



**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**

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NVLAP Lab code: 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	1/8/2019	Initial Issue	---
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## 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

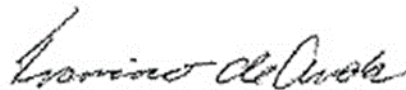
APPLICABLE STANDARDS	
SECTION	TEST RESULTS
DATABASE PORTIONS OF FCC PART 15 SUBPART H	Pass

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	Lattitude 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**

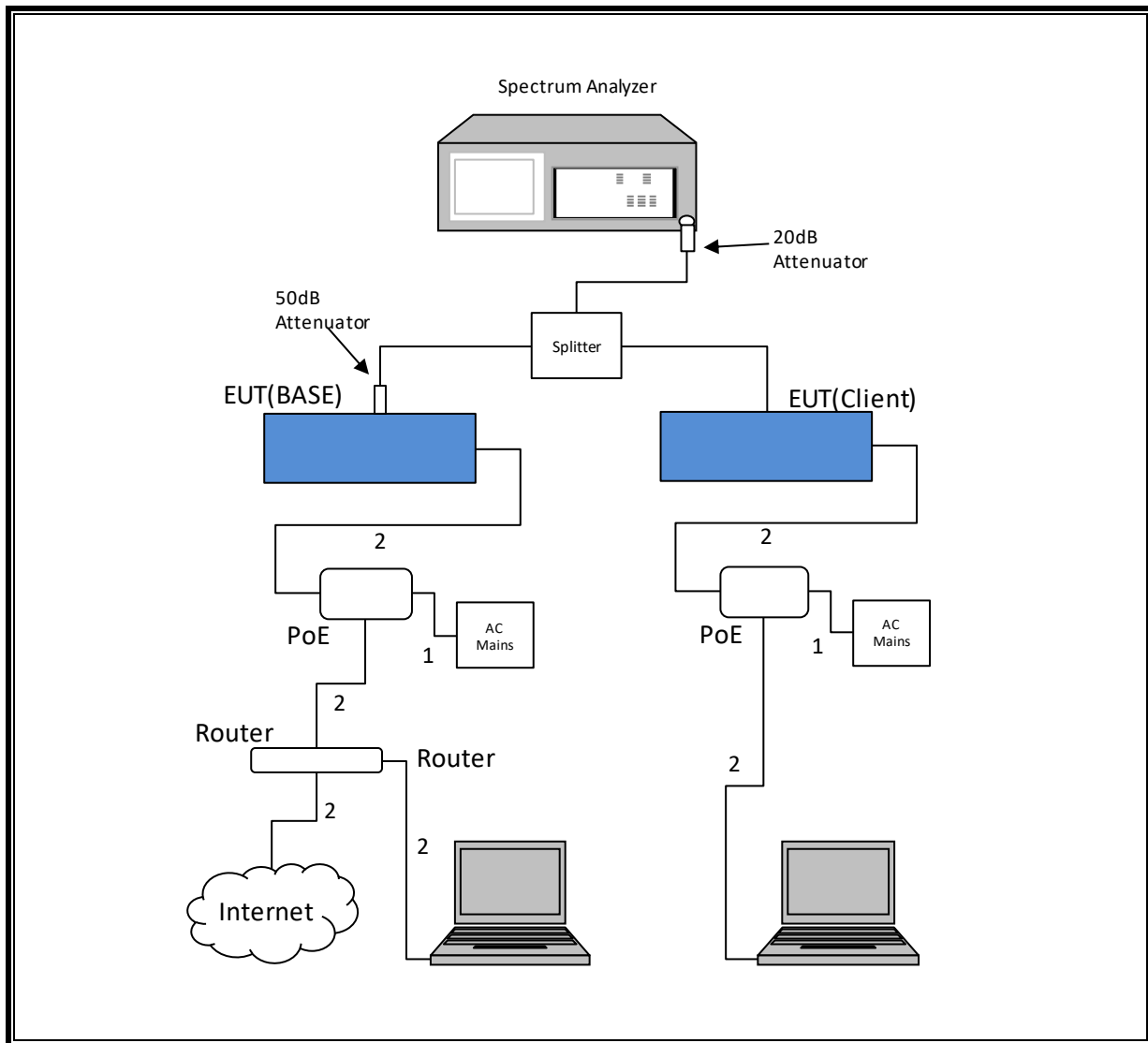
As illustrated in the following setup diagram, the EUT is the Adaptrum ACRS 2.0 base and client radios connected through cable assembly with proper attenuation to form a broadband communications system allowing the client-side PC to connect to the Internet (on the base side) through the TV White Space 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 image displays two screenshots of the Adaptrum web interface, demonstrating successful device registration and channel selection.

**Screenshot 1: Device Logs**

The top screenshot shows the "Device Logs" page. The status bar indicates the device is "Transmitting" with a power level of 20 and a signal strength of 0.59% / 0%. The "Logs" section shows a successful registration process:

```
Register Device
Dec-17-2018 22:05:12
Sending Request to https://paws.wsdh.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 22:05:34
Sending Request to https://paws.wsdh.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":{"stop
Got Response:
Code: 200
Response: {"id":3,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":{"timeRange":{"stopTime":"2018-12-19T22:05:37.148
Channel 16 (482000000 - 485000000): 40
Channel 17 (488000000 - 491000000): 40
```

**Screenshot 2: Channel Selection**

The bottom screenshot shows the "Channel Selection" page. The status bar indicates the device is "Transmitting" with a power level of 20 and a signal strength of 0.59% / 0%. The "Channels" section shows a list of available channels:

Select	CH	Max Power (MOP / GOP)	Noise Level
<input type="checkbox"/>	14		
<input type="checkbox"/>	15		
<input type="checkbox"/>	16	40 / undefined	
<input type="checkbox"/>	17	40 / undefined	
<input type="checkbox"/>	18		
<input type="checkbox"/>	19		
<input checked="" type="checkbox"/>	20	40 / undefined	
<input type="checkbox"/>	21		
<input type="checkbox"/>	22		

Buttons for "RUN CHANNEL SCAN", "REQUEST AVAILABLE CHANNELS", "STOP TRANSMIT", and "SET CHANNELS" are visible.

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

Agilent 14:26:25 Dec 17, 2018

L

Detector

APv9.3(120718),19497 AF, Conducted B

Mkr1 509.00 MHz

Ref -28 dBm

Atten 10 dB

-91.55 dBm

Auto

#Avg

Log

10

dB/

Normal

Average

(Log/RMS/V)

#PAvg

Peak

W1 S2

S3 FC

AA

Sample

f(f):

FTun

Swp

Negative Peak

Center 509.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

More

1 of 2

Copyright 2000-2011 Agilent Technologies

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

The screenshot displays the Adaptrum web interface in a browser window. The address bar shows the URL `10.19.0.25/fuc/admin/system/deviceLogs`. The interface has a red header with the 'Adaptrum' logo. On the left is a navigation menu with options: Device, Database, Channels, Link, Clients, System, Device Logs (highlighted), Device Password, Support, and Logout. The main content area is titled 'Status' and shows details for device 'A2PXJ331'. It lists 'A2.1.3' as the version, 'R0.c3.5' as the firmware, and 'Transmitting' as the status. It also shows '20' channels and '0.95% / 0.94%' usage. Below this is a 'Logs' section with a table showing channel status (Radio vs Database) for channels 40 through 48. Below the table, the log text shows a successful request to the TVWS database and a response containing channel availability data. A 'SAVE FILE' button is visible at the bottom right of the log area.

