FCC PART 15.Subpart H White Spaces System

Part 2 TEST REPORT

Fixed TVBD Device

Applicant	CARLSON WIRELESS TECHNOLOGIES INC.
Address	2700 FOSTER AVENUE ARCATA, CA 95521 USA
FCC ID	OPA-RC2-BS and OPA-RC2-CPE
Model Number	Rural Connect II Base and Rural Connect II Terminal
Product Description	WHITE SPACE FIXED TVBD
Date Sample Received	7/18/2013
Date Tested	7/18 – 19/ 2013
Tested By	MARIO R. DE ARANZETA
Approved By	MARIO R. DE ARANZETA
Report Number	1244UT13TestReport.docx
Test Results	☒ PASS ☐ FAIL

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APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

GENERAL REMARKS

The Carlson White Space radio system consist of a Base Station radio, a Terminal radio, each having its own FCC ID, and an internet or cloud based service called the Operation and Management Center (OMC)to manage the radios and interface with the Spectrum Bridge WSDB service. The information contained in this report represent the results of these components tested as a system.

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc. The test results relate only to the items tested.

Summary

The device under test does:

☒   fulfill the general approval requirements as identified in this test report

☐   not fulfill the general approval requirements as identified in this test report

Attestations

The scope of this document is to report the results of the Fixed TVBD Part 2 Database Interface Certification tests.

There are three (3) components of the Carlson Wireless White Spaces technology;
  - **TV Band Fixed Devices, a Base Station and a Terminal.**
  - **TV Bands Database (Spectrum Bridge Certified White Space Database)**
  - **TV Band System,** Made up of Fixed TVBD's, the Spectrum Bridge WSDB, and layer of interaction between the devices and the database called the Operation and Management Center or OMC.

To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025: 2005 requirements.

Testing Certificate # 0955-01

I attest that the necessary measurements were made by me or under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

Authorized Signatory Name:
Mario R. de Aranzeta
Compliance Engineer

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Date: July 24, 2013

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GENERAL INFORMATION

EUT1 Description
General:

The Rural Connect II Base is designed to provide rural broadband service.

EUT Specification:

Applicable Standard	Part 15 Subpart H TV Band White Space Fixed Device
DUT Description	Transceiver
FCC ID	OPA-RC2-BS
Application:	Rural Broadband transmission
Operating Frequency	473 to 599 MHz and 623 to 695 MHz
Number of channels	14 to 35 and 39 to 51
Transmit Power(dBm):	23

DUT Power Source	☐ 110–120Vac/50– 60Hz
	☒ DC Power 24V 2.5 A Globtek Inc., Model # GT-81081-6024-T3, Part # TR9C12500LCP-F
	☐ Battery Operated Exclusively

Test Item	☐ Prototype	☐ Pre-Production	☒ Production
Type of Equipment	☒ Fixed - WGF	☐ Mobile – WG1	☐ Portable – WG2
	☐ Fixed - WSF	☐ Mobile – WS1	☐ Portable – WS2

Antenna Connector	F connector
Antenna	5 dBi omni antenna model # 057-470-786-8-F
Network Port	RJ 45

Test Facility	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.
Test Conditions	Temperature: 26ºC
	Relative humidity: 50%
Test Exercise	The EUT was tested in normal operator mode.

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GENERAL INFORMATION

EUT2 Description
General:

The Rural Connect II Terminal is designed to provide rural broadband service.

EUT Specification:

Applicable Standard	Part 15 Subpart H TV Band White Space Fixed Device
DUT Description	Transceiver
FCC ID	OPA-RC2-CPE
Application:	Rural Broadband
Operating Frequency	473 to 599 and 623 to 695 MHz
Number of channels	CH14 – 35 and 39 – CH51
Bridged Ethernet Port:	RJ45
Transmit Power:	23 dBm
DUT Power Source	☐ 110–120Vac/50– 60Hz ☒ DC Power UE-POE-33 ☐ Battery Operated Exclusively
Test Item	☐ Prototype ☐ Pre-Production ☒ Production
Type of Equipment	☒ Fixed - WGF ☐ Mobile – WG1 ☐ Portable – WG2
	☐ Fixed - WSF ☐ Mobile – WS1 ☐ Portable – WS2
Antenna Connector	F Connector
Antenna	Log Periodic UHF FOR CPE (Carlson Part Number: 057-470-786-F) 9dBi gain
Network Port	RJ 45
Serial Port	-
Indicators	☐ Power Indicator ☐ Alarm Indicator ☐ Transmit Indicator

Test Facility	Timco Engineering Inc. 849 NW State Road 45 Newberry, FL 32669 USA.
Test Conditions	Temperature: 26ºC Relative humidity: 50%
Test Exercise	The EUT was tested in normal operator mode.

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
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EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Signal Generator	HP	8640B	2308A21464	02/23/12	02/23/14
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Digital Multimeter	Fluke	77	35053830	09/09/11	09/09/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	03/24/12	03/24/14
Spectrum Analyzer	R&S	ESIB40	100274	3/16/12	3/16/14
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	12/07/11	12/07/13
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14

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TEST PROCEDURES

Database Test: Certification Test Procedures for TV Band (White Spaces) Devices Authorized under Subpart H of the Part 15 Rules, 416721 DO1 White Space Test Procedures v02.

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TEST CONFIGURATIONS:

DB – Spectrum Bridge certified White Space Database
EUT1– Fixed Base Station
EUT2- Subscriber
NR – Network Router

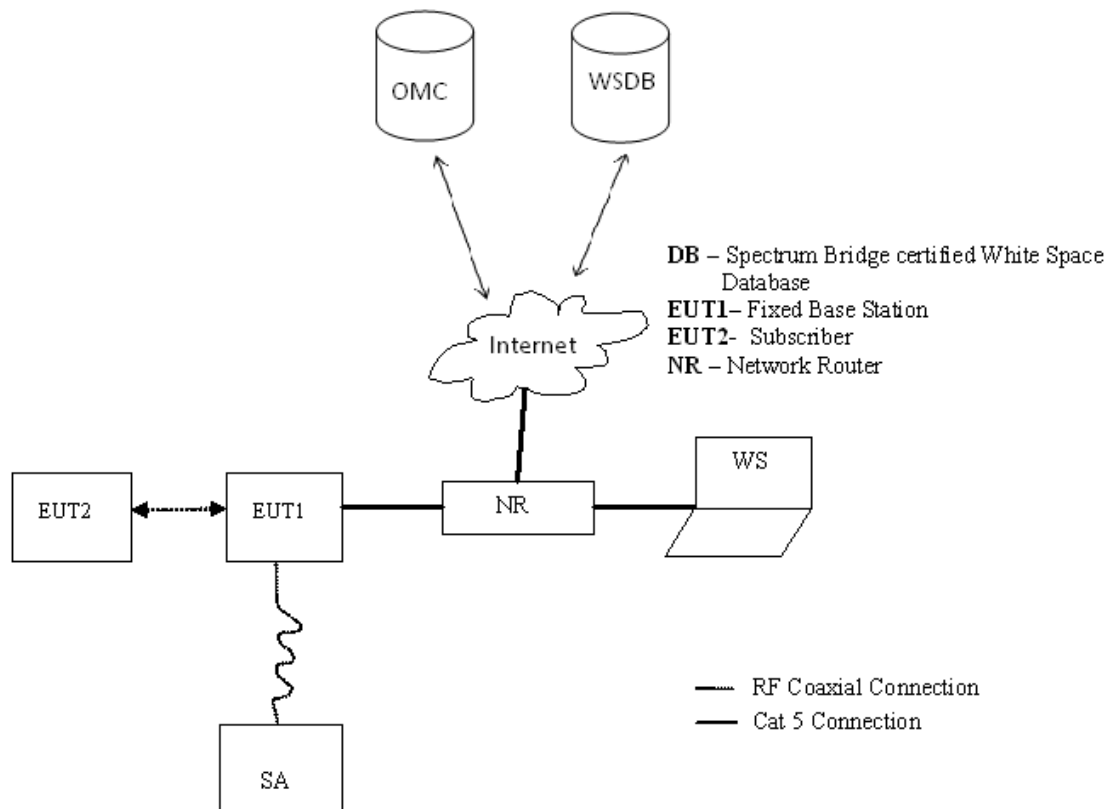—— RF Coaxial Connection
—— Cat 5 Connection

Figure 1 TVBD Configuration

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Device and System Operation

This section provides high level description of the White Space test network configuration. For purposes of this procedure, the White Space device will be controlled via the OMC which will be accessed using a PC work station connected to the test setup network router, enabling a connection to the internet. In order to connect the work station to the OMC and EUT, the operator will have to pre-register and receive account credentials here http://omc.neul.com/Account/SignIn Additional OMC instructions can be found in the Operator Manual.

