
*White Spaces
System Test Report*

*Fixed TVBD Test Report
Part 1*

04/30/2011

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Introduction

Spectrum Bridge, Inc (SBI) develops software and services to build solutions addressing the global demand for wireless spectrum. SBI's core technology empowers database-driven cognitive networking solutions that increase availability, access and utilization of scarce spectrum resources. A tangible realization of this vision already has its place with the utilization of the newly released TV White Spaces spectrum. The company has positioned itself as a pioneer in the White Spaces technology development and as a strong advocate for the timely acceptance and market adoption of the TV bands.

Spectrum Bridge has developed a comprehensive and FCC compliant TV White Spaces database. Partnering with radio manufacturers, Spectrum Bridge has supported prototype product testing of a TV Bands Device (TVBD) and is the only enterprise with deployed trial networks under an experimental White Spaces license. As the FCC Chairman Julius Genachowski noted "... In Claudville, Va., they are providing broadband access to a remotely located elementary school. In Wilmington, N.C., they are trialing 'smart city' applications to manage traffic and monitor water quality at nearby wetlands. In Logan, Ohio, they are using the white space to deliver telemedicine to healthcare providers. Plumas County, Calif., is utilizing 'smart grid' technologies for electricity networks.".

Objective and Scope

The Federal Communications Commission (FCC) and the Office of Engineering and Technology (OET) have set the course for the US to be the global technology leader by defining and governing the use of the TV White Spaces (TVWS) with the 2nd Memorandum Opinion & Order (2MO&O) and its latest revision and publication in the Code of Federal Regulations, Title 47, Part 15, Subpart H, effective December 6, 2010.

Spectrum Bridge acknowledges this achievement and extends its appreciation to the FCC and OET for the recognition given by the Commission to conditionally appoint Spectrum Bridge Inc. as an approved TV White Spaces Database Administrator.

The scope of this document is to combine Fixed TVBD Certification Application and White Spaces System Test Report. Spectrum Bridge identifies three components of the White Spaces technology:

- **TV Bands Device** (Fixed TVBD for certification)
- **TV Bands Database**
- **TV Bands System** (comprised of Fixed TVBDs, database and layer of interaction between the devices and the databases)

This document has been built based on the detailed design, development and testing of these components. The Report also claims satisfactory compliance with the White Spaces rules and adaptability for future regulatory modifications and additions. The Test Report and Certification Application contain:

- High level Fixed TVBD information and description
- High level White Spaces (WS) test network configuration and tools
- High level device, database and system tests identification and test procedures
- Test results

The following Exhibits have been attached to the submission as supportive material:

- **Exhibit A:** AWR White Space User Manual-1– *AWR White Space User Manual-1.pdf*
- **Exhibit B:** Agility Radio 1200 Label Information – *TVBDLabelInformation031111.pdf*
- **Exhibit C:** Agility Radio 1200 Transmit Power Control Mechanism – *TVBDPowerControl031111.pdf*
- **Exhibit D:** Agility Radio 1200 Secure Communications Implementation – *TVBDSecureCommunications031111.pdf*
- **Exhibit E:** Agility Radio 1200 ID Signal – *TVBDIDSignal031111.pdf*
- **Exhibit F:** CFR 47 Part 90.259 Certification Test Report – *KTS radio IQ5-VOY1-2 Test report.pdf*
- **Exhibit G:** CFR 47 Part 90.259 RF Exposure Certification Exhibit – *KTS Radio RF Exposure Report.pdf*

Definitions

Available channel. A six-megahertz television channel, as specified in § 73.603 of this chapter, which is not being used by an authorized service at or near the same geographic location as the TVBD and is acceptable for use by an unlicensed device under the provisions of this subpart.

Contact verification signal. An encoded signal broadcast by a fixed or Mode II device for reception by Mode I devices to which the fixed or Mode II device has provided a list of available channels for operation. Such signal is for the purpose of establishing that the Mode I device is still within the reception range of the fixed or Mode II device for purposes of validating the list of available channels used by the Mode I device and shall be encoded to ensure that the signal originates from the device that provided the list of available channels. A Mode I device may respond only to a contact verification signal from the fixed or Mode II device that provided the list of available channels on which it operates. A fixed or Mode II device shall provide the information needed by a Mode I device to decode the contact verification signal at the same time it provides the list of available channels.

