Section 8   Testing data
Test name   FCC 15.712 Interference protection requirements (Fixed and personal/portable)
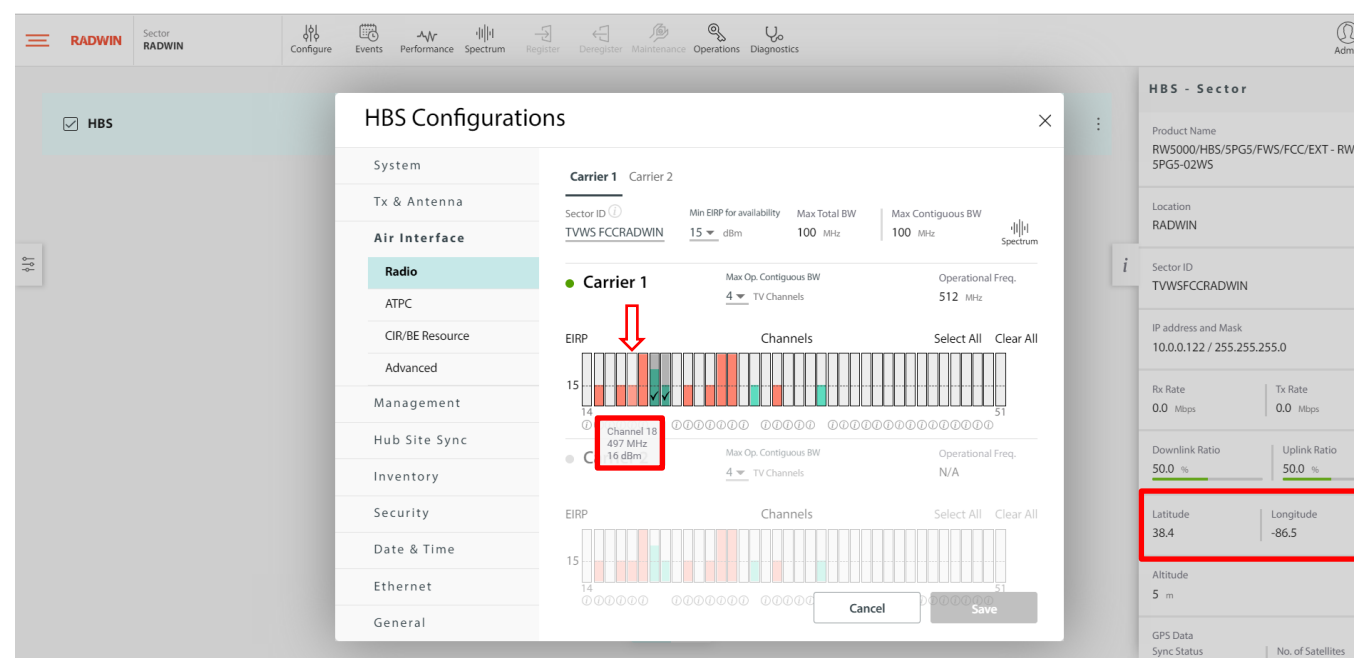**Specification**   FCC Part 15 Subpart H

8.19.4   Test data

Figure 8.19-1: Received channel list for coordinates set in scenarios (a) and (b). DCA channel 18 at location coordinates 38.4N, 86.5W
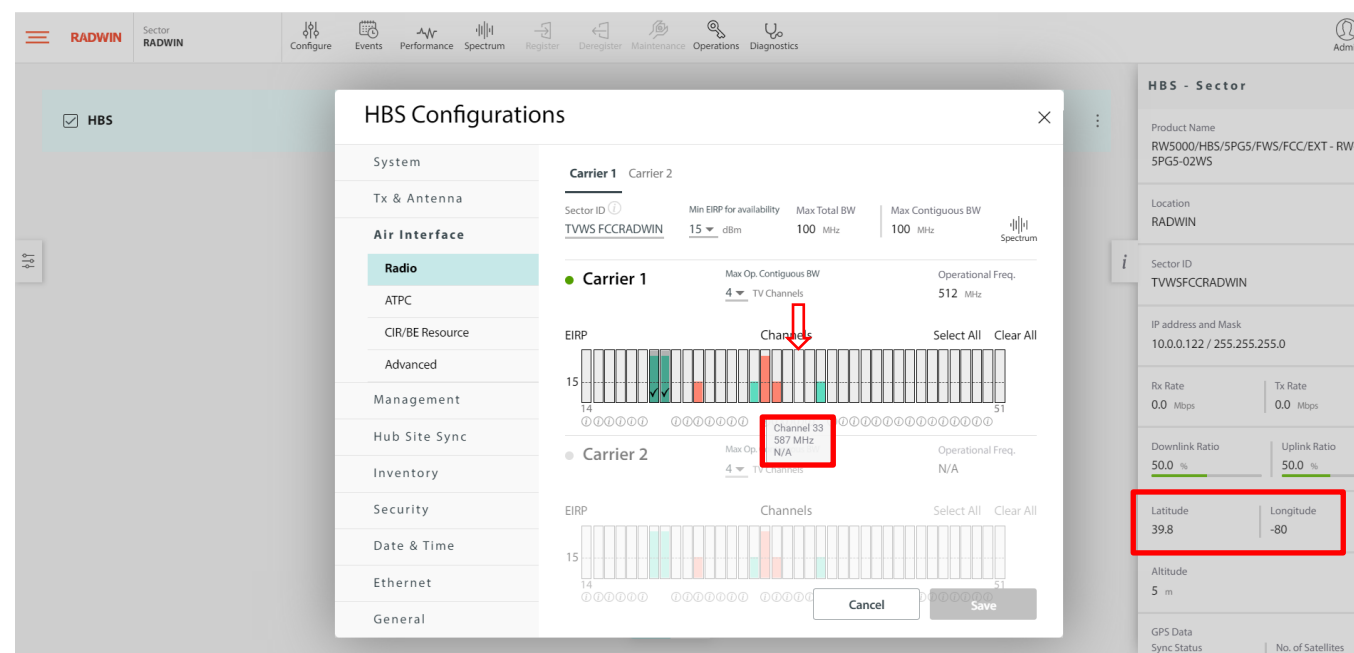

Figure 8.19-2: Received channel list for coordinates set in scenarios (a) and (b). DRT channel 33 at location coordinates 39.8N, 80.0W

Section 8   Testing data
Test name   FCC 15.712 Interference protection requirements (Fixed and personal/portable)
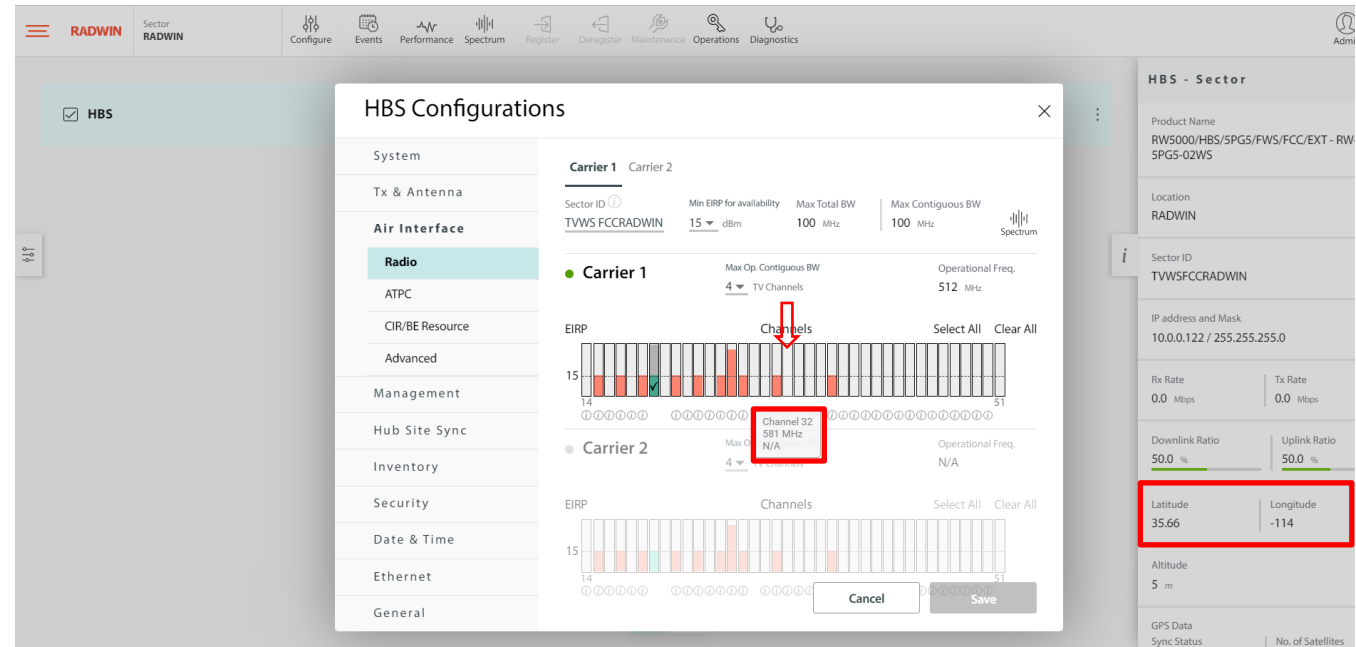**Specification**   FCC Part 15 Subpart H

