



FCC CFR47 PART 15 SUBPART H

DATABASE TEST REPORT

FOR

FIXED TV BAND DEVICE

MODEL NUMBER: ACRS 2.0

REPORT NUMBER: 12605133-E1V2

FCC ID: A2UACRS20F

ISSUE DATE: January 17, 2019

*Prepared for*  
ADAPTRUM  
25 E. TRIMBLE ROAD  
SAN JOSE, CA 95131

*Prepared by*  
UL VERIFICATION SERVICES INC.  
47173 BENICIA STREET  
FREMONT, CA 94538, U.S.A.  
TEL: (510) 771-1000  
FAX: (510) 661-0888



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	1/8/2019	Initial Issue	---
V2	1/17/2019	Updated section 8.9	F. de Anda

## TABLE OF CONTENTS

<b>1. ATTESTATION OF TEST RESULTS .....</b>	<b>4</b>
<b>2. TEST METHODOLOGY .....</b>	<b>5</b>
<b>3. FACILITIES AND ACCREDITATION .....</b>	<b>5</b>
<b>4. CALIBRATION AND UNCERTAINTY .....</b>	<b>6</b>
4.1. <i>MEASURING INSTRUMENT CALIBRATION</i> .....	6
4.2. <i>SAMPLE CALCULATION</i> .....	6
4.3. <i>MEASUREMENT UNCERTAINTY</i> .....	6
<b>5. EQUIPMENT UNDER TEST .....</b>	<b>7</b>
5.1. <i>DESCRIPTION OF EUT</i> .....	7
5.2. <i>CLASS II PERMISSIVE CHANGE</i> .....	7
5.3. <i>DATABASE information</i> .....	7
5.4. <i>SOFTWARE AND FIRMWARE</i> .....	7
5.5. <i>DETAILS OF TESTED SYSTEM</i> .....	8
<b>6. TEST AND MEASUREMENT EQUIPMENT .....</b>	<b>11</b>
<b>8. BASE STATION DATABASE CERTIFICATION TESTS .....</b>	<b>12</b>
8.1. <i>Fixed WSD Registration</i> .....	12
8.1.1. <i>SUCCESSFUL REGISTRATION</i> .....	13
8.1.2. <i>FAILED REGISTRATION – Location Coordinates</i> .....	18
8.1.3. <i>FAILED REGISTRATION – ANTENNA HEIGHT AGL</i> .....	19
8.1.4. <i>FAILED REGISTRATION – INCOMPLETE CONTACT INFORMATION</i> .....	20
8.2. <i>FIXED WSD CHANNELS OF OPERATION</i> .....	21
8.3. <i>FIXED TVDB DATABASE UPDATE</i> .....	24
8.4. <i>48 HOUR CHANNEL SCHEDULING</i> .....	29
8.5. <i>WSD CHANNEL AVAILABILITY</i> .....	37
8.6. <i>SECURITY</i> .....	40
8.7. <i>Push notification to Fixed</i> .....	42
8.8. <i>Location accuracy</i> .....	43
8.9. <i>Interference protection requirement</i> .....	44
8.10. <i>Fixed Power level reduction</i> .....	54
<b>9. SETUP PHOTOS .....</b>	<b>57</b>

## 1. ATTESTATION OF TEST RESULTS

**COMPANY NAME:** Adaptrum  
25 E. Trimble Road  
San Jose, CA 95131

**EUT DESCRIPTION:** FIXED TV BAND DEVICE

**MODEL:** ACRS 2.0

**SERIAL NUMBER:** BASE: A2PXJ331  
CLIENT: A2FJ1065

**DATE TESTED:** JANUARY 13 to14, 2014

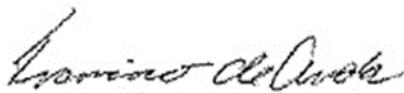
APPLICABLE STANDARDS	
SECTION	TEST RESULTS
DATABASE PORTIONS OF FCC PART 15 SUBPART H	Pass

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For  
UL Verification Services Inc. By:



---

FRANCISCO DE ANDA  
OPERATIONS LEAD  
UL Verification Services Inc.

Prepared By:



---

Jose Martinez  
TEST ENGINEER  
UL Verification Services Inc.

## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 15 Subpart H and KDB 416271 D01 White Space Test Procedures v03.

## 3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
<input type="checkbox"/> Chamber A (ISED:2324B-1)	<input type="checkbox"/> Chamber D (ISED:22541-1)	<input type="checkbox"/> Chamber I (ISED: 2324A-5)
<input type="checkbox"/> Chamber B (ISED:2324B-2)	<input type="checkbox"/> Chamber E (ISED:22541-2)	<input checked="" type="checkbox"/> Chamber J (ISED: 2324A-6)
<input type="checkbox"/> Chamber C (ISED:2324B-3)	<input type="checkbox"/> Chamber F (ISED:22541-3)	<input type="checkbox"/> Chamber K (ISED: 2324A-1)
	<input type="checkbox"/> Chamber G (ISED:22541-4)	<input type="checkbox"/> Chamber L (ISED: 2324A-3)
	<input type="checkbox"/> Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

### 4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned}\text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ \text{Cable Loss (dB)} &- \text{Preamp Gain (dB)} \\ 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} &= 28.9 \text{ dBuV/m}\end{aligned}$$

### 4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.32 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.45 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.24 dB

Uncertainty figures are valid to a confidence level of 95%.

## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

The EUT are Adaptrum ACRS 2.0 base and client radios operating as Fixed TV Band Devices in compliance with Part 15 Subpart H of Title 47 of the Code of Federal Regulations. Adaptrum ACRS 2.0 radios are broadband wireless communication equipment operating in the UHF TV band with frequency range from 473 MHz to 695 MHz (Channels 14 – 51 excluding Channels 36 to 38) and modulation modes QPSK, 16QAM and 64QAM.

The ACRS 2.0 radios are Fixed TV Band Devices that require professional installation.

### 5.2. CLASS II PERMISSIVE CHANGE

This Class 2 Permissive change is to add an alternate database. The new database provider is Nominet. No RF changes are made and power levels remain as originally granted.

### 5.3. DATABASE information

Nominet is the new alternate TVWS Database provider, referred to as the TVWS Database throughout this report.

### 5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was version A2.1.3.

## 5.5. DETAILS OF TESTED SYSTEM

### SUPPORT EQUIPMENT & PERIPHERALS

PERIPHERAL SUPPORT EQUIPMENT LIST				
Description	Manufacturer	Model	S/N	FCC ID
Laptop	Acer	E3-111 series	NXMQVAA001439014FE7600	DoC
Router	HP	J979A	CN20FQ8DNV	DoC
PoE Adapter	LairdTech	PoE-48-i	167015470DRC04	DoC
Laptop	Dell	Latitude 5480	19034981174	DoC
PoE Adapter	Passive	PSE-480100	175242200301125	DoC
RF Splitter	Mini Circuits	ZPSCJ-2-1-5+	502001309 S	N/A

### I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	AC	2	micro USB	un -Shielded	0.8	
2	LAN	6	RJ45	un -Shielded	1	

## **TEST SETUP**

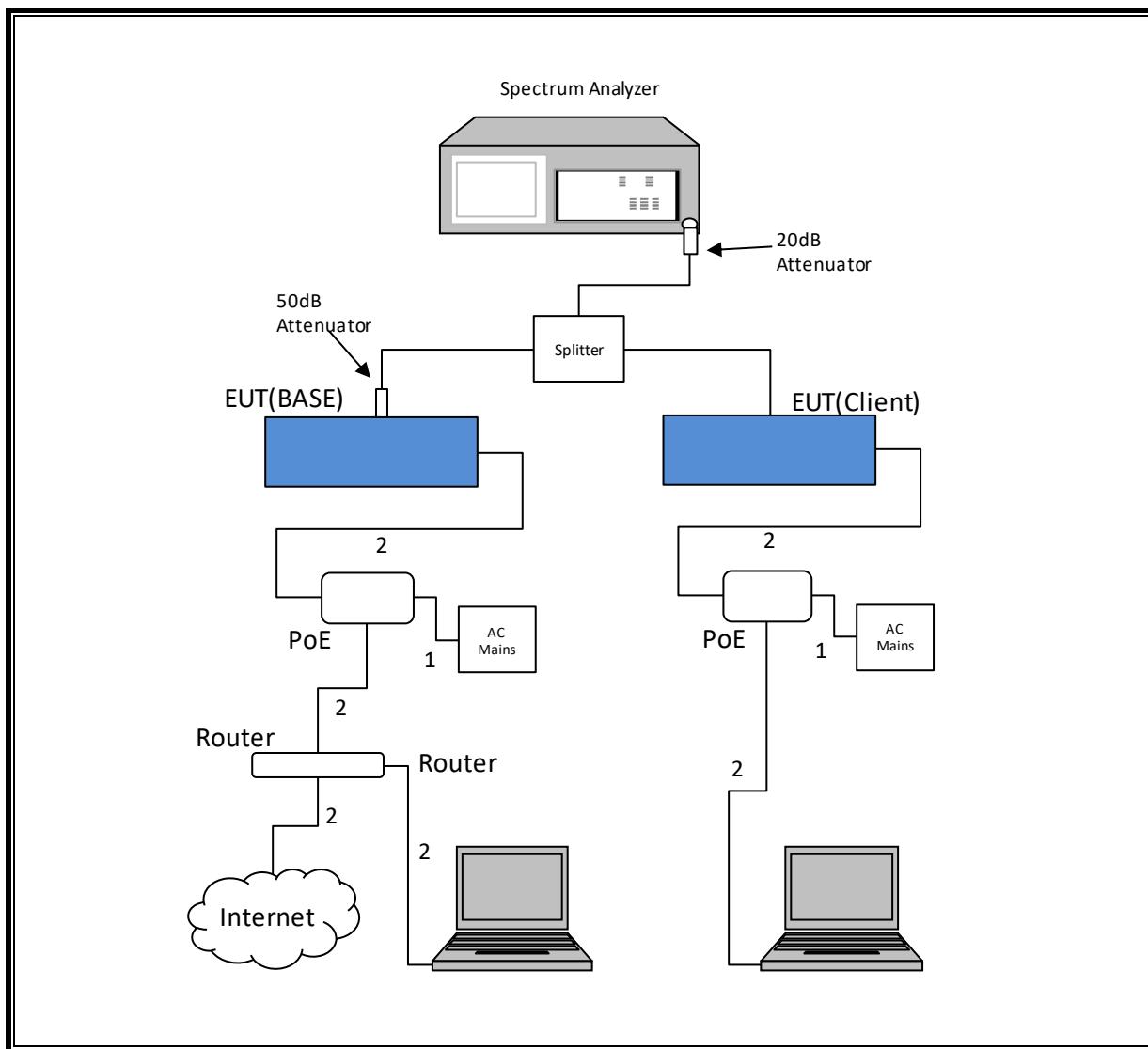
As illustrated in the following setup diagram, the EUT is the Adaptrum ACRS 2.0 base and client radios connected through cable assembly with proper attenuation to form a broadband communications system allowing the client-side PC to connect to the Internet (on the base side) through the TV White Space connection between the client and base radios. The BASE PC and CLIENT PC are used to configure the radio devices and monitor the device-and-database interactions.

The ACRS 2.0 radios are Fixed TV Band Devices that require professional installation. The ACRS 2.0 radio software has a database module that communicates with the TVWS Database and controls the radio operation in accordance with FCC Part 15 Subpart H rules. The EUT radios have been provisioned in the TVWS Database prior to the testing. For the testing conducted in this report, the EUT software was configured in the installer mode to demonstrate the compliance to the Part 15 Subpart H database rules. Once the device registration and location information has been entered into the radio software by the professional installer, the devices will communicate with the TVWS Database to perform device registration and retrieve TVWS channel list. After the installation, the device registration information will be stored in the device firmware and used by the device to automatically perform device registration and channel list request upon power cycling.

As shown in the diagram, the base radio has a direct connection to the Internet and upon power cycling will automatically communicate with the TVWS Database to 1) perform device registration and 2) retrieve TVWS channel list using the device registration information including device type, serial number, location, contact information, etc. The base radio can only operate on a channel that is within the channel list returned from the TVWS Database. Upon power cycling, the client radio will first scan a specified set of channels to look for the base signal. Once the client detects the base signal on a channel, it will send a connection request to the base which contains the client serial number and location information. The base will contact the TVWS Database on behalf of the client to perform device registration and channel list request. Only when the device registration is successful and the returned channel list for the client device contains the channel that the base is currently operating on, the base will grant the connection request from the client.

During normal operation, the base radio will periodically contact the TVWS Database to retrieve the updated channel lists for itself and on behalf of the client radio. The client channel list will be sent over the air to the client. If either the base or the client discovers its current operating channel is no longer in its updated channel list, it will cease operation on the channel immediately.

**TEST SETUP DIAGRAM**



## 6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	Manufacturer	Model	Asset	Cal Due
Spectrum Analyzer, 44 GHz	Agilent	E4446A	T146	8/13/2019

## 8. BASE STATION DATABASE CERTIFICATION TESTS

Both base and client software and hardware are identical the only difference is the deployment location. The test requirements were done on the base except for a few scenarios where client was also tested.

### 8.1. Fixed WSD Registration

#### CLAUSES

- §15.713(g)(3)

#### REQUIREMENT

- The Fixed WSD must provide the required information to the database and obtain a successful registration.
- The management software must be able to collect the data listed below. Confirm that the EUT will not operate unless a successful registration notification is received from the database.
  - i. FCC ID
  - ii. Serial Number
  - iii. Location Coordinates
  - iv. Location uncertainty with 95% accuracy (covered by section 3.8 in this report)
  - v. Antenna Height AGL (must not be > 30 m)
  - vi. Contact information (Device owner and device contact)
- For a fixed WSD 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.
- **PRE-REGISTRATION PROCESS**
- Both the Base and Client Station are registered using an authorized database via the Internet at the depot facility. Following registration a common available channel between each site is selected as the initial transmitting channel for each site. This channel will be the initial “listening” channel for the Remote Station

### 8.1.1. SUCCESSFUL REGISTRATION

#### TEST PROCEDURE

- Configure the base EUT with correct registration information:
  - The FCC ID and serial number are permanently programmed to the device and cannot be modified.
  - Known acceptable geographic coordinates, antenna height AGL and contact information were entered into the EUT.
- The base EUT automatically contacts the TVWS Database to perform device registration.
- Upon successful registration, the base EUT automatically contacts the TVWS Database to retrieve device channel list.
- Selects a channel from the channel list returned from the TVWS Database and start normal radio operation on the selected channel.
- Verify base output signal on the selected channel on the spectrum analyzer.

