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FCC PART 15.Subpart H White Spaces System TEST REPORT

Fixed TVBD Device Part 2

Applicant	Koos Technical Services, Inc.
Address	1025 Greenwood Blvd. Lake Mary FL 32746
Model Number	**AWR-US-U-100.**
Product Description	FIXED TVBD
Database Administrator	Spectrum Bridge Inc.
Date Sample Received	3/6/2012
Date Tested	6 March 2012
Tested By	Sushant Kadimdivan, John Day
Approved By	Sid Sanders
Report Number	547UT12TestReport.doc
Test Results	☒ PASS ☐ FAIL

ACCREDITED

Testing Certificate # 0955-01

TABLE OF CONTENT

GENERAL REMARKS

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 Fixed TVBD Part 2 Application and White Spaces System Test Report. There are three (3) components of the White Spaces technology;

- **TV Band devices (Fixed TVBD for Certification).**
- **TV Bands Database (Spectrum Bridge Inc. certified WSDB services)**
- **TV Band System,** Made up of Fixed TVBD's database, and layer of interaction between the devices and the databases.

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.

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

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669
Authorized Signatory Name:

Testing Certificate # 0955-01

S. S. Sanders
Compliance Engineer
Date: March 16, 2012

GENERAL INFORMATION

DUT Description

General:

The Equipment Under Test (DUT's), are Koos Technical Services, Inc. radios intended for use as Fixed Hub and Spoke equipment in a fixed White Spaces wireless network. For the purpose of testing and compliance with Part 15 Subpart H of Title 47 of the Code of Federal Regulations. The hub radio, named DUT1, operates as Fixed TV Band Device (TVBD) in Hub mode. The spoke radio, named DUT2, operates as Fixed TVBD in Spoke mode. The Koos Technical Services, Inc. radios are intentional radiators operating in the UHF bands. The radios tested are factory pre-configured UHF radios with an operating frequency range of 470-599 MHz (TV channels 14-35) and 620-698 MHz (TV channels 39-51).

The radios are used to create Point-to-Point (PTP), Point-to-Multipoint (PTM) or simplex (one-way) networks with priority routing support for voice, video and data traffic. Ethernet and RS-232 interfaces are available for user data traffic. The Agility Radio functions as a Fixed TVBD as defined in Section 15.703 of the FCC Rules. Local and remote network management is provided through a secure shell (SSH) network connection. Remote management is supported over the wireless link. Radios are managed with downloadable Element Management System software.

DUT Specification: 1.0

Applicable Standard	Part 15 Subpart H	
DUT Description	Point-to-Point(PTP), Point-to-Multipoint(PTM) or simplex(one way)	
FCC ID	ZBGAWR2UHF	
Application:	Voice, Video and Data Traffic Support	
Programmable Data Rates:	3.125 Mbps	
Frequency Band:	470-599 MHz (TV channels 14-35) and 620-698 MHz (TV channels 39-51).	
Bridged Ethernet Port:	Wireless/Ethernet Ports IP Subnets Bridge	
Transmit Power(dBm):	21dBm	
Sensitivity (at 1E-3 BER)	-118dBm @ 20Kbps; -97dBm @ 2Mbps	

Test Facility	Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA.
Test Conditions	Temperature: 26°C Relative humidity: 50%
Test Exercise	The DUT was tested in normal end user mode, poll select operational mode

Controls, Ports and Indicators:

DUT Power Source	☒ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☐ 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	BNC		
Antenna	Telex ALP-450		
Network Port	RJ 45		
Serial Port	Male RS 232		
Test Exercise	All of the device/database tests were executed in normal operational mode.		
Indicators	☐ Power Indicator		
	☐ Alarm Indicator		
	☐ Traffic Indicator		

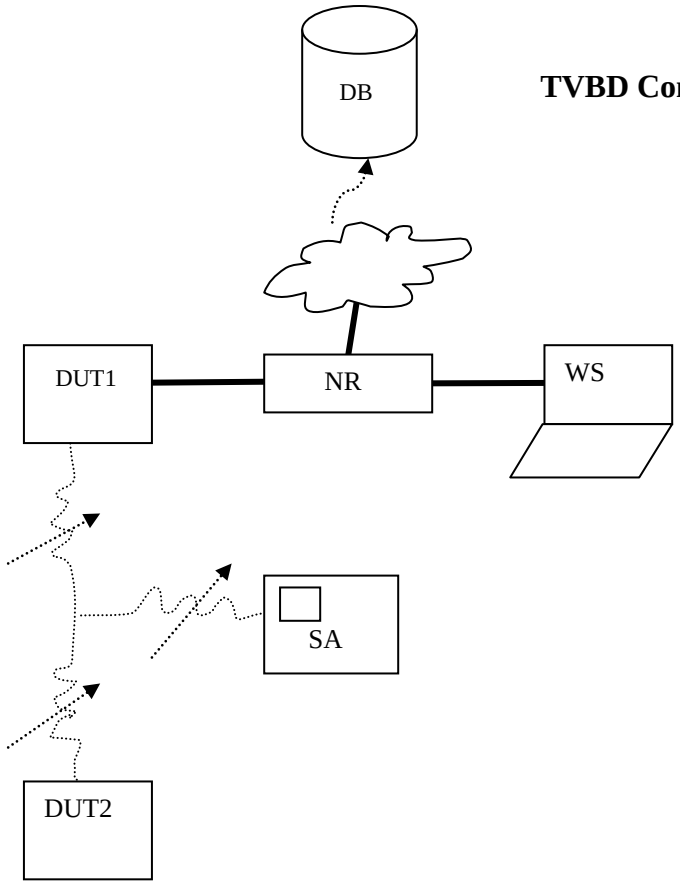
EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	Listed 5/10/10	5/10/12
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 10/28/11	10/28/13
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 10/28/11	10/28/13
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 10/28/11	10/28/13
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 10/28/11	10/28/13

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 v01.

TEST CONFIGURATIONS:



TVBD Configuration

DB – Database
DUT – Equipment Under Test
NR – Network Router
SA – Spectrum Analyzer
WS – Workstation

RF Coaxial Connection
Cat 5 Connection

Figure 1

Device and System Operation

This section provides high level description of the White Space test network configuration, Koos Technical Services, Inc. Radio, operations/commands; and the White Spaces system as a whole consisting of White Spaces network and White Spaces Database (WSDB). Use of this procedure will require that the element manager has been installed on the work station. For purposes of this procedure, the device will be controlled via the TVBD Element Manager. In order to connect the work station to the TVBD, the operator will have to have knowledge of the TVBD static IP address and set the workstation with an IP address within the same subnet range.

Test Network Configuration

The White Spaces test network is configured as Point-to-Point network. The wireless link is established over an 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 networks are:
DUT1 – Koos Technical Services, Inc. Radio configured as a "Hub" Serial #2268
DUT2 – Koos Technical Services, Inc. Radio configured as a "Spoke" Serial #2236
NR – standard network router/switch
WS – workstation (laptop computer) to simulate **in-field wireless communication, execute tests and perform monitoring and measurements**

- SA – spectrum analyzer
- RF attenuators and cabling

- The workstation is physically connected to one of the network router LAN ports via RJ45 and establishes a network connection. The routers WAN port connection is required to be capable of providing Internet access to connect to the Spectrum Bridge White Space database.

DUT1 is physically connected to a network router LAN port via its RJ45 network port. All of the device/database tests were executed in normal operational mode. Configuration of DUT1 and DUT2 is accomplished using Spectrum Bridge's Element Management System (EMS).

As defined in the FCC's White Spaces Final Rules, DUT1 and DUT2 only operate and are tested as Fixed TV Band Devices (TVBDs). DUT1 operates as Fixed TVBD with direct connection to the Internet. Both DUT1 and DUT2 are provisioned or enrolled by the manufacturer with Spectrum Bridge's WSDB agent. In addition, both devices must be configured with registration information to communicate with WSDB.

Fixed TVBD labeled DUT1 is pre-configured as a Hub with 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 TVBD sends geo-location and registration information to the database via the Internet. The WSDB verifies the TVBD's FCC ID and serial number and upon confirmation, registers the device. The device then requests a channel map for its location. Upon receiving a list of available channels from the database the TVBD will pick an available channel, enable its radio transmitter and begin to transmit a beacon for other devices to join the network.

Test Network Configuration (Cont.)