Figure 8.19-3: Received channel list for coordinates set in scenarios (a) and (b). DTS channel 32 at location coordinates 35.66N, 114.0W

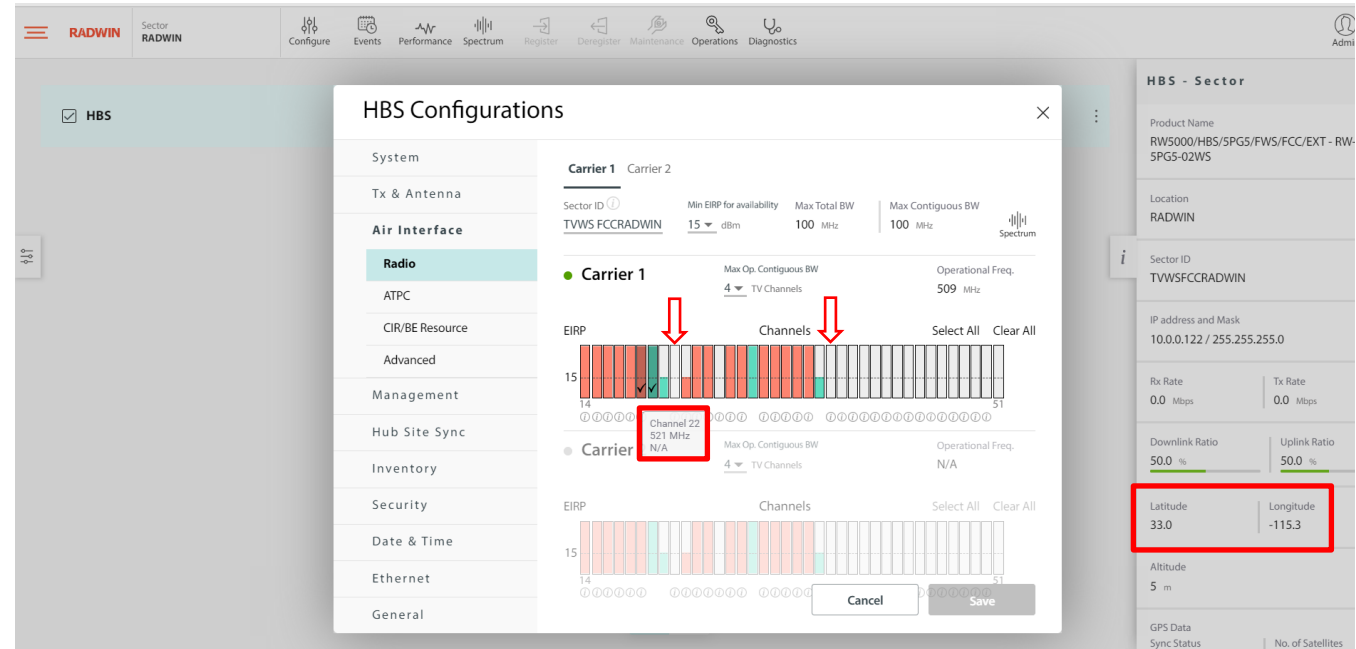*Figure 8.19-4: Received channel list for coordinates set in scenarios (a) and (b). DTV channels 22 and 36 at location coordinate 33.0N, 115.3W*

Report reference ID: 378820-4TRFWL
Applicant: RADWIN Inc.
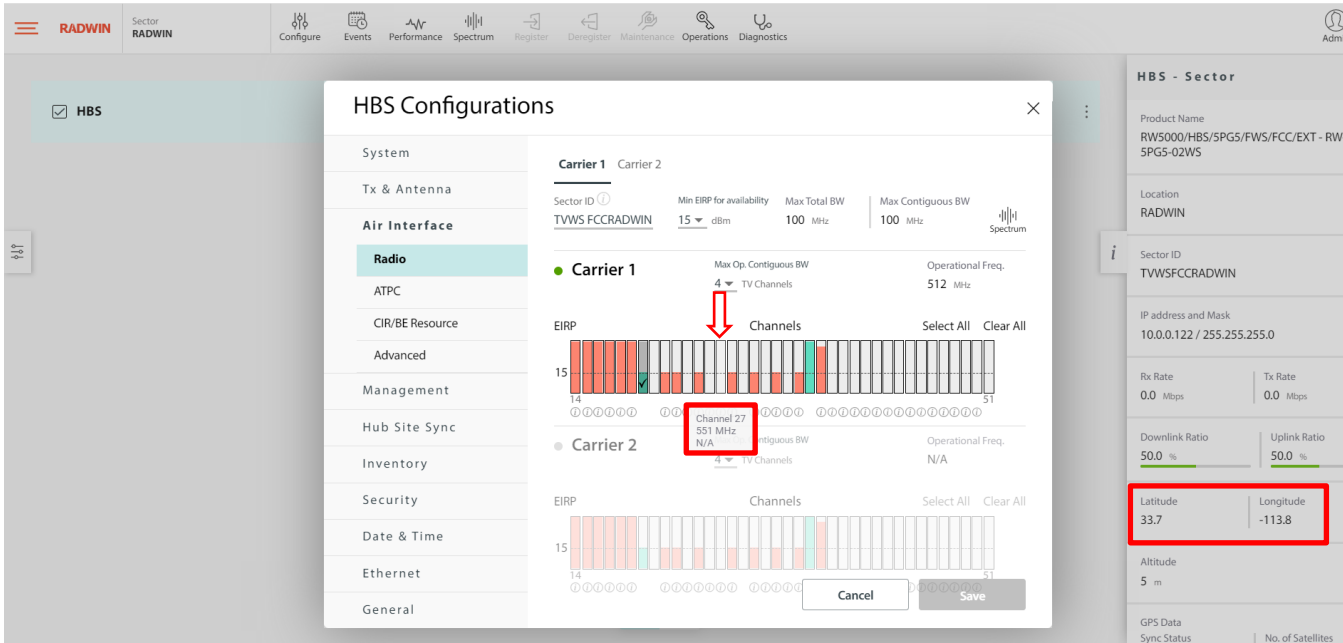Models: TVWS BS EXT; TVWS SU INT

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Figure 8.19-5: Received channel list for coordinates set in scenario (a) and (b). LPA channel 27 at location coordinates 33.7N, 113.8W
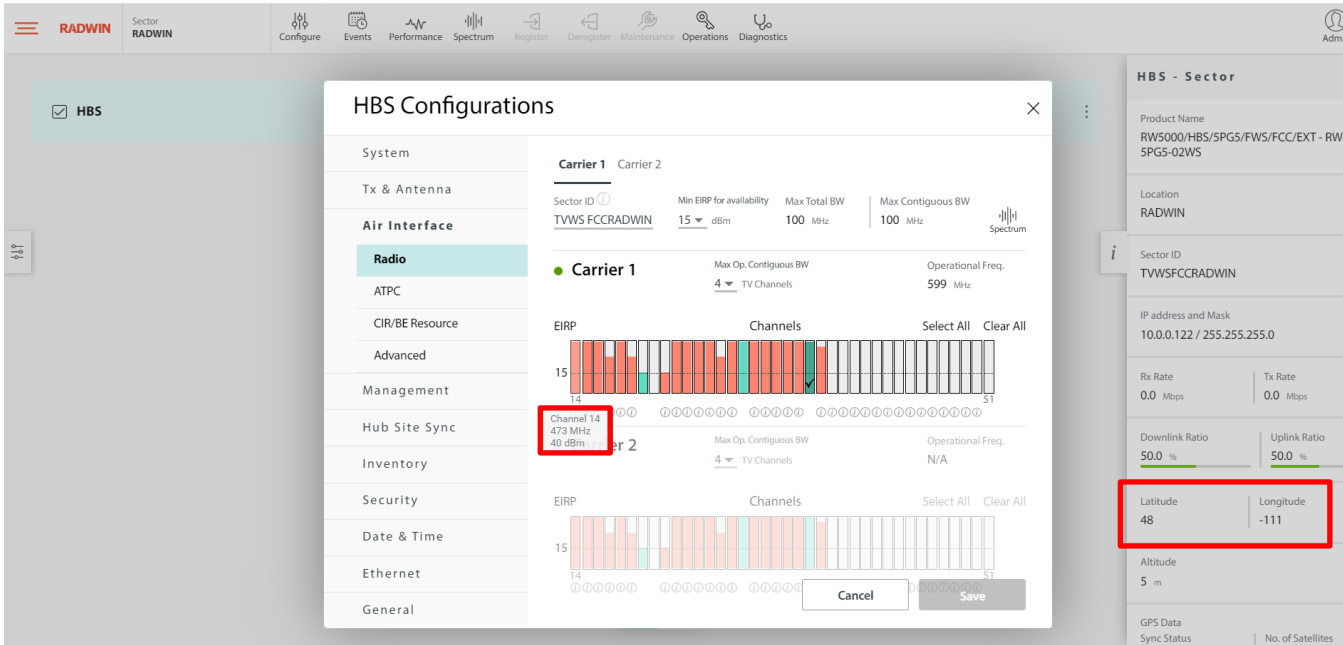