Test Network Configuration

The Carlson Rural Connect II transmits on a single preferred and available TV White Space channel in the UHF frequency band. The bench test network configuration is shown in Figure 1 above. The elements of the test setup are:

- EUT1 –RC2 – Base Station White Space Radio Serial # ec78963a-a8f0-4532-8e50-2d48c89f3b89
- EUT2 –RC2 – CPE White Space Radio Serial # f58457b8-ed1f-453d-8d7f-8c2418a34038
- NR – standard network router/switch
- WS – workstation (laptop computer) to access TVBD, the OMC, and record measurements
- SA – spectrum analyzer
- RF attenuators and cabling
- Spectrum Bridge White Space Database
- Operations and Management Center (OMC)

The workstation is physically connected to one of the network router LAN ports via RJ45 and establishes a network connection to the EUT and the internet. The routers WAN port connection is required to be capable of providing Internet access.

EUT1 is physically connected to the network router LAN port via its RJ45 network port. The network router provides IP addresses to the EUT. EUT1 is called the Base station and has direct connection to the internet. EUT2 (the CPE) is connected to EUT1 via a Coax link. EUT2 has no direct connection to the internet. EUT2 can have access to the internet only when the EUT1-EUT2 RF link is operating. All of the device/database tests were executed in normal operational mode. Configuration of EUT is accomplished using the OMC software.

As defined in the FCC's White Spaces Final Rules, the EUT only operates and is tested as Fixed TV Band Device. The EUT is enrolled in the WSDB prior to testing by a Spectrum Bridge representative. In addition, the EUT1 and EUT2 must be configured with registration information via the OMC to register with Spectrum Bridge WSDB. The firmware loaded in the EUT includes the ability to communicate with the OMC database interface agent that inter connects to the Spectrum Bridge White Space service.

An OMC entry for each EUT must be configured with complete registration information and will not transmit until it registers and receives a valid channel list. When power is applied and the radio establishes an Internet connection; the Base Station EUT/TVBD sends the OMC a signal prompting the OMC to send registration information to the database via the Internet. The WSDB verifies the TVBD and upon confirmation, registers the device. The OMC then requests a channel map for the EUT location. Upon receiving a list of available channels from the database the OMC will verify if the pre-configured channel is available before enabling transmission on the EUT.

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The following tests address the Radios functionality as a Fixed TVBD and compliance with the FCC's TV White Space Database Interface Certification Rules Part 2.

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TEST Summary

    This document provides test overviews and test results that apply specifically to Fixed TVBD's operating in TV White Spaces on an unlicensed secondary use basis.

Test Result Summary

Test Case	P/F/I
§15.713(f)(3) Fixed TVBD Registration(Successful Registration)	**P**
§15.713(f)(3) Fixed TVBD Registration(Restricted Co-ordinates)	**P**
§15.713(f)(3) Fixed TVBD Registration(Incomplete Contact, etc. Information)	**P**
§15.713(f)(3) Fixed TVBD Registration(HAAT)	**P**
§15.713(f)(3) Fixed TVBD Registration(Antenna Height AGL)	**P**
§15.713(f)(3) Fixed TVBD Registration(FCCID/Serial Number)	**P**
§15.707(a) Fixed TVBD Relocated	**P**
§15.711(b)(3)(iii) Fixed & Mode II TVDB Database Update	**P**
§15.711(b)(3)(i)(ii), §15.713(a)(1) 48 Hour Channel Scheduling	**P**
§15.707, §15.711(b)(3)(i)(ii)(iv),(c), §15.712 TVBD Channel Availability	**P**
§15.711(f) Security:	**P**

       P-Pass   **F-Fail**   **I-Inconclusive**   **N.A.-not applicable/not supported**

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Database Enrollment Information

The following screenshot of the log shows the TVBD enrolled in the Spectrum Bridge whitespace database prior to the testing.

FCCID	Serial #	Entity Name	Expires
OPA-RC2	ec78963a-a8f0-4532-8e50-2d48c89f3b89	Carlson Wireless Technologies, Inc.	11/1/2013
OPA-RC2	f58457b8-ed1f-453d-8d7f-8c2418a34038	Carlson Wireless Technologies, Inc.	11/1/2013

The Fixed TVBD must be able to provide the required information to the database and obtain a successful registration:

EUT OMC Registration input screenshot

Station Properties: CSB00370

Refresh | Open in New Window

Health | System Images | Fingerprints | Topology | Properties | Activity | Messages | Audit Log

Station Entities

Legacy Properties (Entity Id=3197)

Legacy Properties (Entity Id = 3197) Edit Entity

LastReported	2013-07-18 17:51:17	2013-07-18 17:51:17Z
CurrentFirmwareVersion	2013-07-18 17:48:52	19041 Variant:CWT4BSC Built:at 17:03:35 on Jun 21 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
CurrentFPGAVersion	2013-07-18 17:48:52	15b Variant:NMAC170513_0936 Name:fpga2
CurrentMasterManifest	2013-07-18 17:21:25	Base Station Release 2013W28:20130711_10.29.49.07
CurrentStackVersion	2013-07-18 17:49:15	1.0.19290.0
Role	2013-06-13 21:16:57	Basestation
WsDbProvider	2013-07-18 17:21:25	SpectrumBridgeTestWsdb
deviceType	2013-07-18 17:21:25	8
latitude	2013-07-18 17:21:25	28.0
longitude	2013-07-18 17:21:25	-81.0
antennaHeight	2013-07-18 17:21:25	30
PreferredChannels	2013-07-18 17:21:25	19
ContactCity	2013-07-18 17:21:25	Walla Walla
ContactCountry	2013-07-18 17:21:25	United States
ContactEmail	2013-07-18 17:21:25	support@carlson.com
ContactName	2013-07-18 17:21:25	Jim Lancaster
ContactPhone	2013-07-18 17:21:25	407-792-1570 x540
ContactState	2013-07-18 17:21:25	Florida
ContactStreet	2013-07-18 17:21:25	1064 Greenwood Blvd St 124
ContactZip	2013-07-18 17:21:25	32746
DeviceOwner	2013-07-18 17:21:25	Birdseye Wireless
FccId	2013-07-18 17:21:25	OPA-RC2

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Setup Photo

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§15.713(f)(3) Fixed TVBD Registration

a) Successful Registration, 15.713(f)(3) – Fixed TVBD with direct connection to Internet (Base Station)

Test procedure:
Configure the EUT with the required registration information. Verify the required registration information is sent and stored in the white space data base.
Successful registration should be verified by accessing the WSDB registration interface and also the EUT status information page.

Test pre-conditions:
The FCC ID and the serial # of the radio are programmed in the firmware of the radio and cannot be modified. The TVBD was configured as follows and the information submitted for registration to the WSDB.