Fixed TVBD labeled DUT2 is pre-configured as a spoke with registration information and will not transmit until it registers and receives a valid channel list. When power is applied DUT2 begins scanning its operating range until it "hears" the hub's beacon. The spoke uses the Hubs channel for a minimum amount of time to communicate over the air for the purpose of executing the network join protocol and to gain access to the Internet in order to complete the registration and channel request with the database. The database verifies TVBD's FCC ID and serial number and upon confirmation, registers the devices.

The device then requests a channel map for its location. Upon receiving a list of available channels from the database the TVBD will pick an available channel, enable its radio transmitter and begin to transmit.

The following tests address the Radios functionality as Fixed TVBDs and compliance with the FCC's TV White Space Final Rules Part 2.

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.

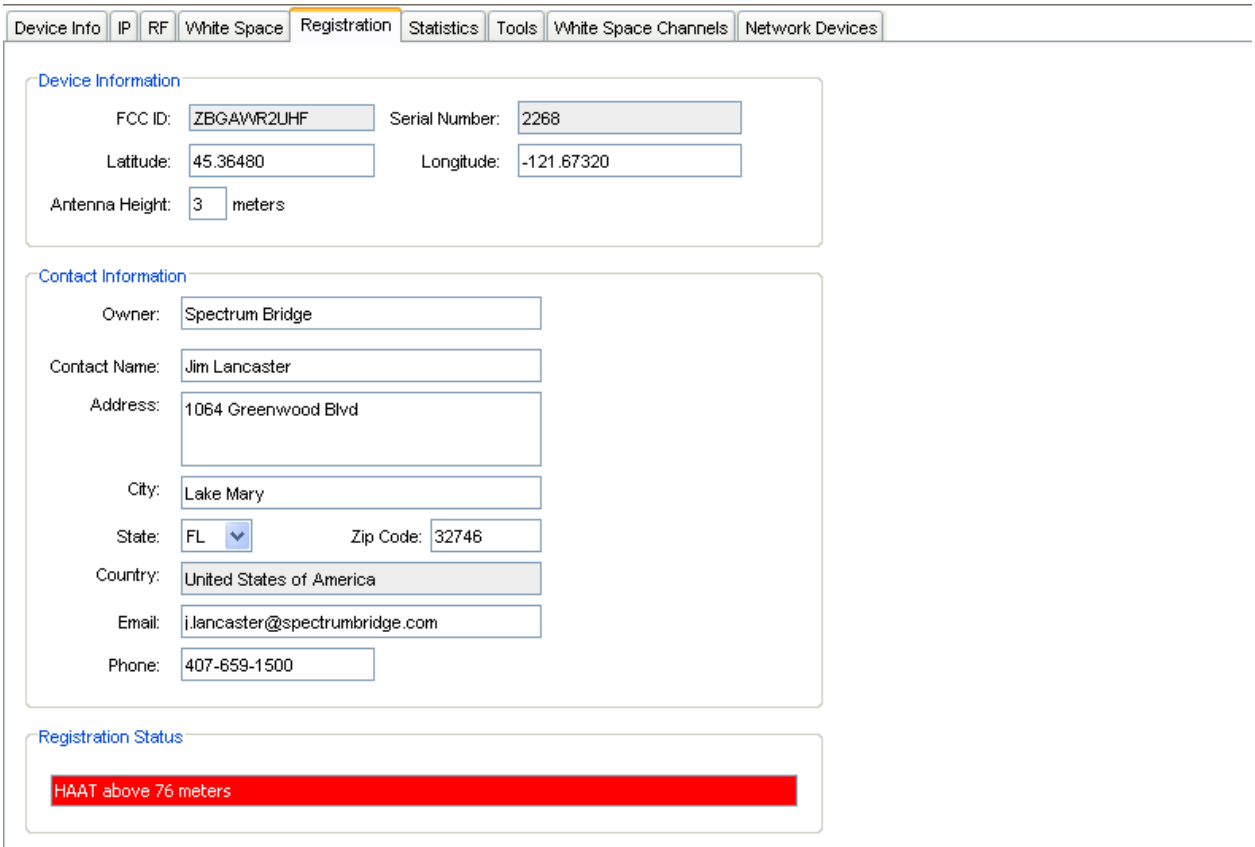
III Test Result Summary

Test Case	P/F/I
§15.713(f)(3) Fixed TVBD Registration(HAAT)	**P**
§15.713(f)(3) Fixed TVBD Registration(Outside Regulatory Domain)	**P**
§15.713(f)(3) Fixed TVBD Registration(successful registration)	**P**
§15.713(f)(3) Fixed TVBD Registration(Available Channels)	**P**
§15.713(f)(3) Fixed TVBD Registration(Spoke w/o direct connection to internet)	**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**
§15.711(b)(3)(i)(ii), §15.713(a)(1) 48 Hour Channel Scheduling(Cont.)	**P**
§15.711(b)(3)(i)(ii), §15.713(a)(1) 48 Hour Channel Scheduling(Cont.)	**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**

§15.713(f)(3) Fixed TVBD Registration(HAAT)

- **Test Procedures:** The database must indicate a successful device registration when the following data is provided in the registration message:
  - FCC ID: SBI TEST #
  - Serial Number: SBI TEST #
  - Valid Coordinates
  - HAAT < 76 m
  - Antenna Height AGL < 30 m
  - Complete contact information
- Configure the fixed device. Verify the attempted registration using any missing or invalid data, results in a failed registration. The registration information can be accessed via the WSDB registration interface.
- Known invalid locations outside of the US Regulatory Domain and invalid HAAT location were predetermined and used for the test.
- **Test Results #1:**



3/6/2012 10:25:01 AM	**98.191.81.133**	**/v3/devices/US/ZBGAWR2UHF/2268**	**HaatAbove76m (11)**	**Request**

Results: PASS

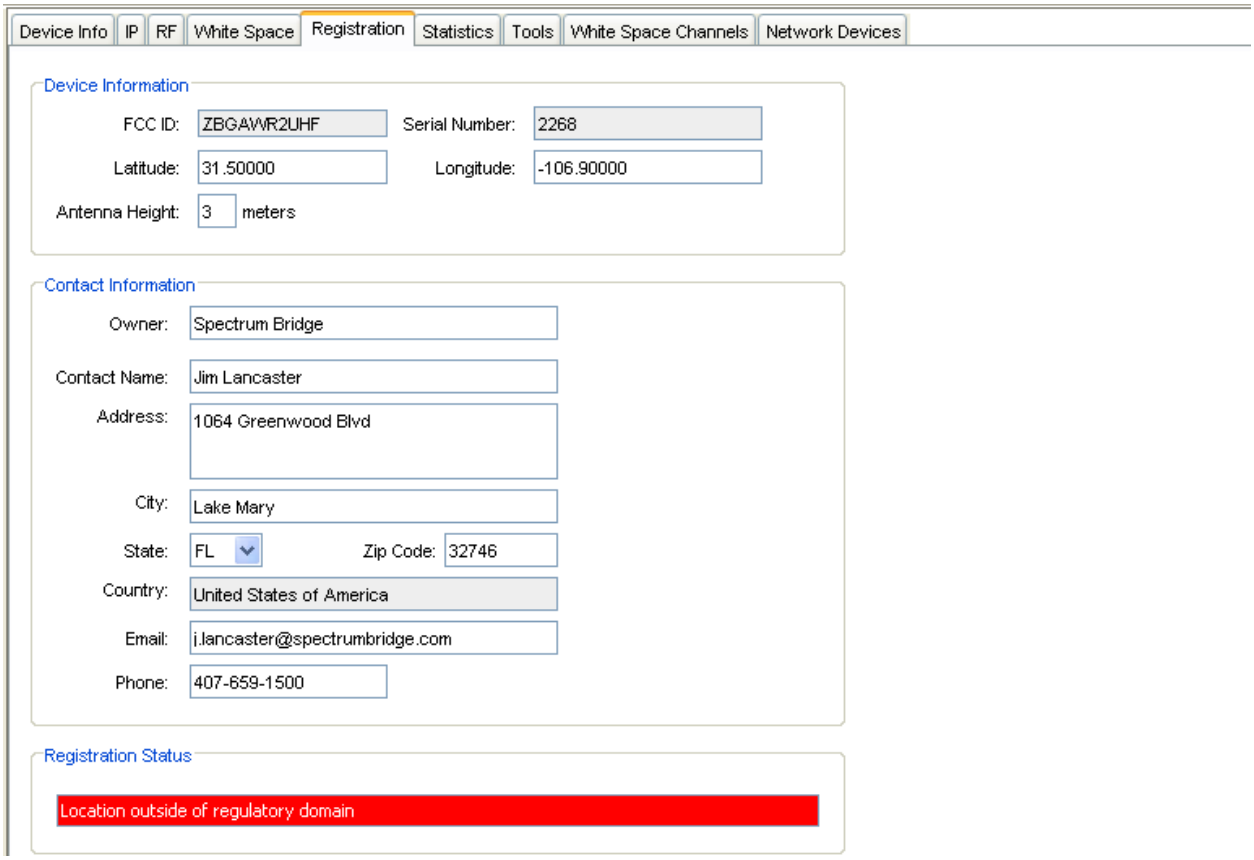
§15.713(f)(3) Fixed TVBD Registration(Outside Regulatory Domain)

- **Test Procedure:** The database must indicate a failed device registration if any of the following data provided by the TVBD is missing or invalid:
  - FCC ID
  - Serial Number
  - Restricted Coordinates
  - HAAT> 76 m
  - Antenna Height AGL > 30 m
  - Incomplete contact information

Configure the fixed device. Verify the attempted registration using any missing or invalid data, results in a failed registration. The registration information can be accessed via the WSDB registration interface.