Figure 8.19-6: Received channel list for coordinates set in scenario (a) and (b). LPD channel 11 (outside operational band of the EUT) at location coordinates 48.0N, 111.0W
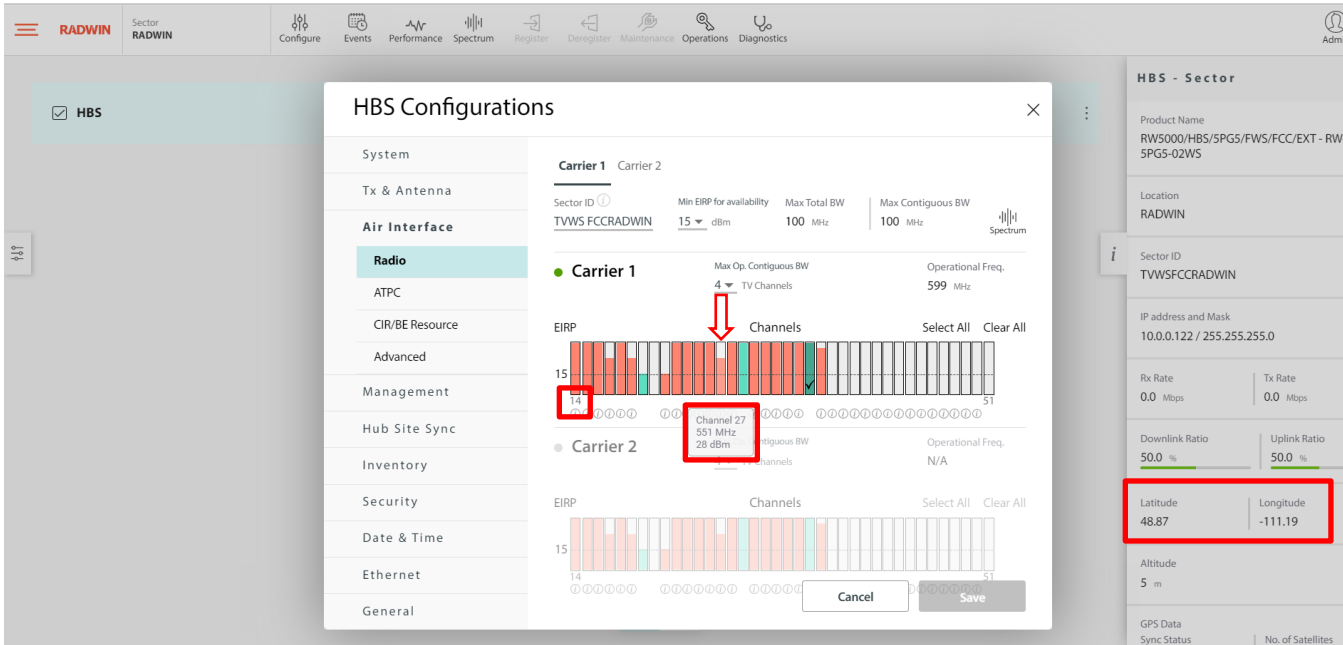
Figure 8.19-7: Received channel list for coordinates set in scenario (a) and (b). LPT channel 27 and TV receive site channel 11 (outside operational band of the EUT) at location coordinates 48.87N, 111.19W
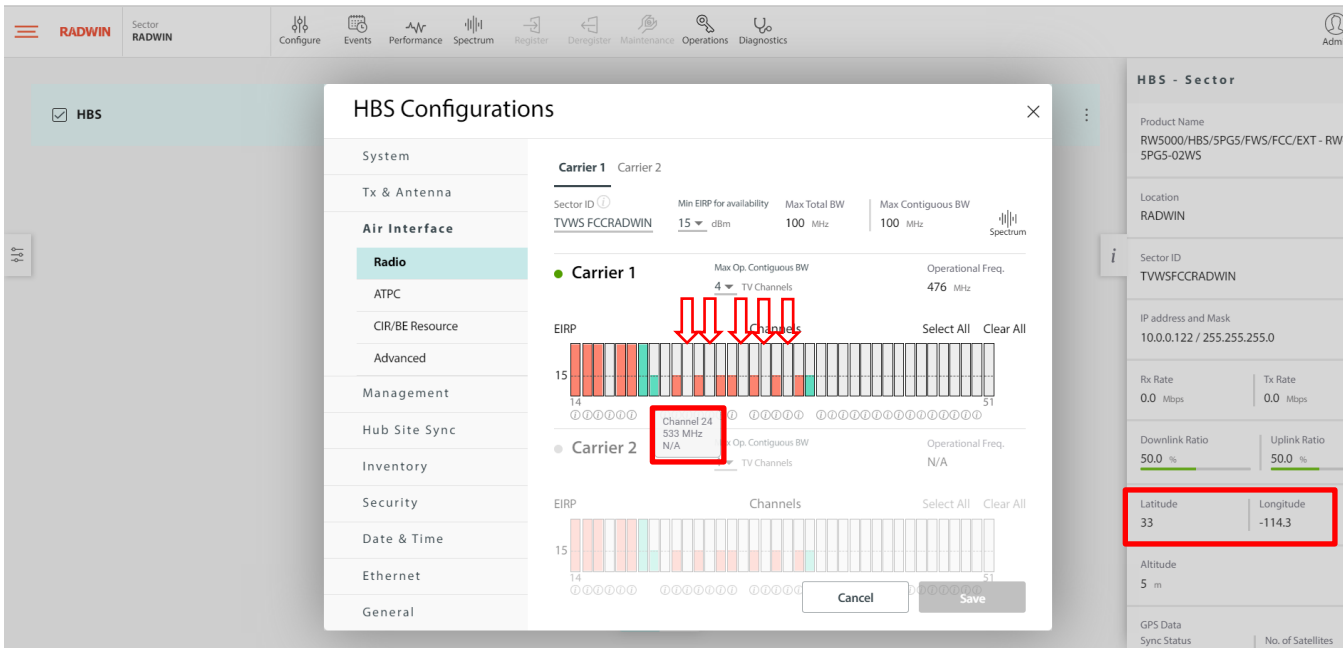

Figure 8.19-8: Received channel list for coordinates set in scenario (a) and (b). LPX channels 24, 26, 29, 31 and 33 at location coordinates 33N, 114.3W
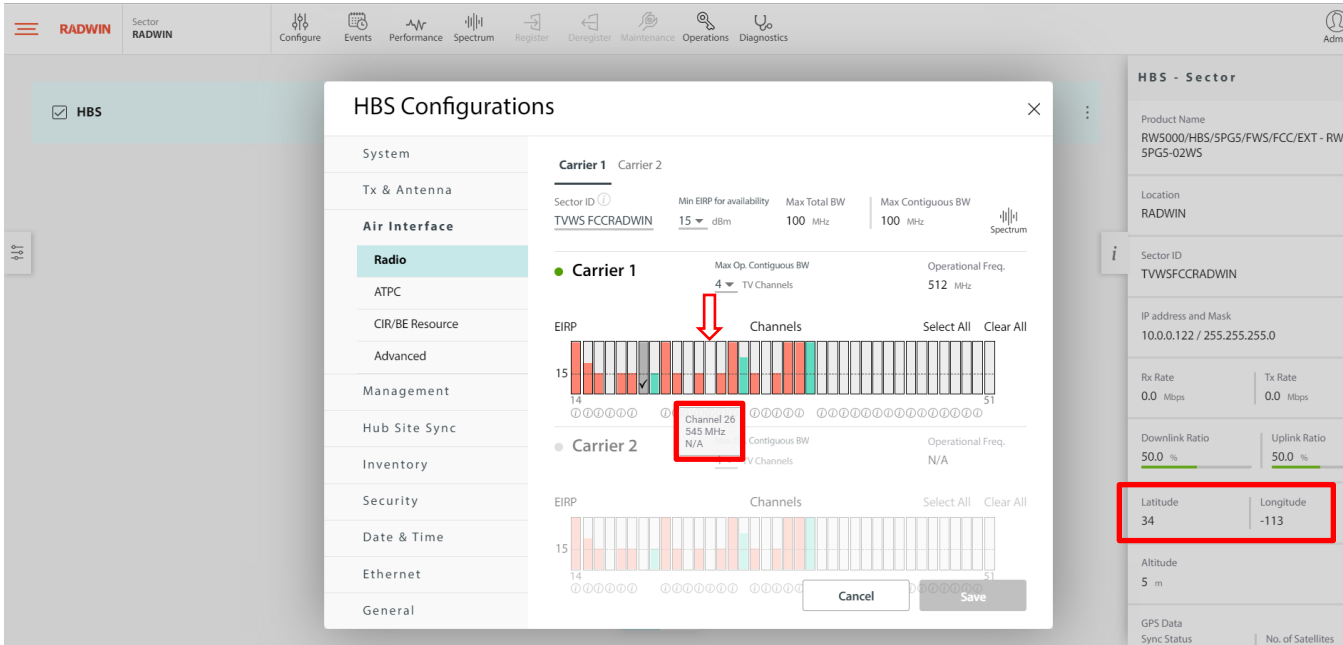
Figure 8.19-9: Received channel list for coordinates set in scenario (a) and (b). MVPD channel 26 at location coordinates 34.0N, 113.0W
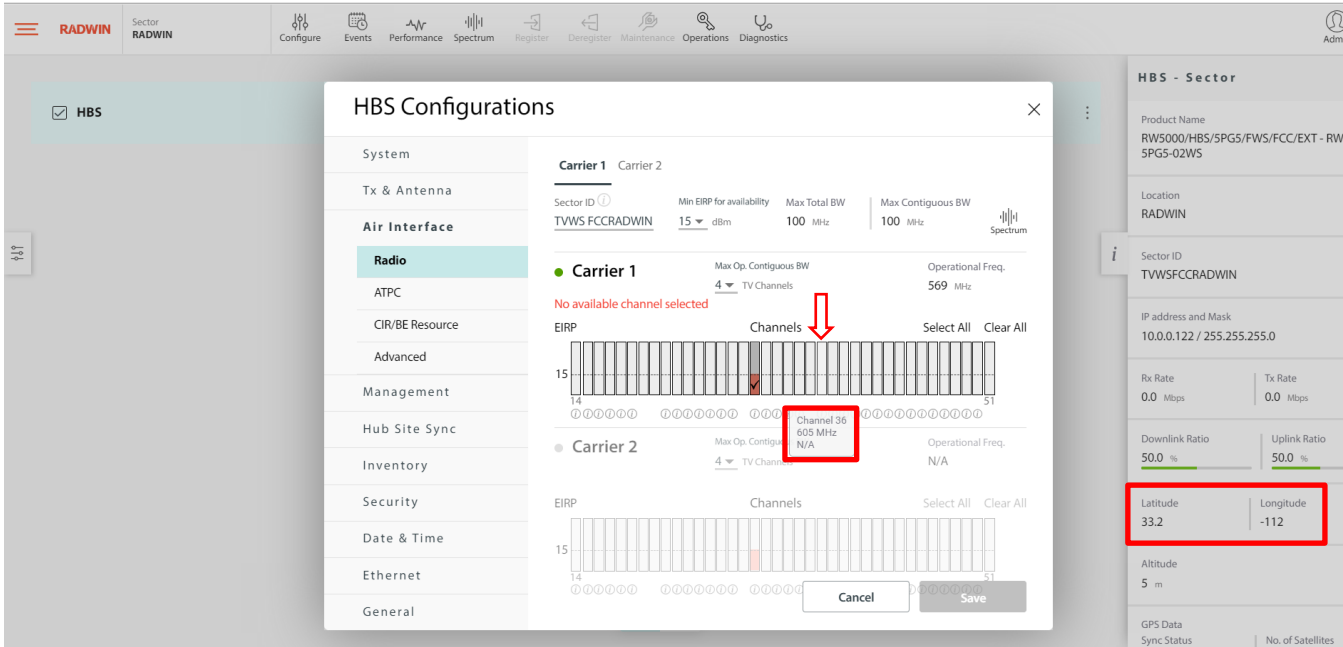