Fixed device. A TVBD that transmits and/or receives radio communication signals at a specified fixed location. A fixed TVBD may select channels for operation itself from a list of available channels provided by a TV bands database, initiate and operate a network by sending enabling signals to one or more fixed TVBDs and/or personal/portable TVBDs. Fixed devices may provide to a Mode I personal/portable device a list of available channels on which the Mode I device may operate under the rules, including available channels above 512 MHz (above TV channel 20) on which the fixed TVBD also may operate and

a supplemental list of available channels above 512 MHz (above TV channel 20) that are adjacent to occupied TV channels on which the Mode I device, but not the fixed device, may operate.

Geo-location capability. The capability of a TVBD to determine its geographic coordinates within the level of accuracy specified in section 15.711(b)(1), i.e. 50 meters. This capability is used with a TV bands database approved by the FCC to determine the availability of TV channels at a TVBD's location.

Mode I personal/portable device. A personal/portable TVBD that does not use an internal geo-location capability and access to a TV bands database to obtain a list of available channels. A Mode I device must obtain a list of available channels on which it may operate from either a fixed TVBD or Mode II personal/portable TVBD. A Mode I device may not initiate a network of fixed and/or personal/portable TVBDs nor may it provide a list of available channels to another Mode I device for operation by such device.

Mode II personal/portable device. A personal/portable TVBD that uses an internal geo-location capability and access to a TV bands database, either through a direct connection to the Internet or through an indirect connection to the Internet by way of fixed TVBD or another Mode II TVBD, to obtain a list of available channels. A Mode II device may select a channel itself and initiate and operate as part of a network of TVBDs, transmitting to and receiving from one or more fixed TVBDs or personal/portable TVBDs. A Mode II personal/portable device may provide its list of available channels to a Mode I personal/portable device for operation on by the Mode I device.

Network initiation. The process by which a fixed or Mode II TVBD sends control signals to one or more fixed TVBDs or personal/portable TVBDs and allows them to begin communications.

Operating channel. An available channel used by a TVBD for transmission and/or reception.

Personal/portable device. A TVBD that transmits and/or receives radio communication signals at unspecified locations that may change. Personal/portable devices may only transmit on available channels in the frequency bands 512-608 MHz (TV channels 21-36) and 614-698 MHz (TV channels 38-51).

Receive site. The location where the signal of a full service television station is received for rebroadcast by a television translator or low power TV station, including a Class A TV station, or for distribution by a Multiple Video Program Distributor (MVPD) as defined in 47 U.S.C. 602(13).

Sensing only device. A personal/portable TVBD that uses spectrum sensing to determine a list of available channels. Sensing only devices may transmit on any available channels in the frequency bands 512-608 MHz (TV channels 21-36) and 614-698 MHz (TV channels 38-51).

Spectrum sensing. A process whereby a TVBD monitors a television channel to detect whether the channel is occupied by a radio signal or signals from authorized services.

Television band device (TVBD). Intentional radiators that operate on an unlicensed basis on available channels in the broadcast television frequency bands at 54-60 MHz (TV channel 2), 76-88 MHz

(TV channels 5 and 6), 174-216 MHz (TV channels 7-13), 470-608 MHz (TV channels 14-36) and 614-698 MHz (TV channels 38-51).

TV bands database. A database system that maintains records of all authorized services in the TV frequency bands, is capable of determining the available channels as a specific geographic location and provides lists of available channels to TVBDs that have been certified under the Commission's equipment authorization procedures. TV bands databases that provide lists of available channels to TVBDs must receive approval by the Commission.