#### RESULTS

The EUT successfully registered when correct registration information was submitted to the TVWS Database. The EUT transmission was observed on the spectrum analyzer on the selected TV channel from the returned channel list from the TVWS Database.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

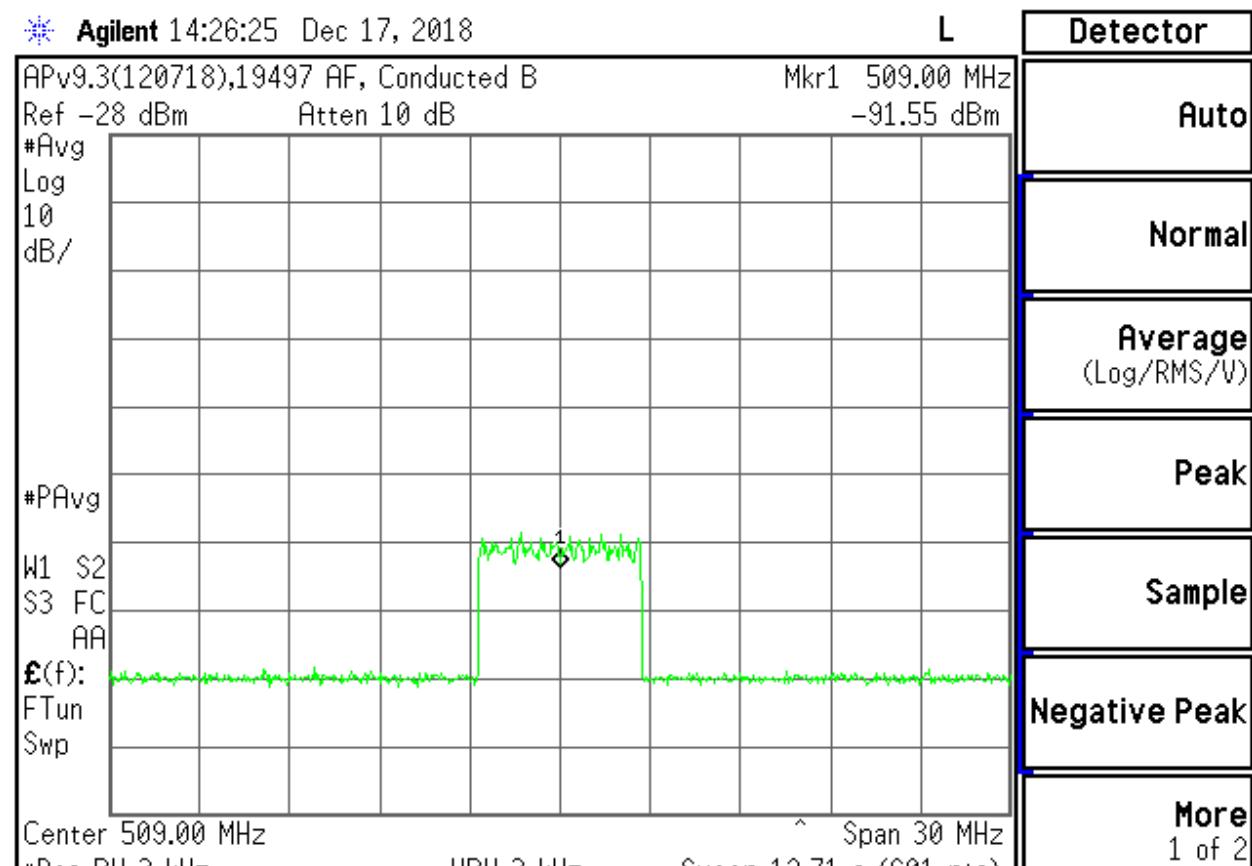
## **BASE SOFTWARE SHOWING SUCCESSFUL DEVICE REGISTRATION WITH THE TVWS DATABASE**

The screenshot shows the Adaptrum Device Logs interface. The top navigation bar includes tabs for Device Logs, Device Status, Device Database, Device Channels, Device Link, Device Clients, and Device System. The main content area is divided into two sections: Status and Logs. The Status section displays device information: A2PXJ331 (Database), A2.1.3 (Version), R0.c3.5 (Build), Transmitting (Status), 20 (RSSI), and 0.59% / 0% (Signal Strength). The Logs section contains a table with two entries. The first entry is for 'Register Device' on Dec-17-2018 22:05:32, showing a JSON response from the 'paws' service. The second entry is for 'Request Channels' on Dec-17-2018 22:05:34, showing a JSON response from the 'paws' service. A 'SAVE FILE' button is located at the bottom right of the logs table.

Log Type	Timestamp	Response
Register Device	Dec-17-2018 22:05:32	<pre>-----    Request Device     Dec-17-2018 22:05:32   -----    Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :     {"id":2,"method":"spectrum.paws.register","jsonrpc":"2.0","params":{"type":"REGISTRATION_REQ","version":"1.0","location":{"point":{"semiMinorAxis":0,"orient":0,"semiMajorAxis":0,"type":1,"value":0}},"token":null}     Got Response:   Code: 200     Response: {"id":2,"jsonrpc":"2.0","result":{"type":"REGISTRATION_RESP","version":"1.0","serverMessage":null,"databaseChange":null,"rulesetInfos":[{"maxLocal":100,"name":null,"ruleset":1}], "token":null}   -----    Registration Passed!   -----</pre>
Request Channels	Dec-17-2018 22:05:34	<pre>-----    Request Channels     Dec-17-2018 22:05:34   -----    Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :     {"id":3,"method":"spectrum.paws.getspectrum","jsonrpc":"2.0","params":{"type":"AVAIL_SPECTRUM_REQ","version":"1.0","capabilities": [{"frequencyRanges": [{"stopTime": "2018-12-19T22:05:37.148Z", "startFrequency": 482000000, "stopFrequency": 484000000}], "type": 1}], "token": null}     Got Response:   Code: 200     Response: {"id":3,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime": "2018-12-19T22:05:37.148Z", "startFrequency": 482000000, "stopFrequency": 484000000}, "channel": 16, "type": 1}], "token": null}     Channel 16 (482000000 - 484000000): 48     Channel 17 (484000000 - 486000000): 48   -----</pre>

Status						
Device						
Database	A2PXJ331	A2.1.3	R0.c3.5	Transmitting	20	0.59% / 0%
Channels						
Channel Selection						
Link						
Channels						
Clients	<input checked="" type="checkbox"/> Channel Expansion <input type="checkbox"/> All Available			<b>RUN CHANNEL SCAN</b>	<b>REQUEST AVAILABLE CHANNELS</b>	
System				<b>STOP TRANSMIT</b>	<b>SET CHANNELS</b>	
Logout	Select	CH	Max Power (MOP / GOP)	Noise Level		
		14				
		15				
	<input checked="" type="checkbox"/>	16	40 / undefined			
	<input checked="" type="checkbox"/>	17	40 / undefined			
		18				
		19				
	<input checked="" type="checkbox"/>	20	40 / undefined			
		21				
		22				

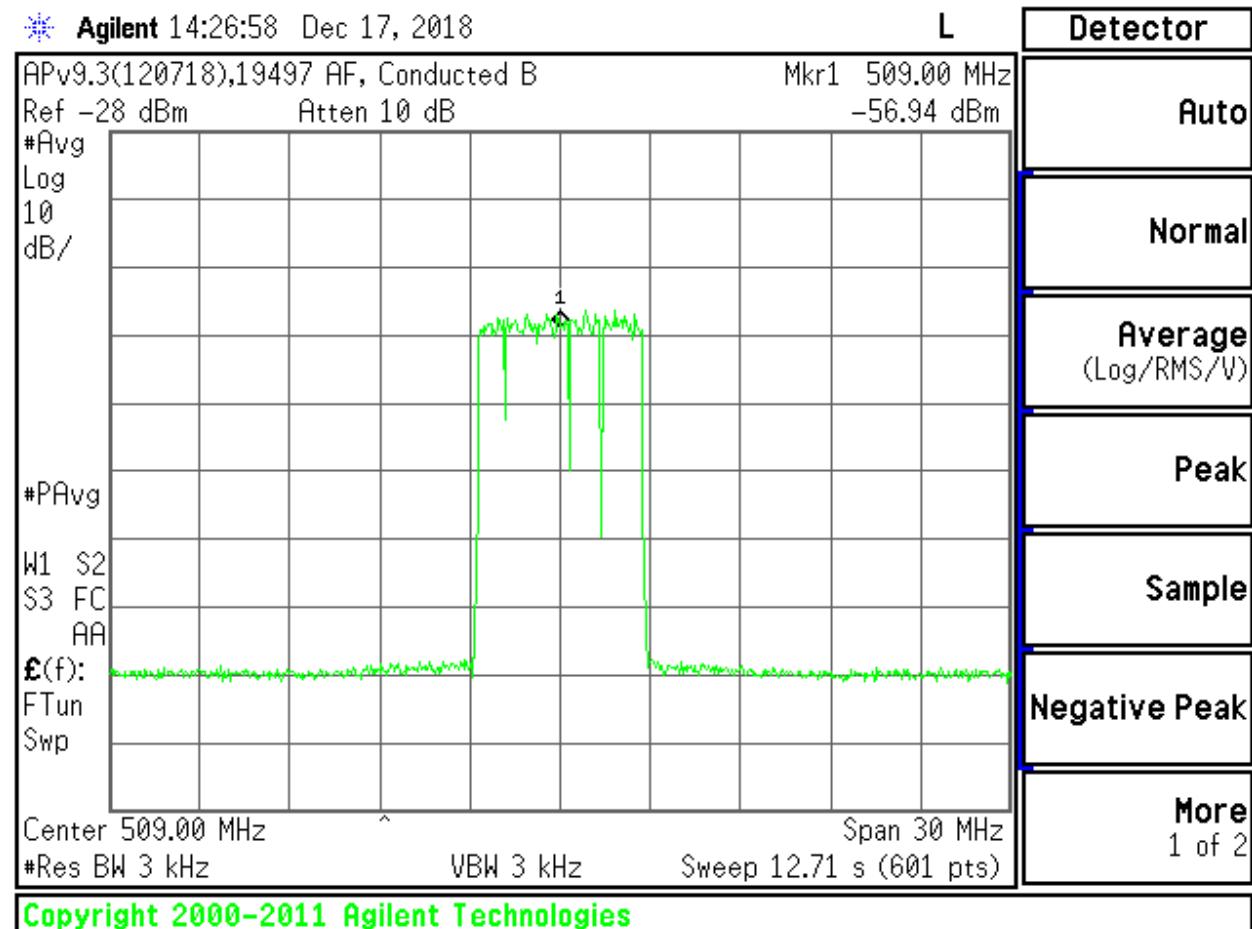
**SPECTRUM ANALYZER SHOWING ACTIVE BASE SIGNAL ON THE SELECTED CHANNEL (CHANNEL 20)**



**BASE SOFTWARE SHOWING SUCCESSFUL CLIENT DEVICE REGISTRATION WITH THE TVWS DATABASE**

The screenshot shows the Adaptrum software interface. The top navigation bar includes 'Adaptrum - Device Logs - LuCI', a search bar, and a URL 'Not secure | 10.19.0.25/luci/admin/system/device.logs'. The main header 'Adaptrum' is in a red bar. Below it, a table shows 'Device' and 'Status' for 'Database' (A2PXJ31, A2.1.3, R0.c3.5), 'Channels' (Transmitting, 20, 0.95% / 0.94%), and 'Link' (Clients, System). A 'Logs' tab is selected, showing a list of log entries. The log entries detail a 'Device Logs' request to https://paws.wsdr.uk/ with a token and various channel status updates (e.g., Channel 40, 41, 48). The log concludes with 'Request Channels SOP Successful!'. A 'SAVE FILE' button is at the bottom right of the log area.

**SPECTRUM ANALYZER SHOWING ACTIVE CLIENT SIGNAL ON THE SELECTED CHANNEL (CHANNEL 20)**



### 8.1.2. FAILED REGISTRATION – Location Coordinates

## TEST PROCEDURE

- Configure the EUT with restricted coordinates which is a location that is prohibited to transmit
- Observe the base EUT registration failure indicated by the database message

## RESULT

The base EUT failed to register when restricted coordinates information were submitted to the TVWS Database.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

## BASE SOFTWARE SHOWING FAILED DEVICE REGISTRATION DUE TO RESTRICTED COORDINATES

The screenshot shows the Adaptrum Device Logs interface. The left sidebar lists navigation options: Device, Database, Channels, Link, Clients, System, Device Logs (which is selected and highlighted in red), Device Password, and Support. The main content area has tabs for 'Logs' and 'Database' (the 'Logs' tab is active). The logs table displays a single log entry:

Timestamp	Message
Dec-17-2018 22:31:26	Getting URL from: https://tvws-databases.ofcom.org.uk/weblist.json Got Response: Code: 200 Response: {"ws_databases": {"refresh_rate": "1440", "last_update": "2016-06-30T12:00:00", "db": [{"us_db_id": "1", "url": "https://www.fsgbdb.com/paws/paws_server"}]} Init Request Dec-17-2018 22:31:28 Sending Request to https://paws.usdb.uk/?token=3b65e38b-415e-4764-87dd-cd1e44ed4ca2 : {"id":1,"method":"spectrum.paws.init","jsonrpc":2.0,"params":{"type":"INITREQ","version":1.0,"location":{"point":{"semiMinorAxis":0,"orientation":0,"center":{},"radius":0}}} Got Response: Code: 400 Response: {"id":1,"jsonrpc":2.0,"error":{"message":"location is outside coverage area","data":"","code":-104}} Initreq error!

At the bottom right of the log table is a red 'SAVE FILE' button.