- Known invalid locations outside of the US Regulatory Domain and invalid HAAT location were predetermined and used for the test.

Test Results #2:

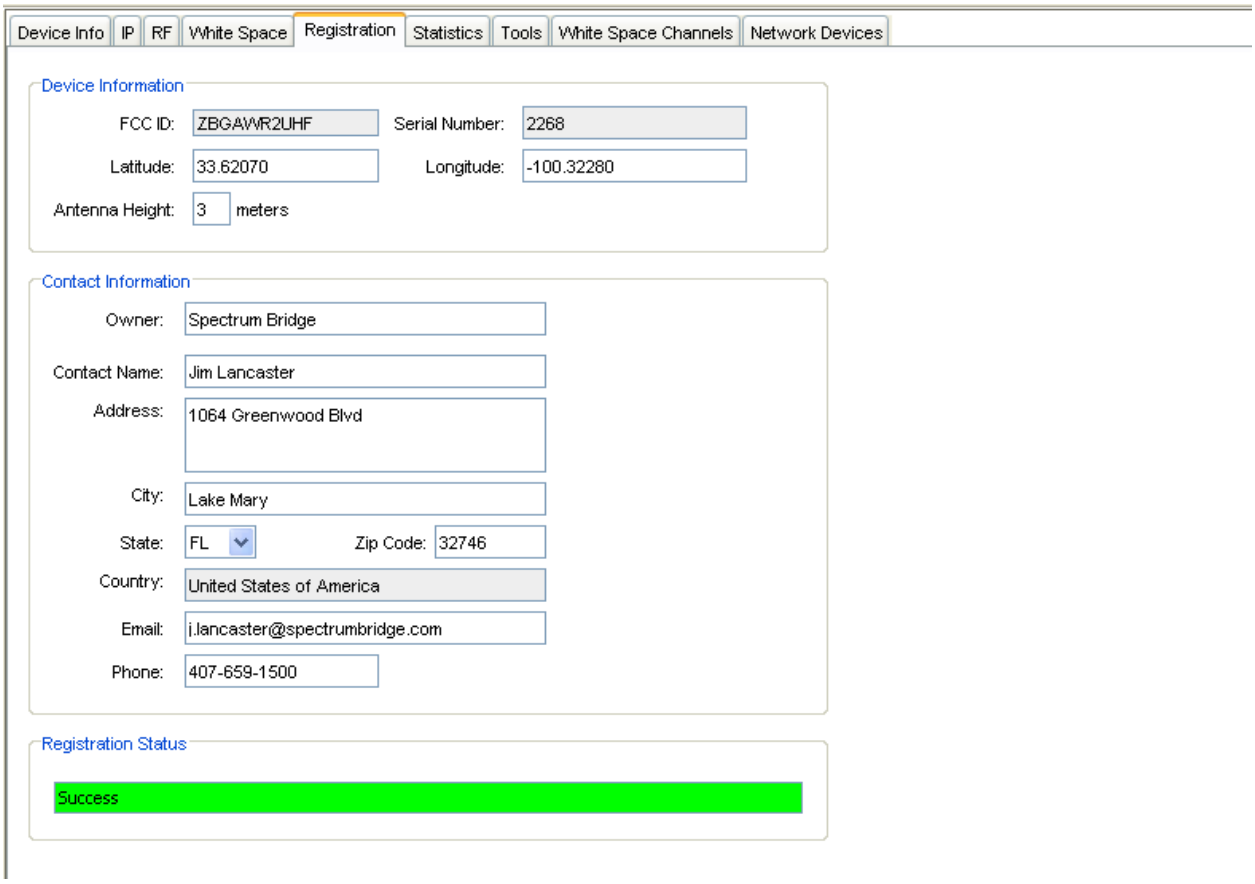


3/6/2012 10:25:07 AM	98.191.81.133	/v3/devices/US/ZBGAWR2UHF/2268	LocatedOutsideRegulatoryDomain (9)	Request

Results: PASS

§15.713(f)(3) Fixed TVBD Registration(successful registration)
Test Procedure: Configure the fixed device. Verify the required registration information is sent and stored in the white space data base. The registration information can be accessed via the WSDB registration interface. Successful registration can be verified by accessing the WSDB registration interface.

Test Results #3:

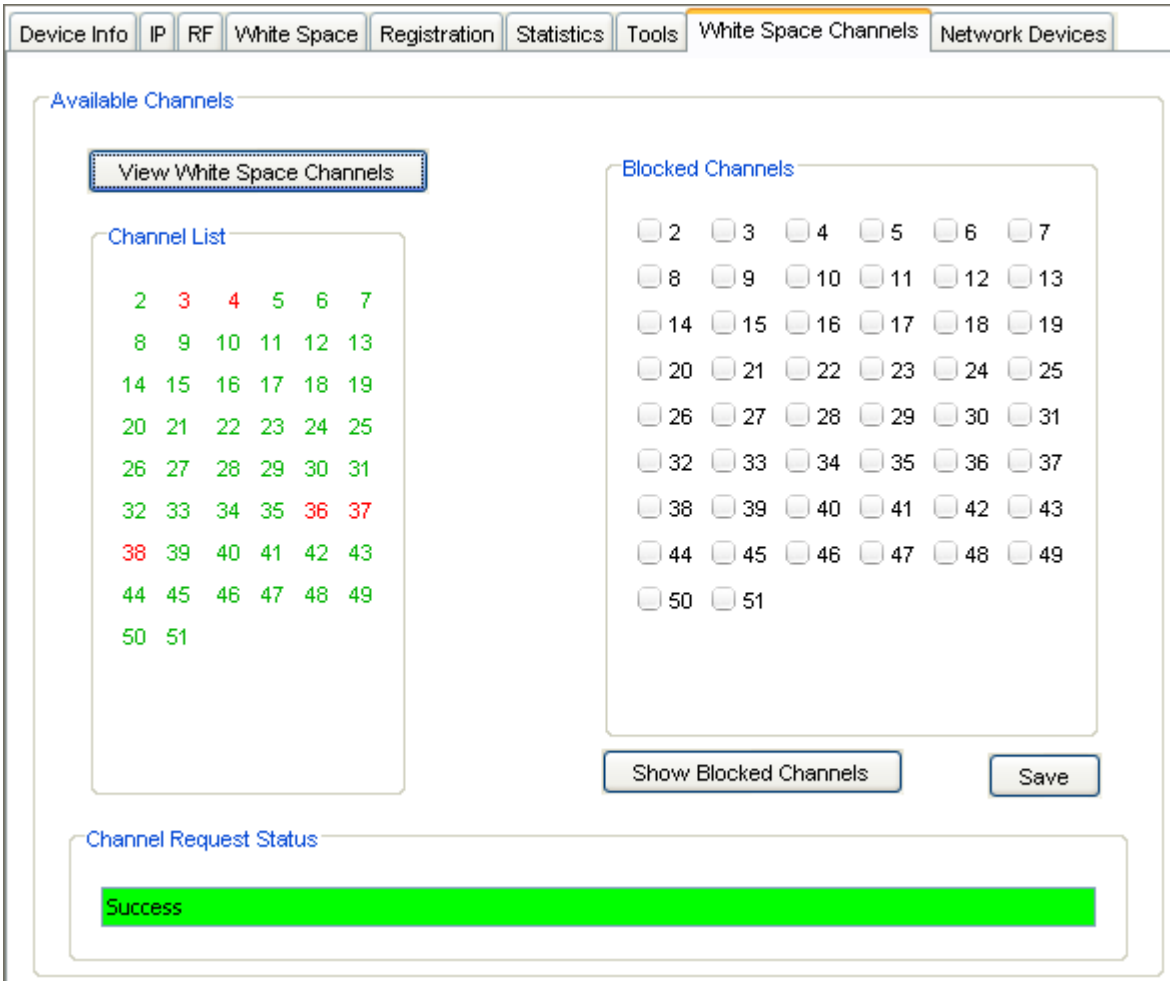


3/6/2012 10:54:43 AM	**98.191.81.133**	**/v3/devices/US/ZBGAWR2UHF/2268**	**Success (0)**	**Request**

The FCCID and the serial # of the radio's are in the firmware of the radios. A known acceptable location was put into the radio and registration was successful. Both the hub & spoke registered successfully.

