

Wireless test report – 376028-2TRFWL

Applicant:

6harmonics Inc.

Product type:

Television Band Device (TVBD)

Model:

GWS-5002 Series

Model variant:

GWS-5002

FCC ID:

2AASTGWS-5002

IC Registration Number:

20750-GWS-5002

Specifications:

◆ **FCC 47 CFR Part 15 Subpart H, §15.713**

White Space devices; White space database.

Date of issue: July 15, 2019

Andrey Adelberg, Senior Wireless/EMC Specialist

Test engineer(s)

Signature



Kevin Rose, Wireless/EMC Specialist

Reviewed by

Signature

Test location

Company name	Nemko Canada Inc.
Address	303 River Road
City	Ottawa
Province	Ontario
Postal code	K1V 1H2
Country	Canada
Telephone	+1 613 737 9680
Facsimile	+1 613 737 9691
Toll free	+1 800 563 6336
Website	www.nemko.com
Site number	FCC: CA2040; (3 m semi anechoic chamber)

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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Section 1. Report summary

1.1 Applicant and manufacturer

Company name	6harmonics Inc.
Address	Suite 10 - 21 Concourse Gate
City	Ottawa
Province/State	ON
Postal/Zip code	K2E 7S4
Country	Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart H	White Space Devices
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1.3 Test methods

KDB 416721 D01 v03	White Space Test Procedures
Nominet manual V1.0	TVWS Radio Testing Manual FCC

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.5 below. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Exclusions

None

1.6 Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	July 15, 2019	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart H test results

Part	Test description	Verdict
§15.713(g)(3)	Fixed white space device registration	Pass
§15.713(g)(3)(iii)	Unsuccessful registration – restricted coordinates	Pass
§15.713(g)(3)(v)	Unsuccessful registration due to incomplete information – missing owner	Pass
§15.713(g)(3)(vi)	Unsuccessful registration due to incomplete information – contact name	Pass
§15.713(g)(3)(vii)	Unsuccessful registration due to incomplete information – contact address	Pass
§15.713(g)(3)(vii)	Unsuccessful registration due to incomplete information – contact state (province)	Pass
§15.713(g)(3)(vii)	Unsuccessful registration due to incomplete information – contact zip (postal) code	Pass
§15.713(g)(3)(vii)	Unsuccessful registration due to incomplete information – contact city	Pass
§15.713(g)(3)(vii)	Unsuccessful registration due to incomplete information – contact country	Pass
§15.713(g)(3)(viii)	Unsuccessful registration due to incomplete information – contact email	Pass
§15.713(g)(3)(ix)	Unsuccessful registration due to incomplete information – contact telephone	Pass
§15.713(e)(6)	Unsuccessful registration due to HAAT > 250 m	Pass
§15.713(e)(6)	Unsuccessful registration due to antenna height that exceeds 30 m	Pass
§15.713(g)(3)(i) and (ii)	Unsuccessful registration due to incomplete information – FCC ID and Serial number	Pass
§15.713(a)(1)	48-hour channel scheduling	Pass
§15.713(a)(3)	Relocation of fixed TVBD	Pass
§15.711(c)(2)(i)	Fixed & Mode II TVDB database update	Pass
§15.711(c)(2)(iii)	Low-power auxiliary device protection	Pass
§15.712	Interference protection requirements (Fixed and personal/portable)	Pass
§15.711(c)(2)(ii)	Fixed and Mode II Power level reduction	Pass
§15.711(j)	Security	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 24, 2019
Nemko sample ID number	1 and 2

3.2 EUT information

Product name	Television Band Device (TVBD)
Model	GWS-5002
Serial number	520000050 (BTS), 520000047 (CPE)

3.3 Technical information

Frequency band	470–698 MHz (channels 14–51)
Channel BW	6, 12, 18, 24 MHz
Type of modulation	OFDM (BPSK to 64QAM)
Power requirements	120 VAC 60 Hz or 48 V _{DC} via PoE

3.4 Product description and theory of operation

The GWS-5000 Series is the most advanced TV White Space solution available and is the 5th generation of TV White Space radio developed by 6Harmonics. Throughput with a 24 MHz and a single spatial stream can achieve 70 Mbps UDP and 50 Mbps TCP/IP. Based upon the globally accepted robust Wi-Fi protocol, the GWS-5000 Series radios can maintain NLOS data links in the most challenging of TVWS deployments when faced with in-band noise & interference, multipath fade, trees or other obstructions. The radios can operate in point-to-point or point-to-multipoint mode. With an internal GPS the radios automatically geolocate to ensure accurate compliance with channel availability from an approved database.