### 8.1.3. FAILED REGISTRATION – ANTENNA HEIGHT AGL

#### TEST PROCEDURE

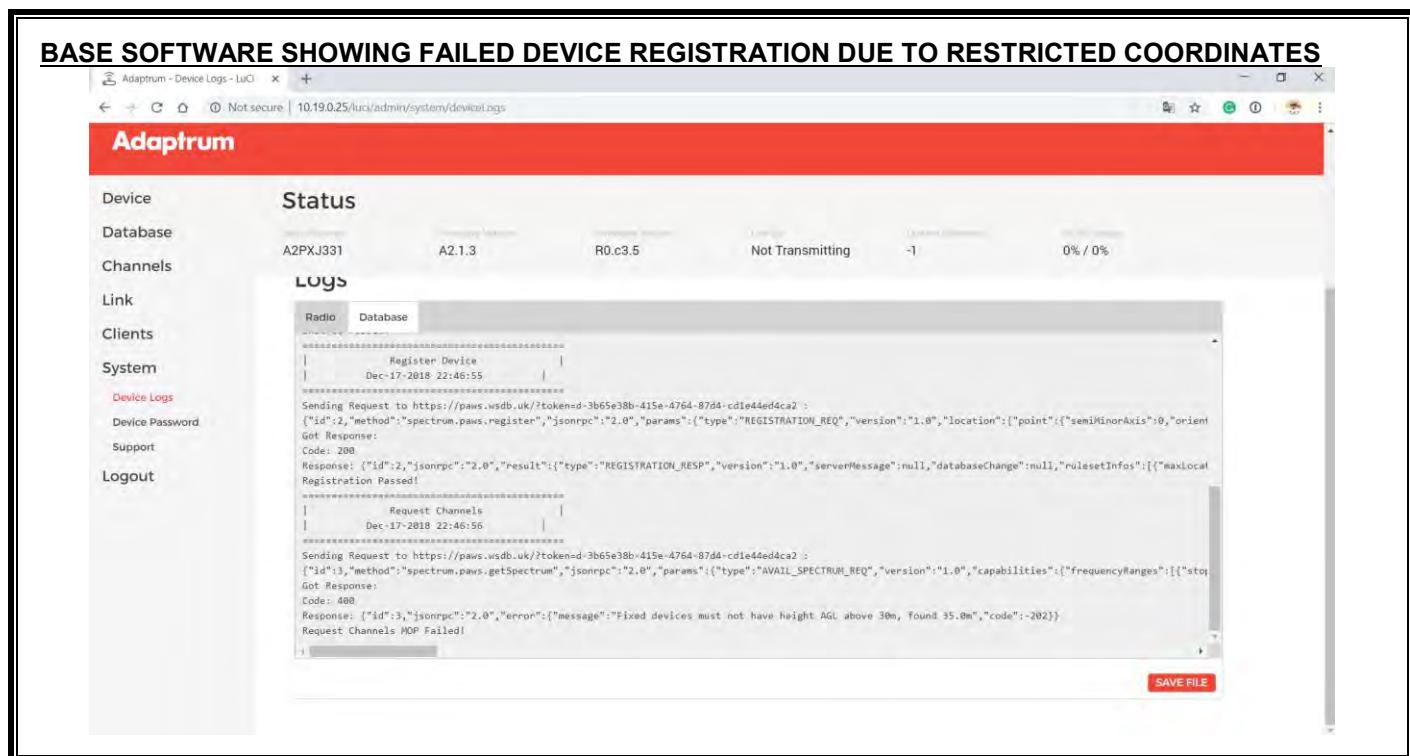
- Configure the EUT with antenna height Above Ground Level (AGL) > 30 meters.
- Observe the base registration failure indicated by the database message.

#### RESULTS

The base EUT failed to register when it is set to a location with antenna AGL above the limit.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**BASE SOFTWARE SHOWING FAILED DEVICE REGISTRATION DUE TO RESTRICTED COORDINATES**



The screenshot shows the Adaptrum software interface. The main window title is "Adaptrum - Device Logs - LuCI". The URL in the address bar is "10.19.0.25/luci/admin/system/deviceLogs". The left sidebar menu includes: Device, Database, Channels, Link, Clients, System, Device Logs (which is selected and highlighted in red), Device Password, Support, and Logout. The main content area displays a table with device status information and a log window. The log window shows two entries: a successful "Register Device" attempt and a failed "Request Channels" attempt due to a height restriction error. The failed log entry is as follows:

```
-----  
| Register Device |  
| Dec-17-2018 22:46:55 |  
-----  
Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :  
{"id":2,"method":"spectrum.paws.register","jsonrpc":"2.0","params":{"type":"REGISTRATION_REQ","version":1.0,"location":{"point":{"semiMinorAxis":0,"orient  
Got Response:  
Code: 200  
Response: {"id":2,"jsonrpc":"2.0","result":{"type":"REGISTRATION_RESP","version":1.0,"serverMessage":null,"databaseChange":null,"rulesetInfos":[{"maxLocal  
Registration Passed!  
-----  
| Request Channels |  
| Dec-17-2018 22:46:56 |  
-----  
Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :  
{"id":3,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"type":"AVAIL_SPECTRUM_REQ","version":1.0,"capabilities":[{"frequencyRanges":  
Got Response:  
Code: 400  
Response: {"id":3,"jsonrpc":"2.0","error":{"message":"Fixed devices must not have height AGL above 30m, Found 35.0m","code":-202}}  
Request Channels MOP Failed!  
-----
```

SAVE FILE

### 8.1.4. FAILED REGISTRATION – INCOMPLETE CONTACT INFORMATION

#### TEST PROCEDURE

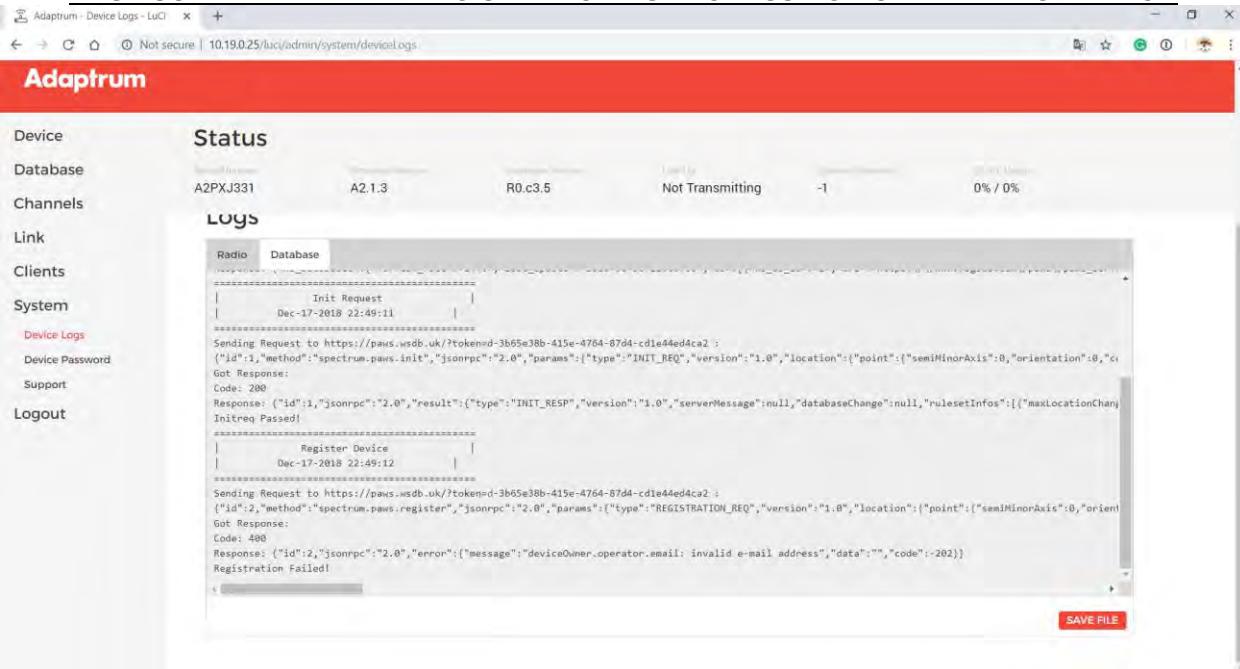
- Configure the base EUT with missing contact information, e.g. email.
- The device software cannot proceed with registration and prompts user to enter the missing information.

#### RESULTS

Software didn't proceed with registration when contact information fields are missing.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**BASE SOFTWARE FAILED REGISTRATION DUE TO MISSING CONTACT INFORMATION**



The screenshot shows a browser window titled 'Adaptrum - Device Logs - LuCI'. The URL is '10.19.0.25/luci/admin/system/device.logs'. The page has a red header bar with the 'Adaptrum' logo. On the left is a sidebar with links: Device, Database, Channels, Link, Clients, System, Device Logs (which is selected and highlighted in red), Device Password, Support, and Logout. The main content area has a table with columns: Device, Status, and Logs. The 'Device' row shows 'A2PXJ331', 'A2.1.3', 'R0.c3.5', 'Not Transmitting', '-1', and '0% / 0%'. The 'Logs' section has tabs for 'Radio' and 'Database'. The 'Database' tab is active and shows log entries for 'Init Request' and 'Register Device', both dated 'Dec-17-2018 22:49:11'. The log for 'Init Request' shows a successful response with code 200. The log for 'Register Device' shows an error response with code 400, indicating an invalid e-mail address. A 'SAVE FILE' button is at the bottom right of the log area.

## 8.2. FIXED WSD CHANNELS OF OPERATION

### CLAUSES

- §15.711(c)(2)(ii)

### REQUIREMENT

Confirm that the device only operates on channels provided by the database

### TEST PROCEDURE

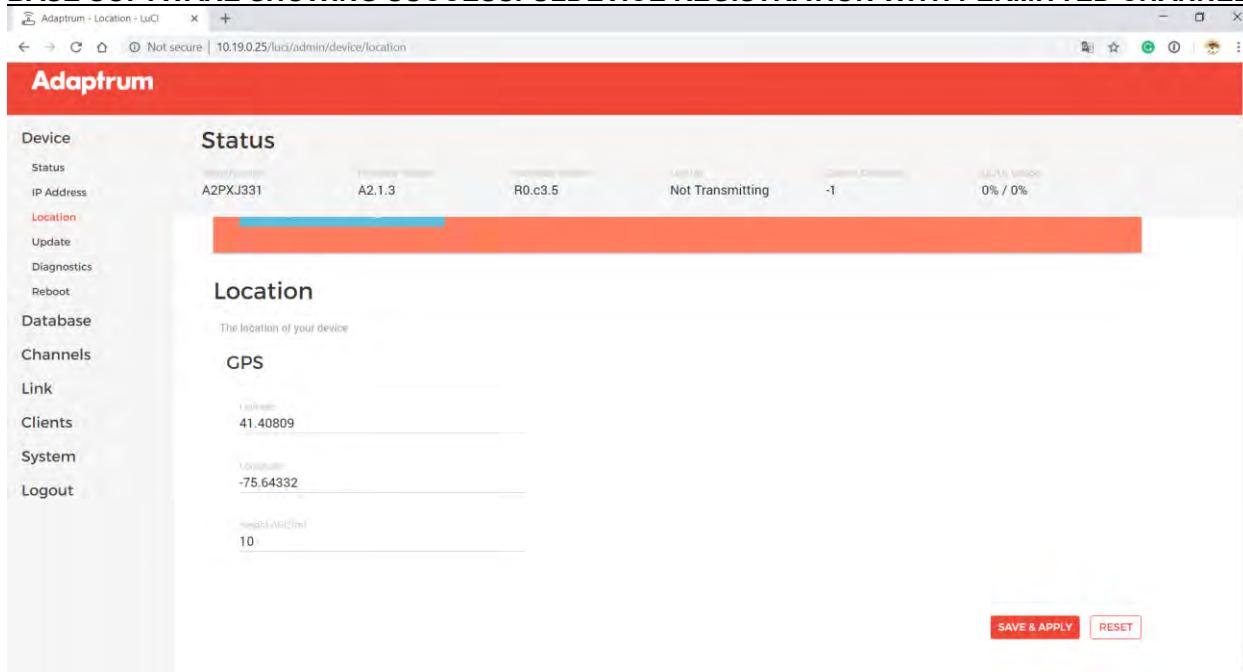
- The base EUT geographic coordinates are entered at registration time and stored in the device. The device channel list request uses the same coordinates established at registration time. No separate coordinates can be entered for channel list request.
- The device requires professional installation and device registration information including device location will be entered by the professional installer.
- Once the registration is complete, upon power cycling the device will use the stored registration location for channel list request.