Radio	Database
Channel 40 (626000000 - 632000000):	40
Channel 41 (632000000 - 638000000):	40
Channel 48 (674000000 - 680000000):	40

Sending Request to `https://paws.wdb.uk/?token=3b65e38b-415e-4764-87d4-cd1e44ed4ca2` :  
{"id":5,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"masterDeviceLocation":{"point":{"semiMinorAxis":0,"orientation":0,"center":{"longiti  
Got Response:  
Code: 200  
Response: {"id":5,"jsonrpc":"2.0","result":{"type":"AVAIL\_SPECTRUM\_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime":"2018-12-19T22:18:46.996  
Channel 16 (482000000 - 488000000): 40  
Channel 17 (488000000 - 494000000): 40  
Channel 19 (508000000 - 506000000): 40  
Channel 20 (506000000 - 512000000): 40  
Channel 21 (512000000 - 518000000): 40  
Channel 26 (542000000 - 548000000): 40  
Channel 27 (548000000 - 554000000): 40  
Channel 39 (620000000 - 626000000): 40  
Channel 40 (626000000 - 632000000): 40  
Channel 48 (674000000 - 680000000): 40  
Request Channels SOP Successful



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

✱ Agilent 14:26:58 Dec 17, 2018

L

Detector

APv9.3(120718),19497 AF, Conducted B

Mkr1 509.00 MHz

Ref -28 dBm

Atten 10 dB

-56.94 dBm

Auto

#Avg

Log

10

dB/

Normal

Average  
(Log/RMS/V)

#PAvg

Peak

W1 S2

S3 FC

AA

Sample

f(f):

FTun

Swp

Negative Peak

Center 509.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

More  
1 of 2

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## 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

### 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 base software interface. The main status area displays the following information:

- Device:** A2PXJ331
- Database:** A2.1.3
- Channels:** R0.c3.5
- Status:** Not Transmitting
- Link:** -1
- Clients:** 0% / 0%

The 'Logs' section shows a failed registration attempt:

```

=====
| Register Device |
| Dec-17-2018 22:46:55 |
=====
Sending Request to https://paws.wsdh.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,"majorAxis":0,"point":{}}},"rulesetInfos":{"maxLocal":0}}}
Got Response:
Code: 200
Response: {"id":2,"jsonrpc":"2.0","result":{"type":"REGISTRATION_RESP","version":"1.0","serverMessage":null,"databaseChange":null,"rulesetInfos":{"maxLocal":0}}}
Registration Passed!
=====
| Request Channels |
| Dec-17-2018 22:46:56 |
=====
Sending Request to https://paws.wsdh.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":{"start":0,"end":0}}}
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 PDF Failed!
=====
  
```

A 'SAVE FILE' button is located 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"/>	

Adaptrum - Location - Luci

Not secure | 10.19.0.25/luci/admin/device/location

Adaptrum

Device

Status

IP Address

Location

Update

Diagnostics

Reboot

Database

Channels

Link

Clients

System

Logout

Status

Device Firmware

Firmware Version

Hardware Version

Upn ID

Current Channel

LLNFS Version

A2PXJ331

A2.1.3

R0.c3.5

Not Transmitting

-1

0% / 0%

Location

The location of your device

GPS

Latitude

41.40809

Longitude

-75.64332

Speed (km/h)

10

SAVE & APPLY

RESET

Adaptrum - Device Logs - Luci

← → ↺ ⌂

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

Adaptrum

Device

Database

Channels

Link

Clients

System

Device Logs

Device Password

Support

Logout

Status

Serial Number

AP2PXJ331

Firmware Version

A2.1.3

Hardware Version

R0.c3.5

Mode

Not Transmitting

Channel (Channel)

-1

Signal Strength

0% / 0%

Logs

Radio

Database

```

Registration Passed!
=====
|           Request Channels           |
|           Dec-17-2018 22:54:03       |
=====
Sending Request to https://paws.usd6.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":[{"stop
Got Response:
Code: 200
Response: [{"id":3,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime":"2018-12-19T22:54:08.912Z
Channel 16 (483000000 - 488000000): 40
Channel 17 (488000000 - 494000000): 40
Channel 20 (506000000 - 512000000): 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

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

The screenshot displays the Adaptrum web interface in a browser window. The address bar shows the URL `10.19.0.25/luci/admin/channels/channelSelection`. The interface has a red header with the 'Adaptrum' logo. A left sidebar contains navigation links: Device, Database, Channels, Link, Clients, System, and Logout. The 'Channels' section is active, showing a 'Status' area with fields for Device (A2PKJ331), Version (A2.1.3), Model (R0.03.5), and Status (Not Transmitting). Below this is a red box with the message 'No password set!' and a button 'Go to password configuration'. The 'Channels' table lists 10 channels with columns for Select, CH, Max Power (MOP / GOF), and Noise Level. All channels are currently 'undefined'.

Select	CH	Max Power (MOP / GOF)	Noise Level
<input type="checkbox"/>	15	40 / undefined	
<input type="checkbox"/>	17	40 / undefined	
<input type="checkbox"/>	20	40 / undefined	
<input type="checkbox"/>	26	40 / undefined	
<input type="checkbox"/>	27	40 / undefined	
<input type="checkbox"/>	35	40 / undefined	
<input type="checkbox"/>	39	40 / undefined	
<input type="checkbox"/>	40	40 / undefined	
<input type="checkbox"/>	41	40 / undefined	
<input type="checkbox"/>	48	40 / undefined	

### 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 displays the Adaptrum Channel Selection web interface. The status bar at the top indicates the device is transmitting on channel 20. The 'Channels' section shows a table of available channels, with channel 20 selected. The interface also includes a sidebar with navigation options like Device, Database, Channels, Link, Clients, System, Device Logs, Device Password, Support, and Logout.

Select	CH	Max Power (MOP / COP)	Noise Level
<input type="checkbox"/>	19	40 / undefined	
<input checked="" type="checkbox"/>	20	40 / undefined	
<input type="checkbox"/>	21	40 / undefined	
<input type="checkbox"/>	26	40 / undefined	
<input type="checkbox"/>	27	40 / undefined	
<input type="checkbox"/>	39	40 / undefined	
<input type="checkbox"/>	40	40 / undefined	
<input type="checkbox"/>	48	40 / undefined	

# **BASE SIGNAL SPECTRUM BEFORE DATABASE BLOCKING**

Agilent 15:06:51 Dec 17, 2018

L

**Detector**

APv9.3(120718),19497 AF, Conducted B

Mkr1 509.00 MHz

Ref -28 dBm

Atten 10 dB

-56.81 dBm

**Auto**

#Avg

Log

10

dB/

**Normal**

**Average**

(Log/RMS/V)

#PAvg

**Peak**

W1 S2

S3 FC

AA

**Sample**

f(f):

FTun

Swp

**Negative Peak**

Center 509.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

**More**

1 of 2

Copyright 2000-2011 Agilent Technologies

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

The screenshot displays the Adaptrum web interface in a browser window. The address bar shows the URL `10.19.0.25/luci/admin/system/device_logs`. The interface has a red header with the 'Adaptrum' logo. On the left is a sidebar menu with options: Device, Database, Channels, Link, Clients, System, Device Logs (highlighted), Device Password, Support, and Logout. The main content area is titled 'Status' and shows device information: A2PXJ331, A2.1.3, R0.c3.5, Transmitting, 20, and 0.52% / 0.79%. Below this is a 'Logs' section with a table header 'Radio Database' and a 'SAVE FILE' button. The log text shows a successful 'Request Channels SOP' and a failed 'Request Channels RDP'.