OMC record:

Station Properties: CSB00370

Basestation Details

Name	CSB00370		Whitespace Provider	SpectrumBridgeTestWsdb				
Description	SBI FCC Test							
StationGuid	ec78963a-a8f0-4532-8e50-2d48c89f3b89			Frequency	Bandwidth	Max Tx Power	Start Time	Expiry Time
				473 MHz	SixMHz	Infinity	2013-07-18 21:13:33Z	2013-07-20 21:14:33Z
AfterBootSystem	UMS 2013W27		Channel Allocations					
				599 MHz	SixMHz	Infinity	2013-07-18 21:13:33Z	2013-07-20 21:14:33Z
Set for Reboot	Reboot			Force WSDB Query				
Restart Stack	Restart		Last WSDB Activity Timestamp	2013-07-18 21:14:31Z				
			Last WSDB Activity Result	Success				
			Last WSDB Registration	2013-07-18 21:14:32Z				

WsdbLastQueryTimestamp	2013-07-18 21:14:31	2013-07-18 21:14:31Z
WsdbLastQueryStatus	2013-07-18 21:14:33	Success
WsdbLastRegistrationTimestamp	2013-07-18 21:14:32	2013-07-18 21:14:32Z
BoardVariant	2013-07-18 21:14:28	16: cwt4_6mhz_f
Firmware	2013-07-18 21:14:28	*NULL*
FPGA	2013-07-18 21:14:28	*NULL*
Bootloader	2013-07-18 21:14:28	*NULL*
CurrentBootloaderVersion	2013-07-18 21:14:28	15537 API:1 Variant:CWT4Bootloader Built:at 13:41:48 on Jan 16 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
WsdbLastQueryRawOutput	2013-07-18 21:14:33	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><ChannelCount>8</ChannelCount><ChannelList>2,5,6,8,9,13,14,35</ChannelList><RefreshIn>48</RefreshIn></ChannelResponse>

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Test Results:

The registration request and the response for the successful registration can be seen on the Spectrum Bridge WSDB log below.

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 5:14:44 PM	168.63.75.133	/v3/channels/US/28/-81/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	796	Response
7/18/2013 5:14:44 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	Success (0)	486	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>28</Latitude>
  <Longitude>-81</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```
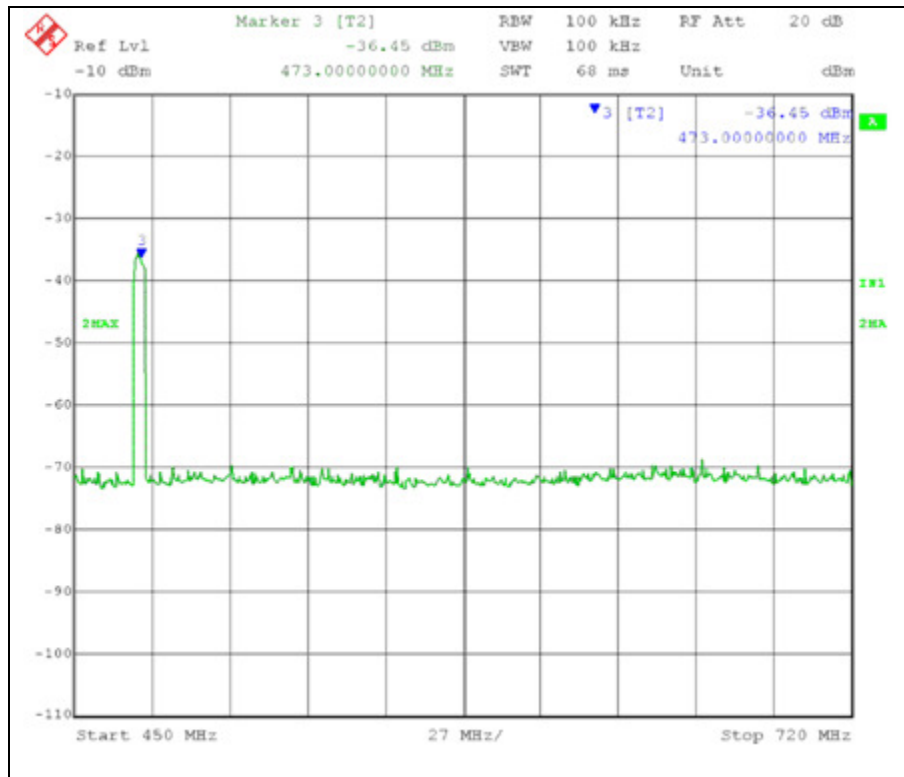
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Spectrum Analyzer Plot:

Successful Registration

Result: PASS

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b) Successful Registration, 15.713(f)(3) – Fixed TVBD without a direct connection to the internet(Subscriber)

Test procedure:
Configure the base station with the required registration information. Verify that the required registration information is sent and stored in the white space data base.
Operating channel should be verified on the subscriber (radio without the internet connection).

Test pre-conditions:

The Base station TVBD was configured and the information submitted for registration to the WSDB.

OMC record:
The OMC status page shown below confirms the successful registration of the subscriber. Operating Channel is 14. The transmitter did not turn ON until the database exchange was successfully completed.

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Test Results:

The registration request and the response for the successful registration can be seen on the WSDB log below for the subscriber.

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 5:26:36 PM	168.63.75.133	/v3/channels/US/28/-81/?fccid=OPA-RC2&serial=f58457b8-ed1f-453d-8d7f-8c2418a34038&type=8&ant=25	Success (0)	796	Response
7/18/2013 5:26:35 PM	168.63.75.133	/v3/devices/US/OPA-RC2/f58457b8-ed1f-453d-8d7f-8c2418a34038	Success (0)	313	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>28</Latitude>
  <Longitude>-81</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```

Result: PASS

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c) Unsuccessful Registration, 15.713(f)(3) – Restricted co-ordinates

Test Procedure:
Configure the EUT with restricted co-ordinates (Outside US Regulatory boundaries, example 31.5, -106.9).
Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface and also the EUT GUI.

Test Pre-conditions:
A location outside US regulatory boundaries (31.5, -106.9) was entered into the radio and the information submitted for registration to the WSDB**.**

WsDbProvider	2013-07-18 19:39:31	SpectrumBridgeTestWsdb
deviceType	2013-07-18 19:39:31	8
latitude	2013-07-18 19:39:31	31.5
longitude	2013-07-18 19:39:31	-106.9
antennaHeight	2013-07-18 19:39:31	30
PreferredChannels	2013-07-18 19:39:31	19
ContactCity	2013-07-18 19:39:31	Lake Mary
ContactCountry	2013-07-18 19:39:31	United States
ContactEmail	2013-07-18 19:39:31	support@carlson.com
ContactName	2013-07-18 19:39:31	Shamus Jennings
ContactPhone	2013-07-18 19:39:31	(707) 822-7000
ContactState	2013-07-18 19:39:31	California
ContactStreet	2013-07-18 19:39:31	2700 Foster Avenue
ContactZip	2013-07-18 19:39:31	95521
DeviceOwner	2013-07-18 19:39:31	James Carlson
FccId	2013-07-18 19:39:31	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 19:39:33	2013-07-18 19:39:33Z
WsdbLastQueryStatus	2013-07-18 19:39:35	Failure Guid=00000000-0000-0000-0000-000000000000: LOCATION_OUTSIDE_REG_DOMAIN

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
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Test Results:

The failed registration with the reason for failure can be seen on the log below.

WSDB log:

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 3:49:56 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	LocatedOutsideRegulatoryDomain (9)	170	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>31.5</Latitude>
  <Longitude>-106.9</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```

Test Results:
The WSDB returned the appropriate error code to the OMC and the base station transmitter turned off or remained off if there was a prior successful registration.

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

The screen shot of the spectrum analyzer shown below confirms the failed registration. The transmitter did not turn ON.

Result: PASS

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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d) **Unsuccessful Registration, 15.713(f)(3) – Invalid registration data (Missing FCC ID)**

Test Procedure:
Configure the EUT with Incomplete Information (e.g. Missing FCC ID). Verify the required registration information is sent and stored in the white space data base.
Registration failure was verified by accessing the Operation and Management Center webpage (OMC) by opening a browser window on the workstation and typing the following in the URL field:
http://omc.neul.com (prior OMC registration is required).

