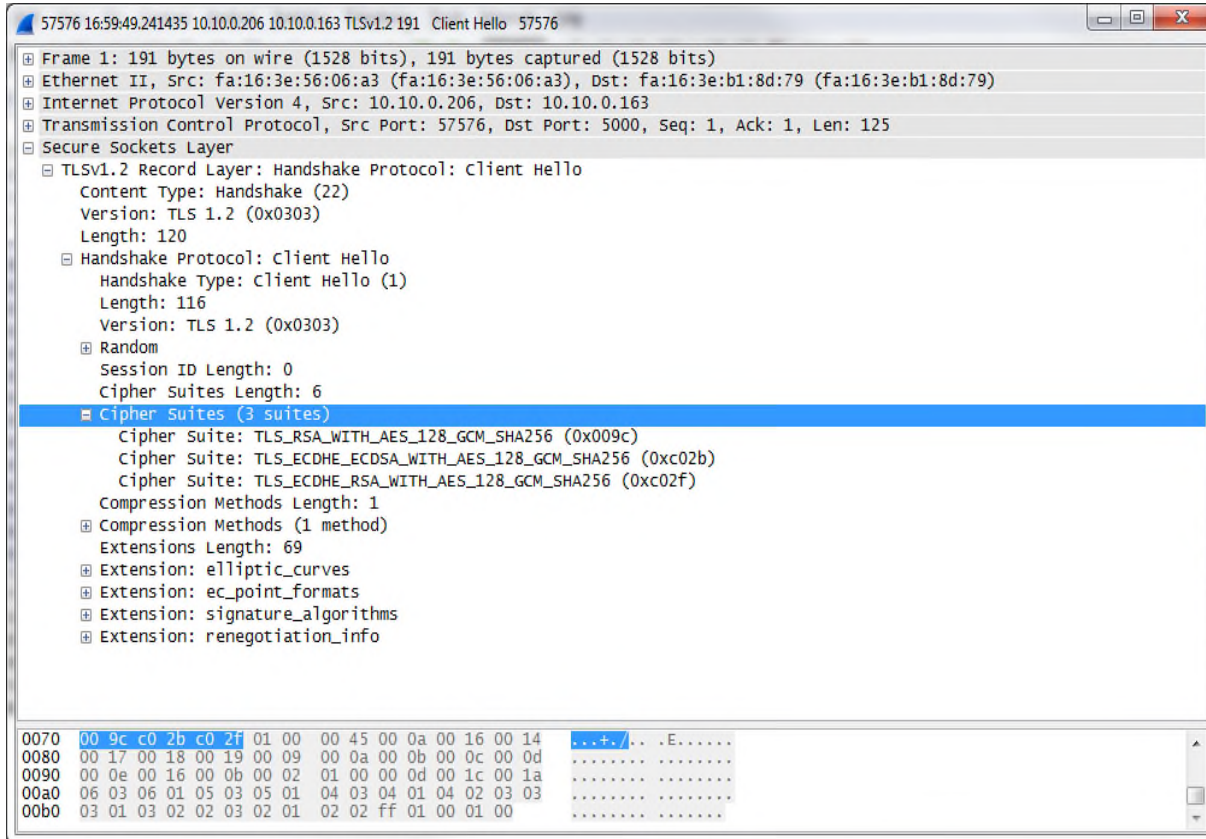
| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



2. From Client Hello, cipher suite list is from WINNF approved list:

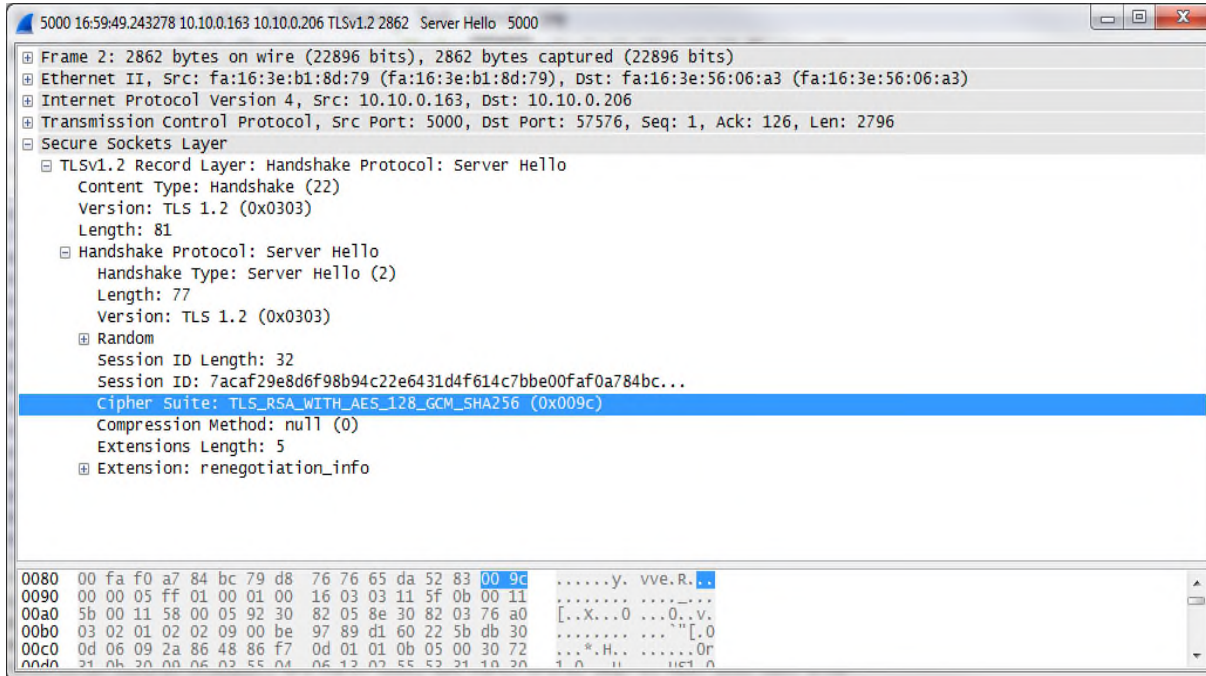
TLS_RSA_WITH_AES_128_GCM_SHA25
 TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

| | | |
|-------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Client | Ericsson | 
Canada |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