### RESULTS

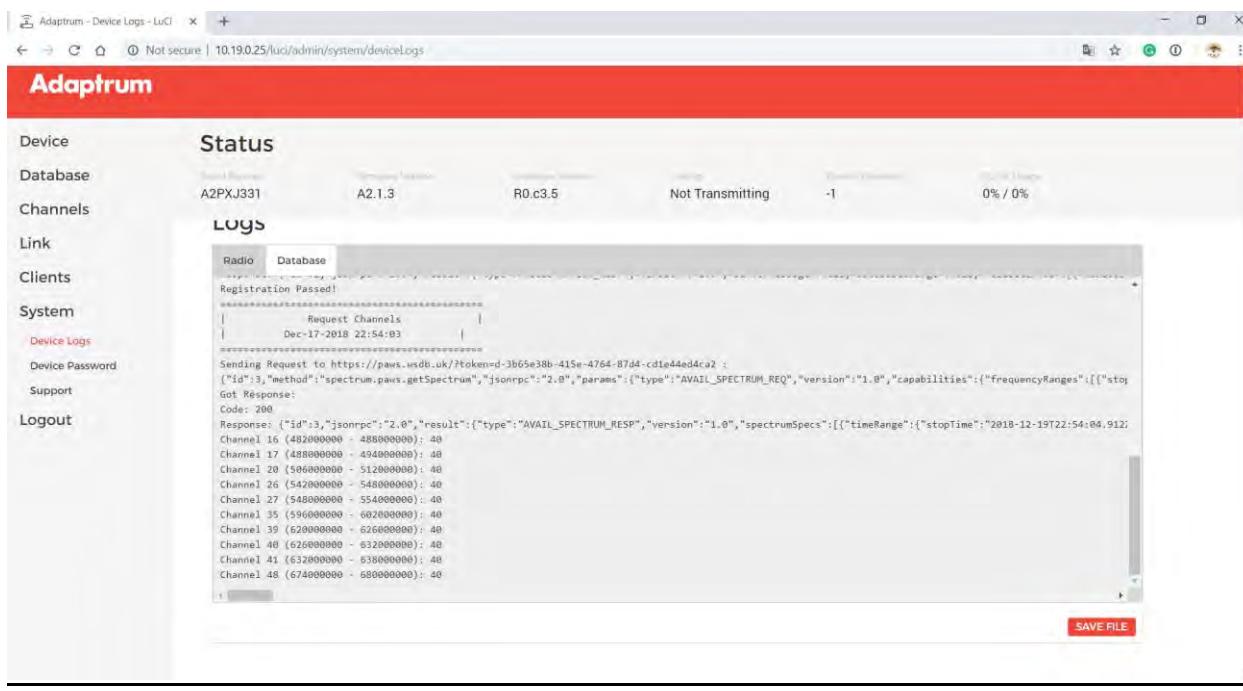
The device only uses its registered location for channel list request. The device registered location will be established at installation time by a professional installer and cannot be altered after installation

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

## BASE SOFTWARE SHOWING SUCCESSFUL DEVICE REGISTRATION WITH PERMITTED CHANNELS

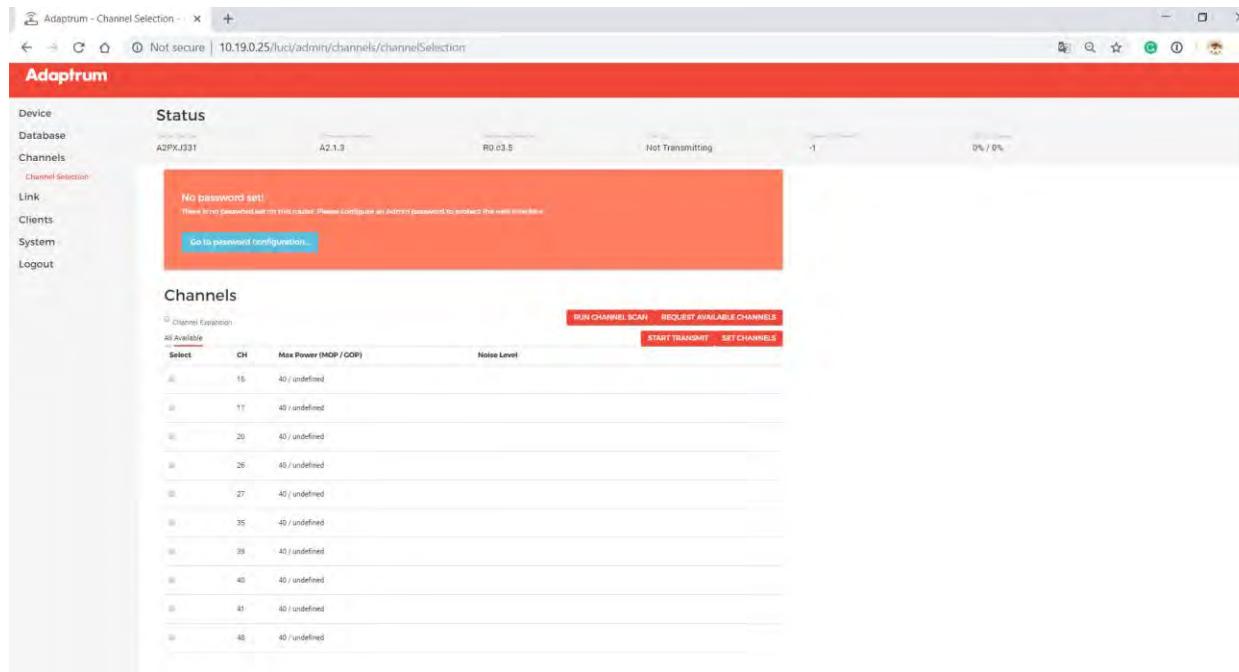


The screenshot shows the 'Location' section of the Adaptrum LuCI interface. The 'Status' table includes fields for IP Address (A2PXJ331), Version (A2.1.3), Radio (R0.c3.5), and Channel (Not Transmitting, -1). The 'Location' section shows GPS coordinates (41.40809, -75.64332) and a signal strength of 10. The 'SAVE & APPLY' and 'RESET' buttons are at the bottom.



The screenshot shows the 'Logs' section of the Adaptrum LuCI interface. The 'Status' table is identical to the previous screenshot. The 'Logs' section displays a log entry for a spectrum request, showing the device successfully passed the registration test. The log output includes details of the request and the response, including channel numbers and frequency ranges.

**BASE SOFTWARE SHOWING SUCCESSFUL DEVICE REGISTRATION WITH PERMITTED CHANNELS -  
CONTINUE**



### 8.3. FIXED TVDB DATABASE UPDATE

#### CLAUSES

- §15.711(h)

#### REQUIREMENT

If a fixed or Mode II personal/portable TVBD fails to successfully contact the white space database during any given day, it may continue to operate until 11:59 p.m. of the following day at which time it must cease operations until it re-establishes contact with the white space database and re-verifies its list of available channels.

To simulate that the device fails to successfully contact the database, block access to the database from the WSD by removing connection to the database. All other radio functions, including internet connectivity should be maintained. Confirm that the WSD ceases operation by 11:59PM on the following day

#### TEST PROCEDURE

- Set the base EUT to normal operation mode:
  - Enter proper registration information on the base.
  - Base contacts the TVWS to perform registration.
  - Base contacts the TVWS to retrieve channel list.
  - Select an operating channel from returned channel list.
  - Enable base transmission.
- Observe the base EUT output signal on the spectrum analyzer.
- Use a programmable router to block the database URL.
- Observe that there is no output signal from the base after 11:59 PM on the following day.

#### RESULTS

During normal operation, the base and client channel lists are updated periodically by sending channel list requests to the TVWS Database. For test purposes this time period was shortened. After the database access was blocked, the next channel list requests failed and the EUTs stopped transmission immediately.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**BASE SOFTWARE BEFORE DATABASE BLOCKING (BASE ON CHANNEL 20)**

The screenshot shows a web-based interface for 'Adaptrum - Channel Selection'. The top status bar indicates the device is A2PXJ31, operating on A2.1.3, with a signal level of R0:c3.5, transmitting on channel 20, and a power level of 0.47% / 0%. A prominent orange button in the center says 'Do to password configuration...'. The 'Channels' section lists available channels from 19 to 48, all set to 40. Buttons for 'RUN CHANNEL SCAN', 'REQUEST AVAILABLE CHANNELS', 'STOP TRANSMIT', and 'SET CHANNELS' are visible. The left sidebar includes links for Device Logs, Device Password, Support, and Logout.

## **BASE SIGNAL SPECTRUM BEFORE DATABASE BLOCKING**

 **Agilent** 15:06:51 Dec 17, 2018

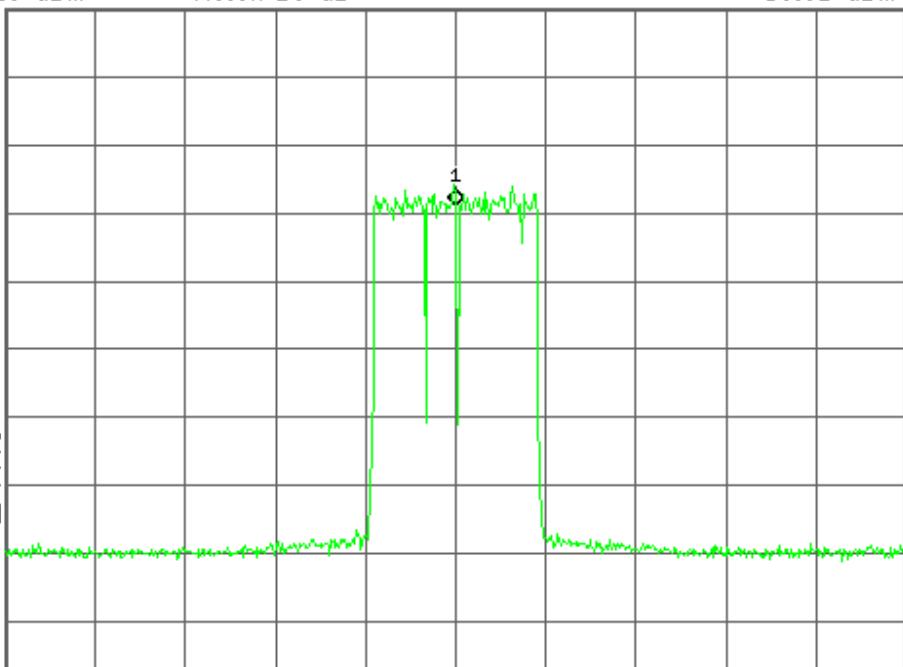
L

### Detector

APv9.3(120718),19497 AF, Conducted B  
Ref -28 dBm Atten 10 dB

Mkr1 509.00 MHz  
-56.81 dBm

#Avg  
Log  
10  
dB/



- Detector
- Auto
- Normal
- Average  
(Log/RMS/V)
- Peak
- Sample
- Negative Peak
- More  
1 of 2

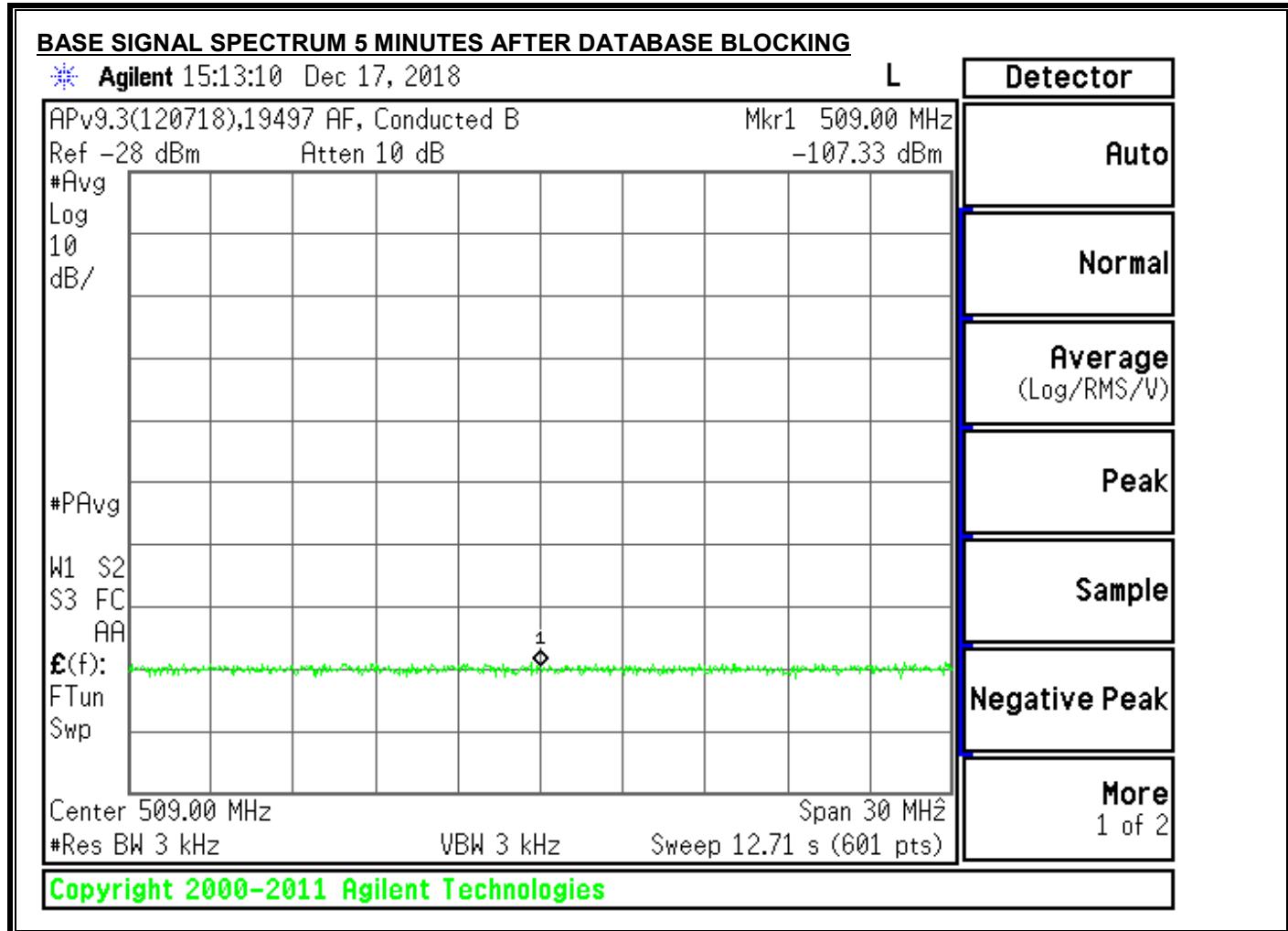
Copyright 2000-2011 Agilent Technologies

## **BASE SOFTWARE 5 MINUTES AFTER DATABASE BLOCKING (BASE STOPPED)**

The screenshot shows the Adaptrum Device Logs interface. The top navigation bar includes a back button, forward button, refresh button, and a 'Not secure' warning. The URL is 10.19.0.25/luci/admin/system/device.logs. The main header 'Adaptrum' is in a large, bold, orange font. Below it, a navigation bar has 'Device' and 'Status' buttons. The 'Status' button is active, showing 'Database: A2PXJ31', 'A2.1.3', 'R0.c3.5', 'Transmitting', '20', '0.52% / 0.79%', and a 'Logs' button. The 'Logs' button is also active, showing a list of log entries. The log entries are as follows:

```
=====  
Channel 41 (632000000 - 638000000): 40  
Channel 48 (674000000 - 680000000): 40  
=====  
=====  
Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e4ed4ca2 :  
{"id":5,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"masterDeviceLocation":{"point":{"semiMinorAxis":0,"orientation":0,"center":{"longitude":0,"latitude":0}},"timeRange":{"stopTime":"2018-12-19T23:00:20.245Z","startT  
Got Response:  
Code: 200  
Response: {"id":5,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime":"2018-12-19T23:00:20.245Z","startT  
Channel 16 (482000000 - 488000000): 40  
Channel 20 (506000000 - 512000000): 40  
Channel 39 (620000000 - 626000000): 40  
Channel 40 (626000000 - 632000000): 40  
Request Channels SOP Successful!  
=====  
=====  
Request Channels  
Dec-17-2018 23:01:07  
=====  
=====  
Sending Request to https://paws.wsdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e4ed4ca2 :  
{"id":6,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"type":"AVAIL_SPECTRUM_REQ","version":1.0,"capabilities":[{"stopT  
Request Channels MOP Failed!  
=====
```

At the bottom right is a red 'SAVE FILE' button.