```
Radio Database
Channel 41 (632000000 - 638000000): 40
Channel 48 (674000000 - 680000000): 40
=====
Sending Request to https://paws.usdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :
{"id":5,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"masterDeviceLocation":{"point":{"semiMinorAxis":0,"orientation":0,"center":{"longitude":
Got Response:
Code: 200
Response: {"id":5,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime":"2018-12-19T23:00:20.245":
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.usdb.uk/?token=d-3b65e38b-415e-4764-87d4-cd1e44ed4ca2 :
{"id":6,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"type":"AVAIL_SPECTRUM_REQ","version":"1.0","capabilities":{"frequencyRanges":[{"stop
Request Channels RDP Failed!
```

**BASE SIGNAL SPECTRUM 5 MINUTES AFTER DATABASE BLOCKING**

Agilent 15:13:10 Dec 17, 2018

L

APv9.3(120718),19497 AF, Conducted B

Mkr1 509.00 MHz

Ref -28 dBm

Atten 10 dB

-107.33 dBm

#Avg

Log

10

dB/

#PAvg

W1 S2

S3 FC

AA

E(f):

FTun

Swp

Center 509.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

**Detector**

Auto

Normal

Average  
(Log/RMS/V)

Peak

Sample

Negative Peak

More  
1 of 2

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## 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 TESTING TIMELINE ILLUSTRATION

TVBD UUT  
Base or Client

TVBD Transmission  
On

TVBD Transmission Stopped  
Since Ch. 17 Not Available  
at Base Location

Low Power  
Aux Device

Low Power Auxiliary Device  
registration at Base location  
on Ch.17

Start Test

Start Protection  
Period

End Test

### 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	Serial Number	Firmware Version	Baseband Version	Link Info	Channel	Power
A2PXJ331	Transmitting	A2.1.3	R0.c3.5	17	0.67% / 0.76%		

**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=3b6530b-415e-4764-87d4-cd1e44eddc2:	
{"id":4,"method":"spectrum.paws.getSpectrum","jsonrpc":"2.0","params":{"type":"AVAIL_SPECTRUM_REQ","version":"1.0","capabilities":{"frequencyRanges":[{"stopTime":2018-12-19T23:24:52,507}]}}	