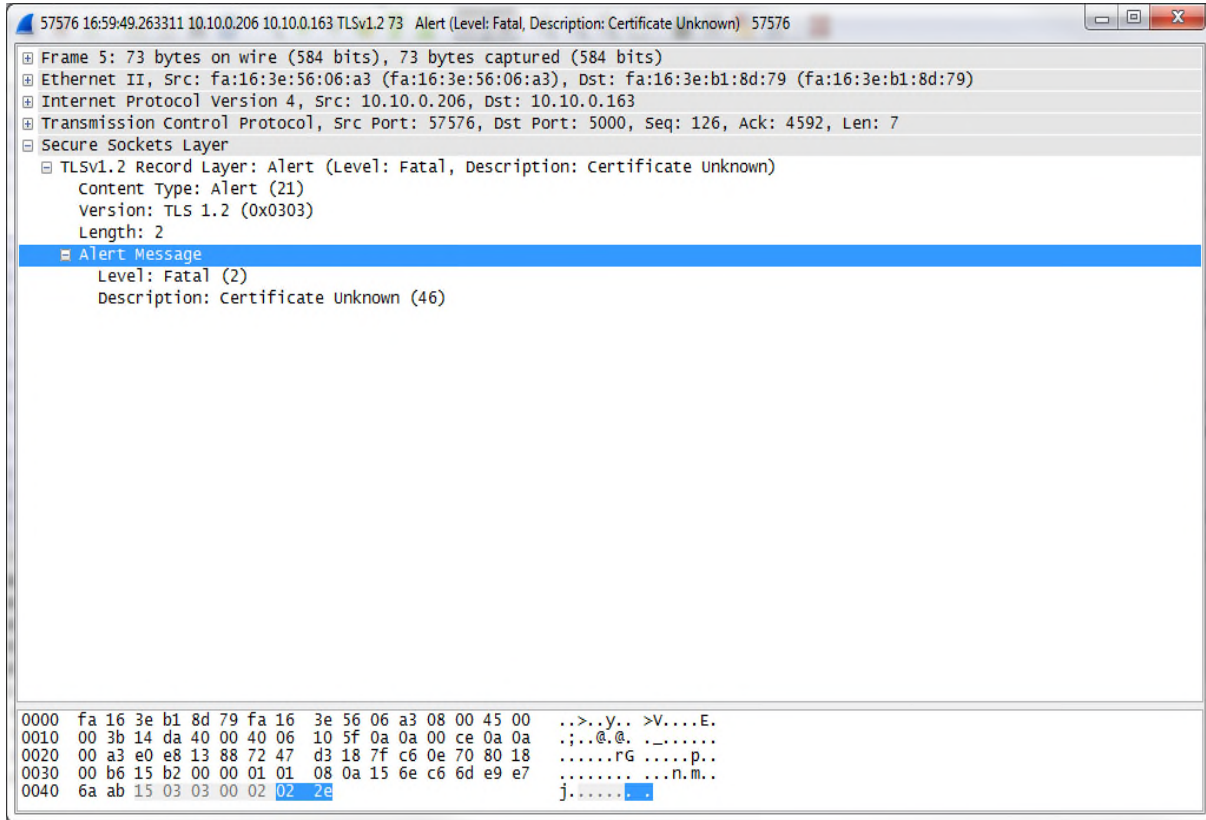
3. From Server Hello, cipher suite chosen:
 TLS_RSA_WITH_AES_128_GCM_SHA256

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



4. Authentication exchange ends with TLS Alert message (i.e. authentication fails):

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



57576 16:59:49.263311 10.10.0.206 10.10.0.163 TLSv1.2 73 Alert (Level: Fatal, Description: Certificate Unknown) 57576

- Frame 5: 73 bytes on wire (584 bits), 73 bytes captured (584 bits)
- Ethernet II, Src: fa:16:3e:56:06:a3 (fa:16:3e:56:06:a3), Dst: fa:16:3e:b1:8d:79 (fa:16:3e:b1:8d:79)
- Internet Protocol Version 4, Src: 10.10.0.206, Dst: 10.10.0.163
- Transmission Control Protocol, Src Port: 57576, Dst Port: 5000, Seq: 126, Ack: 4592, Len: 7
- Secure Sockets Layer
 - TLSv1.2 Record Layer: Alert (Level: Fatal, Description: Certificate Unknown)
 - Content Type: Alert (21)
 - Version: TLS 1.2 (0x0303)
 - Length: 2
 - Alert Message
 - Level: Fatal (2)
 - Description: Certificate unknown (46)

```

0000  fa 16 3e b1 8d 79 fa 16 3e 56 06 a3 08 00 45 00  ..>..y.. >V....E.
0010  00 3b 14 da 40 00 40 06 10 5f 0a 0a 00 ce 0a 0a  .;..@.@. _.....
0020  00 a3 e0 e8 13 88 72 47 d3 18 7f c6 0e 70 80 18  .....rG .....p..
0030  00 b6 15 b2 00 00 01 01 08 0a 15 6e c6 6d e9 e7  .....n.m..
0040  6a ab 15 03 03 00 02 2e                j.....

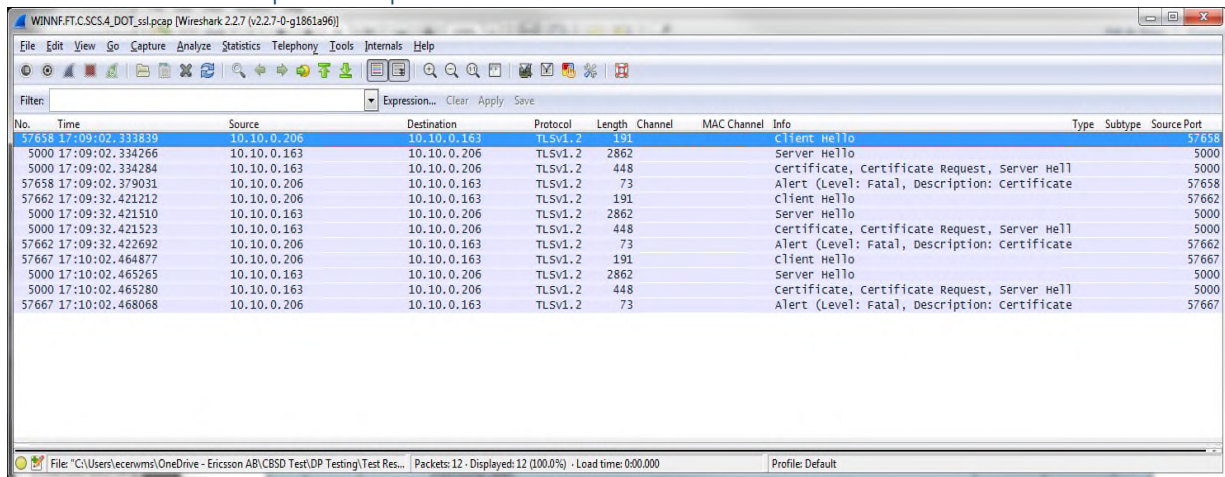
```