3.5 Database information

Nominet White Space Data Base and Data base sandbox were used for devices registration and testing.

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

There were no modifications performed to the EUT during this assessment.

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 mbar

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of $K = 2$ with 95% certainty.

Table 6.1-1: Measurement uncertainty

Test name	Measurement uncertainty, dB
All antenna port measurements	0.55



Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Spectrum analyzer	Rohde & Schwarz	FSP	FA001920	1 year	Sep.30/19

Section 8. Testing data

8.1 FCC 15.713(g)(3) Fixed white space device registration

8.1.1 Definitions and limits

Prior to operating for the first time or after changing location, a fixed white space device must register with the white space database by providing the information listed in paragraph (g)(3) of §15.713. Testing in accordance with KDB 416721 D01, III (2)(a)

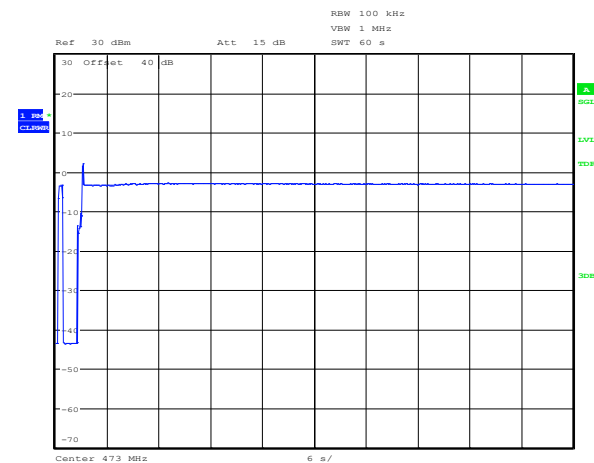
8.1.2 Test summary

Test date June 27, 2019

8.1.3 Observations, settings and special notes

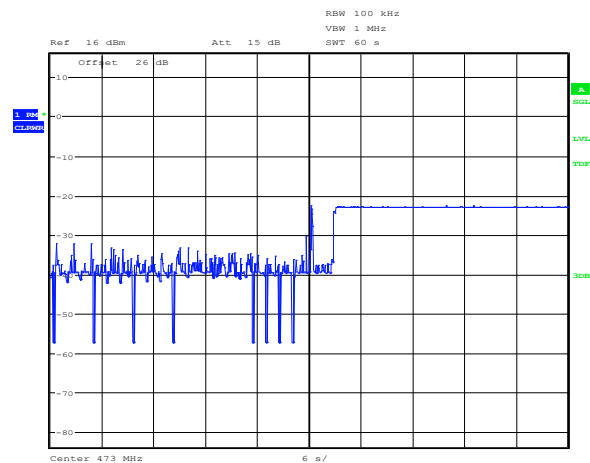
EUT was configured with the with proper registration information. Successful registration with all required fields and as a Fixed device type was verified by showing on the GUI page.
There were no emissions detected, on any channels, until it has successfully registered

8.1.4 Test data



Date: 27.JUN.2019 15:08:34

Figure 8.1-1: Successful registration and transmission begins from Base station unit



Date: 27.JUN.2019 15:28:05

Figure 8.1-2: Successful registration and transmission begins from CPE unit (lower level signal indicates advertising signal from base station)

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3) Fixed white space device registration
FCC Part 15 Subpart H



System

System Network Tools Features Database

Device Characteristics:

Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5000	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0

Location:

Latitude:	33.846508	Longitude:	-112.883876
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Database Parameters:

Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdh.uk
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Owner Information

Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA

Operator Information

Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA

Figure 8.1-3: Successful registration and identification as Fixed Device Type device