Got Response:	
Code: 200	
Response: {"id":4,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpec":{"timeRange":{"stopTime":"2018-12-19T23:24:52,507"/>	
Channel 16 (482000000 - 488000000): 40	
Channel 17 (488000000 - 494000000): 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

Mkr1 491.00 MHz

Ref -28 dBm

Atten 10 dB

-58.50 dBm

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

#Avg

Log

10

dB/

#PAvg

W1 S2

S3 FC

AA

E(f):

FTun

Swp

Center 491.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

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

APv9.3(120718),19497 AF, Conducted B

Mkr1 491.00 MHz

Ref -28 dBm

Atten 10 dB

-108.11 dBm

#Avg

Log

10

dB/

#PAvg

W1 S2

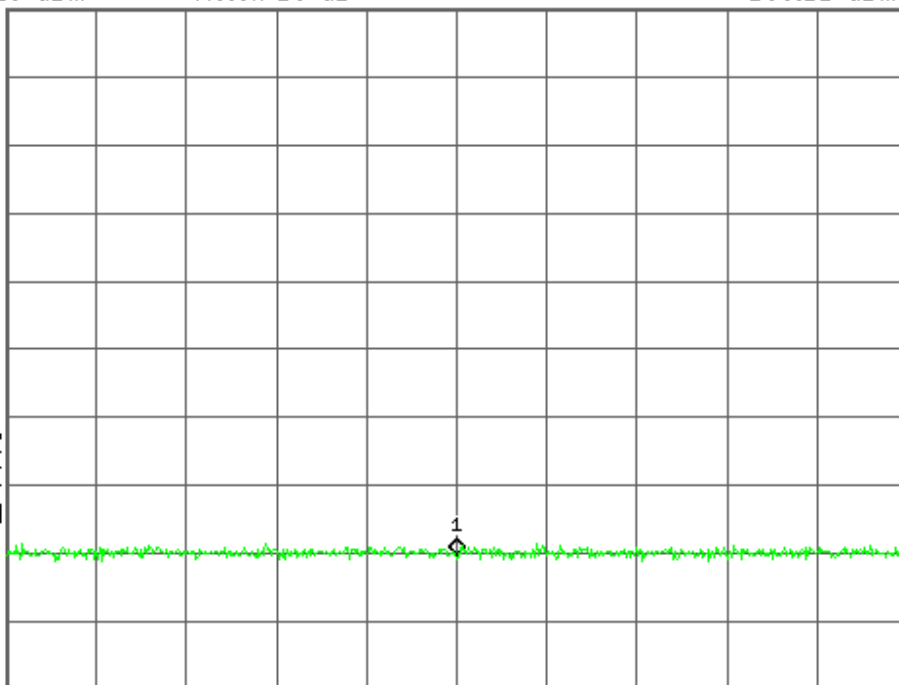
S3 FC

AA

E(f):

FTun

Swp



Center 491.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

Freq/Channel

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

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## 48 HOUR CHANNEL SCHEDULING CLIENT SOFTWARE BEFORE PROTECTION PERIOD

The screenshot displays the Adaptrum web interface for device management. The browser address bar shows the URL `10.19.0.25/luci/admin/system/deviceLogs`. The interface includes a sidebar menu with options: Device, Database, Channels, Link, Clients, System, Device Logs (highlighted), Device Password, Support, and Logout. The main content area is titled 'Status' and shows device information for 'A2PXJ331', including 'A2.1.3', 'R0.c3.5', 'Transmitting', '17', and '0.78% / 0.75%'. A red alert box states 'No password set!' with a link to 'Go to password configuration...'. Below this is a 'Logs' section with a table showing radio and database logs. The logs include channel information and a successful PDP response.

**Status**

Device: A2PXJ331 | A2.1.3 | R0.c3.5 | Transmitting | 17 | 0.78% / 0.75%