Results: PASS

§15.713(f)(3) Fixed TVBD Registration(Available Channels)
Test Procedure:
Test Results #3:



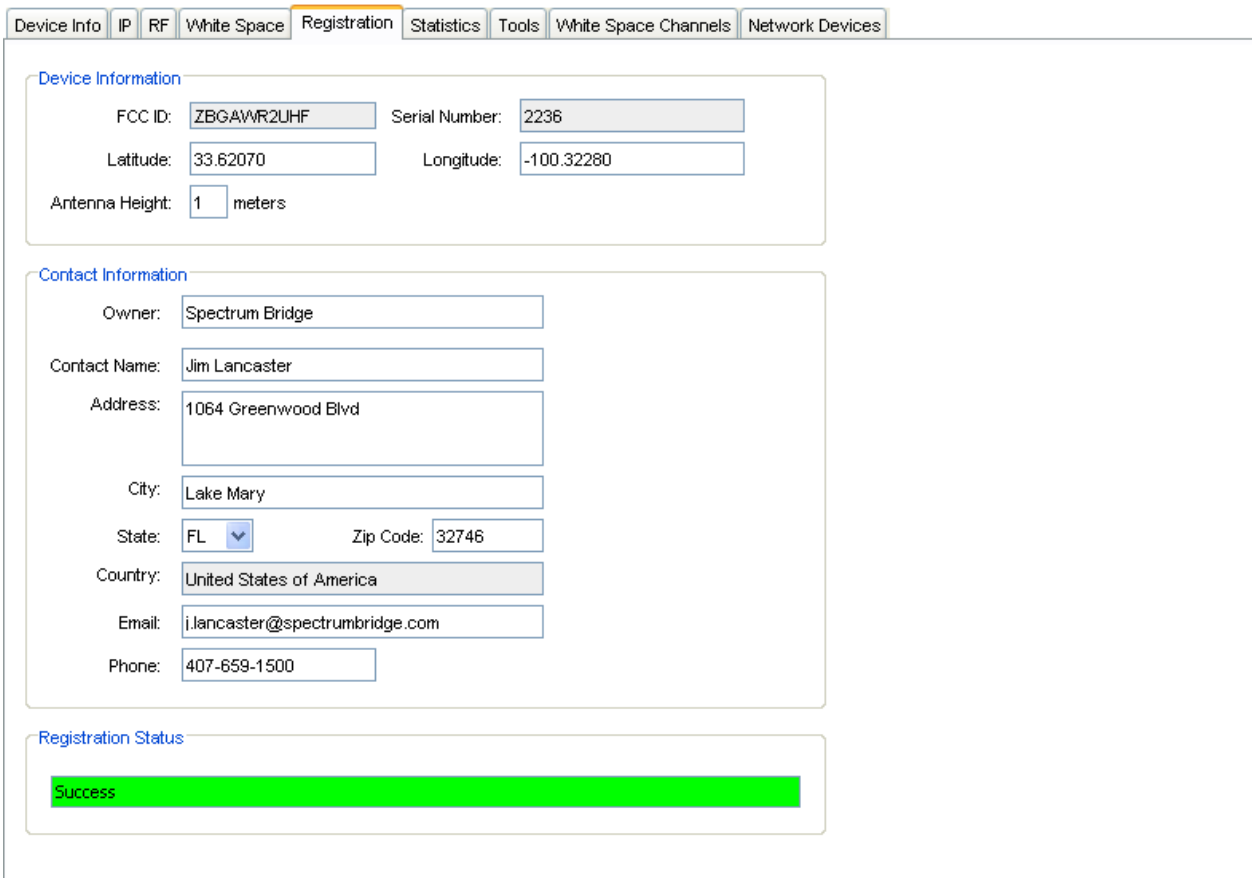
The radios were programmed with Channel 19 as the preferred channel of operation and once registration was successful they transmitted on Channel 19.

§15.713(f)(3) Fixed TVBD Registration(Spoke w/o direct connection to internet)

- **Test Procedure:** For a fixed TVBD without a direct connection to the internet, confirm that registration through a registered fixed device takes place only on a channel available to that registered device.

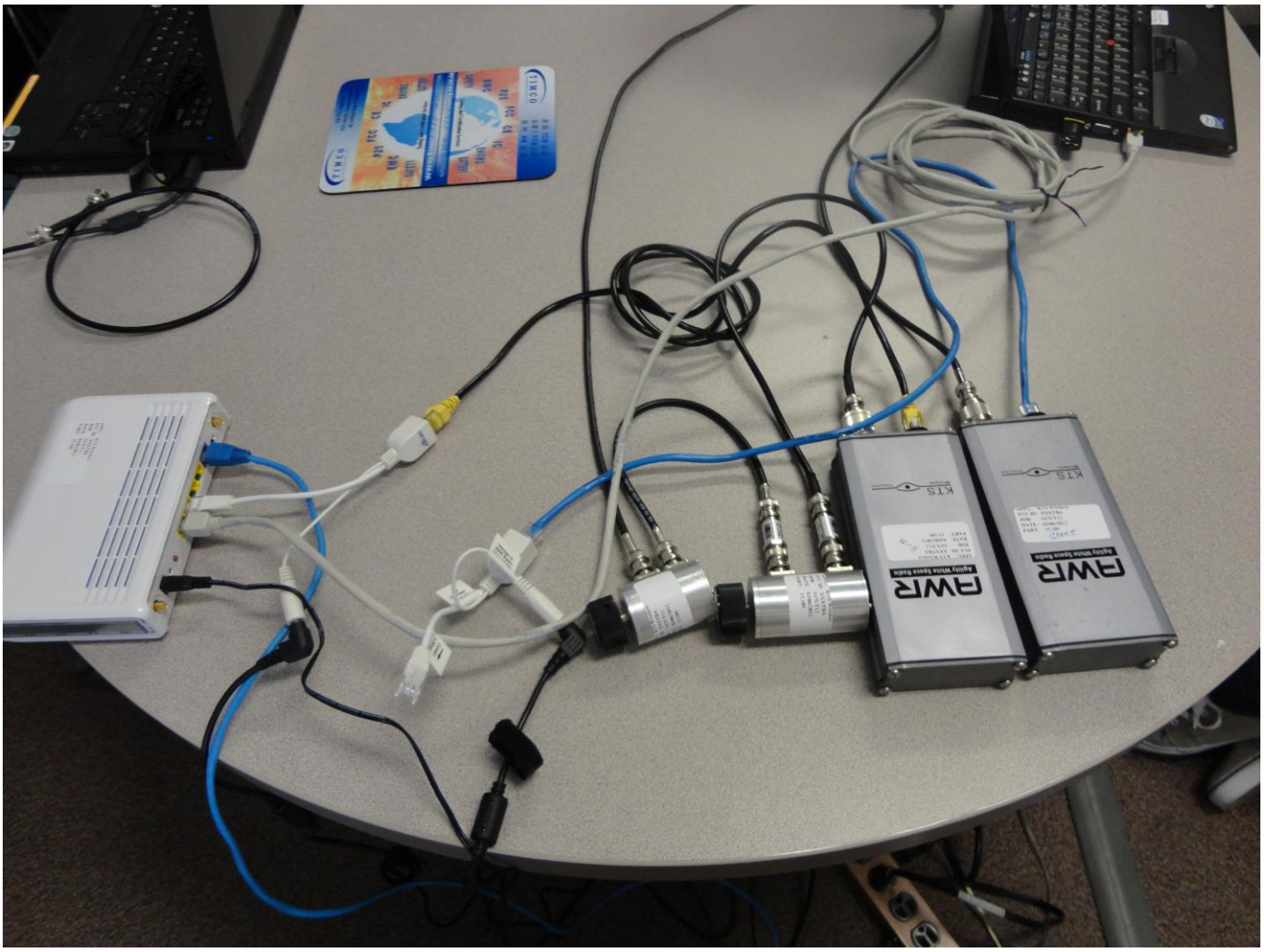
Verify proper channel operation using a spectrum analyzer and the device management interface.