Figure 8.19-10: Received channel list for coordinates set in scenario (c). Fixed BAS link channel 36 at location coordinates 33.2N, 112.0W

Section 8   Testing data
Test name   FCC 15.712 Interference protection requirements (Fixed and personal/portable)
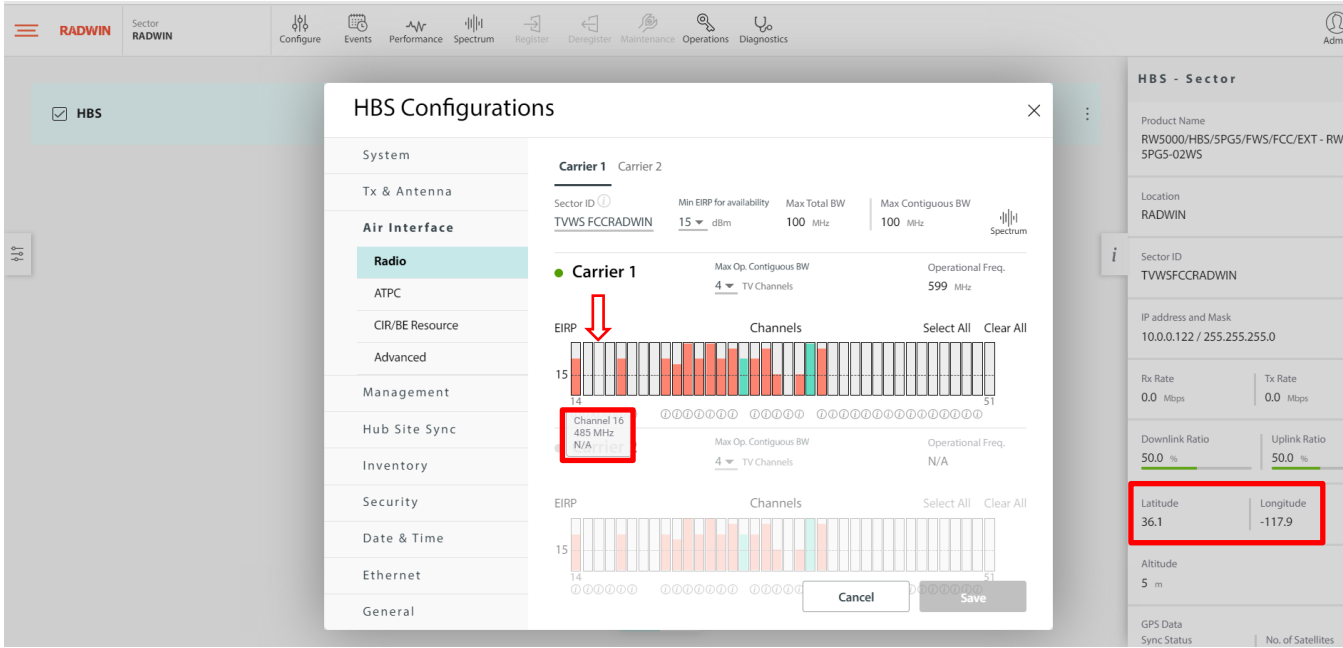**Specification**   FCC Part 15 Subpart H

Figure 8.19-11: Received channel list for coordinates set in scenario (d). PLMRS/CMRS operations channel 16 at location coordinates 36.1N, 117.9W
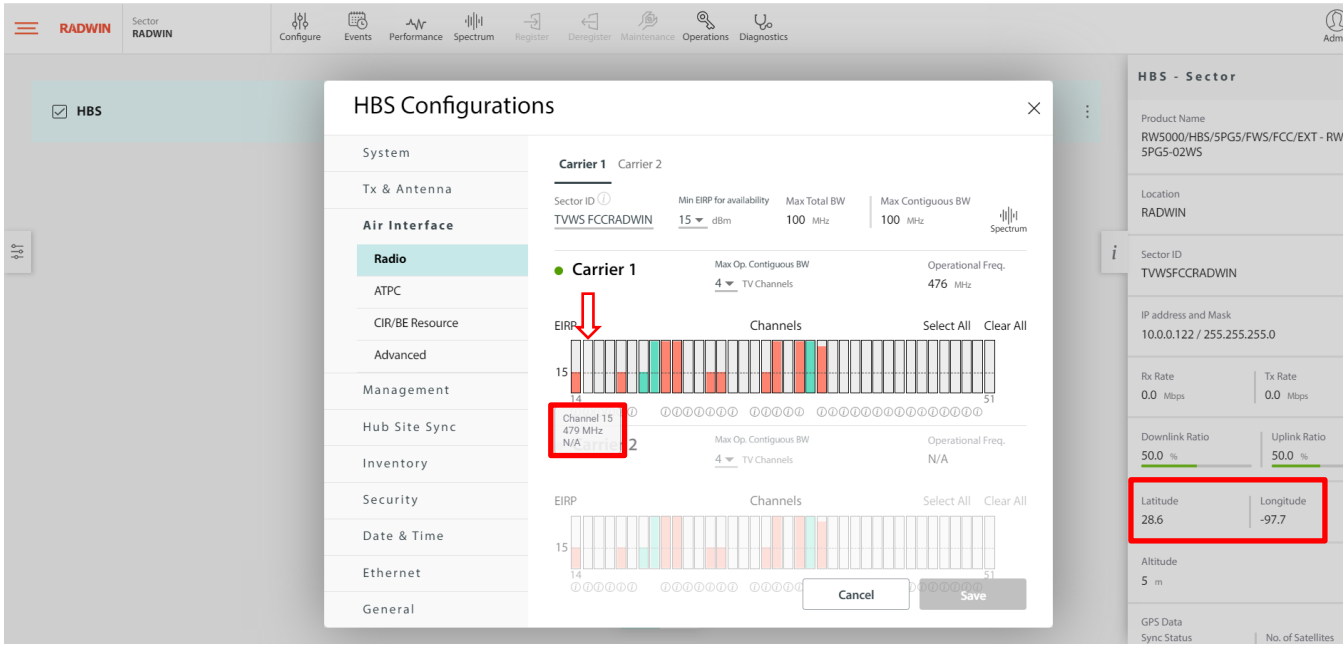

Figure 8.19-12: Received channel list for coordinates set in scenario (e). Offshore radiotelephone on channel 15 at location coordinates 28.6N, 97.1W