Equipment Manufacturer Information

Manufacturer name: Koos Technical Services, Inc
Address: 1025 Greenwood Blvd #391, Lake Mary, FL 32746
Telephone: 407-401-7042
Fax: N/A
Email: larry@koostech.com
Contact name: Larry Koos

Database Administrator Information

Administrator name: Spectrum Bridge, Inc
Address: 1064 Greenwood Blvd #200, Lake Mary, FL 32746
Telephone: 407-792-1570
Fax: 407-805-3118
Email: info@spectrumbridge.com
Contact name: Neeraj Srivastava

Equipment Under Test Information

Product Name: KTS Agility Radio
Product Type: Fixed TVBD
Model(s): Agility Radios 1200
FCC ID (invalid, for testing purposes only): KOOSRADIO
Serial Number(s): 332, 333, 334, 335
RF Board Version: D
Digital Board Version: G
Firmware Version: 76
FPGA Version: 0x2d
MAC and IP Address(es):

Serial #	MAC Address	IP Address
332	00:22:63:00:01:4C	172.20.1.66
333	00:22:63:00:01:4D	172.20.1.67
334	00:22:63:00:01:4E	172.20.1.68
335	00:22:63:00:01:4F	172.20.1.69

Test information

Testing Lab: Spectrum Bridge, Inc Lab

Address: 1064 Greenwood Blvd #200, Lake Mary, FL 32746

Test Specifications: Applicable FCC Part 15, Subpart A, B, C and H

1. Equipment Under Test Description

1.1. General

The Equipment Under Test (EUT), are KTS Agility radios intended for use as Base Station (BS) or Hubs and Access Point (AP) or Spoke equipment in a fixed White Spaces wireless network. For the purpose of testing and compliance with Part 15 of Title 47 of the Code of Federal Regulations and the respective amendments published in the Second Memorandum Opinion and Order (FCC 10-174), Appendix B, adopted on 09/23/2010; two radios, operating in different modes are used. The BS radio, named EUT1, operates as Fixed TV Band Device (TVBD) in Hub mode. The AP radio, named EUT2, operates as Fixed TVBD in Spoke mode. The KTS Agility radios are intentional radiators operating in the VHF and UHF bands which have already been certified under Part 2, Part 90, and Part 15 Subpart B rules. The radios tested are factory pre-configured VHF radios with an operating frequency range of 174 – 216 MHz (TV Channels 7-13).

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.

1.1.1. Radio Specifications

Features	
Agility:	Data Rate, Channel Size and Frequency Agile
Network Types:	Point-to-Point (PTP), Point-to-Multipoint (PTM) or Simplex
Application:	Voice, Video and Data Traffic Support

Programmable Data Rates:	Between 3.125 Mbps and 2.4 Kbps
Frequency Band:	145 to 225 MHz
Bridged Ethernet Port:	Wireless/Ethernet Ports IP Subnets Bridge
Certification & Compliance:	Code of Federal Regulations 47, FCC Part 15 & Part 90
Radio Specs	
Transmit Power (dBm):	1 dB Adjustable Power Limit from 17 – 30 dBm
Noise Figure:	4 dB
Sensitivity (at 1E-3 BER):	-118 dBm @ 20 Kbps; -97 dbm @ 2 Mbps
Modulation:	GFSK, GMSK, SOQPSK
Power	
Input Voltage:	DC 9 – 14 V
Electrical Current:	0.5 A (Rx), 1.5 A (Tx)
Operating Environment	
Temperature:	-22 – 122° F (-30 – 55° C)
Humidity:	≤ 95% Non-condensing
Use:	Indoors / Outdoors within Enclosure
Mechanical	
Dimensions:	3.5 x 5 x 1.4 in (8.9 x 12.7 x 3.6 cm)
Weight:	0.66 lbs (0.3 kg)
Connectors:	DC Power Input: 0.1 in (2.5 mm) Female Jack
	Serial Port: Male DE-9
	Network Port: RJ 45 (Cat 5, Cat 5e, Cat 6)
	Antenna Port: 50 Ohms BNC
Enclosure Material:	Anodized or Powder Coated Aluminum