Test Results #4



The Spoke radio was disconnected from the internet and the power turned off. Upon turning the spoke radio on after approximately 30 seconds the spoke successfully registered with the database on channel 19 via the RF link with the Hub.

§15.713(f)(3) Fixed TVBD Registration(Spoke w/o direct connection to internet)
Test Setup:

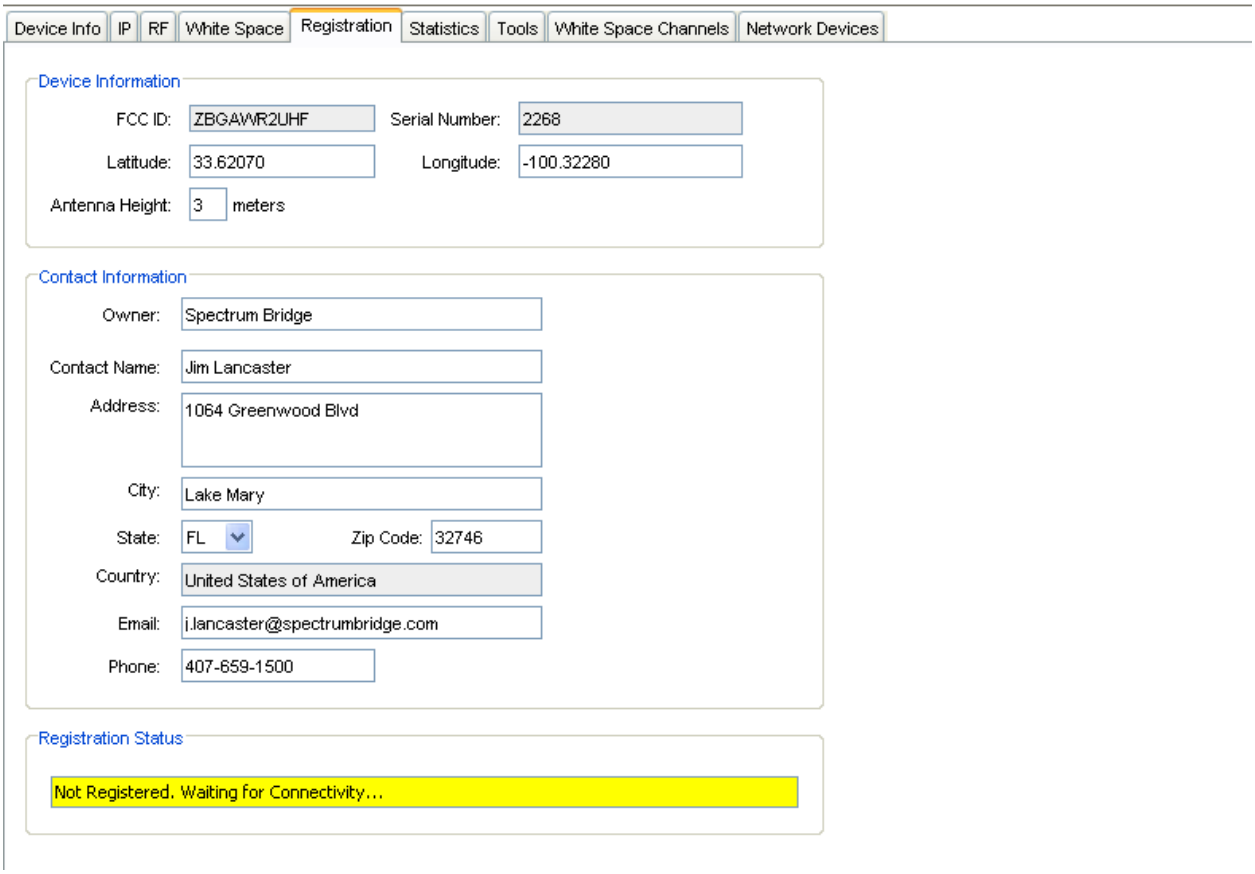


Results: PASS

§15.707(a) Fixed TVBD Relocated

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.



3/6/2012 12:30:50 PM	**98.191.81.133**	**/v3/channels/US/28.0/-81/?fccid=ZBGAWR2UHF&serial=2268&type=8**	**RequestDoesNotMatchRegistration (14)**

The radio is not capable of separating these commands so a simulator was use 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

Test Results: Pass

§15.711(b)(3)(iii) Fixed & Mode II TVDB Database Update
Test Procedure

- ✓ 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.
- ✓ Disconnect or block the device from the internet, allowing no access to the internet/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:

Pinging 172.20.1.67
with 32 bytes data (60 bytes IP):

2012-03-07 17:01:27.015: Reply from 172.20.1.67: seq=0001 time=3.416ms TTL=64 ID=2a1c
2012-03-07 17:02:27.015: Reply from 172.20.1.67: seq=0002 time=3.696ms TTL=64 ID=2a26
2012-03-07 17:03:27.015: Reply from 172.20.1.67: seq=0003 time=2.615ms TTL=64 ID=2a30
2012-03-07 17:04:27.015: Reply from 172.20.1.67: seq=0004 time=4.427ms TTL=64 ID=2a35
2012-03-07 17:05:27.015: Reply from 172.20.1.67: seq=0005 time=2.918ms TTL=64 ID=2a3e
2012-03-07 17:06:27.015: Reply from 172.20.1.67: seq=0006 time=2.884ms TTL=64 ID=2a47
2012-03-07 17:07:27.015: Reply from 172.20.1.67: seq=0007 time=2.719ms TTL=64 ID=2a4b
2012-03-07 17:08:27.015: Reply from 172.20.1.67: seq=0008 time=2.942ms TTL=64 ID=2a55
2012-03-07 17:09:27.015: Reply from 172.20.1.67: seq=0009 time=3.407ms TTL=64 ID=2a5f
2012-03-07 17:10:27.015: Reply from 172.20.1.67: seq=000a time=3.861ms TTL=64 ID=2a62
2012-03-07 17:11:27.015: Reply from 172.20.1.67: seq=000b time=3.049ms TTL=64 ID=2a6c
2012-03-07 17:12:27.031: Reply from 172.20.1.67: seq=000c time=3.696ms TTL=64 ID=2a74
2012-03-07 17:13:27.031: Reply from 172.20.1.67: seq=000d time=3.313ms TTL=64 ID=2a79
2012-03-07 17:14:27.031: Reply from 172.20.1.67: seq=000e time=3.722ms TTL=64 ID=2a85
2012-03-07 17:15:27.031: Reply from 172.20.1.67: seq=000f time=5.144ms TTL=64 ID=2a8f

2012-03-07 17:16:27.031: Reply from 172.20.1.67: seq=0010 time=2.950ms TTL=64 ID=2a98
2012-03-07 17:17:27.031: Reply from 172.20.1.67: seq=0011 time=3.438ms TTL=64 ID=2a9c
2012-03-07 17:18:27.031: Reply from 172.20.1.67: seq=0012 time=2.672ms TTL=64 ID=2aa7
2012-03-07 17:19:27.031: Reply from 172.20.1.67: seq=0013 time=3.133ms TTL=64 ID=2ab1
2012-03-07 17:20:27.031: Reply from 172.20.1.67: seq=0014 time=3.540ms TTL=64 ID=2ab6
2012-03-07 17:21:27.031: Reply from 172.20.1.67: seq=0015 time=3.626ms TTL=64 ID=2abf
2012-03-07 17:22:27.031: Reply from 172.20.1.67: seq=0016 time=3.782ms TTL=64 ID=2ac9
2012-03-07 17:23:27.031: Reply from 172.20.1.67: seq=0017 time=3.150ms TTL=64 ID=2ace
2012-03-07 17:24:27.031: Reply from 172.20.1.67: seq=0018 time=3.202ms TTL=64 ID=2ad8
2012-03-07 17:25:27.031: Reply from 172.20.1.67: seq=0019 time=3.636ms TTL=64 ID=2ae1
2012-03-07 17:26:27.031: Reply from 172.20.1.67: seq=001a time=5.239ms TTL=64 ID=2ae5
2012-03-07 17:27:27.031: Reply from 172.20.1.67: seq=001b time=2.944ms TTL=64 ID=2aef
2012-03-07 17:28:27.031: Reply from 172.20.1.67: seq=001c time=3.168ms TTL=64 ID=2af8
2012-03-07 17:29:27.031: Reply from 172.20.1.67: seq=001d time=3.611ms TTL=64 ID=2afc
2012-03-07 17:30:27.031: Reply from 172.20.1.67: seq=001e time=3.269ms TTL=64 ID=2b08
2012-03-07 17:31:27.031: Reply from 172.20.1.67: seq=001f time=3.318ms TTL=64 ID=2b12
2012-03-07 17:32:27.031: Reply from 172.20.1.67: seq=0020 time=2.888ms TTL=64 ID=2b1b
2012-03-07 17:33:27.031: Reply from 172.20.1.67: seq=0021 time=2.947ms TTL=64 ID=2b20

The pinging continued uninterrupted until the DUT timed-out. If a complete copy of the log is wanted it can be supplied.