System

System Network Tools Features Database

REBOOT

System Info

System Time	Thu Jun 27 10:39:03 EDT 2019 - EST5EDT
Firmware Version	GWS5002-FCC-Rel-2.0.0-Beta Jun 26 2019 18:14:54-build
Serial Number	520000010
Ethernet MAC Address	AC:EE:3B:03:3E:FE
Location	(33.846508 , -112.883876)
GWS Mode	CAR (Core Adaptive Radio)
Valid Database Channels	(14); (15); (16); (17); (18); (19); (20); (21); (22); (23); (24); (25); (26); (27); (28); (29); (30); (31); (32); (33); (34); (35); (39); (40); (41); (42); (43); (46); (47); (48); (49); (50); (51)
Full Channel List	(14); (15); (16); (17); (18); (19); (20); (21); (22); (23); (24); (25); (26); (27); (28); (29); (30); (31); (32); (33); (34); (35); (39); (40); (41); (42); (43); (44); (45); (46); (47); (48); (49); (50); (51)

Config

Set User Account

Set System Time

Firmware Upgrade

Figure 8.1-4: Successful registration with received list of available channels

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3) Fixed white space device registration
FCC Part 15 Subpart H



Core Adaptive Radio (CAR) Status

	Status
Radio Type / MAC	GWS5002 / AC:EE:3B:03:3E:FE
Connected Stations	1 station connected
IP / SSID	192.168.3.164 / 6harmonicsGWS
LAN Speed Duplex	100 Mbps full duplex Diagnosis
Location	(33.846466 , -112.883914) PE<7.8m, 95%CL Map
Channel / Region	CH 14 (473 MHz) / 0 Config
Tx State / Tx Power	TX ON / 7 dBm Config
RX Gain	Auto
Temperature	46.00 °C
Channel Bandwidth	6 MHz Config
System Up Time	0h:35m:21s-0 d-0 m-0 y
Free Memory	MemFree: 89504 kB

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里 米

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[Spectrum Channel Scan](#)

Database Agent Status

Database access	nominetus	System time	Thu Jun 27 10:38:33 EDT 2019
T-validity	286 minutes	T-Update	104 seconds
Agent status	Query successful	Database error log	

Connection Status

Up Link

Status at CAR

+	IP/MAC	RSSI / Noise Floor / SNR	Tx Rate / Modulation / Tx Packets	Rx Rate / Modulation / Rx Packets	Radio Link Up Time
+	192.168.3.165	-65 dBm / -107 dBm / SNR 42 110 ms ago	14.4 Mbit/s, MCS 7, short GI 24324 Pkts.	14.4 Mbit/s, MCS 7, short GI 3144 Pkts.	0h:10m:36s-0 d-0 m-0 y

Figure 8.1-5: Successful registration status

System

System Network Tools Features Database

[REBOOT](#)

System Info	
System Time	Thu Jun 27 14:14:51 EDT 2019 - EST5EDT
Firmware Version	GWS5002-FCC-Rel-2.0.0-Beta Jun 26 2019 18:14:54-build
Serial Number	520000010
Ethernet MAC Address	AC:EE:3B:03:3E:FE
Location	(33.700011 , -113.800015) Config
GWS Mode	CAR (Core Adaptive Radio)
Valid Database Channels	(14); (15); (16); (17); (18); (19); (20); (22); (23); (25); (28); (30); (32); (34); (35); (36)
Full Channel List	(14); (15); (16); (17); (18); (19); (20); (21); (22); (23); (24); (25); (26); (27); (28); (29); (30); (31); (32); (33); (34); (35); (36); (37); (38); (39); (40); (41); (42); (43); (44); (45); (46); (47); (48); (49); (50); (51) Config

Set User Account +

Set System Time +

Firmware Upgrade +

Figure 8.1-6: Successful registration with received list of available 6-MHz channels



System

System Network Tools Features Database		REBOOT
System Info		
System Time	Thu Jun 27 14:17:06 EDT 2019 - EST5EDT	
Firmware Version	GWS5002-FCC-Rel-2.0.0-Beta Jun 26 2019 18:14:54-build	
Serial Number	520000010	
Ethernet MAC Address	AC:EE:3B:03:3E:FE	
Location	(33.700011 , -113.800015)	Config
GWS Mode	CAR (Core Adaptive Radio)	
Valid Database Channels	(14,15); (15,16); (16,17); (17,18); (18,19); (19,20); (22,23); (34,35); (35,36)	
Full Channel List	(14,15); (15,16); (16,17); (17,18); (18,19); (19,20); (20,21); (21,22); (22,23); (23,24); (24,25); (25,26); (26,27); (27,28); (28,29); (29,30); (30,31); (31,32); (32,33); (33,34); (34,35); (35,36); (36,37); (37,38); (38,39); (39,40); (40,41); (41,42); (42,43); (43,44); (44,45); (45,46); (46,47); (47,48); (48,49); (49,50); (50,51)	Config