## 8.4. 48 HOUR CHANNEL SCHEDULING

### CLAUSES

- FCC §15.711(c)(2)(iii)
- FCC §15.713(a)(1)

### REQUIREMENT

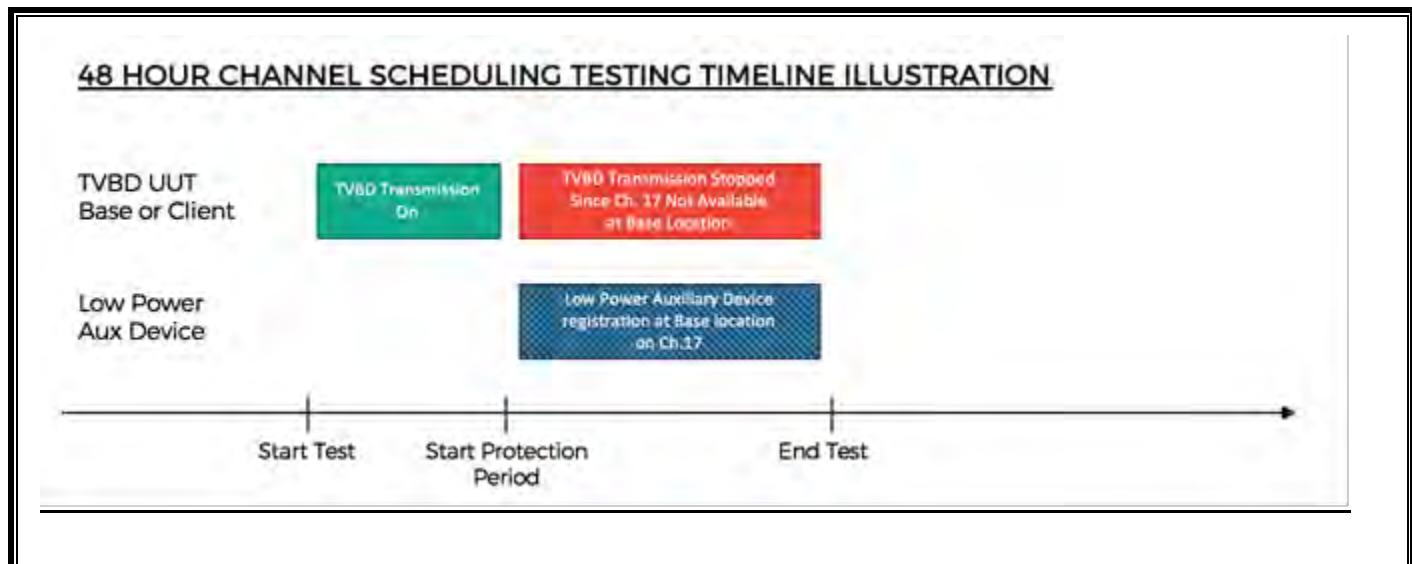
Each fixed whitespace device shall access the database at least once a day to verify that the operating channels continue to remain available. Each fixed white space device must adjust its use of channels in accordance with channel availability schedule information provided by its database for the 48-hour period beginning at the time the device last accessed the database for a list of available channels.

After receiving an available channel list, register a low-power auxiliary device on the WSD operating channel to operate on an available channel and in the upcoming time period when the device will be tested. Repeat the available channel request after the update interval and in the time period when the low-power auxiliary device is scheduled to operate, and confirm that the low-power device is accounted for in the schedule. Using the system management software, confirm that the device changes channels at the scheduled time.

### TEST PROCEDURE

1. A lower power auxiliary devices are registered and scheduled for protection at both base and client locations
2. Allow the base and client EUT to enter normal operations prior to testing
3. Upon channel list request to the TVWS Database, the base EUT obtains the channel list expiration time reflecting the low power auxiliary device's registered protection period
4. The base EUT requests new channel list upon the channel list expiration time and the base EUT's current operation channel is no longer in the returned channel list
5. The base EUT ceases transmission on the protected channel immediately
6. Steps 3-5 were repeated for client EUT

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12506	12/19/19



**48 HOUR CHANNEL SCHEDULING BASE SOFTWARE BEFORE PROTECTION PERIOD**

Adaptrum - Device Logs - LuCI

Not secure | 10.19.0.25/luci/admin/system/deviceLogs

Adaptrum

Device Status

Database A2PXJ331 A2.1.3 R0.c3.5

Channels

Link

Clients

System

Device Logs

Device Password

Support

Logout

Logs

Radio Database

Channel 41 (632000000 - 638000000): 40  
Channel 48 (674000000 - 680000000): 40

Request Channels

Dec-17-2018 23:24:51

Sending Request to https://paws.usdb.uk/?token=3b65e38b-415e-4764-87d4-d1e44ed4ca2 :  
{ "id":4, "method": "spectrum.page.getSpectrum", "jsonrpc": "2.0", "params": { "type": "AVAIL\_SPECTRUM\_REQ", "version": "1.0", "capabilities": { "frequencyRanges": [ { "stop": 632000000, "start": 638000000 } ] } } }

Got Response:

Code: 200

Response: { "id":4, "jsonrpc": "2.0", "result": { "type": "AVAIL\_SPECTRUM\_RESP", "version": "1.0", "spectrumSpecs": [ { "timeRange": { "stopTime": "2018-12-19T23:24:52.507Z", "startTime": "2018-12-19T23:24:52.507Z" }, "frequencyRange": { "start": 480000000, "stop": 488000000 } } ] } }

Channel 16 (492000000 - 498000000): 40  
Channel 17 (498000000 - 504000000): 40  
Channel 26 (542000000 - 548000000): 40  
Channel 27 (548000000 - 554000000): 40  
Channel 35 (596000000 - 602000000): 40  
Channel 39 (620000000 - 626000000): 40  
Channel 40 (626000000 - 632000000): 40  
Channel 41 (632000000 - 638000000): 40  
Channel 48 (674000000 - 680000000): 40

SAVE FILE

48 HOUR CHANNEL SCHEDULING BASE SIGNAL SPECTRUM BEFORE PROTECTION PERIOD

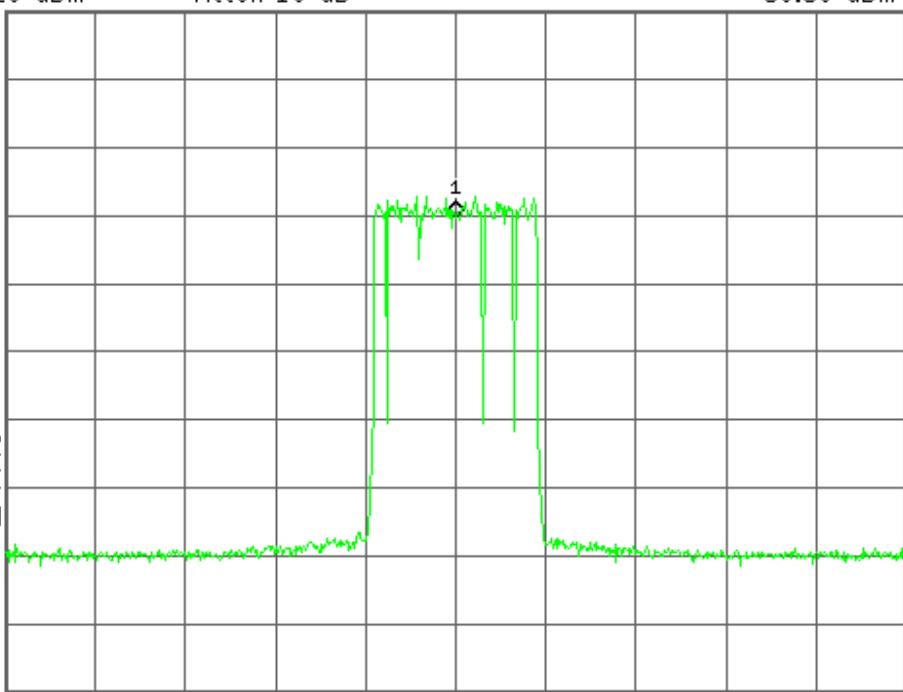
\* Agilent 15:34:44 Dec 17, 2018

L

Freq/Channel

APv9.3(120718),19497 AF, Conducted B  
Ref -28 dBm Atten 10 dB  
Mkr1 491.00 MHz  
-58.50 dBm

#Avg  
Log  
10  
dB/



#PAvg

W1 S2

S3 FC

AA

$\mathfrak{f}(f)$ :

FTun  
Swp

Center 491.00 MHz

#Res BW 3 kHz

VBW 3 kHz

Span 30 MHz

Sweep 12.71 s (601 pts)

Center Freq  
491.000000 MHz

Start Freq  
476.000000 MHz

Stop Freq  
506.000000 MHz

CF Step  
3.00000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

Signal Track  
On Off

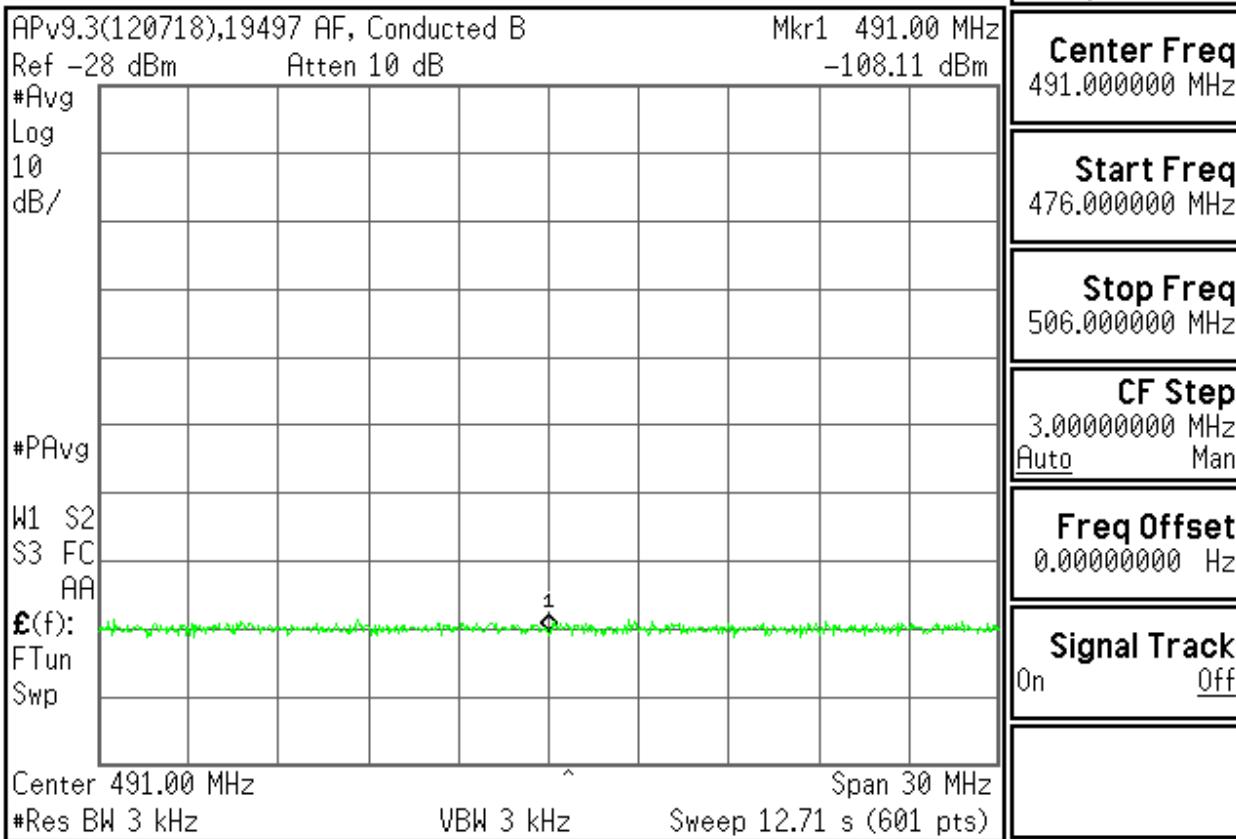
Copyright 2000-2011 Agilent Technologies

**48 HOUR CHANNEL SCHEDULING BASE SIGNAL SPECTRUM DURING PROTECTION PERIOD  
(TRANSMISSION STOPPED)**

\* Agilent 15:37:12 Dec 17, 2018

L

Freq/Channel



Copyright 2000-2011 Agilent Technologies

## 48 HOUR CHANNEL SCHEDULING CLIENT SOFTWARE BEFORE PROTECTION PERIOD

48 HOUR CHANNEL SCHEDULING CLIENT SIGNAL SPECTRUM BEFORE PROTECTION PERIOD

\* Agilent 13:08:43 Dec 15, 2018

L

Freq/Channel

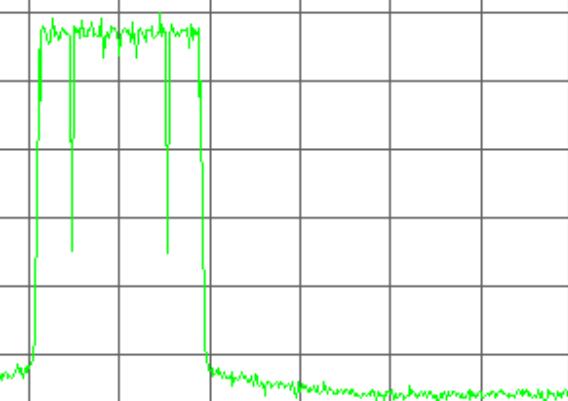
APv9.3(120718),10649,  
Ref -14 dBm Atten 10 dB