1.2. Equipment Controls, Ports and Indicators

Ports			
Type	Description	Characteristics	Count
DC Input	DC Power Supply	12V, 2.5A	1
RJ45	Network Port	10/100 Mbps	1
BNC	Antenna	50 Ohms	1
Male DE-9	Serial Port	RS-232	1
Indicators			
Type	Description	Characteristics	Count
LED	Power Indicator	Normal Operation = GREEN	1
LED	Alarm Indicator	Normal Operation = OFF Alarm Condition = RED	1
LED	Traffic Indicator	Idle Condition = OFF Transmit Condition = AMBER Receive Condition = GREEN	1

1.3. Testing and Supportive Hardware and Equipment

Description	Manufacturer	Model	Qty
AC/DC Power Adapter	I.T.E. Power Supply	PW173KB1203F01	2
UHF Antenna Attenuator	JFW Industries, Inc	50R - 029BNC	1
Spectrum Analyzer	Agilent Technologies, Inc	E4403B	1
Network Router	ASUS Tek Computer, Inc	WL-500gP V2	1
Network Hub	Cisco Systems, Inc	Linksys EW5HUB	1
Workstation (laptop)	Dell, Inc	Latitude E5400	1
6 ft Cat 5e UTP Patch Cord	Various	N/A	5
6 ft RG 223 BNC/BNC Coax Cord	Various	N/A	5
USB/Serial Cable	Various	N/A	2

1.4. Testing Environment

The EUT compliance and performance tests were executed indoors, on the test bench at the Spectrum Bridge, Inc. test lab located at 1064 Greenwood Blvd #200, Lake Mary, FL 32746.