Set User Account	+
Set System Time	+
Firmware Upgrade	+

Figure 8.1-7: Successful registration with received list of available 12-MHz channels

System

System Network Tools Features Database		REBOOT
System Info		
System Time	Thu Jun 27 14:18:53 EDT 2019 - EST5EDT	
Firmware Version	GWS5002-FCC-Rel-2.0.0-Beta Jun 26 2019 18:14:54-build	
Serial Number	520000010	
Ethernet MAC Address	AC:EE:3B:03:3E:FE	
Location	(33.700011 , -113.800015)	Config
GWS Mode	CAR (Core Adaptive Radio)	
Valid Database Channels	(14,15,16); (15,16,17); (16,17,18); (17,18,19); (18,19,20); (34,35,36)	
Full Channel List	(14,15,16); (15,16,17); (16,17,18); (17,18,19); (18,19,20); (19,20,21); (20,21,22); (21,22,23); (22,23,24); (23,24,25); (24,25,26); (25,26,27); (26,27,28); (27,28,29); (28,29,30); (29,30,31); (30,31,32); (31,32,33); (32,33,34); (33,34,35); (34,35,36); (35,36,37); (36,37,38); (37,38,39); (38,39,40); (39,40,41); (40,41,42); (41,42,43); (42,43,44); (43,44,45); (44,45,46); (45,46,47); (46,47,48); (47,48,49); (48,49,50); (49,50,51)	Config

Set User Account	+
Set System Time	+
Firmware Upgrade	+

Figure 8.1-8: Successful registration with received list of available 18-MHz channels



System

System Network Tools Features Database

REBOOT

System Info	
System Time	Thu Jun 27 14:20:18 EDT 2019 - EST5EDT
Firmware Version	GWS5002-FCC-Rel-2.0.0-Beta Jun 26 2019 18:14:54-build
Serial Number	520000010
Ethernet MAC Address	AC:EE:3B:03:3E:FE
Location	(33.700011 , -113.800015) Config
GWS Mode	CAR (Core Adaptive Radio)
Valid Database Channels	(14,15,16,17); (15,16,17,18); (16,17,18,19); (17,18,19,20)
Full Channel List	(14,15,16,17); (15,16,17,18); (16,17,18,19); (17,18,19,20); (18,19,20,21); (19,20,21,22); (20,21,22,23); (21,22,23,24); (22,23,24,25); (23,24,25,26); (24,25,26,27); (25,26,27,28); (26,27,28,29); (27,28,29,30); (28,29,30,31); (29,30,31,32); (30,31,32,33); (31,32,33,34); (32,33,34,35); (33,34,35,36); (34,35,36,37); (35,36,37,38); (36,37,38,39); (37,38,39,40); (38,39,40,41); (39,40,41,42); (40,41,42,43); (41,42,43,44); (42,43,44,45); (43,44,45,46); (44,45,46,47); (45,46,47,48); (46,47,48,49); (47,48,49,50); (48,49,50,51) Config

Set User Account +

Set System Time +

Firmware Upgrade +

Figure 8.1-9: Successful registration with received list of available 24-MHz channels

8.2 FCC 15.713(a)(1), FCC 15.711(c)(2)(iii) 48-hour channel scheduling

8.2.1 Definitions and limits

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

8.2.2 Test summary

Test date June 27, 2019

8.2.3 Observations, settings and special notes

EUT implements a refresh time of 800 seconds instead of 48-hour push notification wait. Information is sent to database more than 4 times an hour.