5. Registration request message is not received at Test Harness (authentication fails)

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

WINNF.FT.C.SCS.4

Packet Capture Sequence



| No. | Time | Source | Destination | Protocol | Length | Channel | MAC Channel | Info | Type | Subtype | Source Port |
|-------|-----------------|-------------|-------------|----------|--------|---------|-------------|------------------------------------------------|------|---------|-------------|
| 57658 | 17:09:02.333839 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 191 | | | Client Hello | | | 57658 |
| 5000 | 17:09:02.334266 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 2862 | | | Server Hello | | | 5000 |
| 5000 | 17:09:02.334284 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 448 | | | Certificate, Certificate Request, Server Hell | | | 5000 |
| 57658 | 17:09:02.379031 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 73 | | | Alert (Level: Fatal, Description: certificate) | | | 57658 |
| 57662 | 17:09:32.421212 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 191 | | | Client Hello | | | 57662 |
| 5000 | 17:09:32.421510 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 2862 | | | Server Hello | | | 5000 |
| 5000 | 17:09:32.421523 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 448 | | | Certificate, Certificate Request, Server Hell | | | 5000 |
| 57662 | 17:09:32.422692 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 73 | | | Alert (Level: Fatal, Description: certificate) | | | 57662 |
| 57667 | 17:10:02.464877 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 191 | | | Client Hello | | | 57667 |
| 5000 | 17:10:02.465265 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 2862 | | | Server Hello | | | 5000 |
| 5000 | 17:10:02.465280 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 448 | | | Certificate, Certificate Request, Server Hell | | | 5000 |
| 57667 | 17:10:02.468068 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 73 | | | Alert (Level: Fatal, Description: certificate) | | | 57667 |

WINNF Test Requirements:

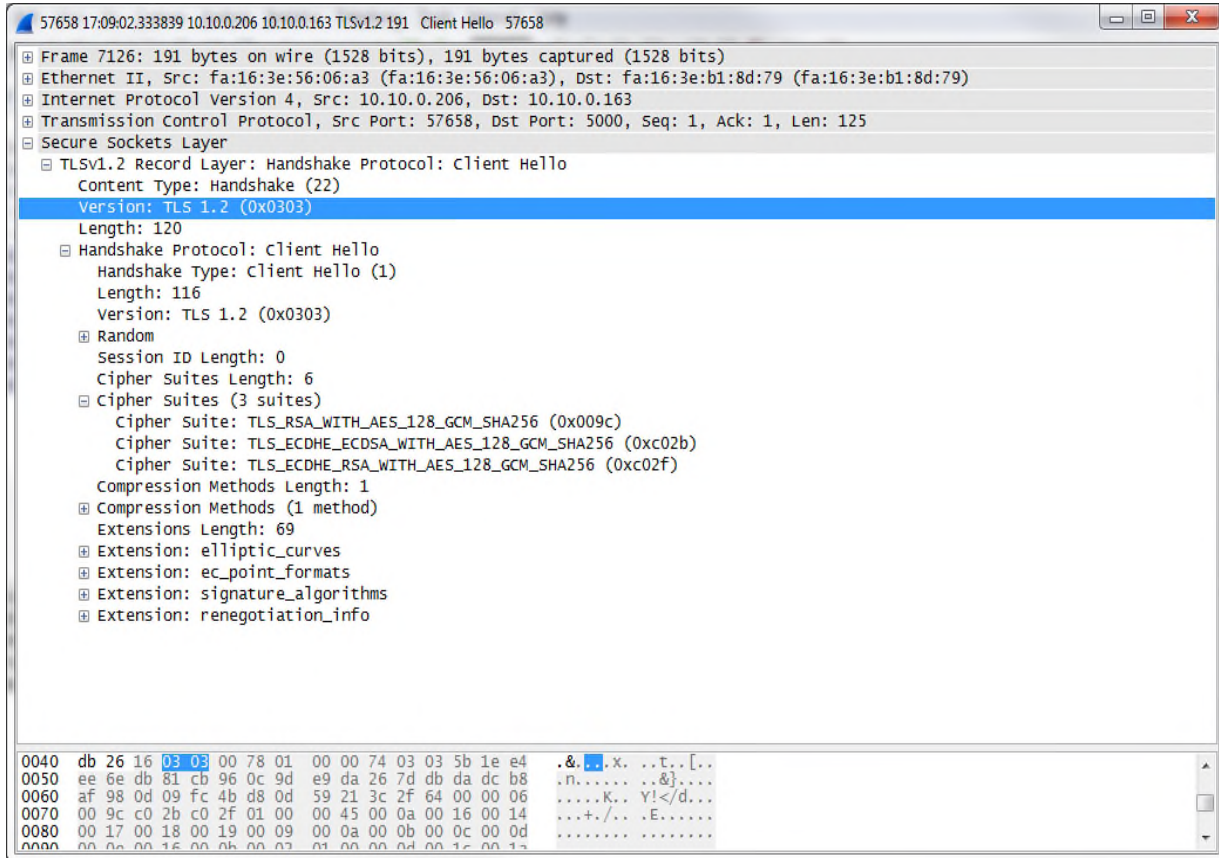
WINNF test requirements from WINNF-TS-0122-V1.0.0 CBRS CBSD Test Specification:

| | | | |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| 2 | <ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. | PASS | FAIL |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|

Analysis of WINNF Test Requirements

1. From Client Hello can read: TLS version = TLS 1.2

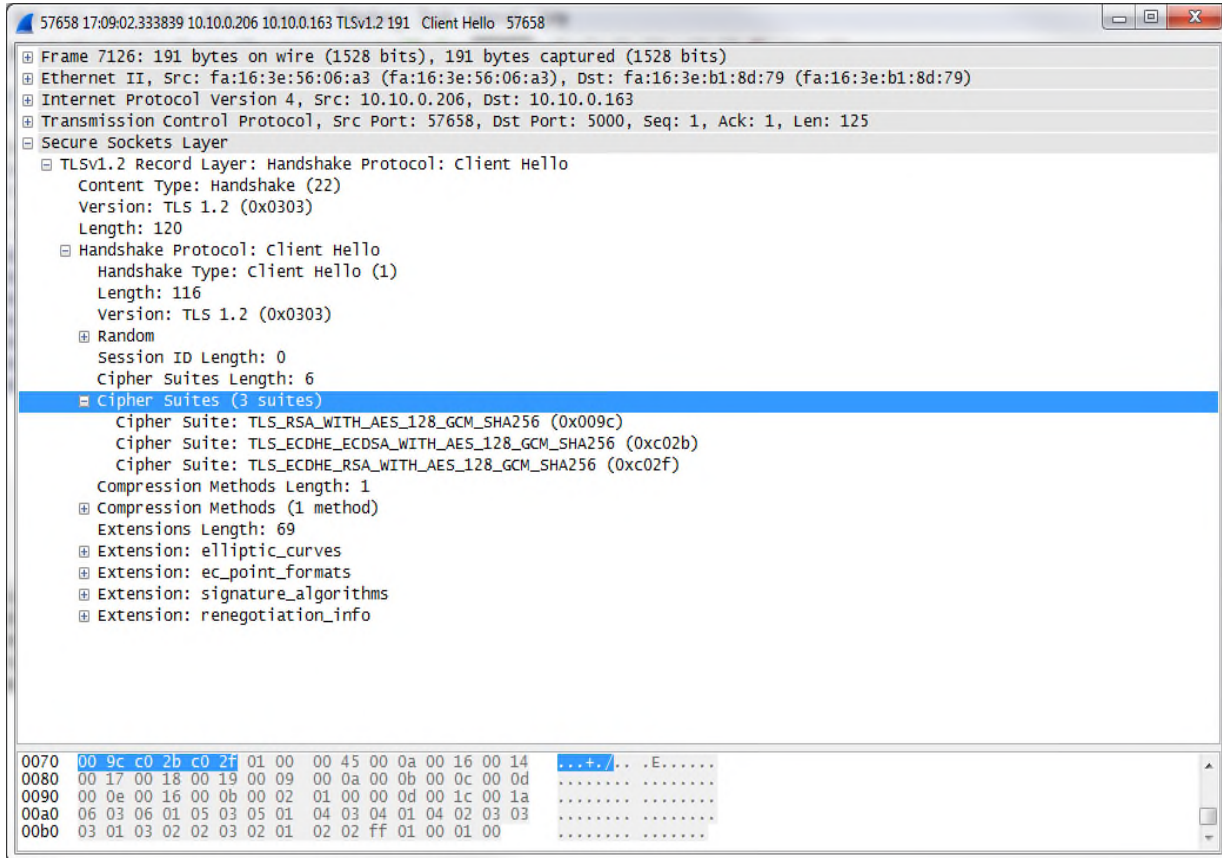
| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