Test Pre-conditions:
The 'FCC ID' Information field should be left blank**.**

OMC record:

WsDbProvider	2013-07-18 19:20:12	SpectrumBridgeTestWsdb
deviceType	2013-07-18 19:20:12	8
latitude	2013-07-18 19:20:12	28.0
longitude	2013-07-18 19:20:12	-81.0
antennaHeight	2013-07-18 19:20:12	30
PreferredChannels	2013-07-18 19:20:12	19
ContactCity	2013-07-18 19:20:12	Lake Mary
ContactCountry	2013-07-18 19:20:12	United States
ContactEmail	2013-07-18 19:20:12	support@carlson.com
ContactName	2013-07-18 19:20:12	Shamus Jennings
ContactPhone	2013-07-18 19:20:12	(707) 822-7000
ContactState	2013-07-18 19:20:12	California
ContactStreet	2013-07-18 19:20:12	2700 Foster Avenue
ContactZip	2013-07-18 19:20:12	95521
DeviceOwner	2013-07-18 19:20:12	James Carlson
FccId	2013-07-18 19:20:12	NULL
WsdbLastQueryTimestamp	2013-07-18 19:20:14	2013-07-18 19:20:14Z
WsdbLastQueryStatus	2013-07-18 19:20:14	Failure Guid=ec78963a-a8f0-4532-8e50-2d48c89f3b89: Station Registration failure for station ec78963a-a8f0-4532-8e50-2d48c89f3b89 a.k.a. CSB00370: missing fields are "FccId"

Test Results:
There was no attempted WSDB registration and the base station transmitter remained off

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL
(4).DOCX

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e) Unsuccessful Registration, 15.713(f)(3) – Incomplete Contact Information (Missing Contact Name)

Test Procedure:

Configure the EUT with Incomplete Information (e.g. Contact information). Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface.

Test Pre-conditions:

The 'Contact Name' Information field should be left blank**.**

OMC record:

WsDbProvider	2013-07-18 18:47:51	SpectrumBridgeTestWsdb
deviceType	2013-07-18 18:47:51	8
latitude	2013-07-18 18:47:51	28.0
longitude	2013-07-18 18:47:51	-81.0
antennaHeight	2013-07-18 18:47:51	30
PreferredChannels	2013-07-18 18:47:51	19
ContactCity	2013-07-18 18:47:51	Lake Mary
ContactCountry	2013-07-18 18:47:51	United States
ContactEmail	2013-07-18 18:47:51	support@carlson.com
ContactName	2013-07-18 18:47:51	NULL
ContactPhone	2013-07-18 18:47:51	407-792-1570 x540
ContactState	2013-07-18 18:47:51	Florida
ContactStreet	2013-07-18 18:47:51	1064 Greenwood Blvd St 124
ContactZip	2013-07-18 18:47:51	32746
DeviceOwner	2013-07-18 18:47:51	Birdseye Wireless
FccId	2013-07-18 18:47:51	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 18:47:54	2013-07-18 18:47:54Z
WsdbLastQueryStatus	2013-07-18 18:47:54	Failure Guid=ec78963a-a8f0-4532-8e50-2d48c89f3b89: Station Registration failure for station ec78963a-a8f0-4532-8e50-2d48c89f3b89 a.k.a. CSB00370: missing fields are "ContactName"

Test Results:

No registration request was sent to the WSDB. All combinations of missing information were tried and the behavior verified. The OMC does not send a registration request to WSDB with missing contact information.

The transmitter did not turn ON. Spectrum analyzer was used to verify no transmission.

Result: PASS

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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f) Unsuccessful Registration, 15.713(f)(3) – Missing City Information

Test Procedure:
Configure the EUT with Incomplete Information (e.g. City information). Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface.

Test Pre-conditions:
The 'City Name' Information field should be left blank.

OMC record:

WsDbProvider	2013-07-18 18:36:32	SpectrumBridgeTestWsdb
deviceType	2013-07-18 18:36:32	8
latitude	2013-07-18 18:36:32	28.0
longitude	2013-07-18 18:36:32	-81.0
antennaHeight	2013-07-18 18:36:32	30
PreferredChannels	2013-07-18 18:36:32	19
ContactCity	2013-07-18 18:36:32	NULL
ContactCountry	2013-07-18 18:36:32	United States
ContactEmail	2013-07-18 18:36:32	support@carlson.com
ContactName	2013-07-18 18:36:32	Jim Lancaster
ContactPhone	2013-07-18 18:36:32	407-792-1570 x540
ContactState	2013-07-18 18:36:32	Florida
ContactStreet	2013-07-18 18:36:32	1064 Greenwood Blvd St 124
ContactZip	2013-07-18 18:36:32	32746
DeviceOwner	2013-07-18 18:36:32	Birdseye Wireless
FccId	2013-07-18 18:36:32	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 18:36:34	2013-07-18 18:36:34Z
WsdbLastQueryStatus	2013-07-18 18:36:34	Failure Guid=ec78963a-a8f0-4532-8e50-2d48c89f3b89: Station Registration failure for station ec78963a-a8f0-4532-8e50-2d48c89f3b89 a.k.a. CSB00370: missing fields are "ContactCity"

Test Results:

No registration request was sent to the WSDB. All combinations of missing information were tried and the behavior verified. The OMC does not send a registration request to WSDB with missing city information.

The transmitter did not turn ON. Spectrum analyzer was used to verify no transmission.

Result: PASS

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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g) Unsuccessful Registration, 15.713(f)(3) – Missing Country Information

Test Procedure:
Configure the EUT with Incomplete Information (e.g. Country information). Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface.

Test Pre-conditions:
The 'Country Name' Information field should be left blank.

OMC record:

WsDbProvider	2013-07-18 18:42:05	SpectrumBridgeTestWsdb
deviceType	2013-07-18 18:42:05	8
latitude	2013-07-18 18:42:05	28.0
longitude	2013-07-18 18:42:05	-81.0
antennaHeight	2013-07-18 18:42:05	30
PreferredChannels	2013-07-18 18:42:05	19
ContactCity	2013-07-18 18:42:05	Lake Mary
ContactCountry	2013-07-18 18:42:05	NULL
ContactEmail	2013-07-18 18:42:05	support@carlson.com
ContactName	2013-07-18 18:42:05	Jim Lancaster
ContactPhone	2013-07-18 18:42:05	407-792-1570 x540
ContactState	2013-07-18 18:42:05	Florida
ContactStreet	2013-07-18 18:42:05	1064 Greenwood Blvd St 124
ContactZip	2013-07-18 18:42:05	32746
DeviceOwner	2013-07-18 18:42:05	Birdseye Wireless
FccId	2013-07-18 18:42:05	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 18:42:08	2013-07-18 18:42:08Z
WsdbLastQueryStatus	2013-07-18 18:42:08	Failure Guid=ec78963a-a8f0-4532-8e50-2d48c89f3b89: Station Registration failure for station ec78963a-a8f0-4532-8e50-2d48c89f3b89 a.k.a. CSB00370: missing fields are "ContactCountry"

Test Results:

   No registration request was sent to the WSDB. All combinations of missing information were tried and the behavior verified. The OMC does not send a registration request to WSDB with missing information.
   Other information "missing" tried:
   A: Zip code
   B: Email address
   C: Owner

   The transmitter did not turn ON. Spectrum analyzer was used to verify no transmission.

Result: PASS

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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h) Unsuccessful Registration, 15.713(f)(3) – HAAT > 250m

Test Procedure:
Configure the EUT with such that HAAT>250m. Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface and also the EUT status web page.

Test Pre-conditions:
.
A location with a HAAT> 250 m (Derived from location, invalid HAAT example - Mt. Hood 45.3648, -121.6732) was entered into the radio and the information submitted for registration to the WSDB**.**

OMC record:

WsDbProvider	2013-07-18 19:59:06	SpectrumBridgeTestWsdb
deviceType	2013-07-18 19:59:06	8
latitude	2013-07-18 19:59:06	45.3648
longitude	2013-07-18 19:59:06	-121.6732
antennaHeight	2013-07-18 19:59:06	30
PreferredChannels	2013-07-18 19:59:06	19
ContactCity	2013-07-18 19:59:06	Lake Mary
ContactCountry	2013-07-18 19:59:06	United States
ContactEmail	2013-07-18 19:59:06	support@carlson.com
ContactName	2013-07-18 19:59:06	Shamus Jennings
ContactPhone	2013-07-18 19:59:06	(707) 822-7000
ContactState	2013-07-18 19:59:06	California
ContactStreet	2013-07-18 19:59:06	2700 Foster Avenue
ContactZip	2013-07-18 19:59:06	95521
DeviceOwner	2013-07-18 19:59:06	James Carlson
FccId	2013-07-18 19:59:06	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 19:59:09	2013-07-18 19:59:09Z
WsdbLastQueryStatus	2013-07-18 19:59:20	Failure Guid=00000000-0000-0000-0000-000000000000: HAAT_ABOVE_76M

The transmitter did not turn ON. Spectrum analyzer was used to verify no transmission.