2012-03-07 22:52:27.125: Reply from 172.20.1.67: seq=0160 time=3.218ms TTL=64 ID=3544
2012-03-07 22:53:27.125: Reply from 172.20.1.67: seq=0161 time=3.714ms TTL=64 ID=354b

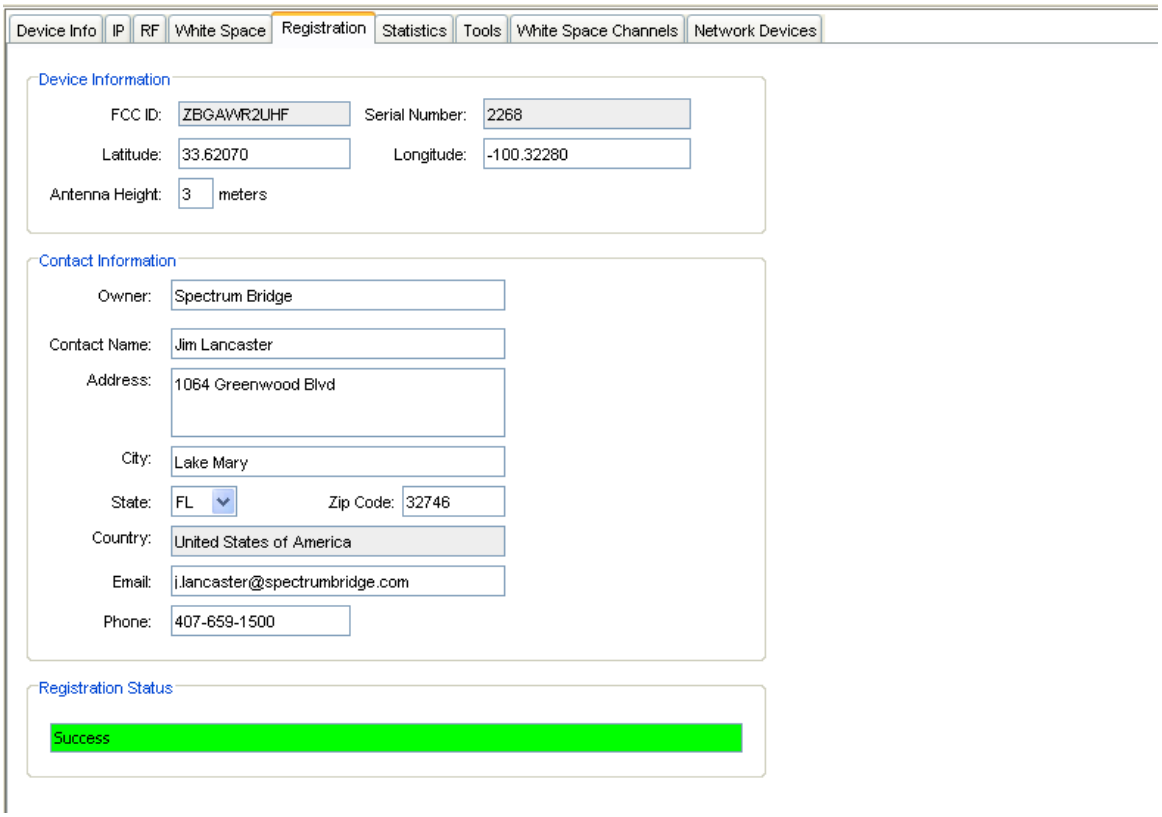
2012-03-07 22:54:27.125: Reply from 172.20.1.67: seq=0162 time=3.398ms TTL=64 ID=3551
2012-03-07 22:55:27.125: Reply from 172.20.1.67: seq=0163 time=3.635ms TTL=64 ID=355b
2012-03-07 22:56:27.125: Reply from 172.20.1.67: seq=0164 time=4.806ms TTL=64 ID=3564
2012-03-07 22:57:27.125: Reply from 172.20.1.67: seq=0165 time=3.627ms TTL=64 ID=3568
2012-03-07 22:58:27.125: Reply from 172.20.1.67: seq=0166 time=3.745ms TTL=64 ID=3572
2012-03-07 22:59:27.125: Reply from 172.20.1.67: seq=0167 time=2.889ms TTL=64 ID=357b
2012-03-07 23:00:27.125: Reply from 172.20.1.67: seq=0168 time=3.640ms TTL=64 ID=357f
2012-03-07 23:01:27.125: Reply from 172.20.1.67: seq=0169 time=3.287ms TTL=64 ID=3589
2012-03-07 23:02:27.125: Reply from 172.20.1.67: seq=016a time=3.020ms TTL=64 ID=3590
2012-03-07 23:03:27.125: Reply from 172.20.1.67: seq=016b time=3.260ms TTL=64 ID=3596
2012-03-07 23:04:27.125: Reply from 172.20.1.67: seq=016c time=3.732ms TTL=64 ID=35a0
2012-03-07 23:05:27.125: Reply from 172.20.1.67: seq=016d time=2.788ms TTL=64 ID=35a9
2012-03-07 23:06:27.125: Reply from 172.20.1.67: seq=016e time=3.483ms TTL=64 ID=35ad
2012-03-07 23:07:27.125: Reply from 172.20.1.67: seq=016f time=4.436ms TTL=64 ID=35b8
2012-03-07 23:08:27.125: Reply from 172.20.1.67: seq=0170 time=3.825ms TTL=64 ID=35c2
2012-03-07 23:09:27.125: Reply from 172.20.1.67: seq=0171 time=3.044ms TTL=64 ID=35cb
2012-03-07 23:10:27.125: Reply from 172.20.1.67: seq=0172 time=3.231ms TTL=64 ID=35d0
[Aborting...]
566 requests timed out.

Statistics for 172.20.1.67:
Packets: sent=936, rcvd=370, error=0, lost=566 (60.4% loss) in 22140.003233 sec
RTTs of replies in ms: min/avg/max/dev: 1.932 / 3.374 / 6.044 / 0.553
Bandwidth in kb/sec: sent=0.002, rcvd=0.001