8.2.4 Test data

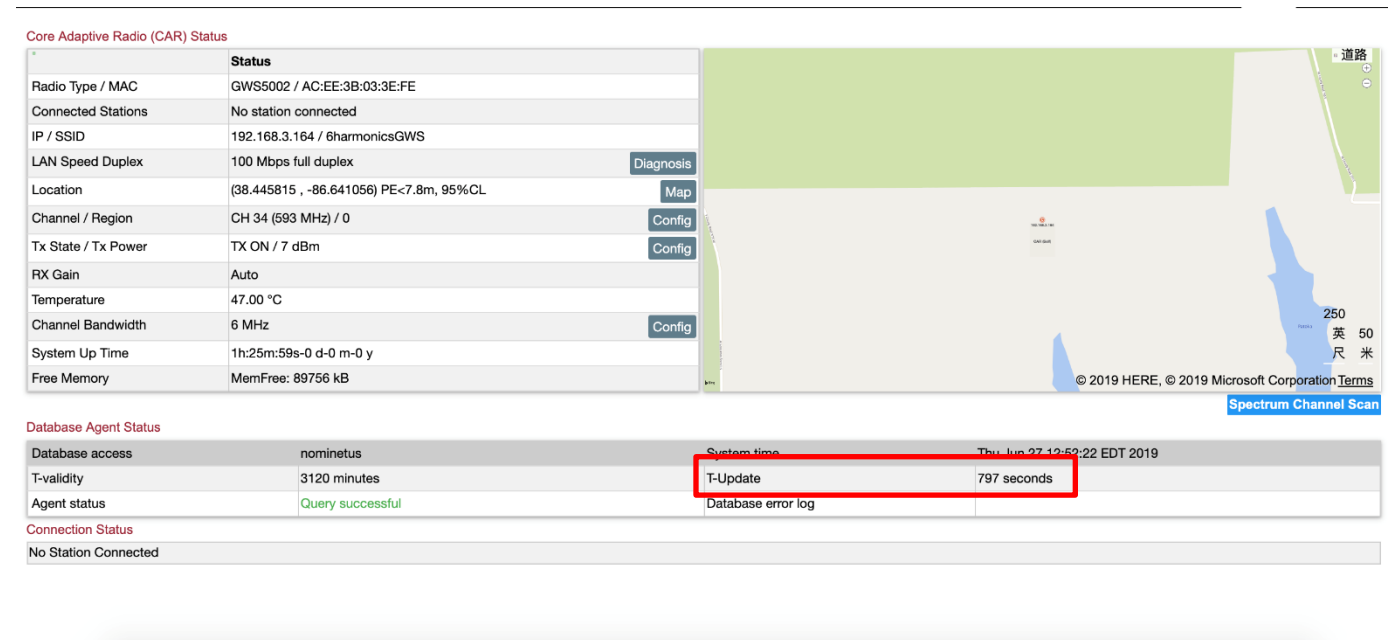


Figure 8.2-1: Refresh time (T-Update) instead of 48-hour push notification wait

8.3 FCC 15.713(g)(3)(iii) Unsuccessful registration – restricted coordinates

8.3.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(iii) Device's geographic coordinates (latitude and longitude (NAD 83));

8.3.2 Test summary

Test date June 27, 2019

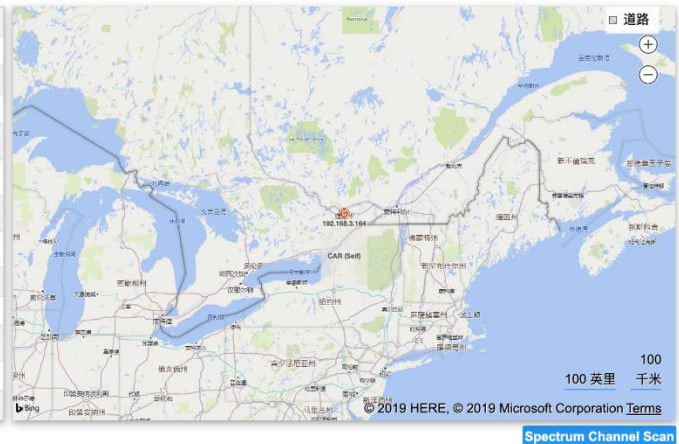
8.3.3 Observations, settings and special notes

The device was initially configured with a valid registration such that the device will begin to transmit on a given channel. Once the device was transmitting and the link was established, the registration data was modified to incorporate restricted coordinates. EUT was configured with restricted coordinates: outside US regulatory boundaries with latitude: 45.3° N and longitude: 75.7° W (within Canada). The registration process was re-initiated with the invalid coordinates. After database rejection, the EUT stopped the transmission.