2. From Client Hello, cipher suite list is from WINNF approved list:

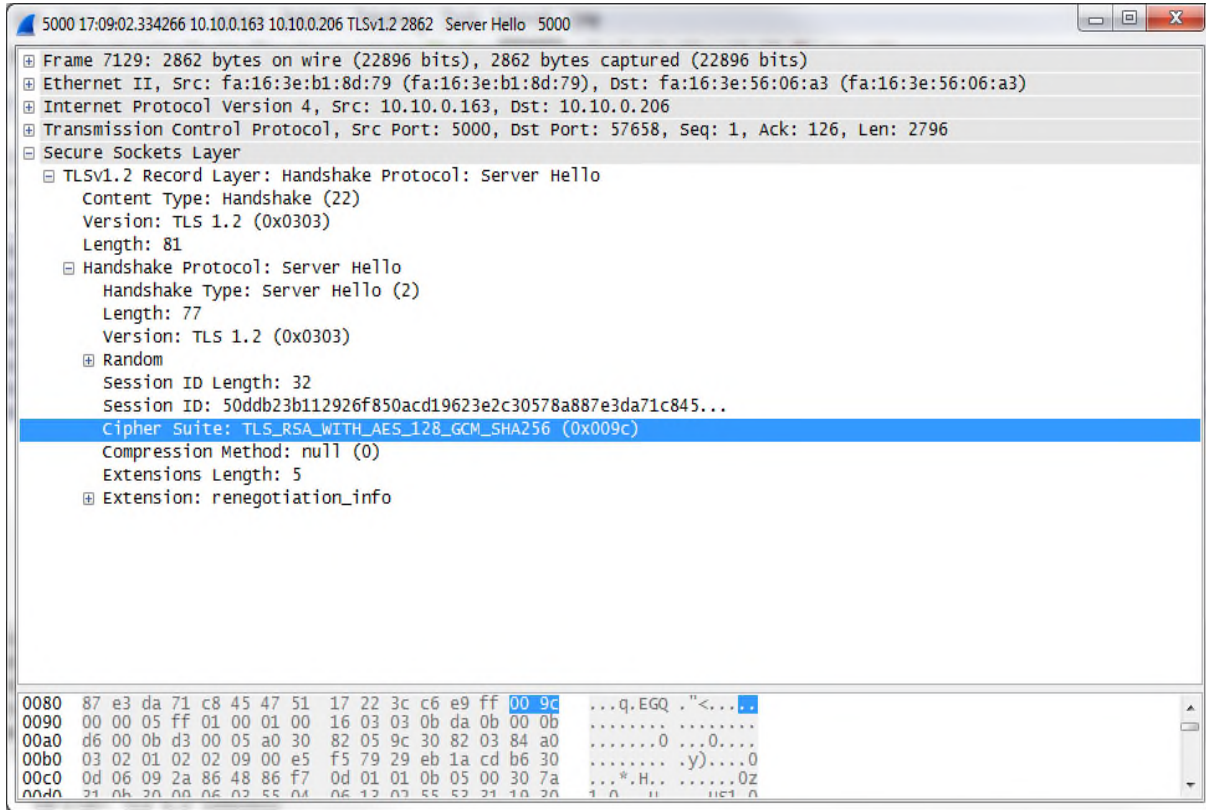
TLS_RSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



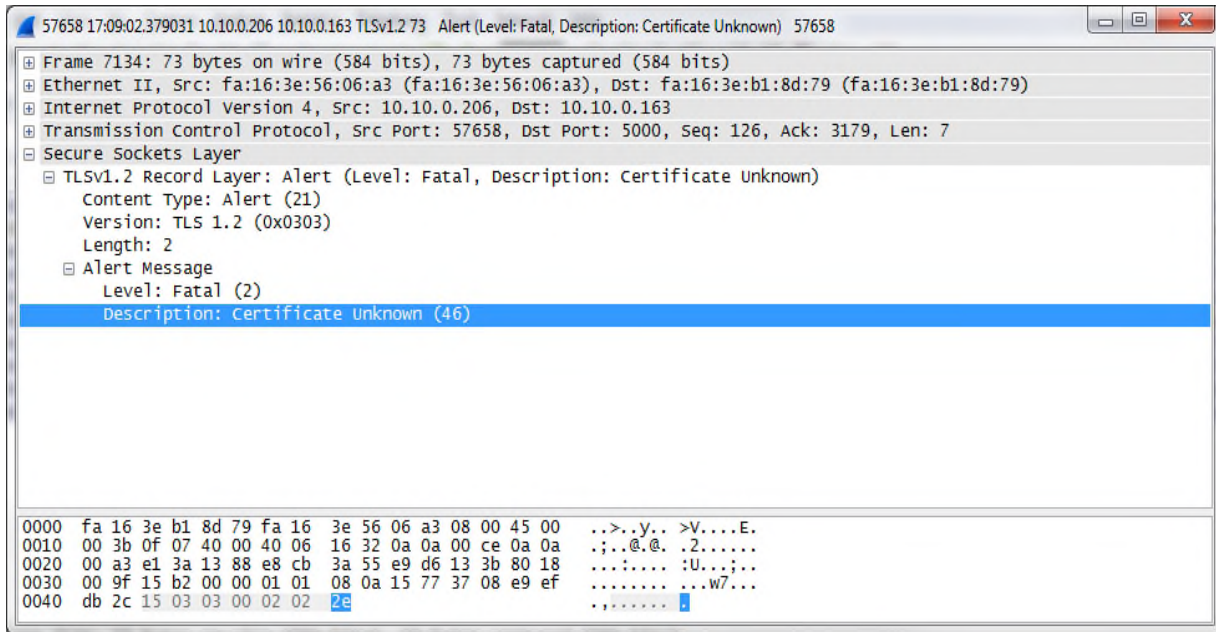
3. From Server Hello, cipher suite chosen:
 TLS_RSA_WITH_AES_128_GCM_SHA256

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



4. Authentication exchange ends with TLS Alert message (i.e. authentication fails):

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



57658 17:09:02.379031 10.10.0.206 10.10.0.163 TLSv1.2 73 Alert (Level: Fatal, Description: Certificate Unknown) 57658