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

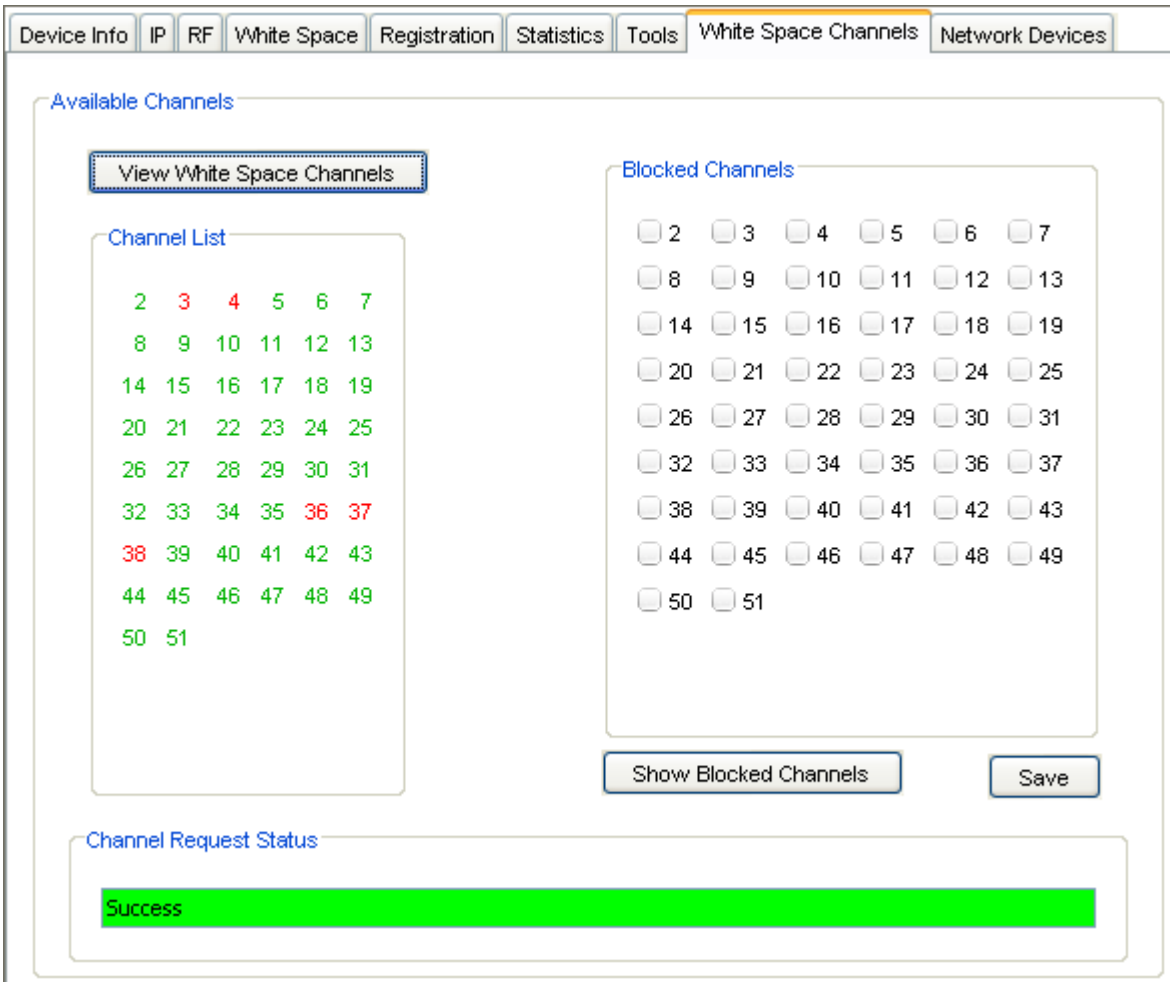
Test Procedure:

- ✓ Configure the TVBD (DUT) such that it can access the database.
- ✓ Verify that DUT requests and receives a valid channel list. Verify the DUT 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 (DUT) has selected and is operating. The registered protection for the low-power auxiliary device should be scheduled for protection within thenext 48 hour period.
- ✓ Verify that the DUT 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 DUT is operating on a different channel from what was previously used and subsequently reserved using a spectrum analyzer and the device management interface.



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

Verified Channel List:



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

Test Procedure: Use the database interface to register protection for a low-power auxiliary device for the same location and channel on which the TVDB (DUT) 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.

Successful Protected Entity Registration

Location(s)

Point: 33.6207 -100.3228

Entity Information

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

Usage Schedule

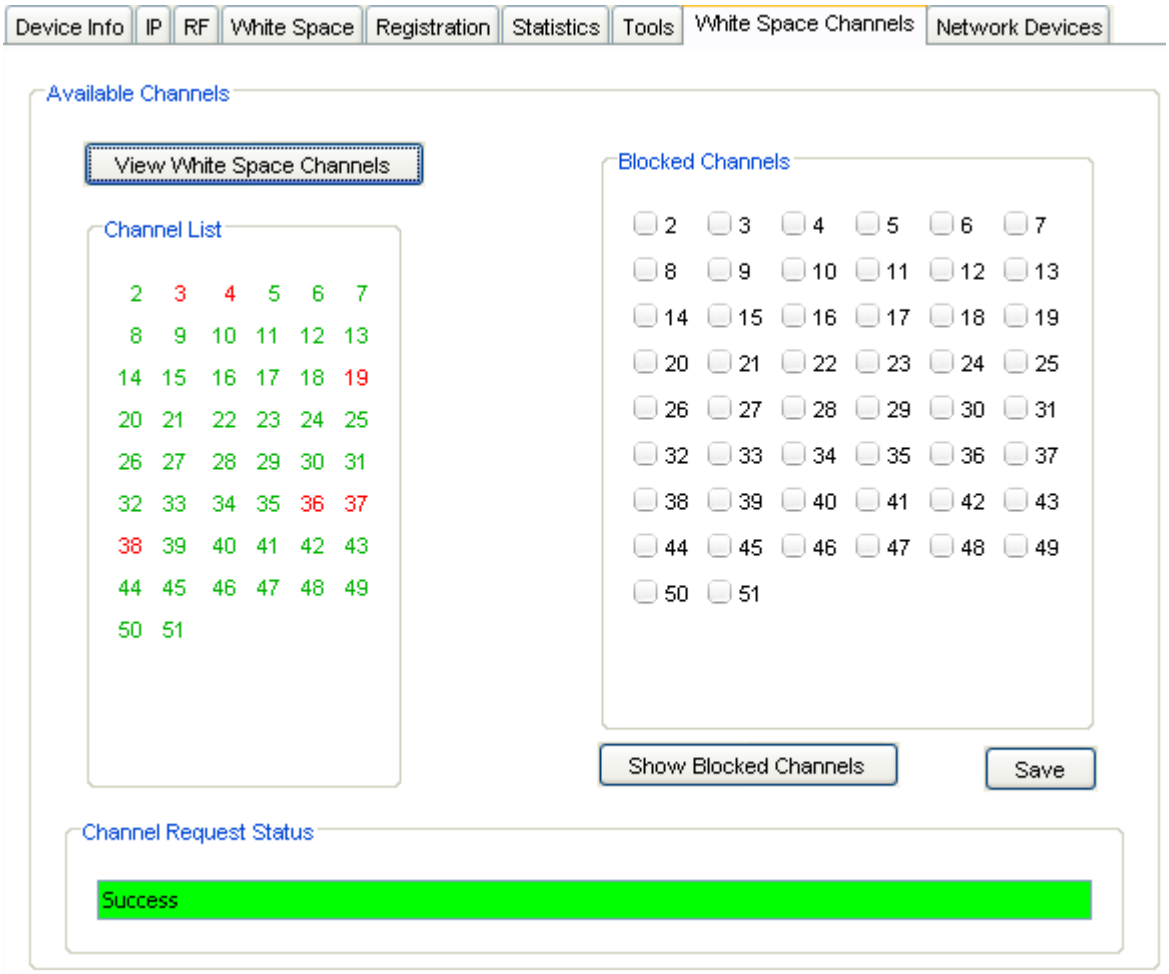
Usage	One Time Event
Time Zone	(UTC-05:00) Eastern Time (US & Canada)
Event Starts	3/6/2012 1:20:00 PM
Event Ends	3/6/2012 1:30:00 PM

Contact Information

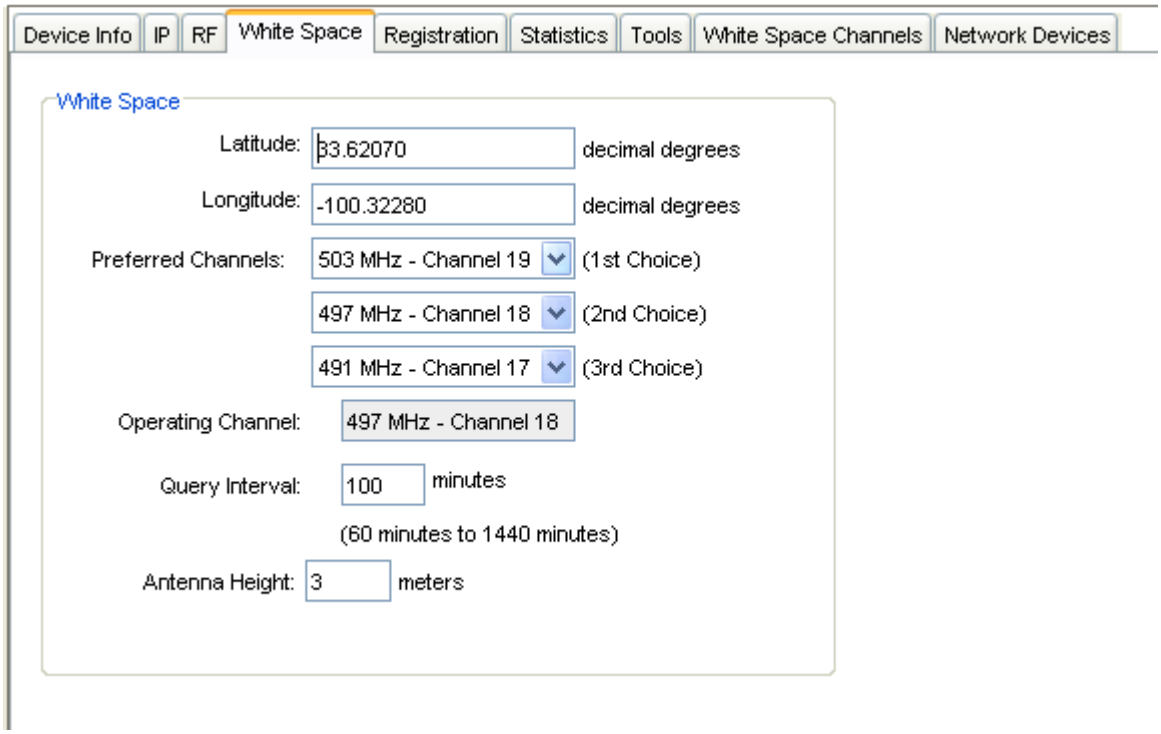
Name of Entity Owner	Temp registration for FCC Testing
Contact Name	Sid Sanders
Country	US
Address	1064 Greenwood Blvd
City	Lake Mary
State	FL
Postal Code	32746
Contact Phone	888-472 2424
Contact Email	sid@timco.cc