#Avg Log 10 dB/  
Center 491.0000000 MHz

#PAvg

W1 S2  
S3 FC  
AA  
£(f):  
FTun  
Swp

Center 491.00 MHz  
#Res BW 3 kHz



Span 30 MHz  
VBW 3 kHz

Sweep 12.71 s (601 pts)

Center Freq  
491.000000 MHz

Start Freq  
476.000000 MHz

Stop Freq  
506.000000 MHz

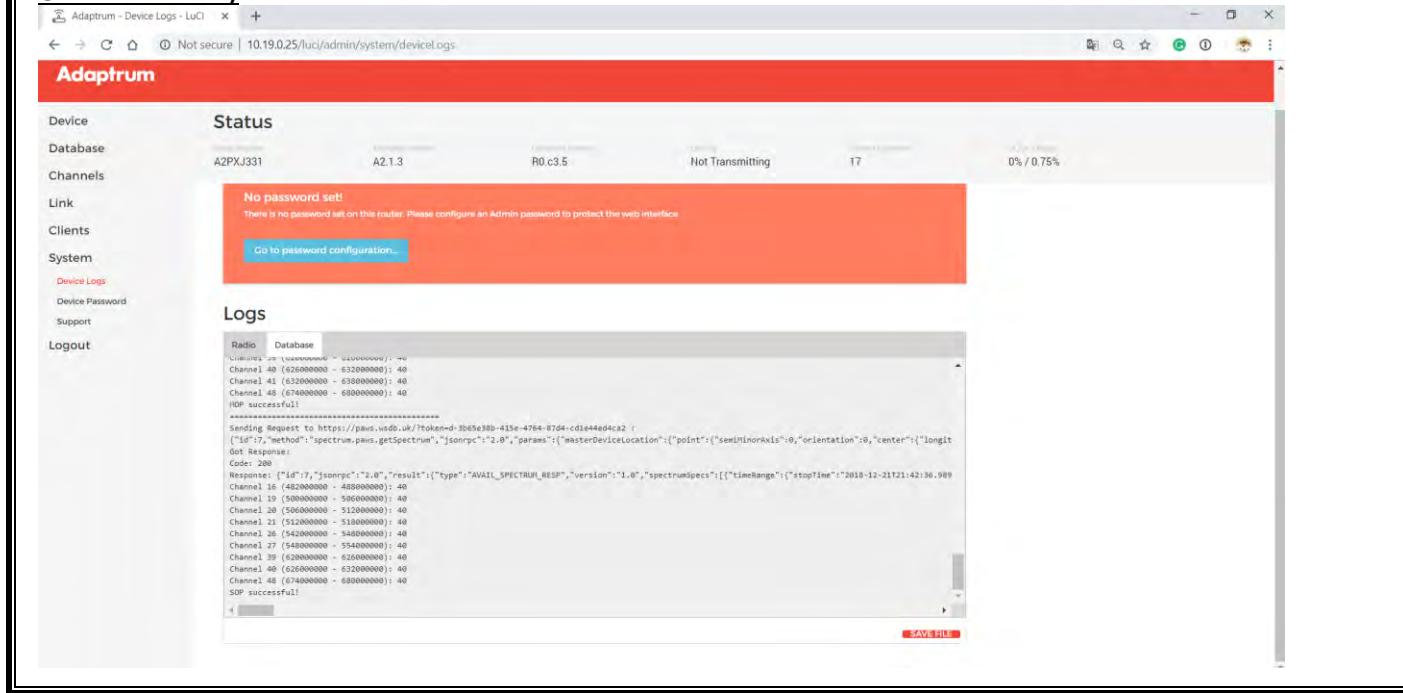
CF Step  
3.00000000 MHz  
Auto Man

Freq Offset  
0.00000000 Hz

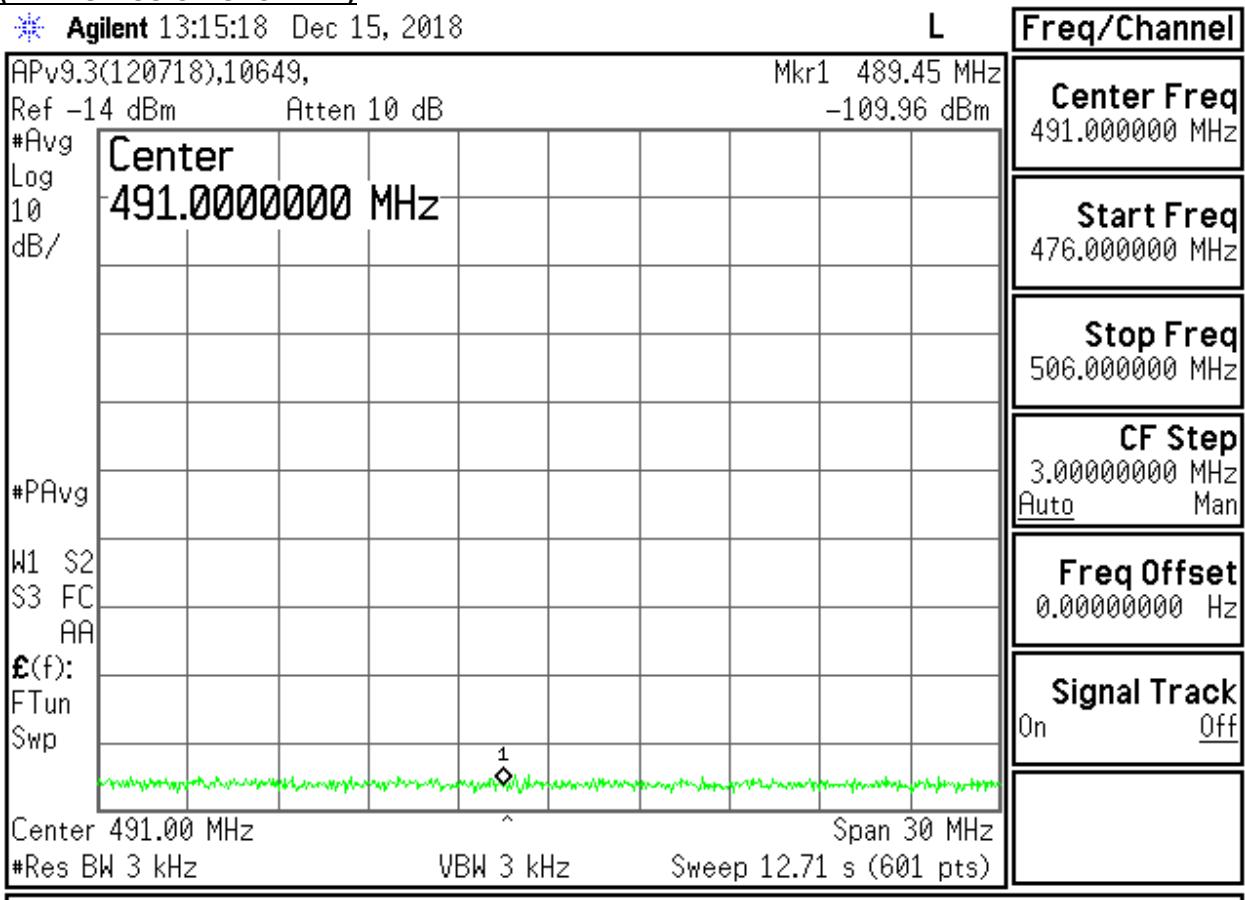
Signal Track  
On Off

Copyright 2000-2010 Agilent Technologies

**48 HOUR CHANNEL SCHEDULING CLIENT SOFTWARE DURING PROTECTION PERIOD (CHANNEL 17 UNAVAILABLE)**



**48 HOUR CHANNEL SCHEDULING BASE SIGNAL SPECTRUM DURING PROTECTION PERIOD  
(TRANSMISSION STOPPED)**



## 8.5. WSD CHANNEL AVAILABILITY

### CLAUSES

- FCC §15.707
- FCC §15.711(c)
- FCC §15.712

### REQUIREMENT

Confirm that WSD properly identifies itself as fixed or personal/portable to the database by comparing the channel list provided by the database with those allowable to the class of WSD under test. Confirm that the WSD is operating on a channel or channels from the list at the authorized power and cannot be made to operate on an unauthorized channel.

### TEST PROCEDURE

- Configure the base EUT with correct registration information.
- The base EUT automatically contacts the TVWS Database to perform device registration.
- Upon successful registration, base automatically contacts the TVWS Database to retrieve device channels.
- Confirm the base EUT software only allows the user to select a channel from the channel list returned from the database which are within the device operating frequency range
- Upon successful registration the database returns the allowable power according to the device type.
- Verify on the spectrum analyzer that the base EUT is operating on the selected channel

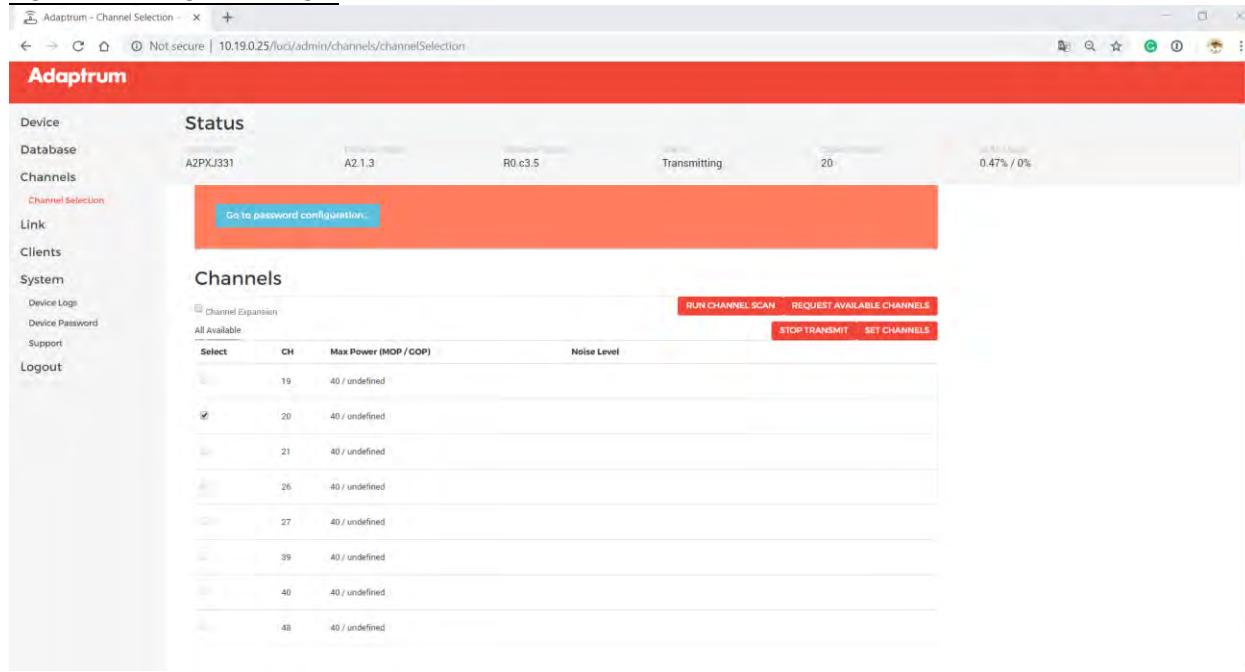
### RESULTS

The EUT operates on a channel from the authorized channel list and at the authorized power level.

The EUT cannot select and operate on any channel other than those within the authorized channel list returned from the TVWS Database, which are within the device operating frequency range.

Test Results		
Pass	Fail	Comment
<input checked="" type="checkbox"/>	<input type="checkbox"/>	

**BASE SOFTWARE ONLY ALLOWS A CHANNEL FROM AUTHORIZED CHANNEL LISTS TO BE SELECTED FOR DEVICE OPERATION**



**BASE SIGNAL SPECTRUM ON THE AUTHORIZED CHANNEL**

\* Agilent 13:29:35 Dec 15, 2018

APV9.3(120718),10649,  
Ref -14 dBm Atten 10 dB

Mkr1 509.00 MHz  
-89.74 dBm

L

**Freq/Channel**

**Center Freq**  
509.000000 MHz

**Start Freq**  
494.000000 MHz

**Stop Freq**  
524.000000 MHz

**CF Step**  
3.00000000 MHz  
Auto Man

**Freq Offset**  
0.00000000 Hz

**Signal Track**  
On Off

#Avg  
Log  
10  
dB/

#PAvg

W1 S2  
S3 FC  
AA  
E(f):  
FTun  
Swp

Center 509.00 MHz

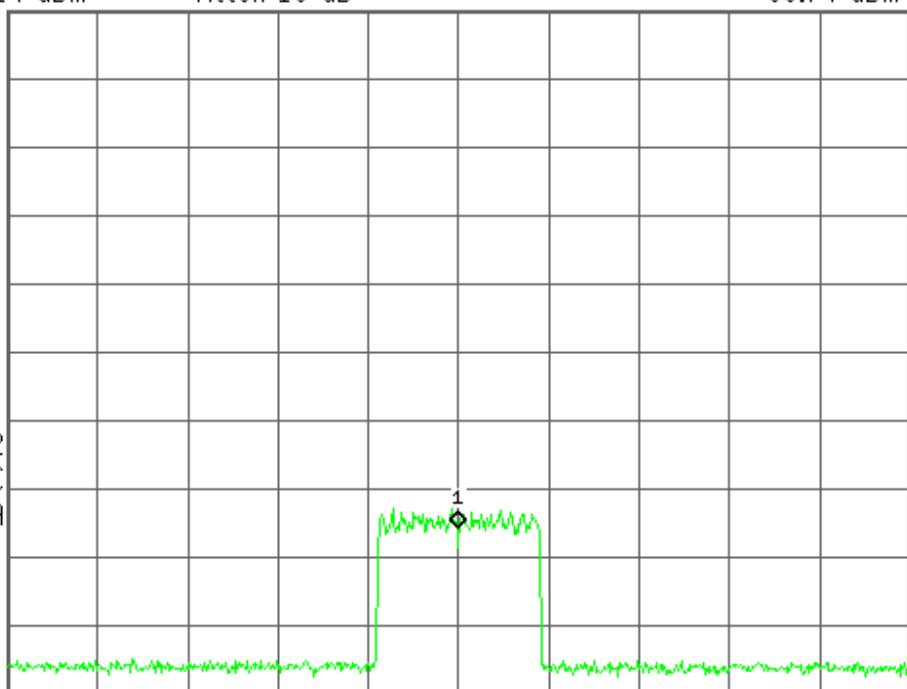
#Res BW 3 kHz

VBW 3 kHz

Span 30 MHz

Sweep 12.71 s (601 pts)

Copyright 2000-2010 Agilent Technologies



## 8.6. SECURITY

### CLAUSES

- §15.715(f)
- §15.713(i)
- §15.711(j)

### REQUIREMENT

The device operations procedures must include documentation with a detailed explanation of the following for each database the device is expected to work with:

- What communication protocol is used between the database and the WSD?
- How are communications initiated?
- How does the WSD validate messages from the database?
- How does the device handle failure to communicate or authenticate the database?
- How does the database validate messages from a WSD?
- What encryption method is used?
- How does the database ensure secure registration of protected devices?