Report reference ID: 378820-4TRFWL
Applicant: RADWIN Inc.
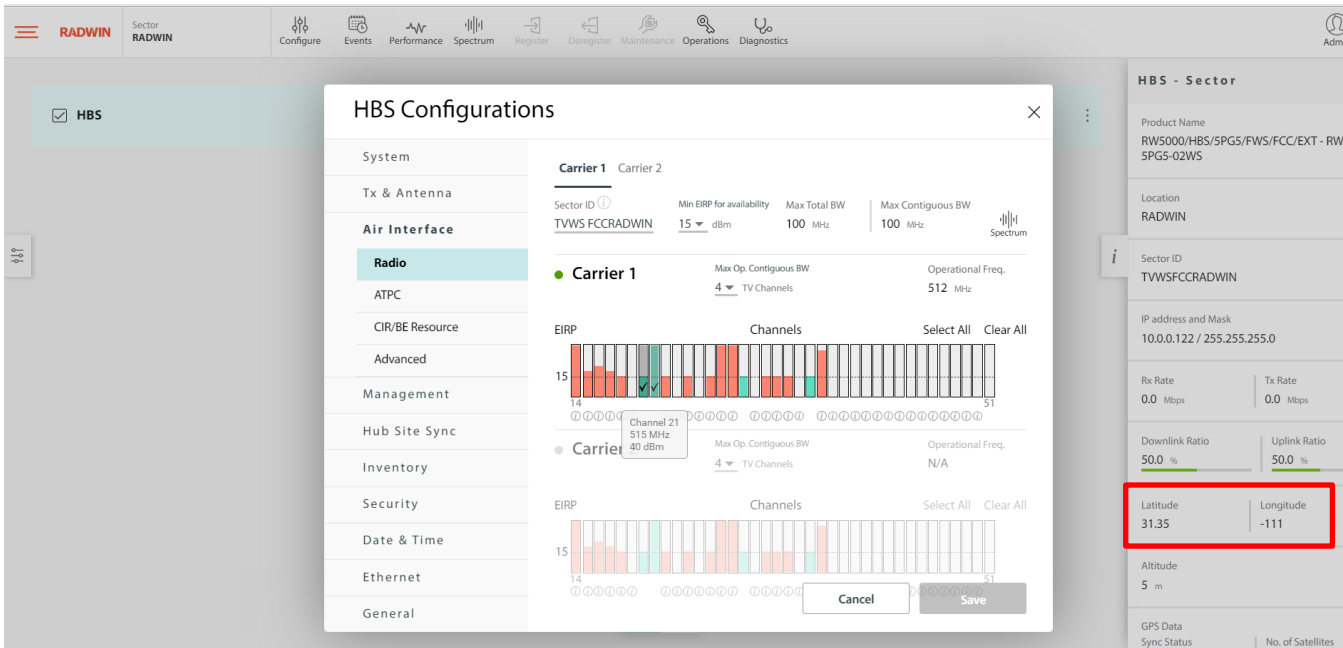Models: TVWS BS EXT; TVWS SU INT

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Figure 8.19-13: Received channel list for coordinates set in scenario (g). Mexico border at location coordinates 31.35N, 111.0W
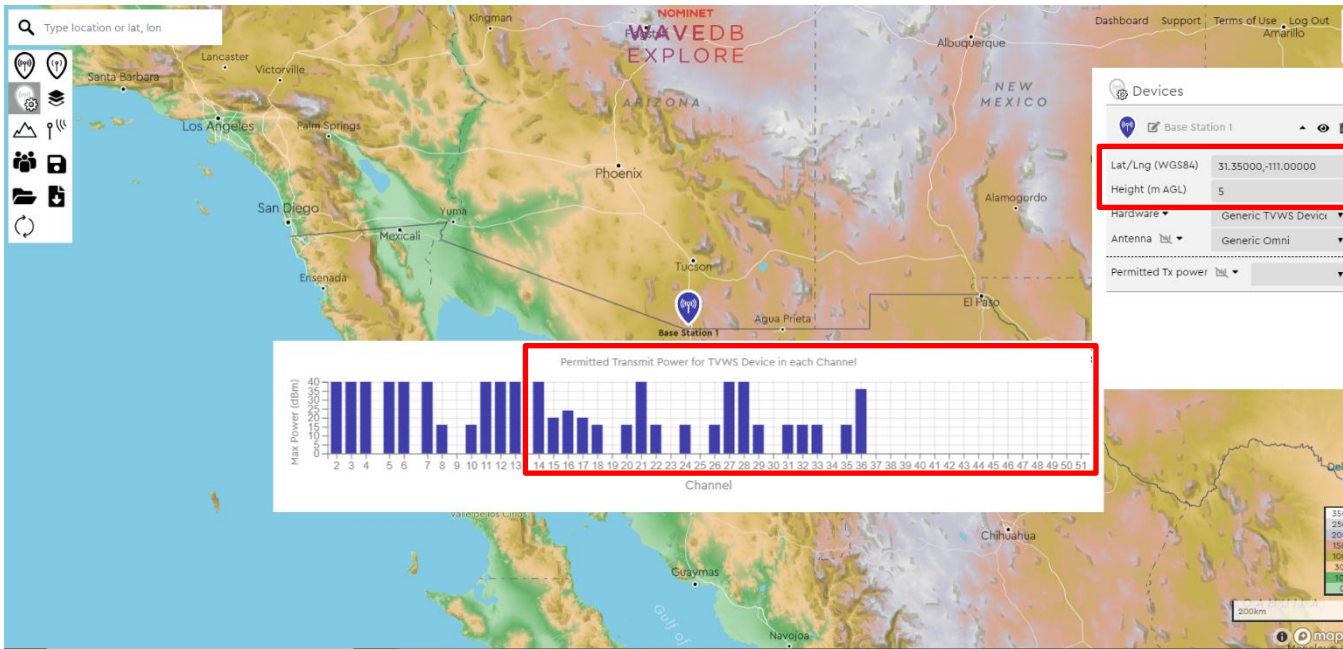