1.5. Testing Configurations.

1.5.1. List of Figures

TVBD Configuration



EUT – Equipment Under Test
WS – Workstation

--- Serial Port Connection
 — Cat 5 Connection

Figure 1

TVBD Testing Configuration

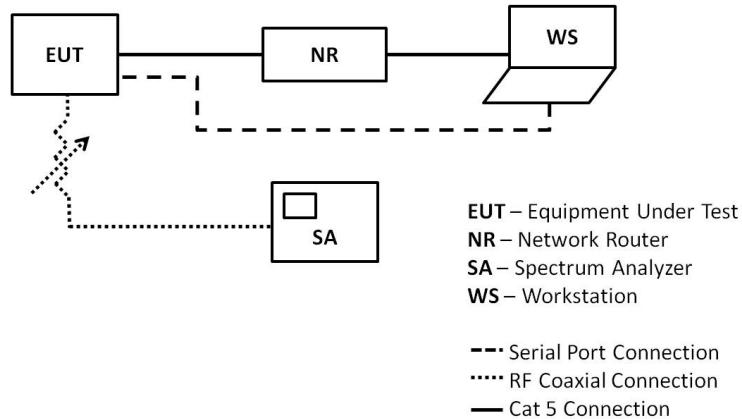


Figure 2

TVBD / White Spaces Database Testing Configuration

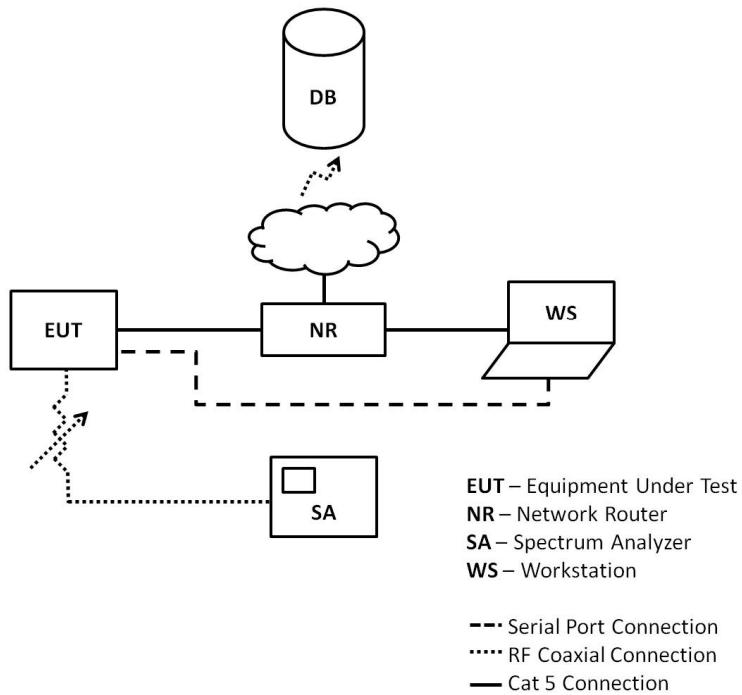


Figure 3

TVBD / TV White Spaces Database System Testing Configuration

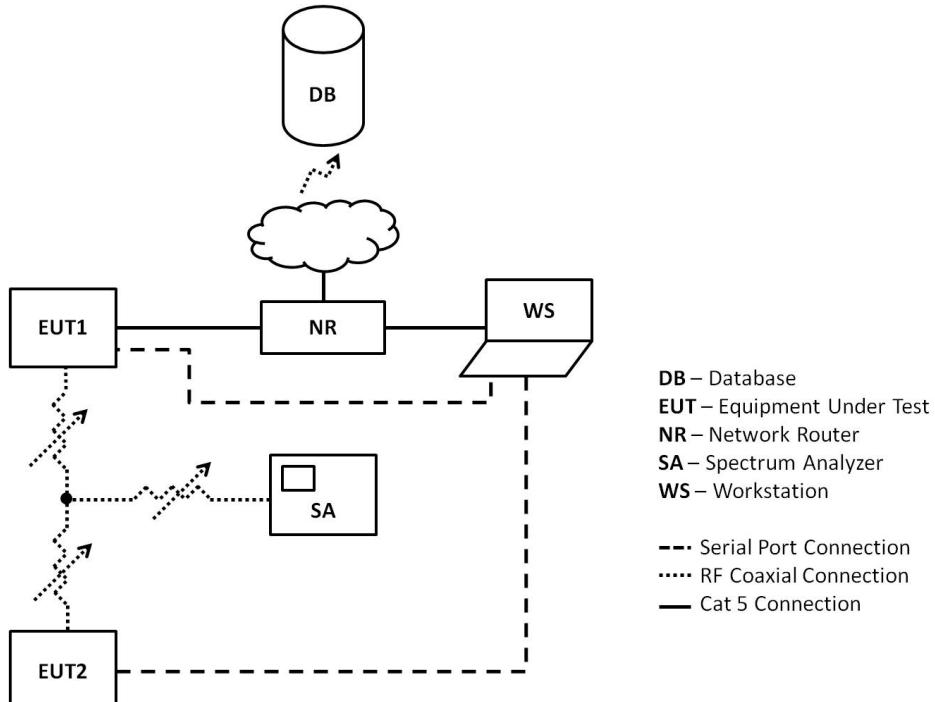


Figure 4

1.5.2. Device and System Operation

This section provides high level description of the White Space test network configuration, KTS Agility 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. The operator will have the ability to change frequency, power, and modulation using a password protected administration menu. 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.

To use the TVBD Element Manager for overriding the normal closed loop White Space operation, the user can gain authorization by:

- Connecting the workstation to the TVBD using an Ethernet cable between the work station and TVBD RJ45 ports
- Apply power to the TVBD
- Starting the TVBD Element Manager on the work station
- Clicking on the Help tool bar option and selecting Admin
- Enter the password “LakeMary”
- Navigate to the White Space tab, and uncheck the White Space Authorization box
- Save and reset the device when prompted

- On the RF tab, set the antenna gain and cable loss fields to 0.0 dBm and save
- On the Admin tab, enable the transmitter by checking the Enable TX box and save
- On the Admin tab, to select the desired transmit mode, select one of the following from the pull down menu and save
 - 5 – FSK continuous modulation
 - 6 – SOQPSK continuous modulation
 - 8 – Poll select FSK
 - 9 – CW tone
 - 14 – Poll select SOQPSK
- On the RF tab, to change frequency, input a value in the Center Frequency field, and save.