8.3.4 Test data

Core Adaptive Radio (CAR) Status

	Status
Radio Type / MAC	GWS5002 / AC:EE:3B:03:3E:FE
Connected Stations	No station connected
IP / SSID	192.168.3.164 / 6harmonicsGWS
LAN Speed Duplex	100 Mbps full duplex
Location	(45.319756 , -75.689705) PE<7.8m, 95%CL
Channel / Region	CH 34 (593 MHz) / 0
Tx State / Tx Power	TX DOWN / 7 dBm
RX Gain	Auto
Temperature	47.00 °C
Channel Bandwidth	6 MHz
System Up Time	1h:28m:21s-0 d-0 m-0 y
Free Memory	MemFree: 89676 kB

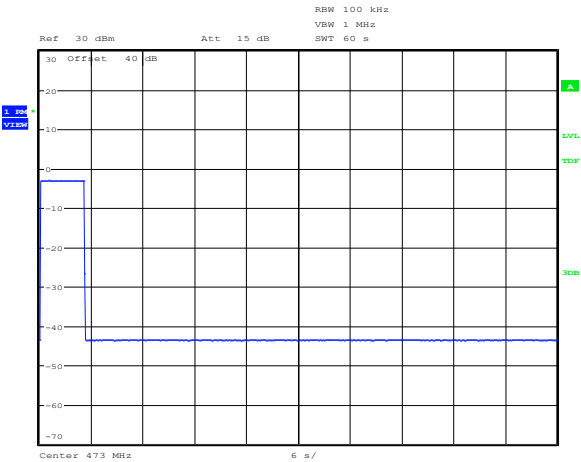


Database Agent Status

Database access	nominatus	System time	Thu Jun 27 12:54:43 EDT 2019
T-validity	3118 minutes	T-Update	655 seconds
Agent status	Query Initial Failed. Sleep 30s...	Database error log	Agent Error: Error : location is outside coverage area (-104);

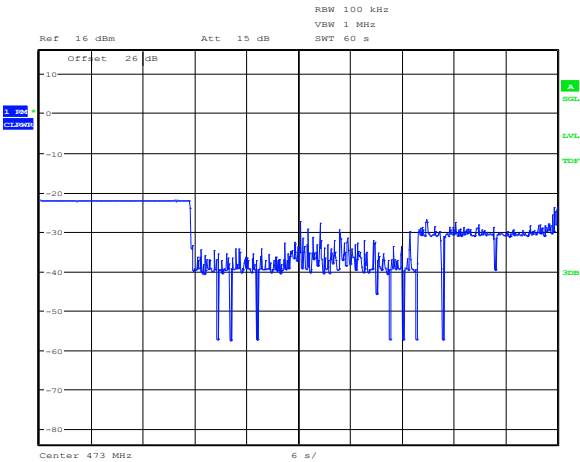
Connection Status

Figure 8.3-1: Unsuccessful registration with restricted coordinates



Date: 27.JUN.2019 15:06:47

Figure 8.3-2: Unsuccessful registration and transmission stops from Base station unit



Date: 27.JUN.2019 15:29:55

Figure 8.3-3: Unsuccessful registration and transmission stops from CPE unit (lower level signal indicates advertising signal from base station)

8.4 FCC 15.713(g)(3)(v) Unsuccessful registration due to incomplete information – missing owner

8.4.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(v) Name of the individual or business that owns the device

8.4.2 Test summary

Test date June 27, 2019

8.4.3 Observations, settings and special notes

EUT was configured with incomplete information: owner name field was left intentionally blank (instead of 6H). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.4.4 Test data

Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846508	Longitude:	-112.883876
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdw.uk
Owner Information			
Name:		Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Reset Save		Save	
Warning! Missing Information. Cannot leave any blanks!			

Figure 8.4-1: Unsuccessful registration with missing owner name information

8.5 FCC 15.713(g)(3)(vi) Unsuccessful registration due to incomplete information – contact name

8.5.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vi) Name of a contact person responsible for the device's operation

8.5.2 Test summary

Test date June 27, 2019

8.5.3 Observations, settings and special notes

EUT was configured with incomplete information: contact name field was left intentionally blank (instead of *Smith*). It was verified, that after detecting missing contact information, EUT did not send any form request to database.

To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.5.4 Test data

Device Characteristics:		
Manufacturer ID:	6harmonics	
Model ID:	GWS5002	
FCC TvbdDevice Type:	FIXED	
FCC ID:	TEST-FCC-ID	
Location:		
Latitude:	33.846505	
Longitude:	-112.883884	
Database Parameters:		
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	
Database Weblisting:	https://sandbox-paws.wsdb.uk	
Owner Information		
Name:	6H	
Telephone:	+16133661768	
Email:	info@6harmonics.com	
ZIP/Post Code:	K2E7S4	
Address Line1:		Suite 10-21
Address Line2:		Concours Gate
City:		Ottawa
State/Region:		ON
Country:		CA
Operator Information		
Name:		
Telephone:	+16133661768	
Email:	info@6harmonics.com	
ZIP/Post Code:	K2E7S4	
Address Line1:		Suite 10-21
Address Line2:		Concours Gate
City:		Ottawa
State/Region:		ON
Country:		CA
Reset Save		
Warning!		
Missing Information. Cannot leave any blanks!		