Figure 8.19-14: Channel availability for coordinates set in scenario (g) from Nominet. Mexico border at 31.35N, 111.0W
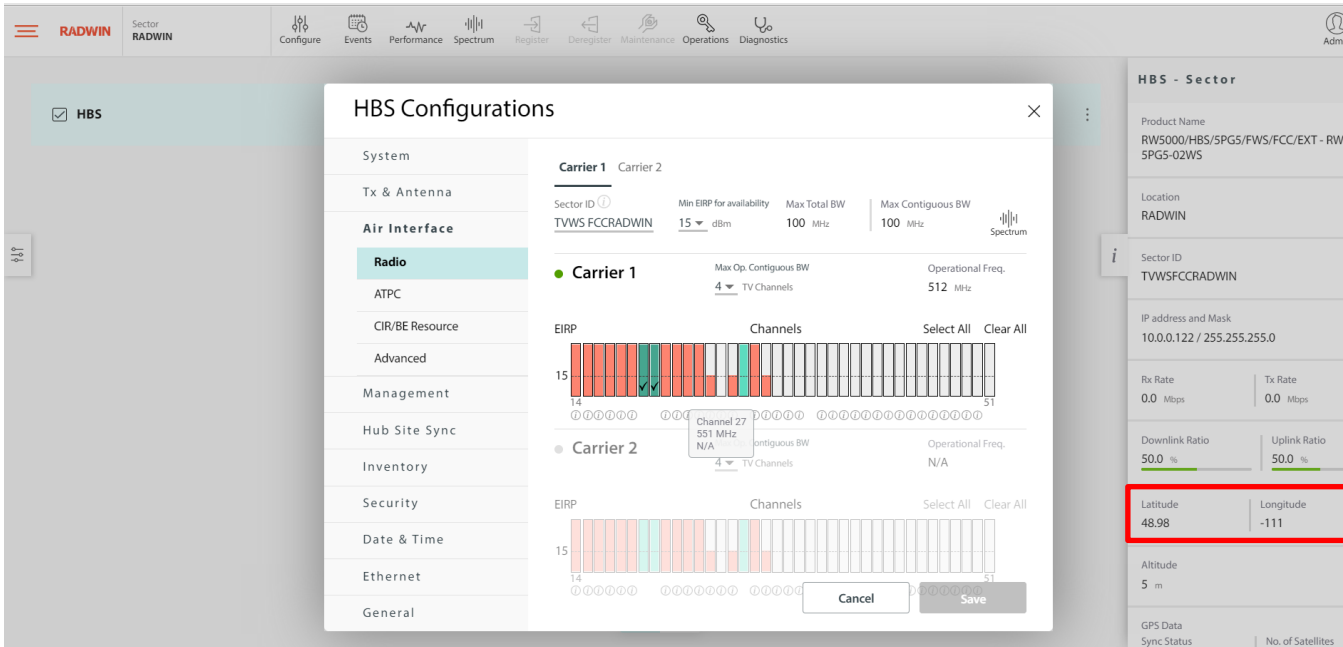
Figure 8.19-15: Received channel list for coordinates set in scenario (g). Canada border at location coordinates 48.98N, 111.0W
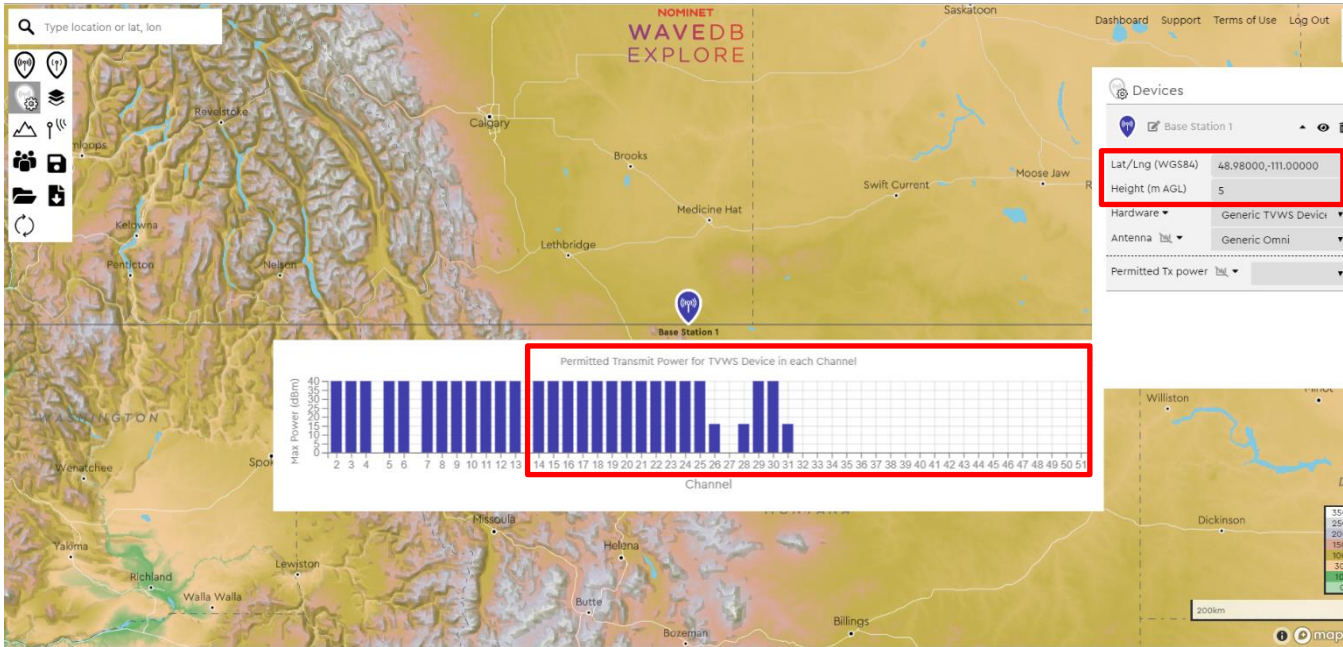
Figure 8.19-16: Channel availability for coordinates set in scenario (g) from Nominet. Canada border at 48.98N, 111.0W
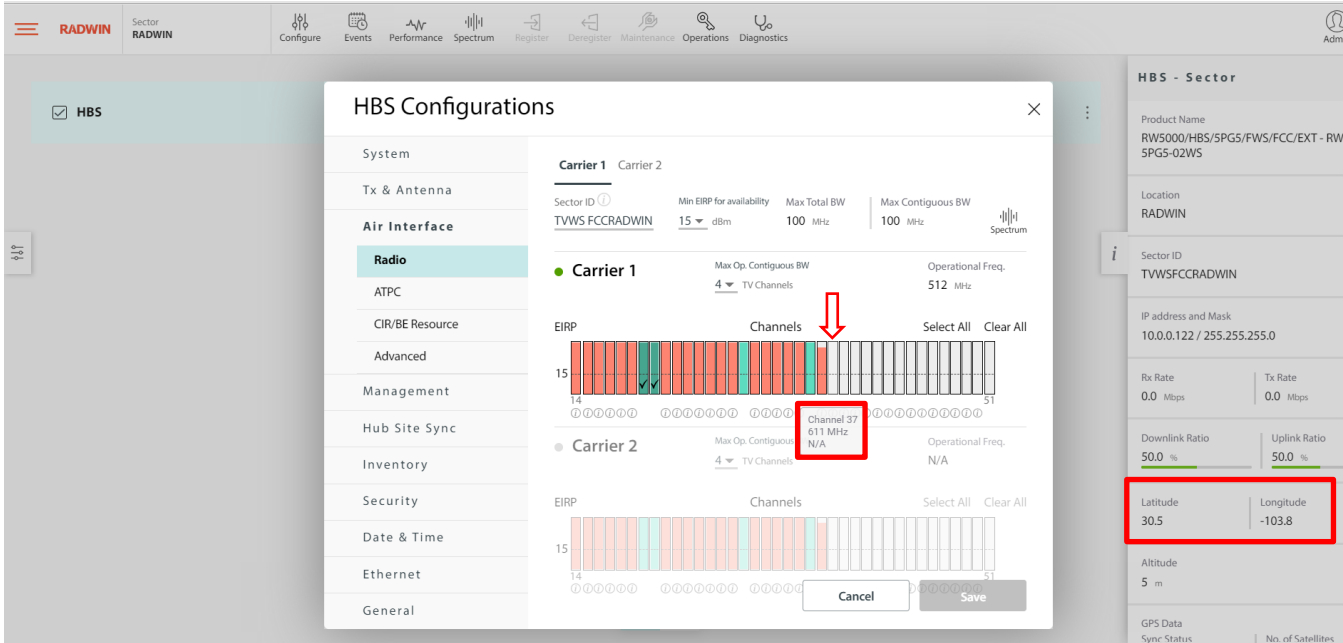
Figure 8.19-17: *Received channel list for coordinates set in scenario (h). Radio astronomy services on channel 37 at location coordinates 30.5N, 103.8W*

Figure 8.19-18: *Received channel list for coordinates set in scenario (i). 600 MHz service band on channels 39–42, 47–50 at location coordinates 42.3N, 85.7W*

Figure 8.19-19: *Received channel list for coordinates set in scenario (k). 488–494 MHz band in Hawaii channel 17 at location coordinates 21.5N, 158.0W*
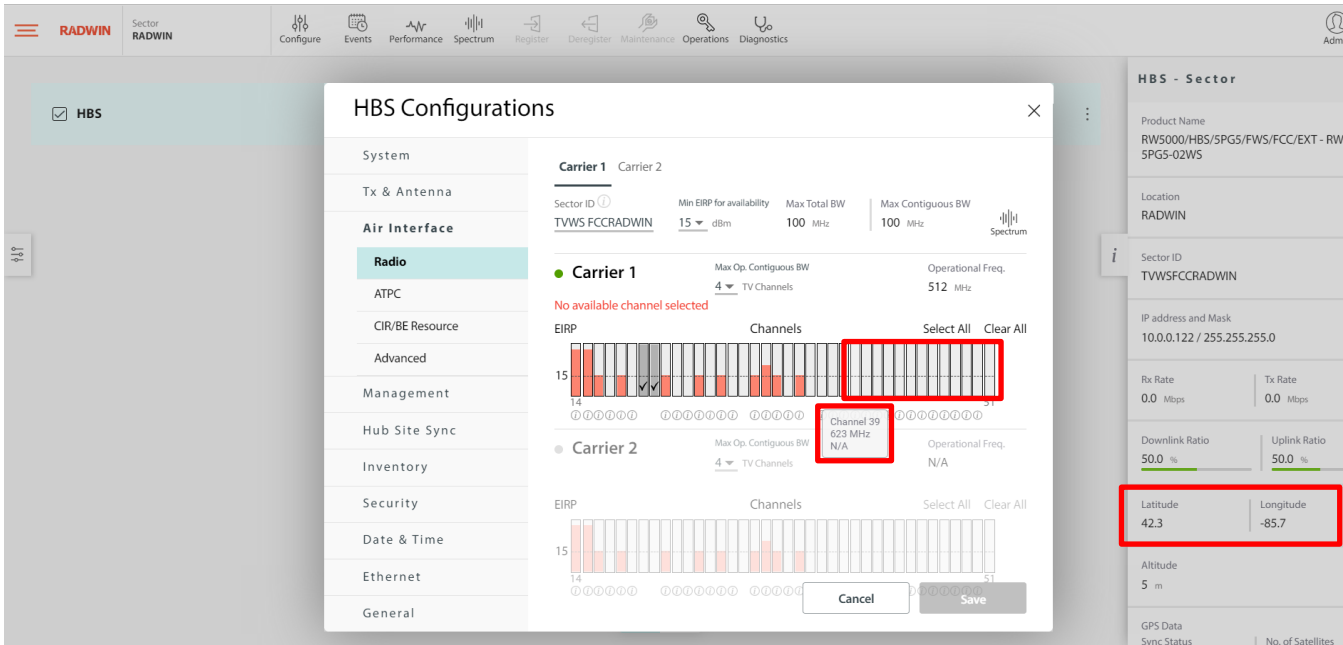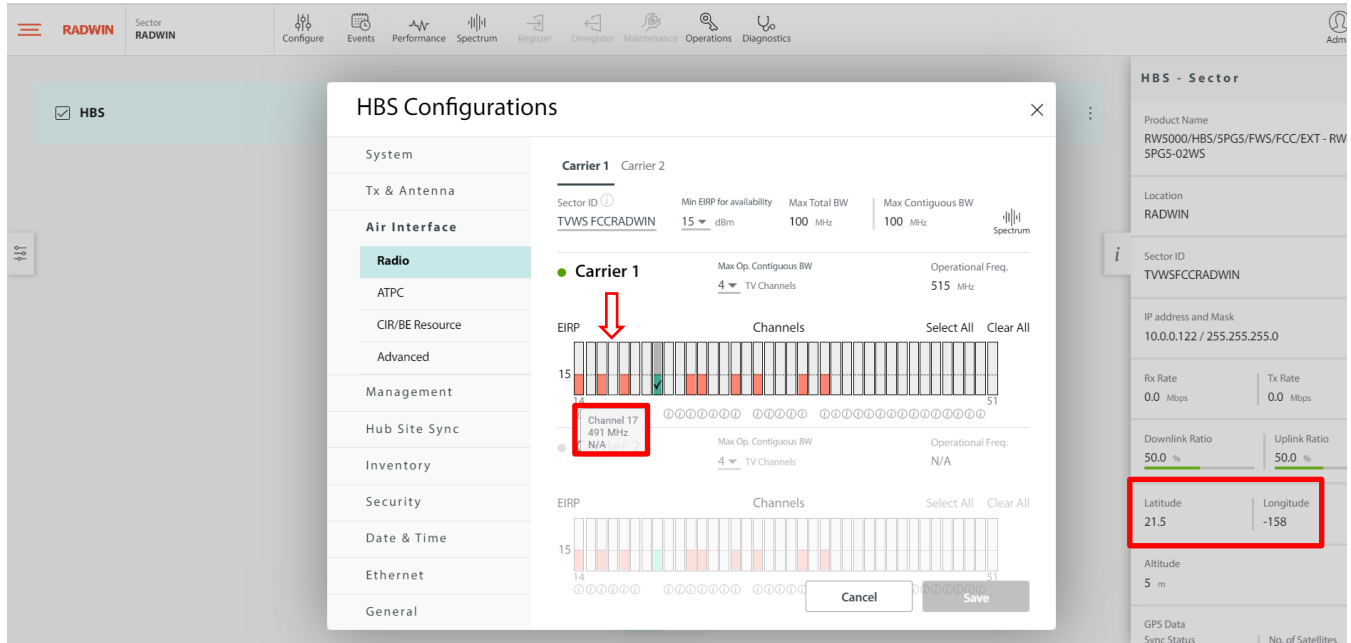
Section 8   Testing data
Test name   FCC 15.711(c)(2)(ii), (d)(3), 15.715(e) Fixed and Mode II Power level reduction
Specification   FCC Part 15 Subpart H