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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Test Results:

The failed registration with the reason for failure can be seen on the WSDB log below.

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 4:24:02 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	HaatAbove250m (11)	500	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>45.3648</Latitude>
  <Longitude>-121.6732</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```

Test Results:
The WSDB returned the appropriate error code to the OMC and the base station transmitter turned off or remained off if there was a prior successful registration.

Result: PASS

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

i) **Unsuccessful Registration, 15.713(f)(3) –Antenna Height AGL> 30m**

Test Procedure:
Configure the EUT with such that AGL>30m. Verify the required registration information is sent and stored in the white space data base.
Registration failure should be verified by accessing the WSDB registration interface and also the EUT status web page.

Test Pre-conditions:
Antenna height = 31 m was entered into the radio and the information submitted for registration to the WSDB**.**

OMC record:

WsDbProvider	2013-07-18 21:00:47	SpectrumBridgeTestWsdb
deviceType	2013-07-18 21:00:47	8
latitude	2013-07-18 21:00:47	45.3648
longitude	2013-07-18 21:00:47	-121.6732
antennaHeight	2013-07-18 21:00:47	31
PreferredChannels	2013-07-18 21:00:47	19
ContactCity	2013-07-18 21:00:47	Lake Mary
ContactCountry	2013-07-18 21:00:47	United States
ContactEmail	2013-07-18 21:00:47	support@carlson.com
ContactName	2013-07-18 21:00:47	Shamus Jennings
ContactPhone	2013-07-18 21:00:47	(707) 822-7000
ContactState	2013-07-18 21:00:47	California
ContactStreet	2013-07-18 21:00:47	2700 Foster Avenue
ContactZip	2013-07-18 21:00:47	95521
DeviceOwner	2013-07-18 21:00:47	James Carlson
FccId	2013-07-18 21:00:47	OPA-RC2
WsdbLastQueryTimestamp	2013-07-18 21:00:50	2013-07-18 21:00:50Z
WsdbLastQueryStatus	2013-07-18 21:00:50	Failure Guid=00000000-0000-0000-0000-000000000000: ANTENNA_HEIGHT_ABOVE_30M

The transmitter did not turn ON. Spectrum analyzer was used to verify no transmission.

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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Test Results:

The failed registration with the reason for failure can be seen on the WSDB log below.

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 5:03:04 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	AntennaHeightAbove30m (10)	30	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>45.3648</Latitude>
  <Longitude>-121.6732</Longitude>
  <AntennaHeight>31</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```

Test Results:
The WSDB returned the appropriate error code to the OMC and the base station transmitter turned off or remained off if there was a prior successful registration.

Result: PASS

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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j) Unsuccessful Registration, 15.713(f)(3) – Serial Number

    The OMC user interface does not contain a mechanism by which the serial number of the radio can be altered. The serial number is flashed during the manufacturing process and can't be changed without being returned to the manufacturer.

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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§15.707(a) Fixed TVBD Relocated

Confirm that the database will <u>not</u> provide a channel list for a Fixed TVBD at a location other than that registered.
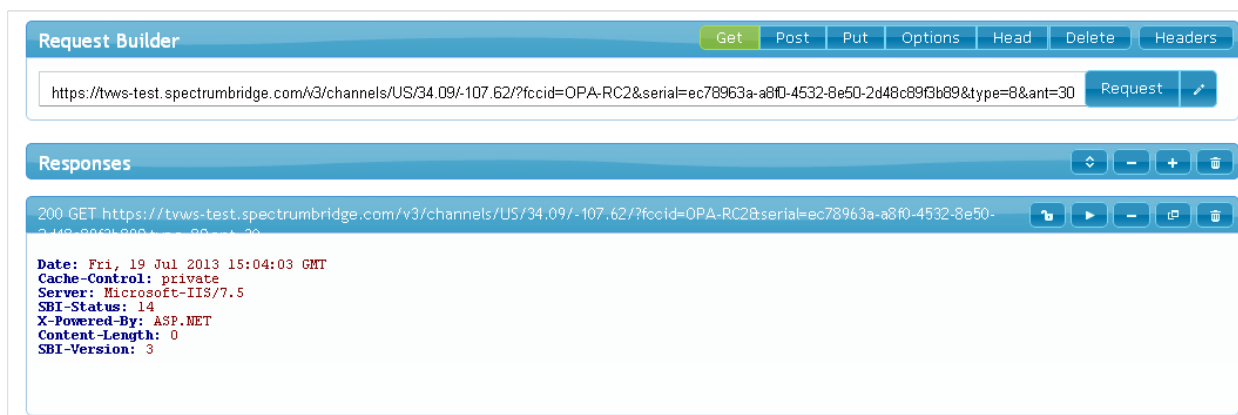
Test Procedure:
- ✓ Configure the fixed device with a location that will yield an authorized channel list. Verify proper channel operation using a spectrum analyzer and the device management interface.
- ✓ Reconfigure (change) the configured location of the fixed device. Power cycle the device.
- ✓ Verify that the fixed device receives a channel map request exception, and does not transmit using white space frequencies using a spectrum analyzer and the device management interface.

Test Data:

The radio is not capable of separating the registration and channel request commands, so a simulator was used to verify this test. Spectrum Bridge has worked with the radio vendor to implement and test the interface between the radio device and Spectrum Bridge's FCC certified TVWS database.

When the channel request is sent through the simulator with a location that is different than the registration location a channel list is not granted by the database and an error 14 code is sent. (Request Does Not Match Registration)

Simulator requesting a channel list on a location different from where it was registered:

The transmitter turned off. Spectrum analyzer was used to verify no transmission.

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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WSDB Log for the response to the TVBD relocated channel request:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 11:04:03 AM	98.191.81.133	/v3/channels/US/34.09/-107.62/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	RequestDoesNotMatchRegistration (14)	346	

Result: PASS

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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§15.711(b)(3)(iii) Fixed & Mode II TVDB Database Update
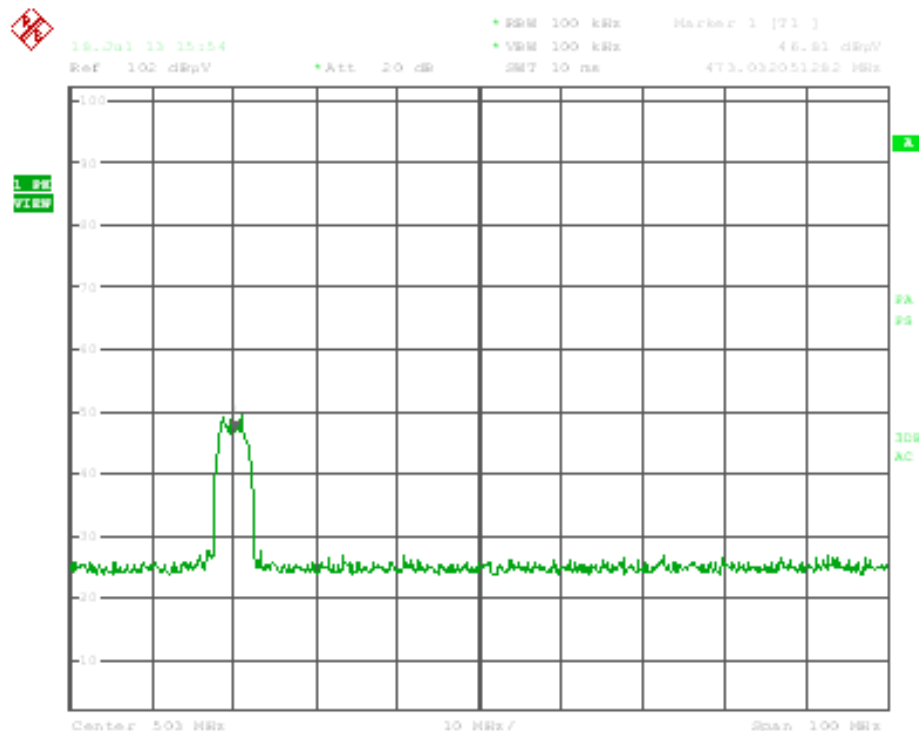
Test Procedure:
Using a programmable router or similar network device, block the access to the database URL or IP address from the TVBD. Confirm that the TVBD shuts down by 11:59 PM on the following day.