**No password set!**  
There is no password set on this router. Please configure an Admin password to protect the web interface.  
[Go to password configuration...](#)

**Logs**

Radio	Database
Channel 41 (652000000 - 653000000): 40	
Channel 48 (674000000 - 680000000): 40	
PDP: successful!	
Sending Request to: http://pau.vddr.uk/tokenid=3b45e38b-415e-4764-8704-c3e84edeca2	
{"id":5,"method":"spectrum.pau.getSpectrum","jsonp":"2.0","params":{"masterDeviceLocation":{"point":{"semiMinorAxis":0,"orientation":0,"center":{"lonlit	
Get Response:	
Code: 200	
Response: {"id":5,"jsonp":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"startTime":"2018-12-21T21:36:49.029	
Channel 16 (482000000 - 483000000): 40	
Channel 17 (483000000 - 484000000): 40	
Channel 19 (500000000 - 505000000): 40	
Channel 20 (506000000 - 512000000): 40	
Channel 21 (512000000 - 518000000): 40	
Channel 25 (542000000 - 545000000): 40	
Channel 27 (548000000 - 554000000): 40	
Channel 38 (620000000 - 626000000): 40	
Channel 40 (626000000 - 632000000): 40	
Channel 45 (674000000 - 680000000): 40	
SDP: successful!	

# 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

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

#PAvg

W1 S2

S3 FC

AA

E(f):

FTun

Swp

Center 491.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

Copyright 2000-2010 Agilent Technologies

Adaptrum - Device Logs - LuCI

Not secure | 10.19.0.25/luci/admin/system/device\_logs

Adaptrum

Device
Database
Channels
Link
Clients
System
Device Logs
Device Password
Support
Logout

## Status

<div> <div>Radio</div> <div>A2PX/J31</div> </div>	<div> <div>Database</div> <div>A2.1.3</div> </div>	<div> <div>Channel</div> <div>R0 c3.5</div> </div>	<div> <div>Link</div> <div>Not Transmitting</div> </div>	<div> <div>Client</div> <div>17</div> </div>	<div> <div>System</div> <div>0% / 0.75%</div> </div>
---	--	--	--	--	--

No password set!

There is no password set on this router. Please configure an Admin password to protect the web interface.

Go to password configuration...