Additional detailed device specifications and operation description can be found in the White Spaces Network Deployment and User Guide. Detailed database functionality, access, administration and management can be found in the Spectrum Bridge, Inc. TV White Spaces Database documentation.

1.5.3. 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 VHF frequency band. The bench test network configuration is shown in Figure 4 above. The elements of the network are:

- EUT1 - KTS Agility Radio configured as a “Hub”
- EUT2 - KTS Agility Radio configured as a “Spoke”
- 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.

EUT1 is physically connected to a network router LAN port via its RJ45 network port. This connection also establishes a link between the administrator’s laptop and the device for the purpose of controlling and commanding the TVBD. Configuration of EUT1 and EUT2 is accomplished using Spectrum Bridge’s Element Management System (EMS).

Certain tests require capturing and analyzing data traffic on the Ethernet interface of the radio. These tests use Wireshark v. 1.4.2, a network protocol analyzer downloaded for free at <http://www.wireshark.org/download.html>. Other tests require observing change of state in the radio. This is observed by using a Telnet client, serial terminal emulator (TeraTerm PRO).

As defined in the FCC’s White Spaces Final Rules, EUT1 and EUT2 only operate and are tested as Fixed TV Band Devices (TVBDs). EUT1 operates as Fixed TVBD with direct connection to the Internet. Both EUT1 and EUT2 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 the WSDB.

Fixed TVBD labeled EUT1 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.

Fixed TVBD labeled EUT2 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 EUT2 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 KTS Agility Radios functionality as Fixed TVBDs and compliance with the FCC's TV White Spaces Final Rules.

2. Tests Summary

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

Reference to database verification and test plan is made in instances where verification of database only requirements are specified.

2.1. Requirements Applicability Matrix

Part 15 Requirement	Requirement Description	Fixed	PP Mode I	PP Mode II	Database
15.705	Cross Reference				
15.705(a)(b)	Subparts A, B and C apply	x	x	x	
15.706	Information to the user				
15.706(a)	Documentation/labeling	x	x	x	
15.707	Permissible channels				
15.707(a)	Channel availability	x	x	x	x
15.707(b)	Channel availability	x			x
15.707(c)	Channel availability	x		x	x
15.707(d)	Channel availability	x	x	x	
15.709	General Technical Requirements				
15.709(a)(1)	Fixed transmit power limit	x			
15.709(a)(2)	Personal/portable power limit		x	x	
15.709(a)(3)	Transmit power control	x	x	x	
15.709(a)(4)	Total power sum	x	x	x	
15.709(a)(5)	Power spectral density	x	x	x	
15.709(a)(6)	TVBD access security	x	x	x	x