8.20   FCC 15.711(c)(2)(ii), (d)(3), 15.715(e) Fixed and Mode II Power level reduction

8.20.1   Definitions and limits

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. Testing in accordance with KDB 416721 D01, III (2)(o).

8.20.2   Test summary

Test date	December 2, 2019

8.20.3   Observations, settings and special notes

EUT was configured with proper registration information and the successful registration was verified. After receiving channel EIRP limit, EUT Tx power and Antenna gain were modified to exceed the limit. It was verified that the output power was automatically reduced to comply with EIRP restriction for the operation channel used.

8.20.4   Test data

Figure 8.20-1: Attempt 1 Database provided an EIRP limitation of 36 dBm for channel 14-15

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Section 8   Testing data
Test name   FCC 15.711(c)(2)(ii), (d)(3), 15.715(e) Fixed and Mode II Power level reduction
Specification   FCC Part 15 Subpart H
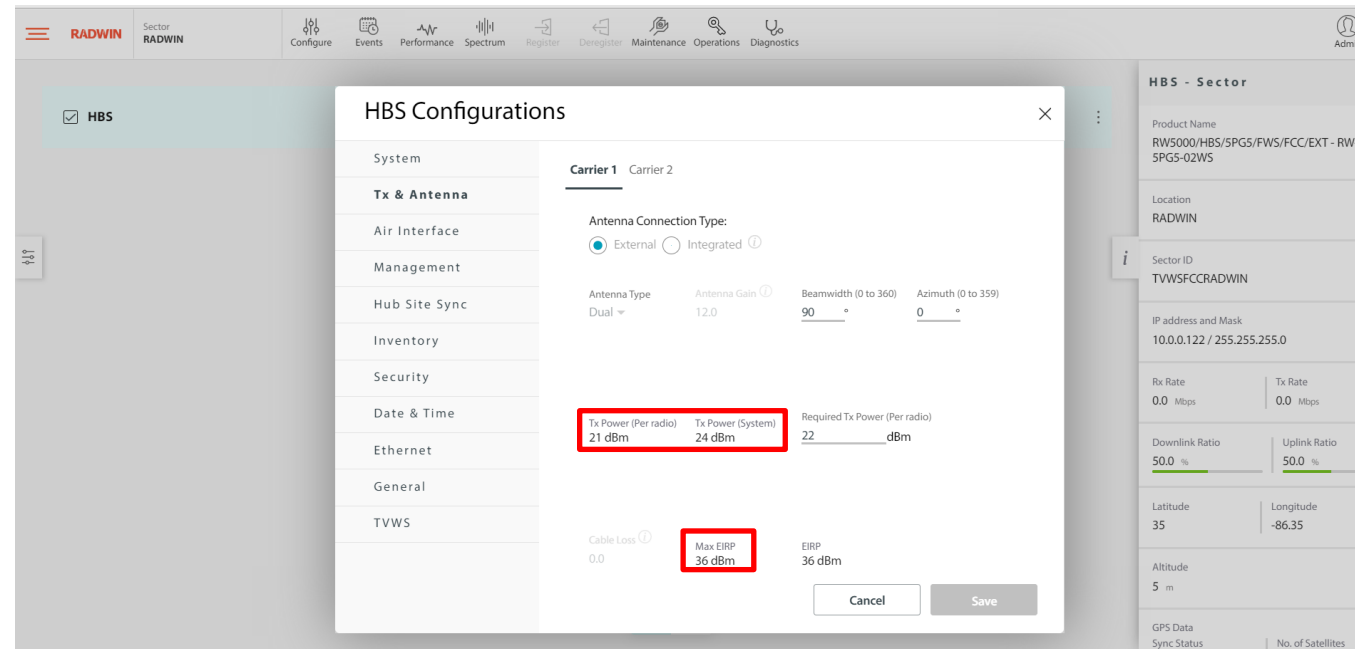
Figure 8.20-2: Attempt 1 Transmit output power settings

Figure 8.20-3: Attempt 1. Transmit conducted output power measurement. Limit 24 dBm

Report reference ID: *378820-4TRFWL*
Applicant: *RADWIN Inc.*
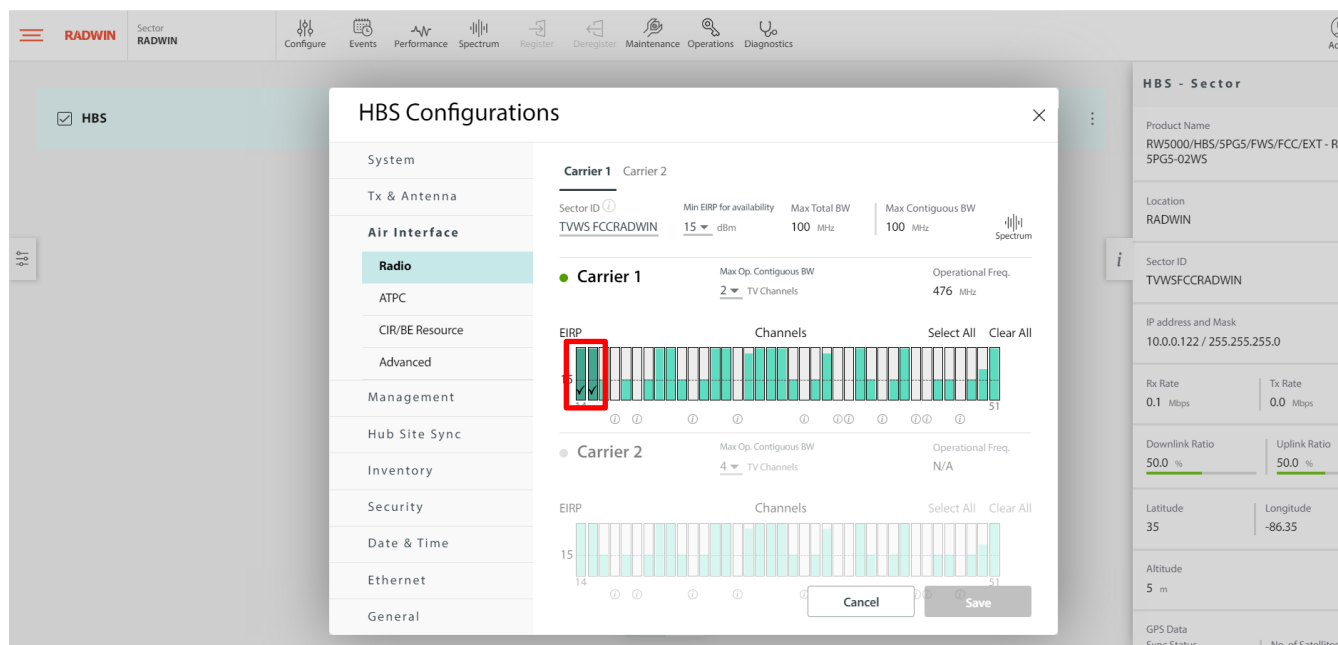Models: *TVWS BS EXT; TVWS SU INT*