### ANSWERS

- What communication protocol is used between the database and the WSD?

The Fixed WSD (WSD) connects to the Nominet database using HTTP over SSL/TLS. The protocol, as certified by Nominet at the FCC, used over this transport layer is similar to the IETF Protocol to Access White Space (PAWS) Draft-12 specification.

- How are communications initiated?

The WSD initiates communication with the Nominet database by initially sending an INIT\_REQ message containing a Device Descriptor. The Device Descriptor element contains the device serial number, manufacturer ID, and model ID, which in the US is FCC ID.

- How does the WSD validate messages from the database?

The identity of the Nominet database is validated through verification of the Nominet SSL certificate through standard third-party certificate authority mechanisms, ensuring communications are secure and authenticated between the WSD and the database. At the application layer both the WSD and database only handle messages that conform to the PAWS protocol specification. One additional message validation feature included in PAWS is the ability for the WSD to correlate a response with a specific request by comparing the message's ID field with the ID field of the request that was sent.

iv. How does the device handle failure to communicate or authenticate the database?

If the WSD has never communicated with or authenticated the database, it will not allow operations to begin. If the WSD experiences a communication or authentication failure, then it will cease operation by 11:59 PM on the following day.

v. How does the database validate messages from a WSD?

The database validates messages from the WSD by checking a token that must correspond with the provided serial number, manufacturer name, and FCC ID received in the Device Descriptor data element present in every message versus a table of validated client devices that is populated ahead of deployment. The list of valid serial numbers is communicated from device manufacturer to Nominet via a separate web dashboard where authorized (by Nominet) parties can generate tokens for specific devices (one at a time or via bulk method).

vi. What encryption method is used?

SSL/TLS standard encryption is used to encrypt packets sent between WSD and database.

vii. How does the database ensure secure registration of protected devices?

In this document, we interpret "protected devices" to mean entities authorized by the rules for protection from WSD transmissions, e.g., Temporary BAS, MVPD, Licensed and Unlicensed Microphones.

Nominet provides a public interface that is available to entities, authorized for protection under CFR Title 47 Part 15 Subpart H, to create protected contours.

## 8.7. Push notification to Fixed

### CLAUSES

- §15.711(i)

### REQUIREMENT

Confirm that the WSD device changes channels (or cease operation) when it receives 'push' notification from the database.

Using system management software, register the device at (specific coordinates) and wait for the database to send a push notification. Confirm that, once the notification is received, the device responds to the new channel availability list provided by the database, which would include ceasing operation on a channel no longer available, or ceases operation.

### TEST PROCEDURE

- Obtain a successful registration to the database.
- Transmit on desired channel
- Wait for database to send a push notification to cease operation on desired channel
- Confirm that once the push notification is received, a new channel availability list is provided and the desired channel ceases operation.

### RESULTS

Per FCC Order DA-18-983, filing by Office of Engineering in Technology on 9/26/2018, the push notification requirements specified in §15.711(i) are waived through 3/31/2019

## 8.8. Location accuracy

### CLAUSES

- §15.711(b)

### REQUIREMENT

For Fixed and Mode II devices, provide details regarding the technologies used by the device to determine its location and how, in case of other than GPS technology, the location uncertainty is calculated with a 95% confidence level

### RESULTS

See theory of operations for details on Location accuracy

## 8.9. Interference protection requirement

### CLAUSES

- §15.712

### REQUIREMENT

Using system management software or database, provide different location (coordinates) so that compliance with operating channel and power level is shown under each of the scenarios outlines in §15.712. Include a sample scan showing the total channel power and adjacent channel emission settings for test coordinates.

### TEST PROCEDURE

For the scenarios listed below confirm there is no allowance of transmission on specific channels according to that particular location

#### Scenarios

- Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations
- TV translator, Low power TV(including Class A) and Multi-channel Video Programming Distributor (MVPD)
- Fixed Broadcast Auxiliary Service (BAS) links
- PLMR/CMRS operations
- Offshore Radiotelephone Service
- Low power auxiliary services including wireless microphones
- Border areas near Canada and Mexico
- Radio astronomy services
- 600 Mhz service band
- Wireless Medical Telemetry Service
- 488-494 MHz band in Hawaii

### RESULTS

Scenario	Coordinate	Note
a	Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations	35.775, -106.24555 (UHF) UHF No transmission allowed
b	TV translator, Low power TV(including Class A) and Multi-channel Video Programming Distributor (MVPD)	43.80102, -111.778 (UHF) UHF coordinate cannot transmit Ch. 23
c	Fixed Broadcast Auxiliary Service (BAS) links	41.890417, -87.623694 Cannot transmit on Ch. 28
d	PLMR/CMRS operations	18.954722, -77.004722 Cannot transmit on Ch. 17 and 18
e	Offshore Radio telephone Service	18.954722, -77.004722 Cannot transmit on Ch. 17 and 18
f	Low power auxiliary services including wireless microphones	N/A 48 hour channel scheduling requirement was based off this scenario
g	Border areas near Canada and Mexico	32.608179, -116.969585 Cannot transmit on Ch. 6 and 32
h	Radio astronomy services	35.775, -106.24555 No channels available
i	600 MHz service band	40.78698, -119.206486 Cannot transmit on Ch. 37 and 38
j	Wireless Medical Telemetry Service	N/A EUT does not support transmission in this frequency band
k	488-494 MHz band in Hawaii	20.88, -156.678611 Cannot transmit on Ch. 17

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12506	12/17/19

Scenario A UHF

**Adaptrum**

**Status**

IP Address	A2PXJ331	Link	A2.1.3	Power	R0.c3.5	Transmit	Not Transmitting	Power	-1	Power	0% / 0%
------------	----------	------	--------	-------	---------	----------	------------------	-------	----	-------	---------

**Location**

GPS

Link

Clients

System

Logout

10

**SAVE & APPLY** **RESET**

**Adaptrum**

**Status**

IP Address	A2PXJ331	Link	A2.1.3	Power	R0.c3.5	Transmit	Not Transmitting	Power	-1	Power	0% / 0%
------------	----------	------	--------	-------	---------	----------	------------------	-------	----	-------	---------

**Channels**

Channel Selection

All available

Select	CH	Max Power (MOP / GOF)	Noise Level
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		
	26		
	27		
	28		
	29		
	30		
	31		
	32		
	33		
	34		
	35		

**RUN CHANNEL SCAN** **REQUEST AVAILABLE CHANNELS**

**START TRANSIT** **GET CHANNELS**

**Scenario B (UHF) (cannot select channel 23)**

**Adaptrum**

**Status**

Status	Current Location	Current Firmware	Current Version	Last User	Last Transmit	License	License Progress
IP Address	A2PXJ331	A2.1.3	R0.c3.5	Not Transmitting	-1	0% / 0%	

**Location**

GPS

Link

Clients

System

Logout

10

**SAVE & APPLY** **RESET**

**Adaptrum**

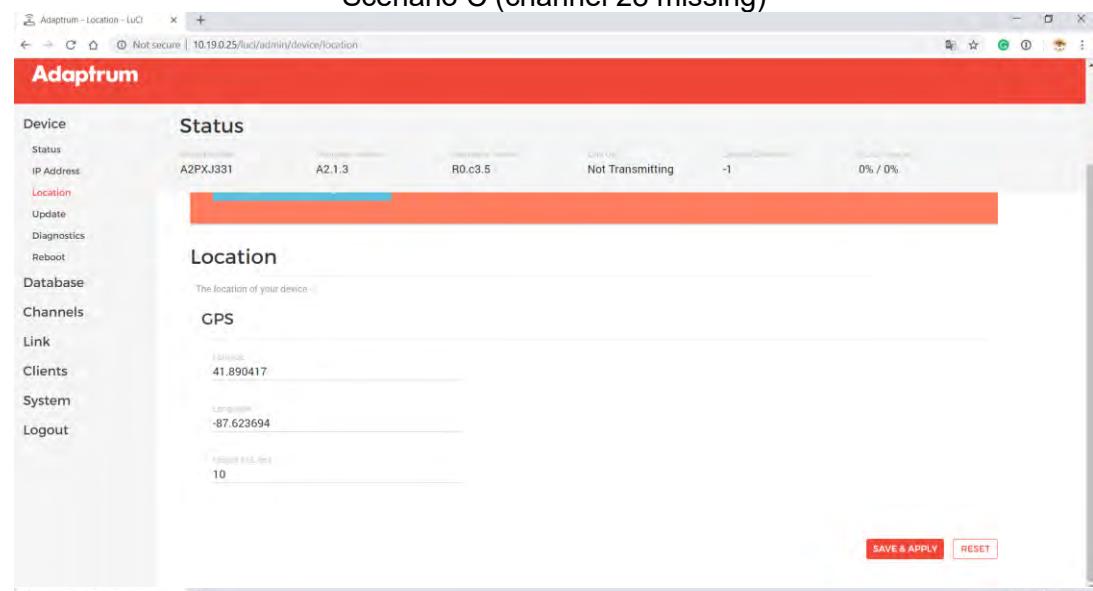
**Status**

Device	Current Location	Current Firmware	Current Version	Last User	Last Transmit	License	License Progress
Database	A2PXJ331	A2.1.3	R0.c3.5	Not Transmitting	-1	0% / 0%	

**Channel Selection**

Channel Selection	14	40 / undefined
Link	15	36 / undefined
Clients	16	
System	17	
Logout	18	
	19	40 / undefined
	20	40 / undefined
	21	
	22	
	23	
	24	
	25	40 / undefined
	26	40 / undefined

Scenario C (channel 28 missing)



Adaptrum

**Status**

IP Address	A2PXJ331	Location	A2.1.3	Link	R0.c3.5	Not Transmitting	-1	0% / 0%
------------	----------	----------	--------	------	---------	------------------	----	---------

**Location**

The location of your device:

**GPS**

Latitude: 41.890417  
Longitude: -87.623694

Link

Clients

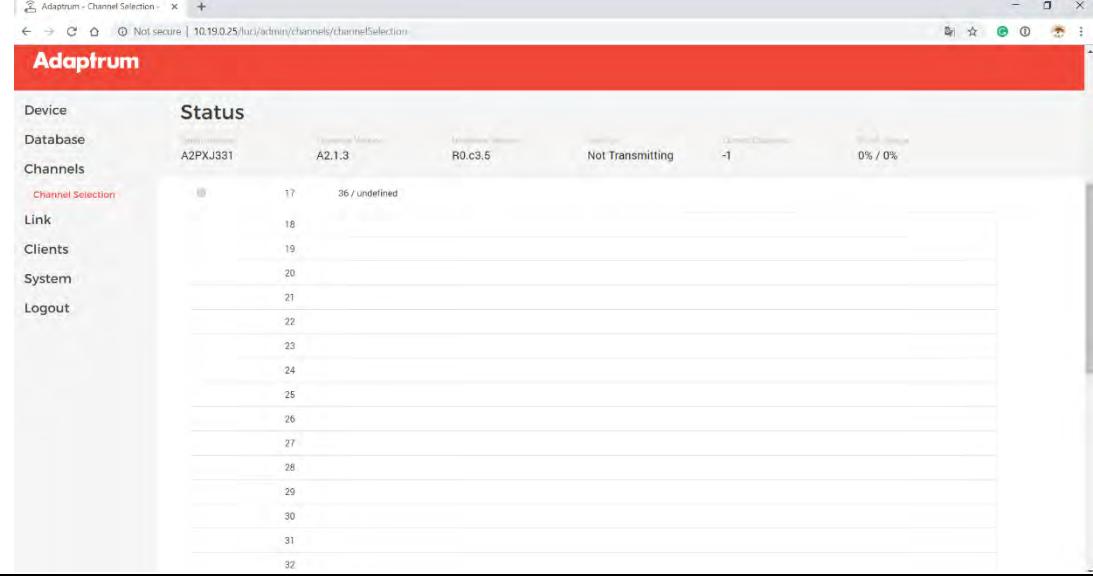
System

Logout

10

SAVE & APPLY    RESET

Adaptrum - Channel Selection -



Adaptrum

**Status**

IP Address	A2PXJ331	Location	A2.1.3	Link	R0.c3.5	Not Transmitting	-1	0% / 0%
------------	----------	----------	--------	------	---------	------------------	----	---------

**Channel Selection**

17	36 / undefined
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	

Channel Selection

Link

Clients

System

Logout

**Scenario D/E**

**Adaptrum**

**Device** **Status**

Status: A2PXJ331, IP Address: A2.1.3, Radio: R0.c3.5, Link Up: Not Transmitting, Channel: -1, Power Usage: 0% / 0%

**Location**

The location of your device:

**GPS**

Latitude: 18.954722, Longitude: -77.004722, Height: 10

**Link**

**Clients**

**System**

**Logout**

**SAVE & APPLY** **RESET**

**Adaptrum**

**Device** **Status**

Status: A2PXJ331, IP Address: A2.1.3, Radio: R0.c3.5, Link Up: Not Transmitting, Channel: -1, Power Usage: 0% / 0%

**Channels**

**Channel Selection**

**Link**

**Clients**

**System**

**Logout**

**Channels**

Channel Expansion: All Available

Select	CH	Max Power (MOP / GOP)	Noise Level
	14		
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		

**RUN CHANNEL SCAN** **REQUEST AVAILABLE CHANNELS**

**START TRANSMIT** **SET CHANNELS**

**Scenario G**

**Adaptrum**

**Status**

IP Address	A2PXJ331	MAC Address	A2.1.3	Software Version	R0.c3.5	Transmitting	-1	0% / 0%
------------	----------	-------------	--------	------------------	---------	--------------	----	---------

**Location**

The location of your device.