## Logs

Radio	Database
<pre> Channel 00 (626000000 - 632000000): 40 Channel 40 (626000000 - 632000000): 40 Channel 41 (632000000 - 638000000): 40 Channel 48 (674000000 - 680000000): 40 HDP successful! ===== Sending Request to https://pamr.vodafone.uk/?token=d.3b6e38b-415e-479a-87d4-cd44404c32 : {"id":7,"method":"spectrum.pamr.getSpectrum","jsonrpc":"2.0","params":{"masterDeviceLocation":{"point":{"semInNonKxi":0,"orientation":0,"center":{"longit dot Response: Code: 200 Response: {"id":7,"jsonrpc":"2.0","result":{"type":"AVAIL_SPECTRUM_RESP","version":"1.0","spectrumSpecs":[{"timeRange":{"stopTime":"2018-12-21T12:42:36.989 Channel 16 (482000000 - 488000000): 40 Channel 19 (508000000 - 506000000): 40 Channel 20 (506000000 - 512000000): 40 Channel 21 (512000000 - 518000000): 40 Channel 26 (542000000 - 548000000): 40 Channel 27 (548000000 - 554000000): 40 Channel 39 (620000000 - 626000000): 40 Channel 40 (626000000 - 632000000): 40 Channel 48 (674000000 - 680000000): 40 SOP successful! </pre>	

SAVE FILE

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

Agilent 13:15:18 Dec 15, 2018

L

Freq/Channel

APv9.3(120718),10649,

Mkr1 489.45 MHz

Ref -14 dBm

Atten 10 dB

-109.96 dBm

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

#Avg

Log

10

dB/

Center  
491.0000000 MHz

#PAvg

W1 S2

S3 FC

AA

£(f):

FTun

Swp

Center 491.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

Sweep 12.71 s (601 pts)

Copyright 2000-2010 Agilent Technologies

## 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

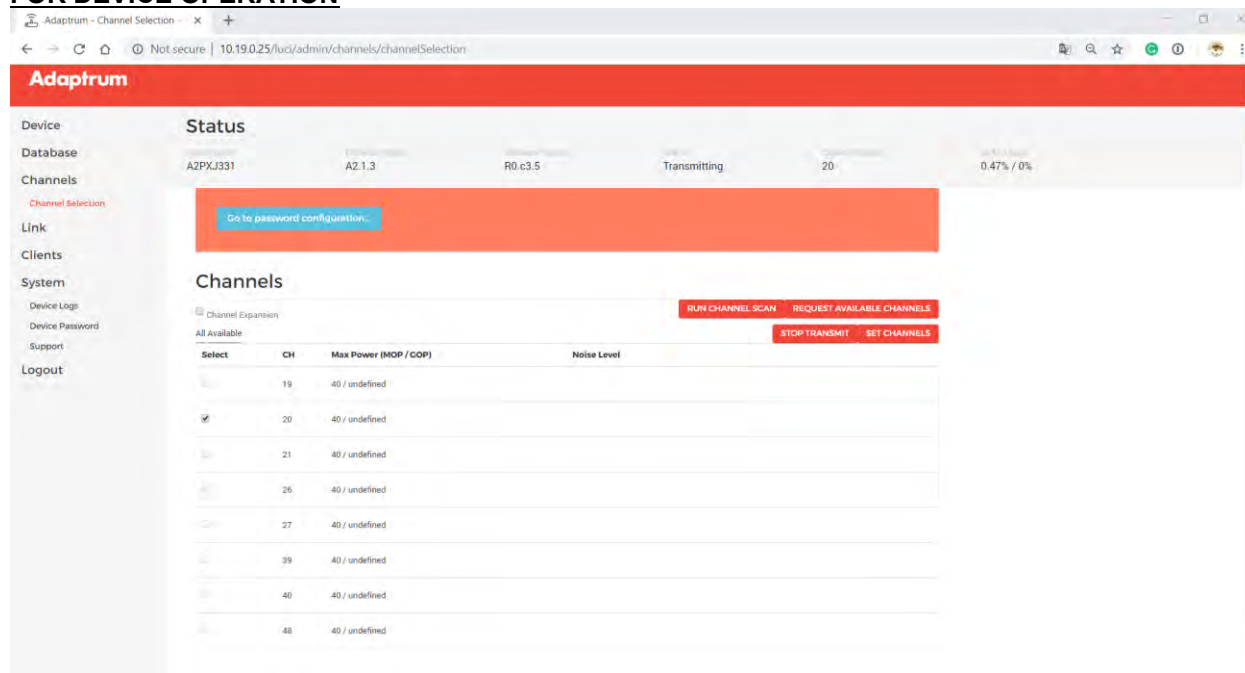
### RESULTS

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

L

**Freq/Channel**

APv9.3(120718),10649,

Mkr1 509.00 MHz

Ref -14 dBm

Atten 10 dB

-89.74 dBm

**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

£(f):

FTun

Swp

Center 509.00 MHz

Span 30 MHz

#Res BW 3 kHz

VBW 3 kHz

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:

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