✓ Configure the fixed or Mode II device with a location that will yield an authorized channel list. Verify proper channel operation using a spectrum analyzer and the device management interface.
✓ Restrict the access to the database.
✓ Verify that the device does not transmit using white space frequencies after 11:59 PM the following day. Verify using a spectrum analyzer and the device management interface.

Test Results:

The device is designed to shut down 23 hours and 59 minutes after the last successful channel request if access to the database is blocked.

The device was initially powered up and it successfully registered with the database at approximately 12:22 PM. The device received a channel list and started transmitting on channel 14. The connection to the database was then blocked, while maintaining regular access to the internet.

Device transmitting on CH14

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL
(4).DOCX

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Ping result to check link:

7/9/2013 12:22pm - Last Successful Channel request

7/9/2013 12:33pm - A laptop is connected to the terminal radio, a continuous ping is started and logged to the commercial router LAN gateway across the WS radio link
7/9/2013 12:33pm – The WAN connection between the BS and the commercial router in the test set up is blocked
7/9/2013 12:33pm – The base station transmitter stays on, the ping to the gateway across the wireless link continues successfully
    Transmitter On
    Tue 07/09/2013 at 12:33:01.37
    Pinging 204.51.100.33 with 32 bytes of data:
    Reply from 204.51.100.33: bytes=32 time=116ms TTL=240
    Ping statistics for 204.51.100.33:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
    Approximate round trip times in milliseconds:
    Minimum = 116ms, Maximum = 116ms, Average = 116ms

7/10/2013 12:21pm – The base station stops transmitting, the ping to the gateway across the wireless link fails
    Transmitter Off
    Wed 07/10/2013 at 12:21:57.13
    Pinging 204.51.100.33 with 32 bytes of data:
    Reply from 192.168.3.207: Destination host unreachable.
    Ping statistics for 204.51.100.33:
    Packets: Sent = 1, Received = 0, Lost = 1 (100% loss)
7/10/2013 1:08pm – The WAN connection between the BS and the commercial router in the test set up is re-connected
7/10/2013 1:12pm – The base station registers, the transmitter comes on, the ping to the gateway across the wireless link continues successfully
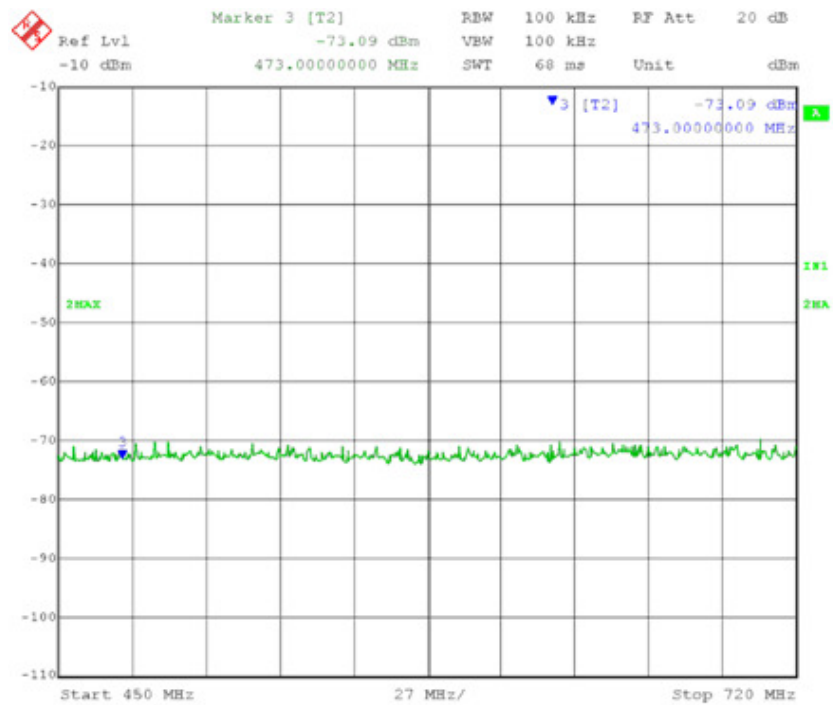
| 7/10/2013 1:12:56 PM | 168.63.75.133 | /v3/channels/US/33.6208/-100.3228/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=20 | Success (0) | 576 | Response |
| 7/9/2013 12:22:47 PM | 168.63.75.133 | /v3/channels/US/33.6208/-100.3228/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=20 | Success (0) | 906 | Response |

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

The device stopped transmitting at 12:21 the next day. The following spectrum analyzer plot was captured to make sure the transmission had stopped.

Result: PASS

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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§15.711(b)(3)(i)(ii), §15.713(a)(1) 48 Hour Channel Scheduling

Use the database interface to register protection for a low-power auxiliary device for the same location and channel on which the TVDB (EUT) has selected and is operating. The registered protection for the low-power auxiliary device should be scheduled for protection within the next 48 hour period.

Test Procedure:
- ✓ Configure the TVBD (EUT) such that it can access the database.
- ✓ Verify that EUT requests and receives a valid channel list. Verify the EUT is using an authorized channel using a spectrum analyzer and the device management interface.
- ✓ Use the database interface to register protection for a low-power auxiliary device for the same location and channel on which the TVDB (EUT) has selected and is operating. The registered protection for the low-power auxiliary device should be scheduled for protection within the next 48 hour period.
- ✓ Verify that the EUT requests and receives a new channel list at the scheduled time of the registered low-power channel protection is to take effect.
- ✓ Verfiy the new channel map does not contain the channel previously protected when the low-power auxiliary device was registered.
- ✓ Verify the EUT is operating on a different channel from what was previously used and subsequently reserved using a spectrum analyzer and the device management interface.

Test Data:

The EUT was registered and verified that a valid channel list was received.

The refresh time was verified in the channel response below. The channel list refresh time is indicated to be 48 Hours.

Operating Channel on 19 before an auxiliary device is registered.

Base Station

WsdbLastQueryTimestamp	2013-07-19 18:48:14	2013-07-19 18:48:14Z
WsdbLastQueryStatus	2013-07-19 18:48:16	Success
WsdbLastRegistrationTimestamp	2013-07-19 18:48:15	2013-07-19 18:48:15Z
BoardVariant	2013-07-19 18:48:11	16: cwt4_6mhz_f
Firmware	2013-07-19 18:48:11	NULL
FPGA	2013-07-19 18:48:11	NULL
Bootloader	2013-07-19 18:48:11	NULL
CurrentBootloaderVersion	2013-07-19 18:48:11	15537 API:1 Variant:CWT4Bootloader Built:at 13:41:48 on Jan 16 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
WsdbLastQueryRawOutput	2013-07-19 18:48:16	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http:, instance"><ChannelCount>45</ChannelCount> <ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45 <RefreshIn>48</RefreshIn></ChannelResponse>

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
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WSDB Log:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 2:39:59 PM	168.63.75.133	/v3/channels/US/28.74749/-81.36509/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	783	Response
7/19/2013 2:39:58 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	Success (0)	283	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>28.74749</Latitude>
  <Longitude>-81.36509</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>James Carlson</DeviceOwner>
  <ContactName>Shamus Jennings</ContactName>
  <ContactStreet>2700 Foster Avenue</ContactStreet>
  <ContactCity>Lake Mary</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlson.com</ContactEmail>
  <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```

Terminal

WsdbLastQueryTimestamp	2013-07-19 18:52:31	2013-07-19 18:52:31Z
WsdbLastQueryStatus	2013-07-19 18:52:32	Success
WsdbLastRegistrationTimestamp	2013-07-19 18:52:28	2013-07-19 18:52:28Z
BoardVariant	2013-07-19 18:52:23	16: cwt4_6mhz_f
Firmware	2013-07-19 18:52:23	17738 Variant:CWT4Terminal Built:at 12:51:08 on Apr 15 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
FPGA	2013-07-19 18:52:23	15a Variant:NMAC180213_1505 Name:fpga2
Bootloader	2013-07-19 18:52:23	17693 API:2 Variant:CWT4Bootloader Built:at 11:59:26 on Apr 12 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
CurrentBootloaderVersion	2013-07-19 18:52:23	17693 API:2 Variant:CWT4Bootloader Built:at 11:59:26 on Apr 12 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
WsdbLastQueryRawOutput	2013-07-19 18:52:32	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http:/ instance"><ChannelCount>45</ChannelCount> <ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45,</ <RefreshIn>48</RefreshIn></ChannelResponse>