15.709(b)(1)	Personal/portable antenna		x	x	
15.709(b)(2)	Fixed device antenna	x			x
15.709(b)(3)	Sensing antenna exclusion		x	x	
15.709(b)(4)	Sensing antenna gain		x	x	
15.709(c)(1)(2)	Adjacent channel emission limits	x	x	x	
15.709(c)(3)(4)	Radiated emissions	x	x	x	
15.709(c)(5)	Conducted emissions	x	x	x	
15.709(d)	RF exposure	x	x	x	
15.711	Interference Avoidance Methods				
15.711(a)	Geo-location DB access	x	x	x	x
15.711(b)(1)	Fixed device geo-location	x			x
15.711(b)(2)	Mode II device geo-location			x	x
15.711(b)(3)(i)	Fixed/Mode II device DB access	x		x	x
15.711(b)(3)(ii)(iii)	Fixed/Mode II device DB update	x		x	x
15.711(b)(3)(iv)(v)	Mode I channel request	x	x	x	x
15.711(b)(3)(vi)	TVBD access security	x	x	x	x
15.711(c)	Display available channels	x	x	x	
15.711(d)	Fixed TVBD ID signal	x			
15.711(e)	Fixed device internet access	x			
15.711(f)	Secure communications	x	x	x	x
15.711(g)	Mode I communication		x		
15.712	Interference Protection				
15.712(a)(1)	Protected contours				x
15.712(a)(2)	Separation distance				x
15.712(b)	TV translator-MVPD sites				x
15.712(c)	Fixed BAS Links				x
15.712(d)	PLMRS-CMRS operations				x
15.712(e)	Offshore Radiotelephone Service				x
15.712(f)(1)(2)	Low power auxiliary				x
15.712(g)	Canada and Mexico borders				x
15.712(h) (1) (2) (3)	Radio astronomy sites				x
15.713	TV Bands Database				
15.713(a)(1)	Available channel lists				x
15.713(a)(2)	Fixed TVBD Registration	x			x
15.713(a)(3)	Protected Devices Registration				x
15.713(b)(1)(2)	Information in the TV band DB				x
15.713(c)(1)	TV Translator, LPTV Restriction				x
15.713(c)(2)	MVPD restriction				x
15.713(d)	Channel list determination	x	x	x	x
15.713(e)(1)(2)(3)(4)(5)(6)	TVBD initialization	x	x	x	x
15.713(f)(1)(2)(3)	Fixed TVBD registration	x			x
15.713(g)	Mode II TVBD registration			x	x
15.713(h)(1)-(9)	TV bands DB information				x
15.713(i)	Commission request for data				x
15.713(j)	Database Security	x	x	x	x
15.714	TV bands DB admin fees				
15.714(a)(b)	Registration and access fees				x
15.715	TV bands DB administration				
15.715(a)	WSDB maintenance				x

15.715(b)	FCC/WSDB synchronization				x
15.715(c)	Registration process	x			x
15.715(d)	Part 74 registration process				x
15.715(e)	Operator WSDB access	x	x	x	x
15.715(f)	Secure accurate transactions	x	x	x	x
15.715(g)	WSDB accessibility				x
15.715(h)	WSDB service term				x
15.715(i)	WSDB inaccuracies process				x
15.715(j)	WSDB administrator change				x
15.715(k)	WSDB FCC channel control				x
15.715(l)	Multiple DB consistency				x
15.717	TVBD spectrum sensing				
15.717	sensing	x	x	x	

2.2. Fixed TV Bands Device Transmitter Tests

Cross Reference

Section §15.705

Information to the user

Section §15.706

Permissible channels of operation

Section §15.707(a)(b)(c)

Adjacent Channel Emissions at Antenna Connector

Section §15.709(c)(1)(2)

Beyond Adjacent Channel Emissions at Antenna Connector

Section §15.709(c)(3)(4)

Power Spectral Density at Antenna Connector

Section §15.709(a)(5)

Maximum Output Power at Antenna Connector

Section §15.709(a)(1)

Occupied Bandwidth

Section §15.709

Transmit Power Control

Section §15.709(a)(3)

Antenna Requirements

Section §15.111; §15.203; §15.709(b)(2)

RF Exposure

Section §15.709

Conducted Emissions at AC Power Input

Section §15.709(c)(5); §15.207

Radiated Emissions

Section §15.709; §15.207

Conducted Emissions at Antenna Port

Section §15.111

2.3. TV Bands System Tests – Fixed TVBD and TV Bands Database Interaction

TVBD Initialization

Section §15.713(e)(1)(2)(3)(6)

Fixed TVBD Registration

Section §15.713(f)(1)(2)(3)

TVBD Access Security

Section §15.709(a)(6); §15.711(b)(3)(vi); §15.711(f); §15.713(j)

Geo Location

Section §15.711(b)(1); §15.713(e)(1)

Database Access Interval

Section §15.711(b)(3)(i)(ii)

Database Access Update

Section §15.711(b)(iii)

Available Channels

Section §15.707(c); §15.711(b)(3)(i); §15.711(c); §15.711(e); §15.712(f)(2); §15.713(e)(3)

Display of Available Channels

Section §15.711(c)

TVBD ID Signal

Note - Please refer to TVBD Test Report Part 2 for the remainder of the report.