### ANSWERS

- i. 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.

- ii. 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.

- iii. 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

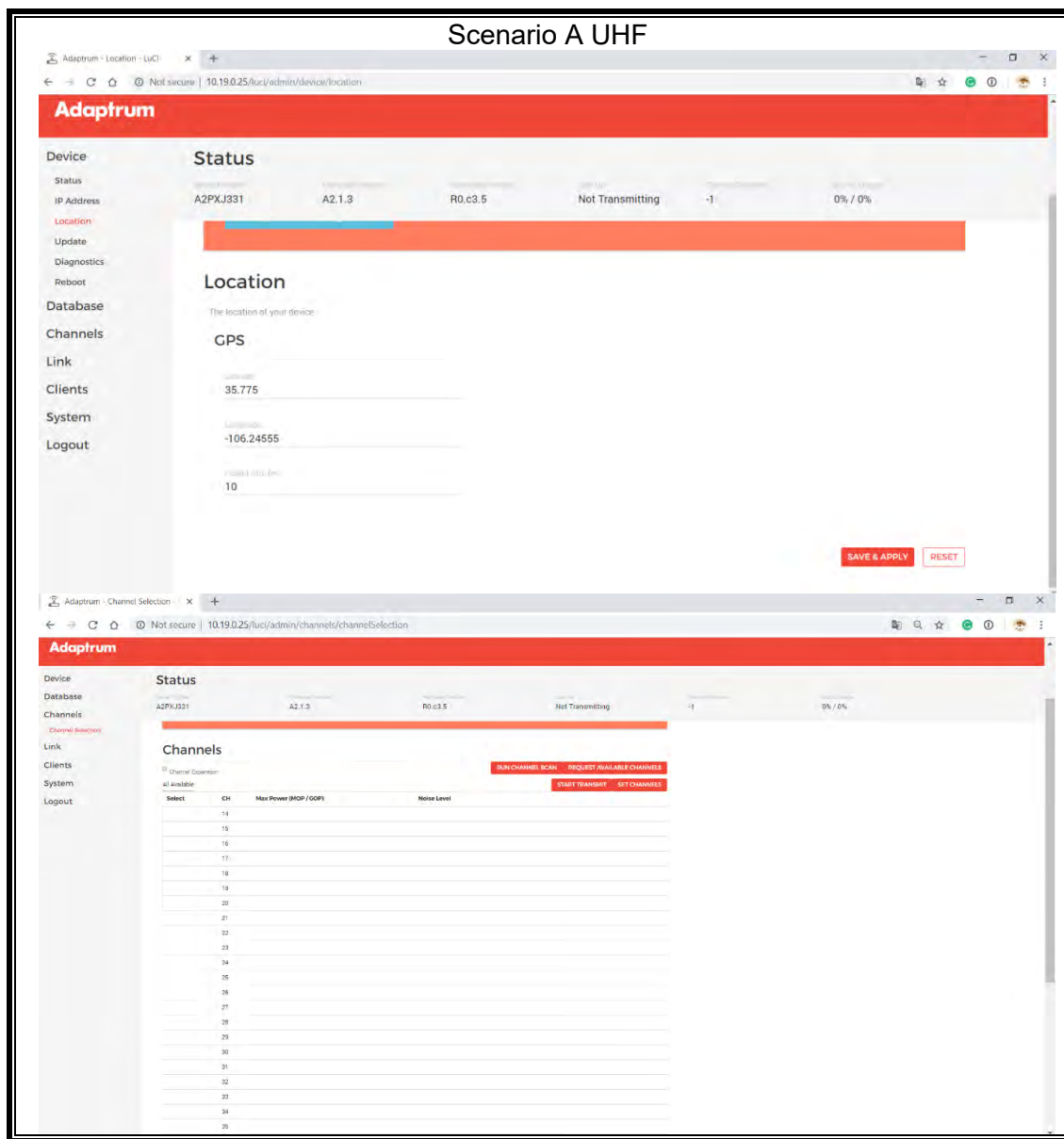
#### Scenarios

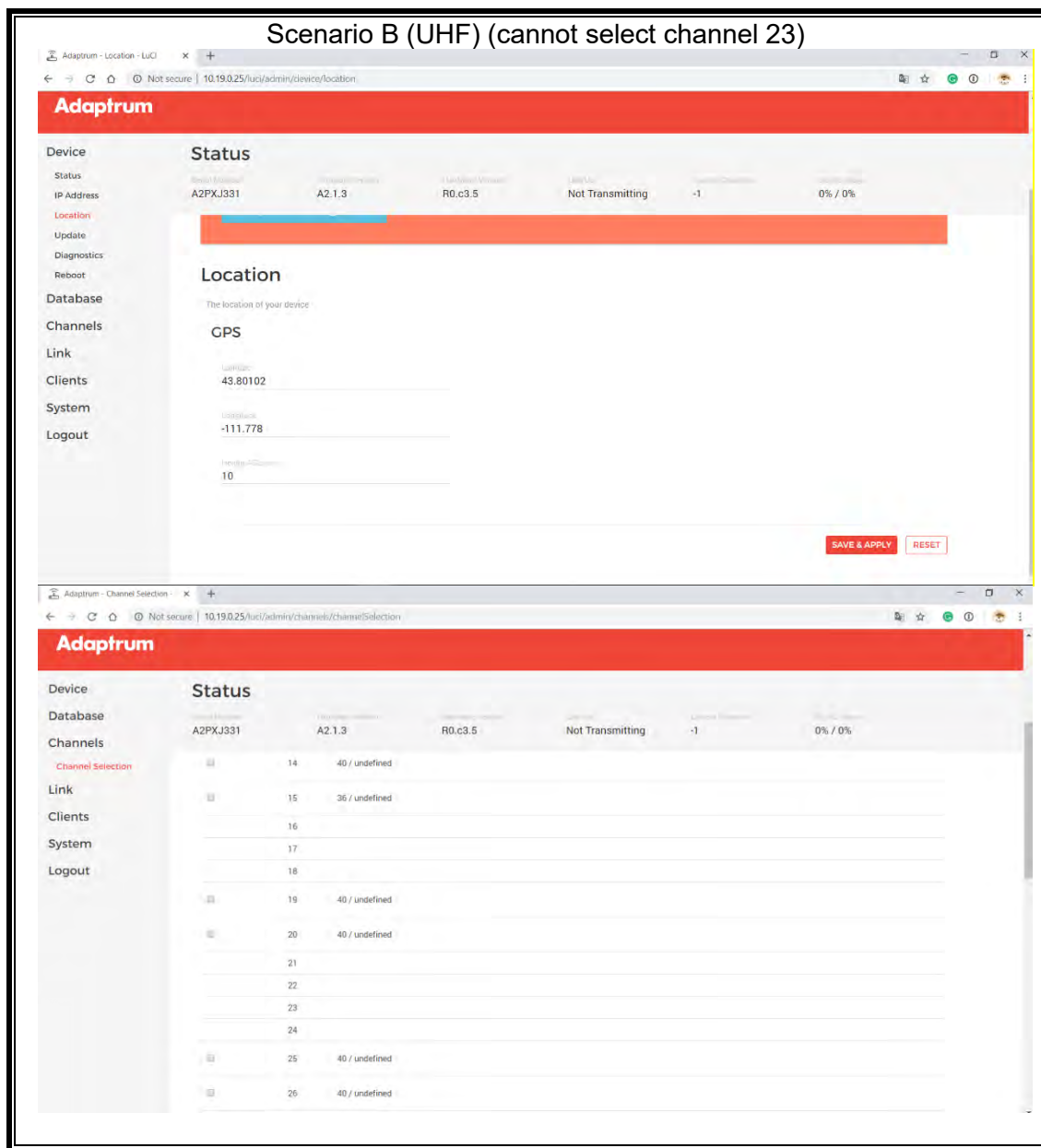
- a) Digital television stations, and digital and analog Class A TV, low power TV, TV translator and TV booster stations
- b) TV translator, Low power TV(including Class A) and Multi-channel Video Programming Distributor (MVPD)
- c) Fixed Broadcast Auxiliary Service (BAS) links
- d) PLMR/CMRS operations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

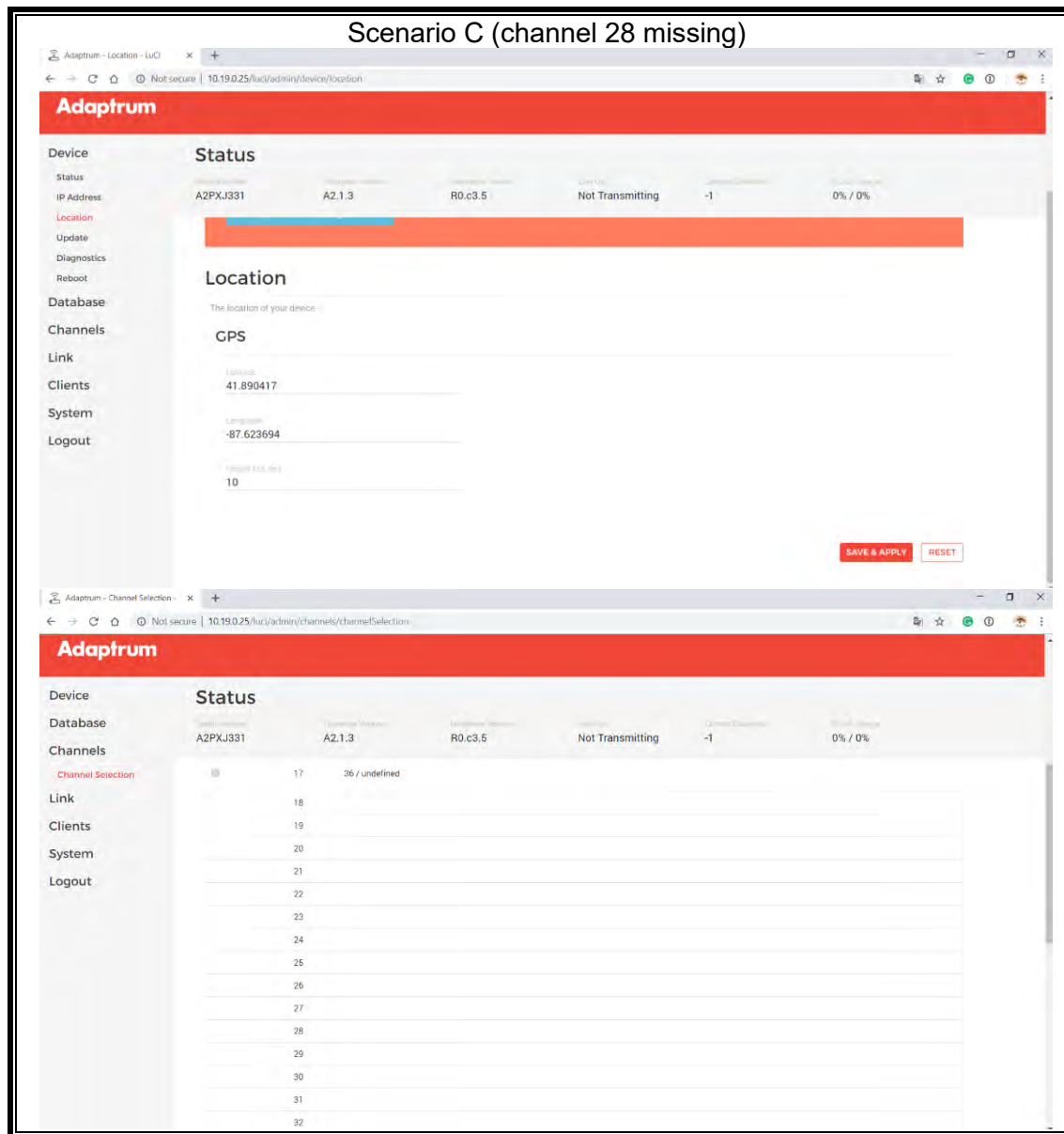
### **RESULTS**

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

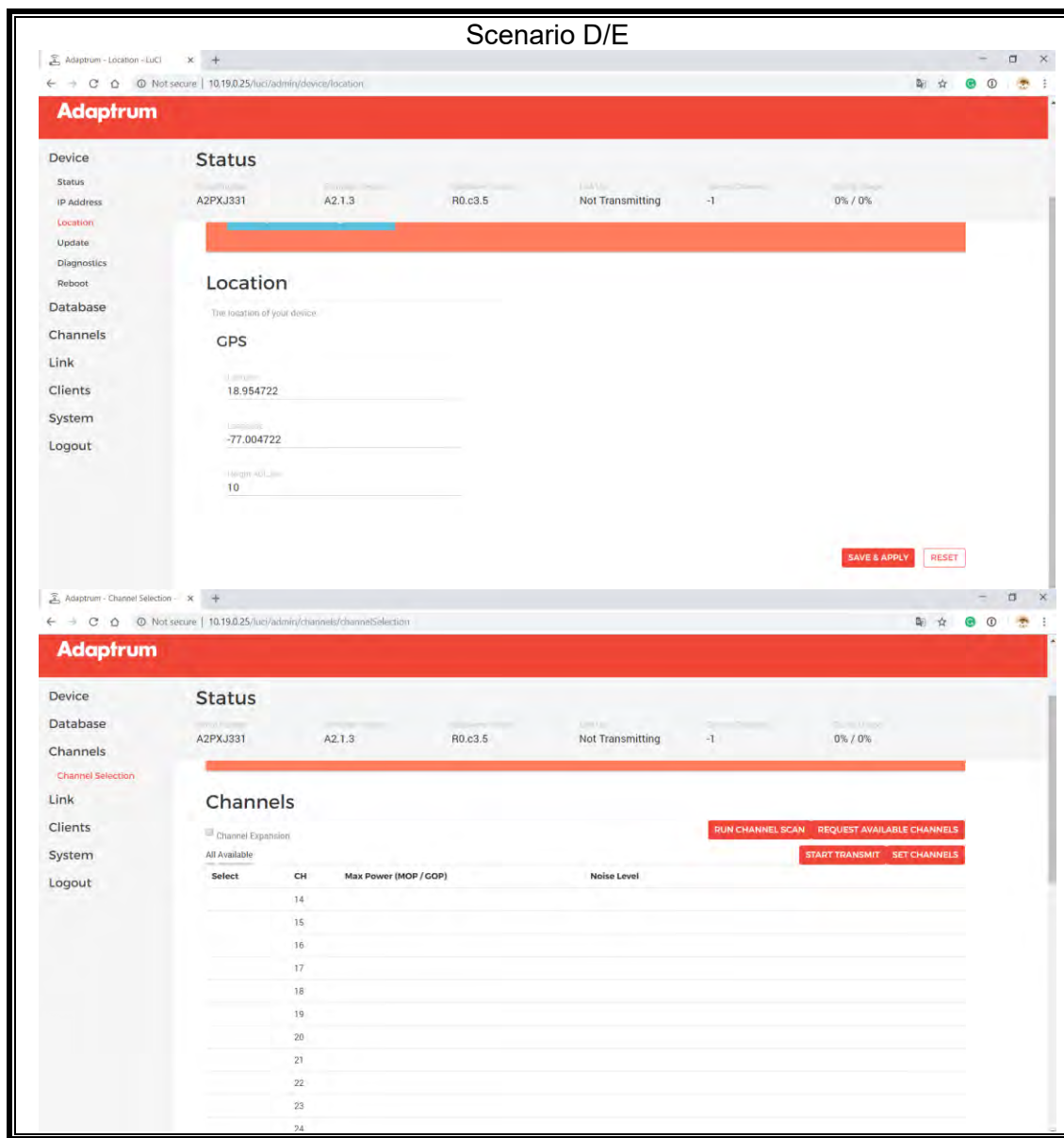
Test Results			
Pass	Fail	Tested By	Test Date
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12506	12/17/19











**Scenario G**

**Adaptrum**

Device

Status

IP Address

A2PXJ331

Location

Update

Diagnostics

Reboot

Database

Channels

Link

Clients

System

Logout

Status

Device ID

A2PXJ331

Device Name

A2.1.3

Device Model

R0.c3.5

Device Status

Not Transmitting

Device Power

-1

Device Signal

0% / 0%

Location

The location of your device

CPS

Latitude

32.608179

Longitude

-116.969585

Altitude (m)

10

SAVE & APPLY

RESET

**Adaptrum**

Device

Database

Channels

Channel Selection

Link

Clients

System

Logout

Status

Device ID

A2PXJ331

Device Name

A2.1.3

Device Model

R0.c3.5

Device Status

Not Transmitting

Device Power

-1

Device Signal

0% / 0%

Channel Selection

Channel Selection

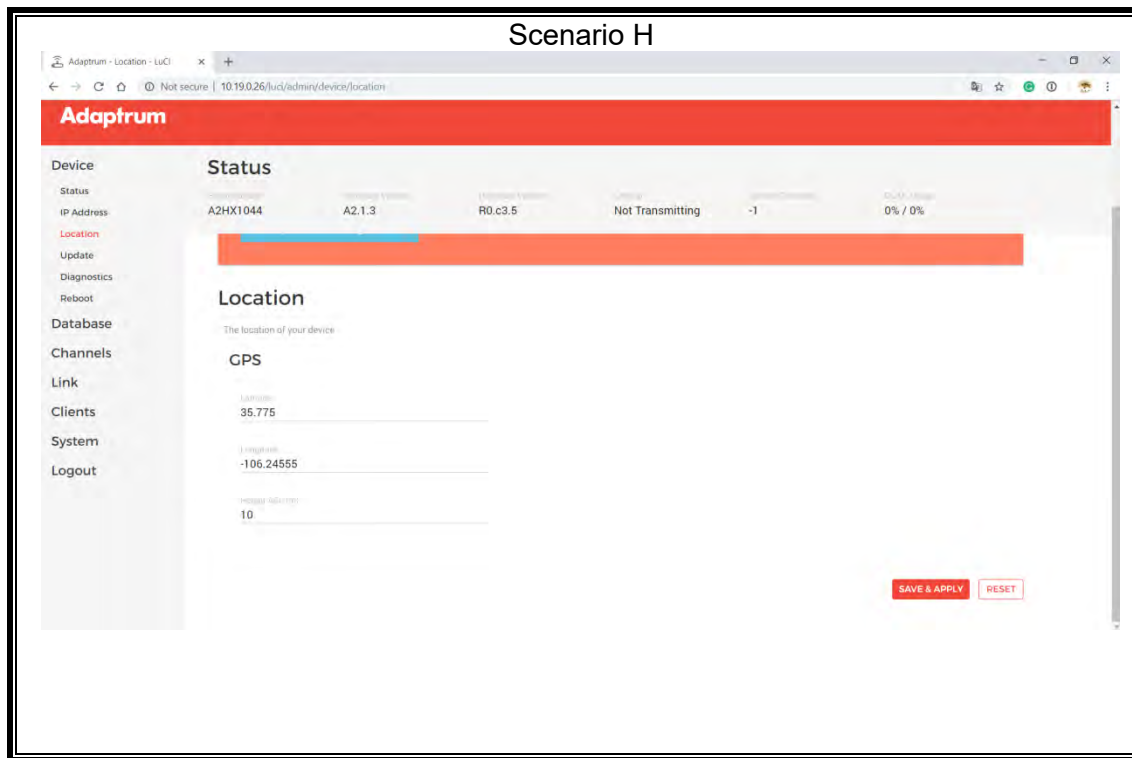
Run Channel Scan

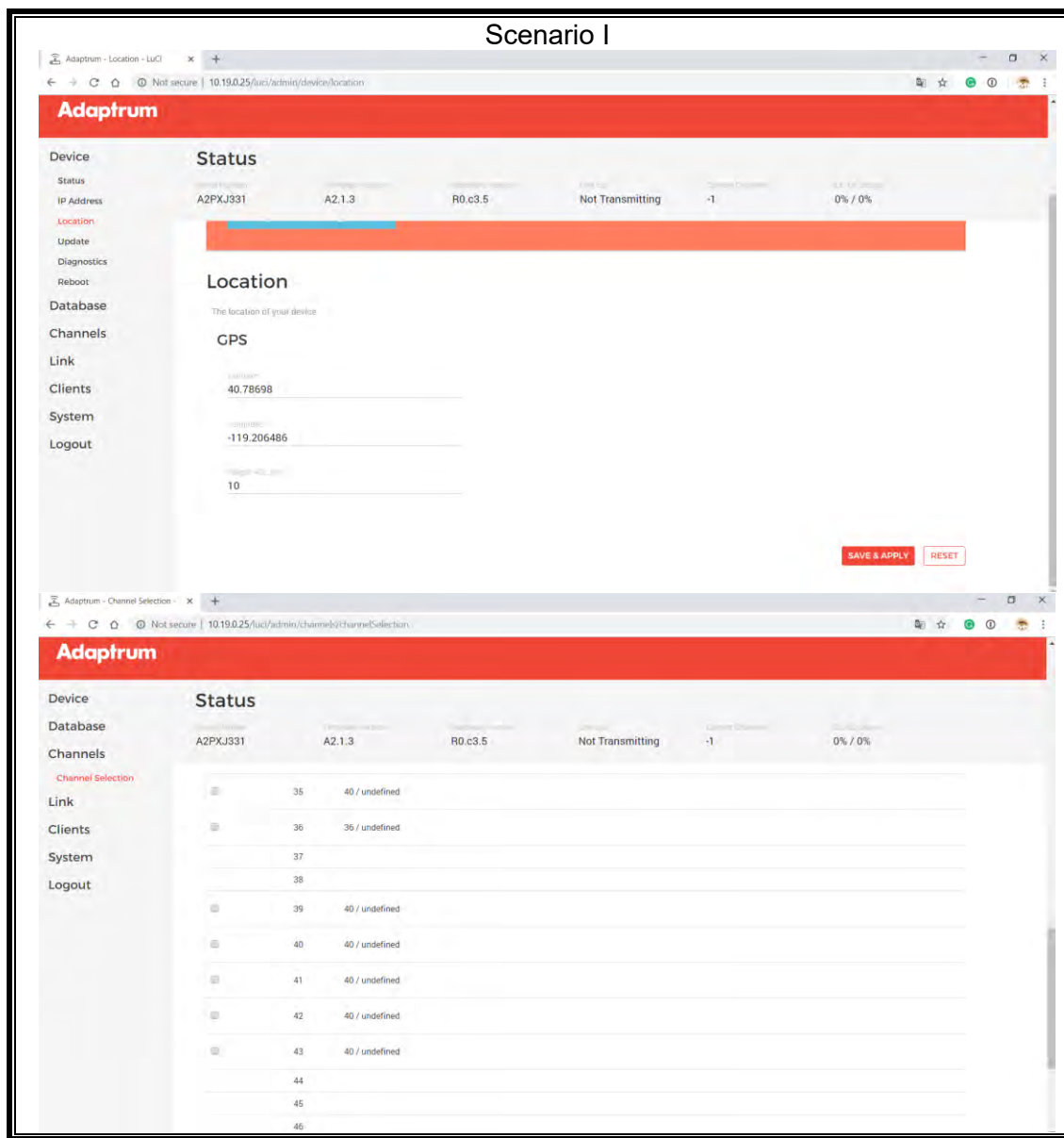
Request Available Channels

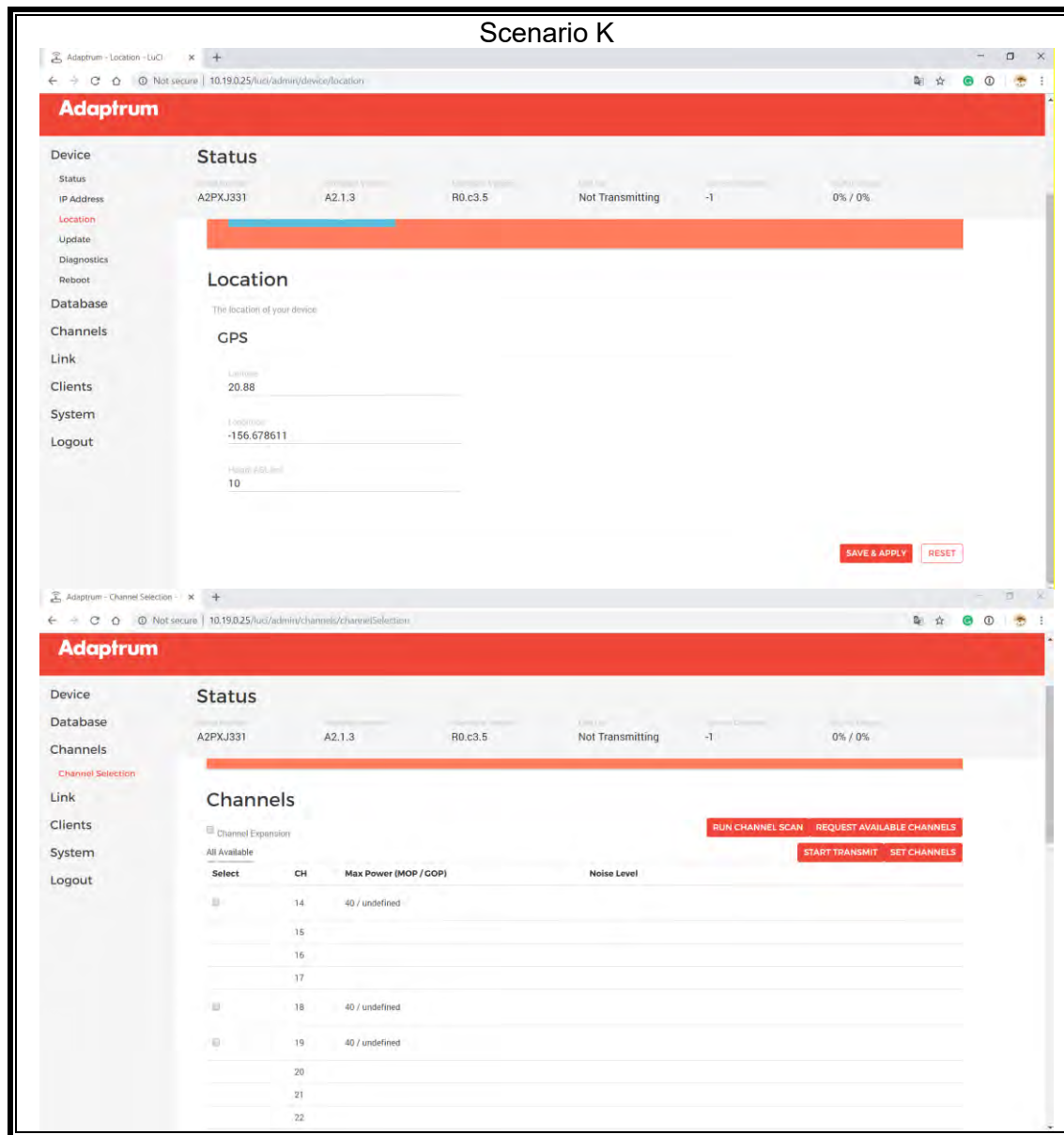
Start Transmit

Set Channels

Select	CH	Max Power (MOP / GOR)	Noise Level
<input checked="" type="checkbox"/>	14	40 / undefined	