- Frame 7134: 73 bytes on wire (584 bits), 73 bytes captured (584 bits)
- Ethernet II, Src: fa:16:3e:56:06:a3 (fa:16:3e:56:06:a3), Dst: fa:16:3e:b1:8d:79 (fa:16:3e:b1:8d:79)
- Internet Protocol Version 4, Src: 10.10.0.206, Dst: 10.10.0.163
- Transmission Control Protocol, Src Port: 57658, Dst Port: 5000, Seq: 126, Ack: 3179, Len: 7
- Secure Sockets Layer
 - TLSv1.2 Record Layer: Alert (Level: Fatal, Description: certificate Unknown)
 - Content Type: Alert (21)
 - Version: TLS 1.2 (0x0303)
 - Length: 2
 - Alert Message
 - Level: Fatal (2)
 - Description: Certificate Unknown (46)

```

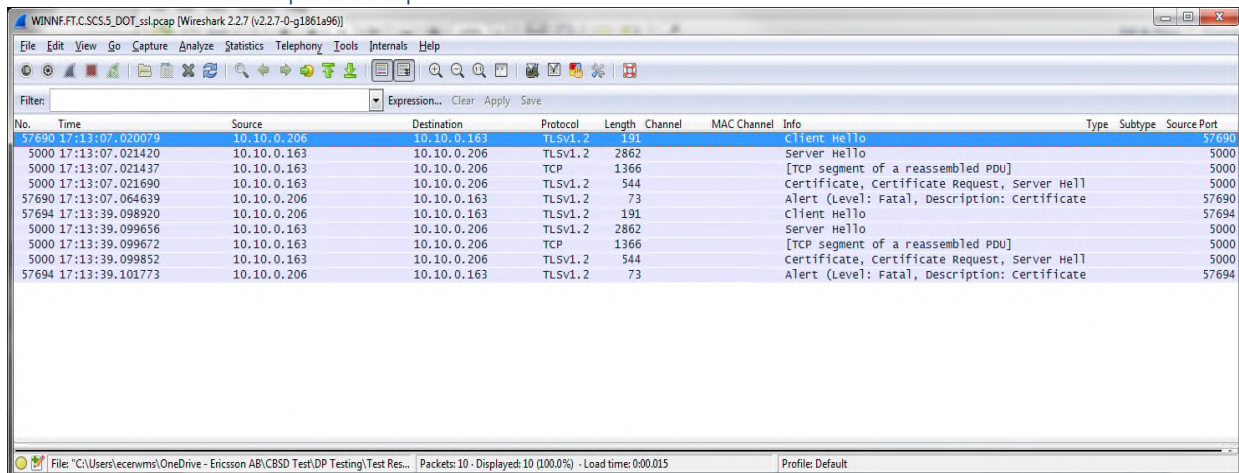
0000  fa 16 3e b1 8d 79 fa 16 3e 56 06 a3 08 00 45 00  ..>..y.. >V....E.
0010  00 3b 0f 07 40 00 40 06 16 32 0a 0a 00 ce 0a 0a  ;:..@.@. .2.....
0020  00 a3 e1 3a 13 88 e8 cb 3a 55 e9 d6 13 3b 80 18  .....:U...;...
0030  00 9f 15 b2 00 00 01 01 08 0a 15 77 37 08 e9 ef  .....:W7...
0040  db 2c 15 03 03 00 02 02 2e                .....

```

5. Registration request message is not received at Test Harness (authentication fails)

WINNF.FT.C.SCS.5

Packet Capture Sequence



| No. | Time | Source | Destination | Protocol | Length | Channel | MAC Channel | Info | Type | Subtype | Source Port |
|-------|-----------------|-------------|-------------|----------|--------|---------|-------------|------------------------------------------------|------|---------|-------------|
| 57690 | 17:13:07.020079 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 191 | | | Client Hello | | | 57690 |
| 5000 | 17:13:07.021420 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 2862 | | | Server Hello | | | 5000 |
| 5000 | 17:13:07.021437 | 10.10.0.163 | 10.10.0.206 | TCP | 1366 | | | [TCP segment of a reassembled PDU] | | | 5000 |
| 5000 | 17:13:07.021690 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 544 | | | Certificate, Certificate Request, Server Hello | | | 5000 |
| 57690 | 17:13:07.064639 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 73 | | | Alert (Level: Fatal, Description: certificate) | | | 57690 |
| 57694 | 17:13:39.098920 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 191 | | | Client Hello | | | 57694 |
| 5000 | 17:13:39.099656 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 2862 | | | Server Hello | | | 5000 |
| 5000 | 17:13:39.099672 | 10.10.0.163 | 10.10.0.206 | TCP | 1366 | | | [TCP segment of a reassembled PDU] | | | 5000 |
| 5000 | 17:13:39.099852 | 10.10.0.163 | 10.10.0.206 | TLSv1.2 | 544 | | | Certificate, Certificate Request, Server Hello | | | 5000 |
| 57694 | 17:13:39.101773 | 10.10.0.206 | 10.10.0.163 | TLSv1.2 | 73 | | | Alert (Level: Fatal, Description: Certificate) | | | 57694 |

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

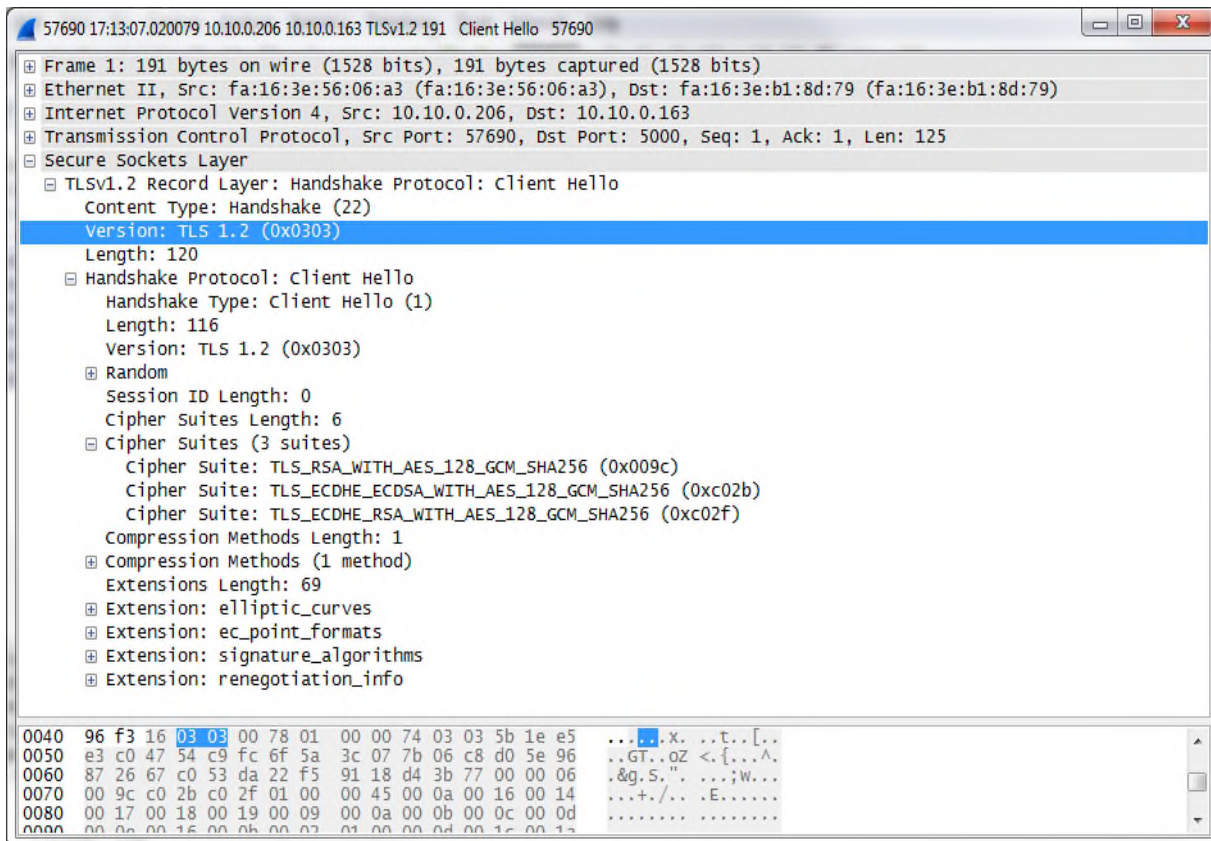
WINNF Test Requirements:

WINNF test requirements from WINNF-TS-0122-V1.0.0 CBRS CBSD Test Specification:

| | | | |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|
| 2 | <ul style="list-style-type: none"> • Make sure that UUT uses TLS v1.2 for security establishment. • Make sure UUT selects the correct cipher suite. • UUT shall use CRL or OCSP to verify the validity of the server certificate. • Make sure that Mutual authentication does not happen between UUT and the SAS Test Harness. | PASS | FAIL |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|

Analysis of WINNF Test Requirements

1. From Client Hello can read: TLS version = TLS 1.2

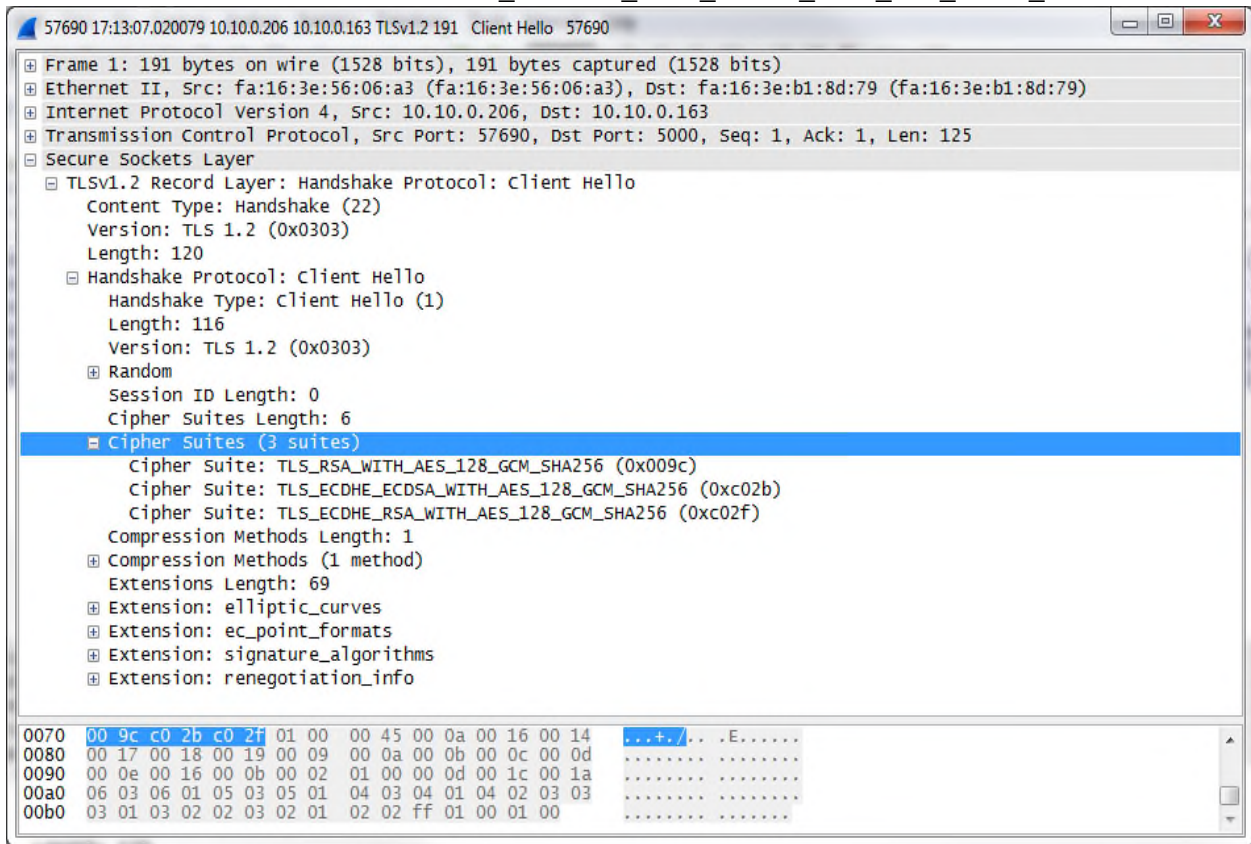


The screenshot shows a Wireshark capture of a TLS Client Hello message. The packet details pane is expanded to show the TLSv1.2 Record Layer and the Handshake Protocol: Client Hello. The 'Version' field is highlighted in blue and shows 'Version: TLS 1.2 (0x0303)'. Below the tree view, the raw packet bytes are displayed in hexadecimal and ASCII.


| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

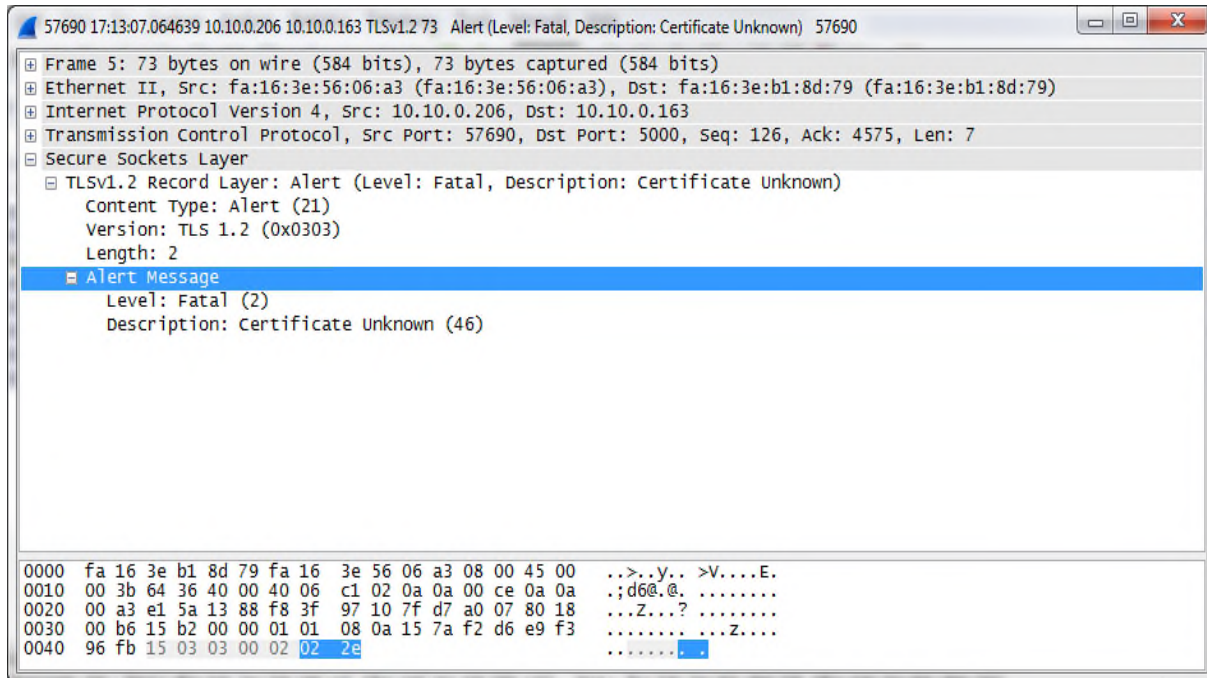
2. From Client Hello, cipher suite list is from WINNF approved list:

TLS_RSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_ECDSA_WITH_AES_128_GCM_SHA256
 TLS_ECDHE_RSA_WITH_AES_128_GCM_SHA256



3. From Server Hello, cipher suite chosen:
 TLS_RSA_WITH_AES_128_GCM_SHA256

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |



5. Registration request message is not received at Test Harness (authentication fails)


| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

Test Equipment

| Instrument | Manufacturer | Type No. | Serial No | Calibration Period (months) | Calibration Due |
|------------------------|-----------------|------------|-------------|-----------------------------|-----------------|
| THG | Fluke | 77 IV | 34770264 | 12 | 18-Apr-2019 |
| DVM | VWR | 61161-378 | 170120564 | 24 | 17-Feb-2019 |
| Power Supply | Xantrex | XKW 60-50 | E00109863 | O/P Mon | - |
| Spectrum Analyser | Keysight | N9030A | MY55410202 | 12 | 26-Sep-2019 |
| Attenuator | Pasternack | PE7004-10 | N/S | O/P Mon | - |
| Switching Control Unit | Hewlett Packard | 11713A | 3748A060876 | O/P Mon | - |
| RF Switch Unit | Burnsco | RARFSW 4x1 | 001 | O/P Mon | - |
| Power Supply | Leader | 730-3D | 9801135 | O/P Mon | - |
| Receiver | Rohde & Schwarz | ESU40 | 1001162 | 24 | 20-Apr-2019 |


| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

Appendix A – EUT & Client Provided Details

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

General EUT Description

| | |
|-------------------------------|---------------------------------------------------------------|
| Manufacturer | Ericsson |
| Address | Torshamnsgatan 23
Kista
SE-16480
Stockholm
Sweden |
| Product Name | Radio 2208 B48 |
| Product Number | KRC 161 711/1 |
| Serial Number(s) | D827120515 and D827189029 |
| Software Version | CXP 903 4711/2_R1H04 |
| Hardware Version | R1B |
| Test Specification/Issue/Date | FCC CFR 47 Part 96: 2017 |

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

Technical Description

The Equipment Under Test (EUT) Radio 2208 B48 KRC 161 711/1 is an Ericsson AB Radio Unit working in the public mobile service (3550-3700 MHz) band which provides communication connections to 3550-3700 MHz network. The Radio 2208 B48 KRC 161 711/1 operates from a -48V DC or a 120V AC power supply.

The Equipment Under Test (EUT) is shown in the photograph below. A full technical description can be found in the Manufacturer's documentation.




EUT Configuration

Please see Appendix B for close up pictures of the unit as configured during testing

- Cables and earthing when applicable were connected as per manufacturer's specification.

Domain Proxy Software

Version: ERICdomainproxyservice_CXP9035414 1.10.1

| | | |
|-------------|--------------------------------------------------------|-------------------------------------------------------------------------------------|
| Client | Ericsson |  |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

Appendix B – EUT, Peripherals, and Test Setup Photos

| | | |
|-------------|--------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Client | Ericsson | 
Canada |
| Product | LTE KRC 161 711/1 Radio 2208 B48 (3550-3700MHz) | |
| Standard(s) | FCC Part 96 SAS requirements (CBRS Test Plan) | |

Test setup