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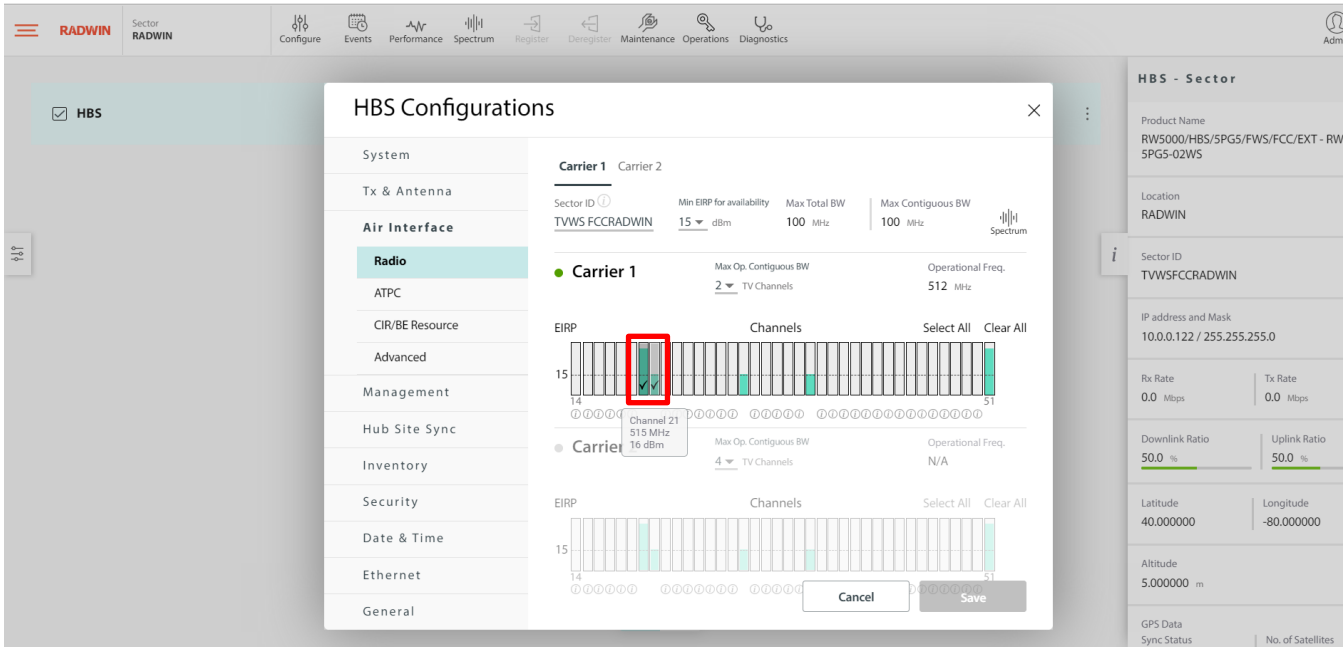
Figure 8.20-4: Attempt 2 Database provided an EIRP limitation of 16 dBm for channels 20-21
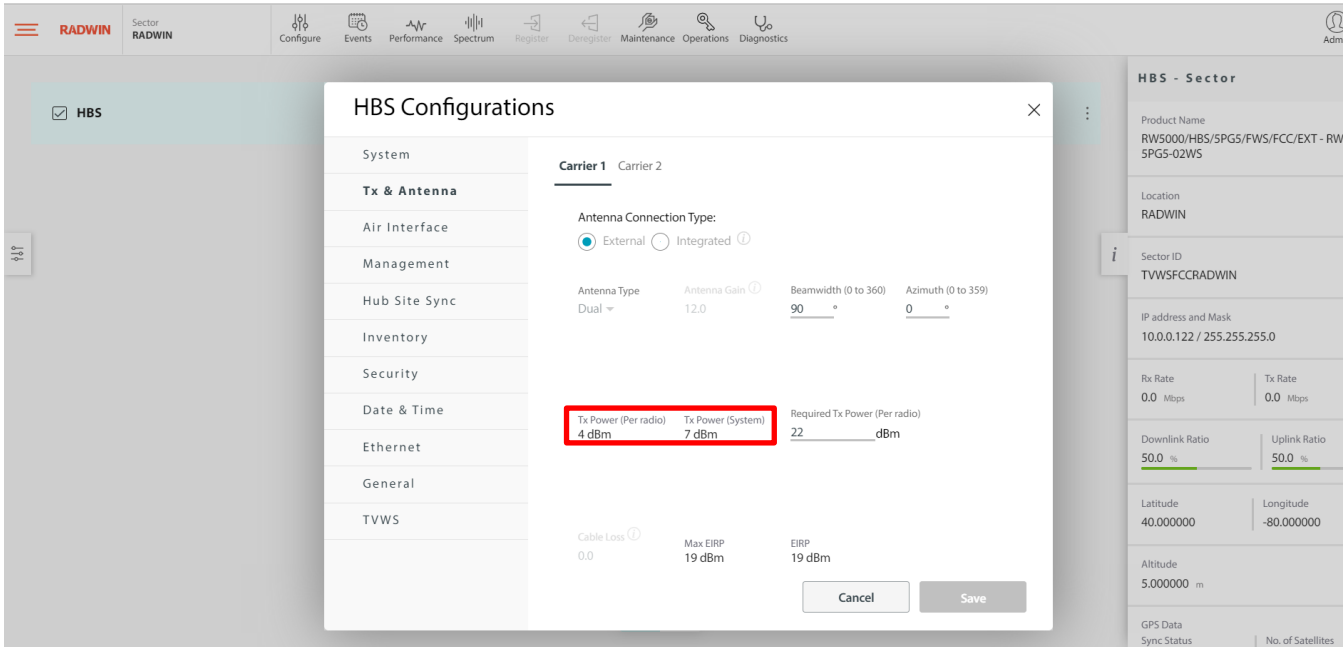
Figure 8.20-5: Attempt 2 Transmit output power settings
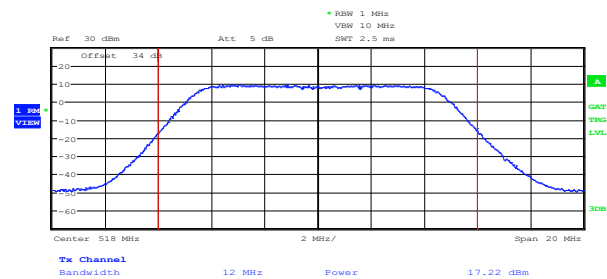
Figure 8.20-6: Attempt 2 (antenna gain 8 dBi) Transmit max power settings for compliance with the EIRP requirement: 24 dBm (EIRP limit) – 8 dBi (Antenna gain) = 16 dBm (Tx power)

Section 8   Testing data
Test name   FCC 15.711(c)(2)(ii), (d)(3), 15.715(e) Fixed and Mode II Power level reduction
Specification   FCC Part 15 Subpart H

Figure 8.20-7: Attempt 2. Transmit conducted output power measurement. Limit 4 dBm

Section 8   Testing data
Test name   FCC 15.711(j) Security
Specification   FCC Part 15 Subpart H

8.21   FCC 15.711(j) Security

8.21.1   Definitions and limits

White space devices shall incorporate adequate security measures to ensure that they are capable of communicating for purposes of obtaining lists of available channels only with databas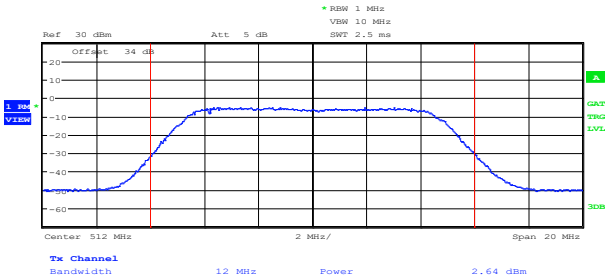es operated by administrators authorized by the Commission, and to ensure that communications between white space devices and databases are secure to prevent corruption or unauthorized interception of data. This requirement applies to communications of channel availability and other spectrum access information between the databases and fixed and Mode II devices (it is not necessary for white space devices to apply security coding to channel availability and channel access information where they are not the originating or terminating device and that they simply pass through).

8.21.2   Test summary

Test date	December 5, 2019

8.21.3   Observations, settings and special notes

Information provided by the manufacturer

8.21.4   Test data

i. What communication protocol is used between the database and the WSD?
> The Fixed WSD (WSD) connects to the Nominet database using HTTPS over SSL/TLS. The Nominet database is certified by FCC which includes the protocol of how WSD interact with the database.

ii. How are communications initiated?
> When the WSD boots up the WSD first ensures a connection to the internet with a valid DNS and gateway. Then the radio accesses the URL of the database and undergoes a TLS v1.2 handshake before exchanging data. This ensures a secure exchange. The WSD initiates communication with the Nominet database by initially sending an INIT_REQ message which includes the WSD Descriptor.
> The WSD Descriptor contains;
> * the device serial number
> * manufacturer ID
> * model ID
> * 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/TLS certificate through standard third-party certificate authority mechanisms, ensuring communications are secure and authenticated between the WSD and the database.

iv. How does the device handle failure to communicate or authenticate the database?
> If the WSD does not successfully communicate with an authenticated database (as above), it will not allow operations to begin. If the device fails to communicate with the database, it will re-try every 30 seconds.

v. How does the database validate messages from a WSD?
> A unique database token installed in the radio during manufacture is required to validate the exchange. Only devices that have a valid database token can receive communications from the database. The database validates the token against the provided serial number, manufacturer name, model ID and FCC ID.
> The list of valid serial numbers is generated by the device manufacturer. Using the Nominet database web interface authorized users can generate tokens for specific devices with specific serial numbers. Users are authorized by Nominet via an account name and password, which is only available to persons authorized by the device manufacturer.

vi. What encryption method is used?
> SSL/TLS1.2 encryption is used to encrypt packets sent between the WSD and the database.

vii. How does the database ensure secure registration of protected devices?
> Protected devices are entities authorized by the rules for protection from WSD transmissions. Nominet provides a public interface to register protected devices in the database web tool using a valid account, valid username and valid password.

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Section 9. Block diagrams of test set-ups

9.1   Test setup diagram