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WSDB Log:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 2:52:47 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=f58457b8-ed1f-453d-8d7f-8c2418a34038&type=8&ant=30	Success (0)	533	Response
7/19/2013 2:52:45 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=f58457b8-ed1f-453d-8d7f-8c2418a34038&type=8&ant=30	Success (0)	563	Response
7/19/2013 2:52:43 PM	168.63.75.133	/v3/devices/US/OPA-RC2/f58457b8-ed1f-453d-8d7f-8c2418a34038	Success (0)	530	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <DeviceType>Fixed</DeviceType>
  <Latitude>33.6207</Latitude>
  <Longitude>-100.3228</Longitude>
  <AntennaHeight>30</AntennaHeight>
  <DeviceOwner>Carlson</DeviceOwner>
  <ContactName>Shamus</ContactName>
  <ContactStreet>2700 Foster Ave</ContactStreet>
  <ContactCity>Arcata</ContactCity>
  <ContactState>California</ContactState>
  <ContactZip>95521</ContactZip>
  <ContactCountry>United States</ContactCountry>
  <ContactEmail>support@carlsonwireless.com</ContactEmail>
  <ContactPhone>7078227000</ContactPhone>
</RegistrationRequest>
```

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The refresh time was verified by clicking on 'response' hyperlink on the WSDB website. The channel list refresh time is indicated to be 48 Hours.

WsdbLastQueryTimestamp	2013-07-19 19:18:59	2013-07-19 19:18:59Z
WsdbLastQueryStatus	2013-07-19 19:19:00	Success
WsdbLastRegistrationTimestamp	2013-07-19 18:48:15	2013-07-19 18:48:15Z
BoardVariant	2013-07-19 18:48:11	16: cwt4_6mhz_f
Firmware	2013-07-19 18:48:11	*NULL*
FPGA	2013-07-19 18:48:11	*NULL*
Bootloader	2013-07-19 18:48:11	*NULL*
CurrentBootloaderVersion	2013-07-19 18:48:11	15537 API:1 Variant:CWT4Bootloader Built:at 13:41:48 on Jan 16 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
WsdbLastQueryRawOutput	2013-07-19 19:19:00	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http:/ instance"><ChannelCount>45</ChannelCount> <ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45, <RefreshIn>1</RefreshIn></ChannelResponse>

WSDB log:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 3:19:15 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	640	Response

```xml
<?xml version="1.0" encoding="utf-16"?>
<ChannelResponse xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ChannelCount>45</ChannelCount>

<ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,3
  <RefreshIn>1</RefreshIn>
</ChannelResponse>
```

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Using the database interface here http://whitespaces-test.spectrumbridge.com **a low-power auxiliary device was registered for the same location and channel on which the TVDB (EUT) has selected and is operating (CH19). The registered protection for the low-power auxiliary device was scheduled for 4:30 PM.**

Entity Information

Entity Type	Low Power Auxilary Stations
Channel Numbers	19
Transmitter Call Sign	LP001

Usage Schedule

Usage	One Time Event
Time Zone	(UTC-05:00) Eastern Time (US & Canada)
Event Starts	7/19/2013 4:30:00 PM
Event Ends	7/19/2013 9:00:00 PM

Contact Information

Name of Entity Owner	Timco Engineering
Contact Name	Mr. Timco
Country	US
Address	849 NW SR 45
City	Newberry
State	FL
Postal Code	32669
Contact Phone	800-472-2424
Contact Email	Support@timco.com

Location(s)

Point: 33.6207 -100.3228

Auxiliary Device Enrollment

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
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After the auxiliary device has been registered, the 'channel refresh' time changes to 1 hour. The EUT is still transmitting on channel 19:

WsdbLastQueryTimestamp	2013-07-19 19:27:39	2013-07-19 19:27:39Z
WsdbLastQueryStatus	2013-07-19 19:27:41	Registration Success
WsdbLastRegistrationTimestamp	2013-07-19 19:27:40	2013-07-19 19:27:40Z
BoardVariant	2013-07-19 19:27:35	16: cwt4_6mhz_f
Firmware	2013-07-19 19:27:35	17738 Variant:CWT4Terminal Built:at 12:51:08 on Apr 15 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
FPGA	2013-07-19 19:27:35	15a Variant:NMAC180213_1505 Name:fpga2
Bootloader	2013-07-19 19:27:35	17693 API:2 Variant:CWT4Bootloader Built:at 11:59:26 on Apr 12 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
CurrentBootloaderVersion	2013-07-19 19:27:35	17693 API:2 Variant:CWT4Bootloader Built:at 11:59:26 on Apr 12 2013 by JENKINSSLAVE2:JENKINSSLAVE2$
WsdbLastQueryRawOutput	2013-07-19 19:27:41	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http:/ instance"><ChannelCount>45</ChannelCount> <ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45, <RefreshIn>1</RefreshIn></ChannelResponse>

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 3:27:56 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=f58457b8-ed1f-453d-8d7f-8c2418a34038&type=8&ant=29	Success (0)	546	Response

```
<?xml version="1.0" encoding="utf-16"?>
<ChannelResponse xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ChannelCount>45</ChannelCount>

<ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30
  <RefreshIn>1</RefreshIn>
</ChannelResponse>
```

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
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Channel Availability after registration of Low Power Auxiliary Device

With the next channel request, the TVBD receives the updated channel list which excludes CH19 and the EUT ceases transmitting on channel 19. The EUT is designed to operate on only one pre-configurable channel.

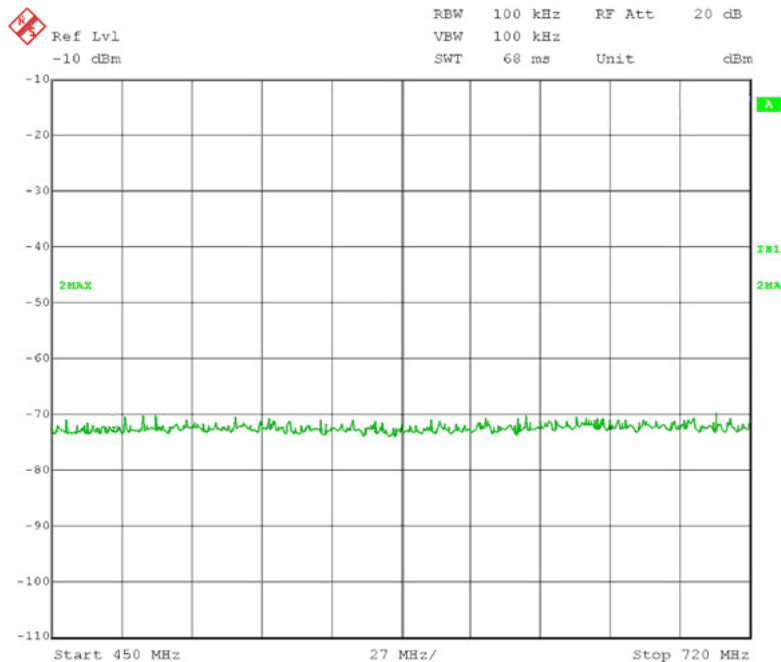|		
WsdbLastQueryTimestamp	2013-07-19 19:49:02	2013-07-19 19:49:02Z
WsdbLastQueryStatus	2013-07-19 19:49:04	Success
WsdbLastRegistrationTimestamp	2013-07-19 18:48:15	2013-07-19 18:48:15Z
BoardVariant	2013-07-19 18:48:11	16: cwt4_6mhz_f
Firmware	2013-07-19 18:48:11	*NULL*
FPGA	2013-07-19 18:48:11	*NULL*
Bootloader	2013-07-19 18:48:11	*NULL*
CurrentBootloaderVersion	2013-07-19 18:48:11	15537 API:1 Variant:CWT4Bootloader Built:at 13:41:48 on Jan 16 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
WsdbLastQueryRawOutput	2013-07-19 19:49:04	<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><ChannelCount>44</ChannelCount> <ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45,46, <RefreshIn>48</RefreshIn></ChannelResponse>

WSDB log:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 3:49:19 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	576	Response

APPLICANT. CARLSON WIRELESS TECHNOLOGIES INC.
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Spectrum Plot: (no TX)

Ref Lvl −10 dBm
RBW 100 kHz VBW 100 kHz SWT 68 ms RF Att 20 dB Unit dBm

Start 450 MHz   27 MHz/   Stop 720 MHz

<u>Channel list response with CH 19 missing:</u>