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

Channel Availability after registration of Low Power Auxiliary Device.



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

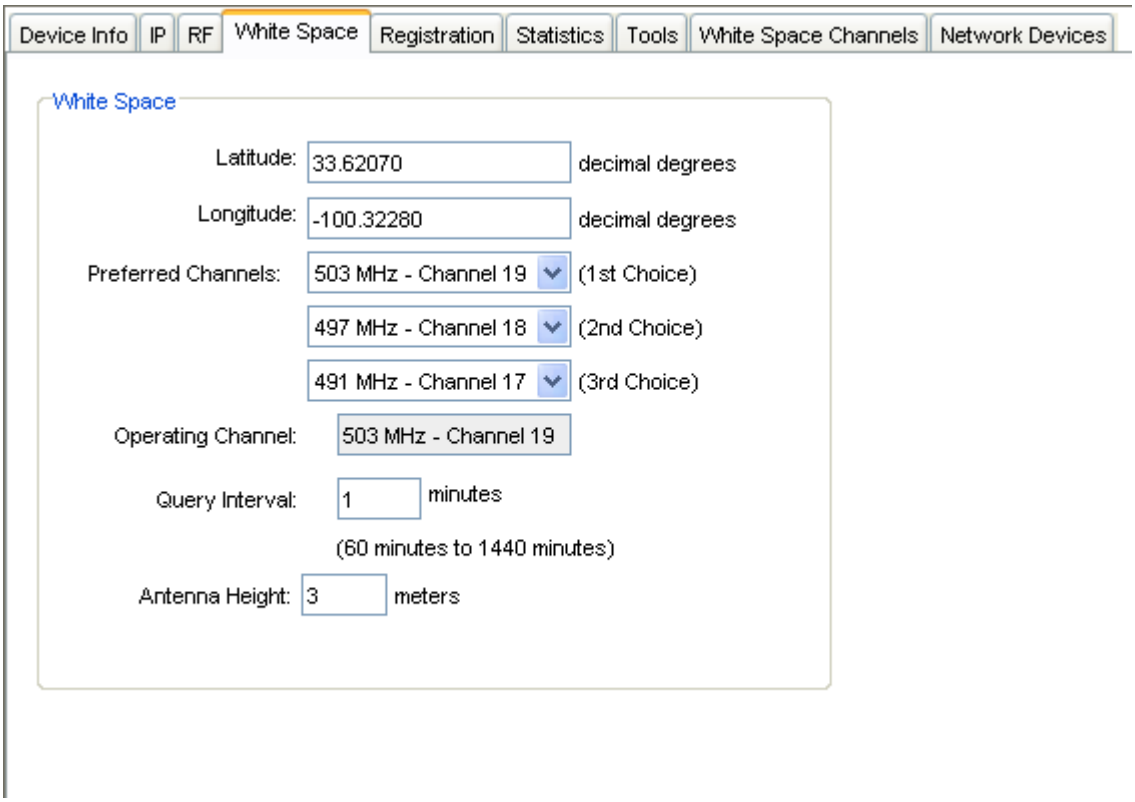


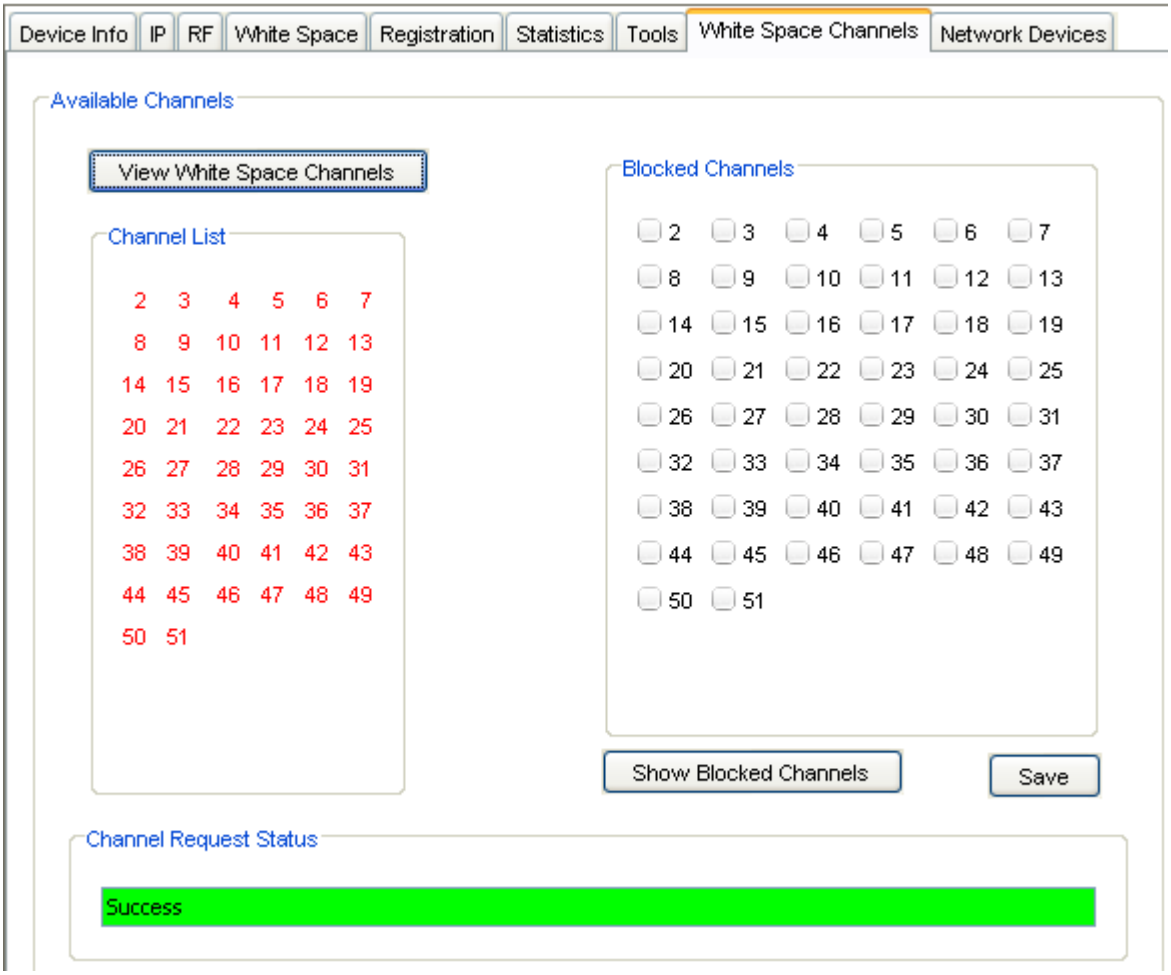
Results: After receiving the updated channel listing the TVBD switched to operating on Channel 18 and this was verified by observing the spectrum analyzer.

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

Test Procedure: All Device types

- ✓ Configure and register the devices location (34 04 43 N, 107 37 05 W) 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





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

§15.711(f) Security:

Please see the attached document, TVBD Secure Communications.pdf .