**GPS**

Latitude: 32.608179

Longitude: -116.969585

Altitude: 10

**SAVE & APPLY** **RESET**

**Adaptrum**

**Status**

IP Address	A2PXJ331	MAC Address	A2.1.3	Software Version	R0.c3.5	Transmitting	-1	0% / 0%
------------	----------	-------------	--------	------------------	---------	--------------	----	---------

**Channels**

Channel Selection

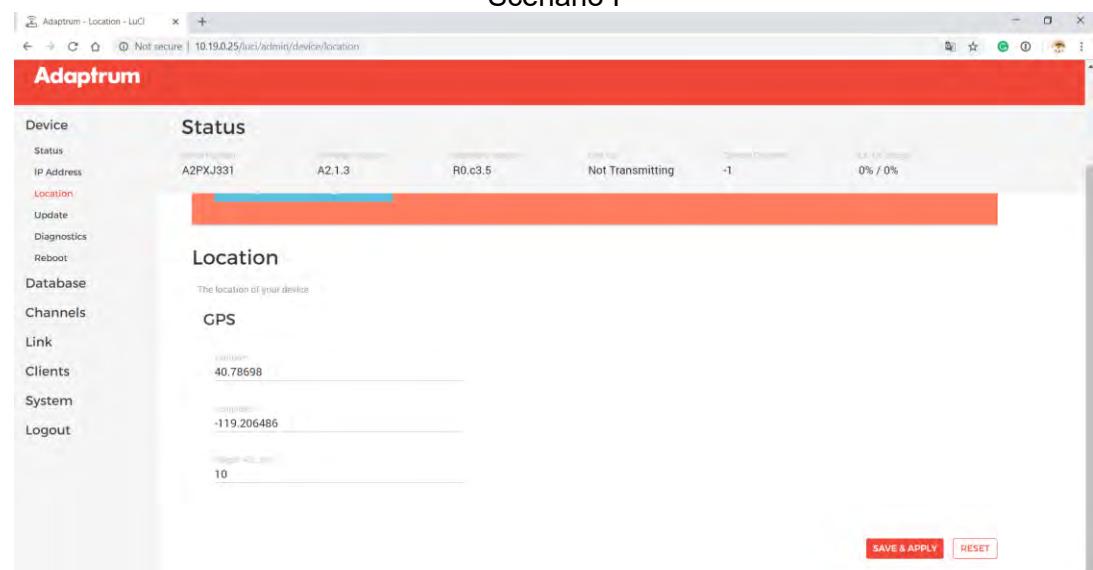
Select	CH	Max Power (MOP / GOP)	Noise Level
<input checked="" type="checkbox"/>	14	40 / undefined	
	15		
	16		
	17		
	18		
	19		
	20		
	21		
	22		
	23		
	24		
	25		
	26		
	27		
	28		
	29		
	30		
	31		
	32		

**RUN CHANNEL SCAN** **REQUEST AVAILABLE CHANNELS** **START TRANSMIT** **SET CHANNELS**

Scenario H

The screenshot shows a web browser window titled "Adaptrum - Location - LuCI" with the URL "10.19.0.26/luci/admin/device/location". The page is titled "Scenario H". The left sidebar has a red header with "Adaptrum" and a list of options: Device, Status, Location (which is selected and highlighted in red), Update, Diagnostics, Reboot, Database, Channels, Link, Clients, System, and Logout. The main content area is titled "Status" and shows the following device information: IP Address: A2HX1044, Version: A2.1.3, Firmware: R0.c3.5, Transmitting: Not Transmitting, and DLUK: 0% / 0%. Below this is a "Location" section with the sub-section "GPS". It contains fields for Latitude (35.775) and Longitude (-106.24555). At the bottom right of the main content area are "SAVE & APPLY" and "RESET" buttons.

Scenario I



Adaptrum

Status

Device

Location

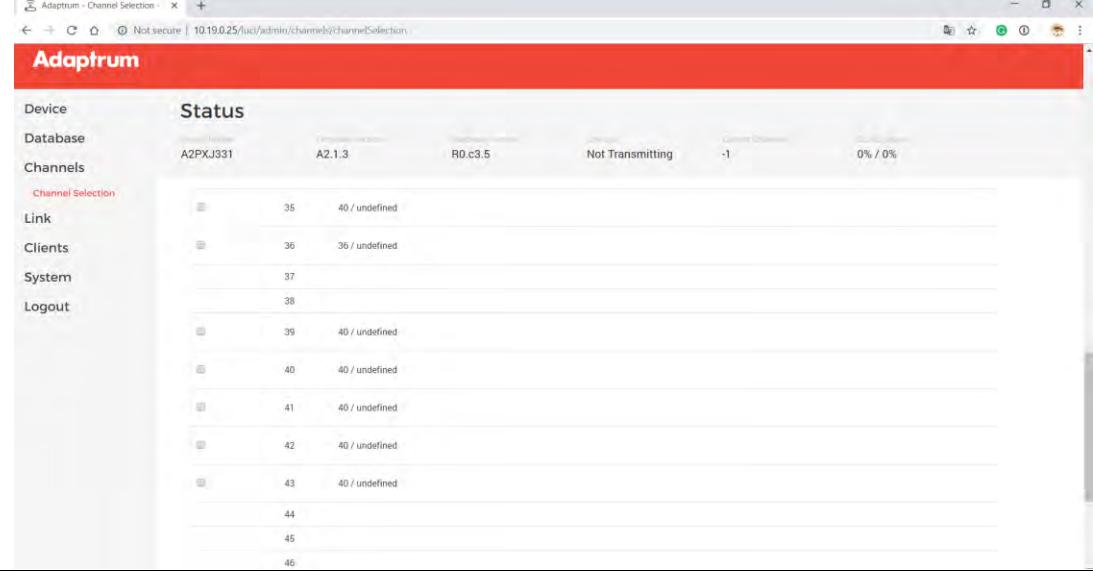
GPS

Location

GPS

SAVE & APPLY

RESET

Adaptrum

Status

Device

Channels

Channel Selection

Link

Clients

System

Logout

35 40 / undefined

36 36 / undefined

37

38

39 40 / undefined

40 40 / undefined

41 40 / undefined

42 40 / undefined

43 40 / undefined

44

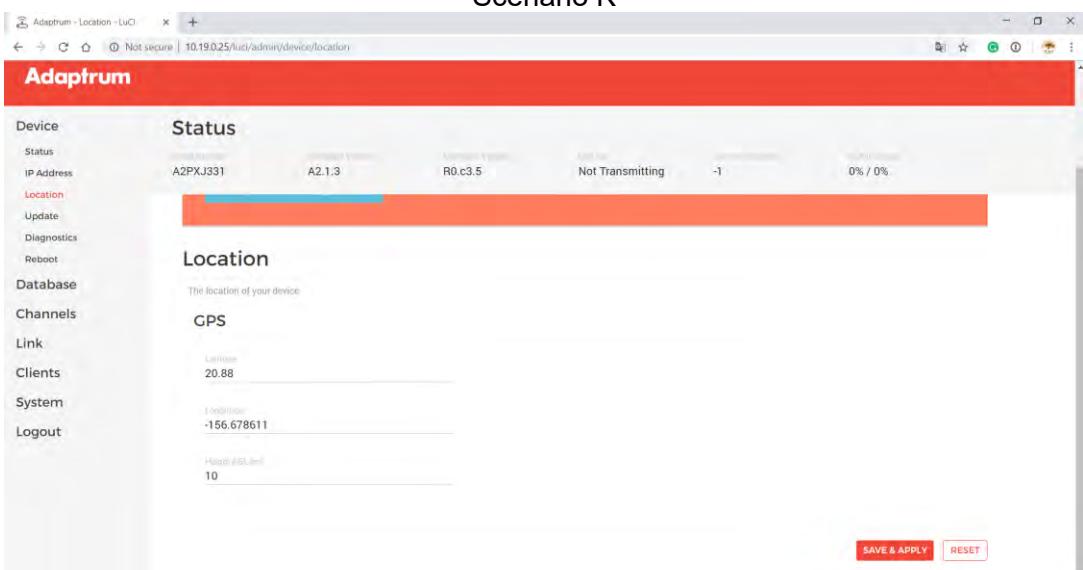
45

46

SAVE & APPLY

RESET

Scenario K



Adaptrum

Device Status

IP Address A2PXJ331 Current Version A2.1.3 Last Update R0.c3.5 Last Log Not Transmitting -1 Pending 0% / 0%

Location

Update

Diagnostics

Reboot

Database

Channels CPS

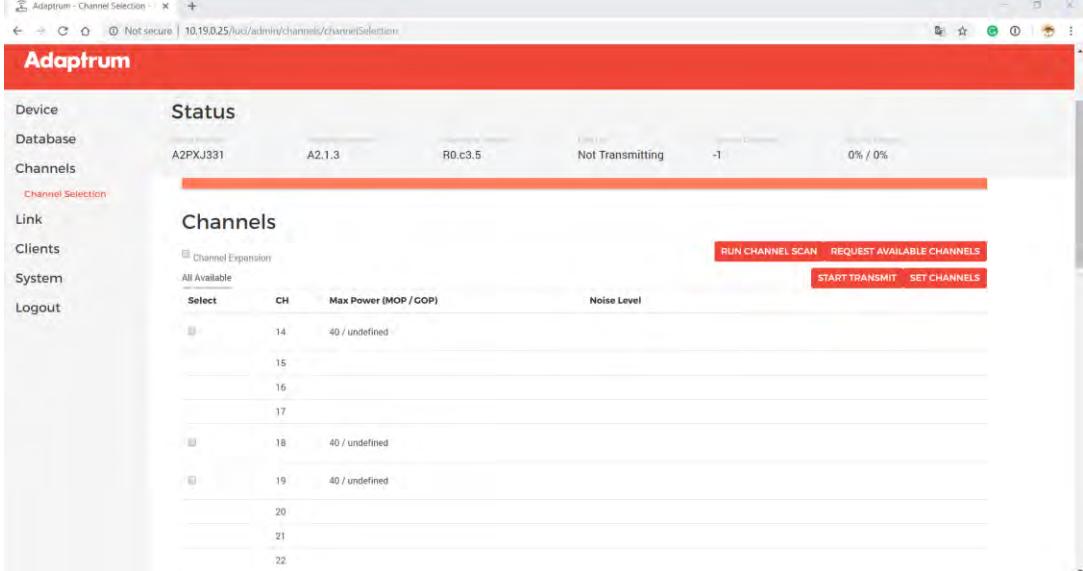
Link

Clients Latitude 20.88

System Longitude -156.678611

Logout Height (ft) 10

SAVE & APPLY RESET

Adaptrum

Device Status

Database A2PXJ331 Current Version A2.1.3 Last Update R0.c3.5 Last Log Not Transmitting -1 Pending 0% / 0%

Channels

Channel Selection

Link

Clients

System

Logout

Channel Expansion

All Available

Select	CH	Max Power (MOP / GOP)	Noise Level
	14	40 / undefined	
	15		
	16		
	17		
	18	40 / undefined	
	19	40 / undefined	
	20		
	21		
	22		

RUN CHANNEL SCAN REQUEST AVAILABLE CHANNELS

START TRANSMIT SET CHANNELS

## 8.10. Fixed Power level reduction

### CLAUSES

- §15.711(c)(2)(ii)
- §15.715(e)

### REQUIREMENT

Using system management software, make a channel availability request to the database. Using the spectrum analyzer, confirm that the WSD operates at no more than the maximum power level indicated by the database and that the power level cannot be set to a higher level than indicated by the database at that specific location. If the device cannot reduce power, it must cease operation.

### TEST PROCEDURE

- Create a successful registration with the database
- Transmit at desired channel
- Confirm with spectrum analyzer that the EUT does not operate more than the max power level indicated by the database.
- Confirm power level cannot be set higher than the level indicated by the database

### RESULTS

Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12506	12/19/19

Successful registration, Channel availability and maximum allowed Power level

Adaptrum - Channel Selection - +

Not secure | 10.19.0.25/luci/admin/channels/channelSelection

Adaptrum

Device Database Channels Link Clients System Logout

Status

A2PXJ331 A2.1.3 R0.c3.5 Transmitting 20 0.47% / 0%

Channels

Channel Expansion All Available Select CH Max Power (MOP / COP) Noise Level

17 40 / undefined

19 40 / undefined

20 40 / undefined

21 40 / undefined

26 40 / undefined

27 40 / undefined

35 40 / undefined

39 40 / undefined

40 40 / undefined

41 40 / undefined

48 40 / undefined

RUN CHANNEL SCAN REQUEST AVAILABLE CHANNELS

STOP TRANSMIT SET CHANNELS

UL Data Before fl. GetApp! GetApp! TVWS Vi. Nominel Helium A techni USA TV USA TV Pan-Am

https://usa.wavedb.com/channelsearch/tvws

USA TVWS Protected Entity Registration

WAVEND Channel Search Discover channel availability at your entered location.

Device Type Unlicensed Wireless Microphone TV White Space

Location (NAEDE) Define GPS

Latitude\* 41.62809

Longitude\* -75.64332

Height (AGL/m)

Height\* 10

Available Channels with Power Units

Channel	Power	Model	Model
2	40dBm	x	x
3	40dBm	x	x
4	40dBm	x	x
5	40dBm	x	x
6	40dBm	x	x
17	16dBm	x	x
18	16dBm	x	x
19	16dBm	x	x
20	40dBm	20dBm	20dBm
23	16dBm	16dBm	16dBm
26	40dBm	20dBm	20dBm
27	40dBm	20dBm	20dBm
30	16dBm	16dBm	16dBm
33	16dBm	16dBm	16dBm
34	16dBm	16dBm	16dBm
35	40dBm	20dBm	20dBm
37	40dBm	20dBm	20dBm
39	40dBm	20dBm	20dBm
40	40dBm	20dBm	20dBm
41	40dBm	20dBm	20dBm
42	16dBm	16dBm	16dBm
46	16dBm	16dBm	16dBm
48	40dBm	20dBm	20dBm
51	16dBm	16dBm	16dBm