```xml
<?xml version="1.0" encoding="utf-16"?>
<ChannelResponse xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
 <ChannelCount>44</ChannelCount>

<ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25,26,27,28,29,30,3
 <RefreshIn>48</RefreshIn>
</ChannelResponse>
```

Results:
After receiving the updated channel listing the EUT ceases the transmission on channel 19, this was verified by observing the spectrum analyzer.

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§15.707, §15.711(b)(3)(i)(ii)(iv),(c), §15.712 TVBD Channel Availability

Confirm that the channel list provided by the database conforms with those allowable to the class of TVBD under test. Confirm that the TVBD is operating on a channel from the list at authorized power and cannot be made to operate on an unauthorized channel.

Test Procedure:
1) Register the TVBD with valid location information.
   Verify that the channel list provided by the WSDB conforms to the device type of the TVBD under test.
   - ✓ Verify that EUT requests and receives a complete channel list using lat/long 33.62070/ -100.32280. Verify the EUT is using an authorized channel using a spectrum analyzer and the OMC device management interface.

Test pre condition 1: The device channel request is tested according to fixed device type in this example.

WsdbLastQueryTimestamp	2013-07-19 19:49:02	2013-07-19 19:49:02Z
WsdbLastQueryStatus	2013-07-19 19:49:04	Success
WsdbLastRegistrationTimestamp	2013-07-19 18:48:15	2013-07-19 18:48:15Z
BoardVariant	2013-07-19 18:48:11	16: cwt4_6mhz_f
Firmware	2013-07-19 18:48:11	*NULL*
FPGA	2013-07-19 18:48:11	*NULL*
Bootloader	2013-07-19 18:48:11	*NULL*
CurrentBootloaderVersion	2013-07-19 18:48:11	15537 API:1 Variant:CWT4Bootloader Built:at 13:41:48 on Jan 16 2013 by JENKINSSLAVE1:JENKINSSLAVE1$
WsdbLastQueryRawOutput	2013-07-19 19:49:04	\<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance">\<ChannelCount>44\</ChannelCount> \<ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25,26,27,28,29,30,31,32,33,34,35,39,40,41,42,43,44,45,46, \<RefreshIn>48\</RefreshIn>\</ChannelResponse>

APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
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REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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Test Result 1:

The database identifies the device type correctly and the channel list provided is correct for the device type.

WSDB log:

Date	Ip	Url	Status	RT (ms)	Data
7/19/2013 3:49:19 PM	168.63.75.133	/v3/channels/US/33.6207/-100.3228/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	576	Response

```xml
<?xml version="1.0" encoding="utf-16"?>
<ChannelResponse xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <ChannelCount>44</ChannelCount>

<ChannelList>2,5,6,7,8,9,10,11,12,13,14,15,16,17,18,20,21,22,23,24,25,26,27,28,29,30,3
  <RefreshIn>48</RefreshIn>
</ChannelResponse>
```

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2) All Device types
   ✓ Configure and register the devices location (34.078611, -107.61805) such that the database returns a channel list that does not allow operation on any channel.
   ✓ Use a spectrum analyzer to verify that the EUT does not transmit on any white space channel.
   ✓ Verify that the EUT does not transmit on any channel until it successfully registers and receives a channel list

Test Precondition 2:
A Registration request is sent for a location with no known available channels. Eg: (34.078611, -107.61805)

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Test Result 2:

An empty channel list is received and the transmitter is disabled.

WSDB log:

Date	Ip	Url	Status	RT (ms)	Data
7/18/2013 6:31:56 PM	168.63.75.133	/v3/channels/US/34.07861/-107.61805/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	300	Response
7/18/2013 6:29:55 PM	168.63.75.133	/v3/channels/US/34.07861/-107.61805/?fccid=OPA-RC2&serial=ec78963a-a8f0-4532-8e50-2d48c89f3b89&type=8&ant=30	Success (0)	296	Response
7/18/2013 6:29:48 PM	168.63.75.133	/v3/devices/US/OPA-RC2/ec78963a-a8f0-4532-8e50-2d48c89f3b89	Success (0)	6373	Request

```xml
<?xml version="1.0" encoding="utf-16"?>
<RegistrationRequest xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
 <DeviceType>Fixed</DeviceType>
 <Latitude>34.07861</Latitude>
 <Longitude>-107.61805</Longitude>
 <AntennaHeight>30</AntennaHeight>
 <DeviceOwner>James Carlson</DeviceOwner>
 <ContactName>Shamus Jennings</ContactName>
 <ContactStreet>2700 Foster Avenue</ContactStreet>
 <ContactCity>Lake Mary</ContactCity>
 <ContactState>California</ContactState>
 <ContactZip>95521</ContactZip>
 <ContactCountry>United States</ContactCountry>
 <ContactEmail>support@carlson.com</ContactEmail>
 <ContactPhone>(707) 822-7000</ContactPhone>
</RegistrationRequest>
```
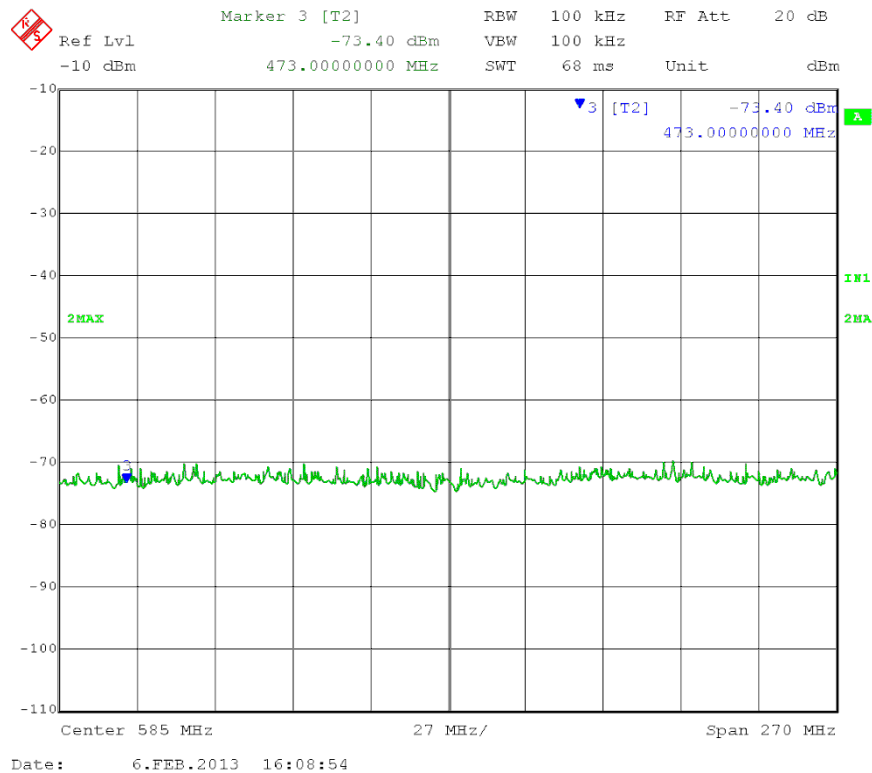
APPLICANT.   CARLSON WIRELESS TECHNOLOGIES INC.
FCC ID: OPA-RC2-BS
REPORT: \\SKYLINE\SHARE\JIM L\TVBD CERTIFICATION\CARLSON\1244UT13TESTREPORT JL (4).DOCX

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Spectrum Analyzer screenshot:

Results: The radio did not/does not transmit until it receives a valid channel list.

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§15.711(f) Security:

Please see the attached document, TVBD Secure Communications.pdf

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