<input type="checkbox"/>	15		
<input type="checkbox"/>	16		
<input type="checkbox"/>	17		
<input type="checkbox"/>	18		
<input type="checkbox"/>	19		
<input type="checkbox"/>	20		
<input type="checkbox"/>	21		
<input type="checkbox"/>	22		
<input type="checkbox"/>	23		
<input type="checkbox"/>	24		
<input type="checkbox"/>	25		
<input type="checkbox"/>	26		
<input type="checkbox"/>	27		
<input type="checkbox"/>	28		
<input type="checkbox"/>	29		
<input type="checkbox"/>	30		
<input type="checkbox"/>	31		
<input type="checkbox"/>	32		
<input type="checkbox"/>	33		







## 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**

Device: A2PXJ331 | Database: A2.1.3 | Channels: R0.c3.5 | Status: Transmitting | Power: 20 | Efficiency: 0.47% / 0%

**Channels**

Channel Expansion: All Available

Select	CH	Max Power (MOP / GOP)	Noise Level
<input type="checkbox"/>	17	40 / undefined	
<input type="checkbox"/>	19	40 / undefined	
<input checked="" type="checkbox"/>	20	40 / undefined	
<input type="checkbox"/>	21	40 / undefined	
<input type="checkbox"/>	26	40 / undefined	
<input type="checkbox"/>	27	40 / undefined	
<input type="checkbox"/>	35	40 / undefined	
<input type="checkbox"/>	39	40 / undefined	
<input type="checkbox"/>	40	40 / undefined	
<input type="checkbox"/>	41	40 / undefined	
<input type="checkbox"/>	48	40 / undefined	

**USA TVWS Protected Entity Registration**

Channel Search: Discover channel availability at your entered location.

Device Type: **Unlicensed Microwave Microphones** | **TV White Space**

Location (NAD83): **Channel 20D**

Latitude: 41.68809

Longitude: 75.66333

Height (AGL/m): 10

Available Channels with Power Limits

Channel	Power	Model1	Model2
1	40dBm	x	x
3	40dBm	x	x
4	40dBm	x	x
5	40dBm	x	x
6	40dBm	x	x
10	16dBm	x	x
12	16dBm	x	x
13	16dBm	16dBm	16dBm
15	40dBm	20dBm	20dBm
17	40dBm	20dBm	20dBm
19	40dBm	20dBm	20dBm
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	16dBm	16dBm	16dBm
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