Figure 8.5-1: Unsuccessful registration with missing contact name

8.6 FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact address

8.6.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vii) Address for the contact person

8.6.2 Test summary

Test date October 16, 2018

8.6.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact address field was left intentionally blank. It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.6.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846508
Longitude:	-112.883876
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1:	
Address Line2:	
City:	
State/Region:	
Country:	
Suite 10-21	
Concours Gate	
Ottawa	
ON	
CA	
Warning!	
Missing Information. Cannot leave any blanks!	

Figure 8.6-1: Unsuccessful registration with missing owner contact address line 1

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact address
FCC Part 15 Subpart H



Device Characteristics:		
Manufacturer ID:	6harmonics	Antenna Height (0-100m): 2
Model ID:	GWS5002	Antenna Height Type: AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain: 9
FCC ID:	TEST-FCC-ID	Height Uncertainty: 0
Location:		
Latitude:	33.846508	Longitude: -112.883876
Database Parameters:		
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting: https://sandbox-paws.wsdw.uk
Owner Information		
Name:	6H	Address Line1: Suite 10-21
Telephone:	+16133661768	Address Line2:
Email:	info@6harmonics.com	City: Ottawa
ZIP/Post Code:	K2E7S4	State/Region: ON
		Country: CA
Operator Information		
Name:	Smith	Address Line1: Suite 10-21
Telephone:	+16133661768	Address Line2: Concours Gate
Email:	info@6harmonics.com	City: Ottawa
ZIP/Post Code:	K2E7S4	State/Region: ON
		Country: CA
Reset Save		
Warning! Missing Information. Cannot leave any blanks!		

Figure 8.6-2: Unsuccessful registration with missing owner contact address line 2

Device Characteristics:		
Manufacturer ID:	6harmonics	Antenna Height (0-100m): 2
Model ID:	GWS5002	Antenna Height Type: AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain: 9
FCC ID:	TEST-FCC-ID	Height Uncertainty: 0
Location:		
Latitude:	33.846505	Longitude: -112.883884
Database Parameters:		
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting: https://sandbox-paws.wsdw.uk
Owner Information		
Name:	6H	Address Line1: Suite 10-21
Telephone:	+16133661768	Address Line2: Concours Gate
Email:	info@6harmonics.com	City: Ottawa
ZIP/Post Code:	K2E7S4	State/Region: ON
		Country: CA
Operator Information		
Name:	Smith	Address Line1:
Telephone:	+16133661768	Address Line2: Concours Gate
Email:	info@6harmonics.com	City: Ottawa
ZIP/Post Code:	K2E7S4	State/Region: ON
		Country: CA
Reset Save		
Warning! Missing Information. Cannot leave any blanks!		

Figure 8.6-3: Unsuccessful registration with missing operator contact address line 1

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact address
FCC Part 15 Subpart H



Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846505	Longitude:	-112.883884
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wscdb.uk
Owner Information			
Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Reset Save			
Warning! Missing Information. Cannot leave any blanks!			

Figure 8.6-4: Unsuccessful registration with missing operator contact address line 2

8.7 FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact state (region)

8.7.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vii) Address for the contact person

8.7.2 Test summary

Test date June 27, 2019

8.7.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact state field was left intentionally blank (instead of *ON*). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.7.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdb.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	Ottawa
State/Region:	
Country:	CA
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	Ottawa
State/Region:	ON
Country:	CA

Warning!
Missing Information. Cannot leave any blanks!

Figure 8.7-1: Unsuccessful registration with missing owner contact state

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact state
FCC Part 15 Subpart H



Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1: Suite 10-21	
Address Line2: Concours Gate	
City: Ottawa	
State/Region: ON	
Country: CA	

Warning!
Missing Information. Cannot leave any blanks!

Figure 8.7-2: Unsuccessful registration with missing operator contact state

8.8 FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact zip (postal) code

8.8.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vii) Address for the contact person

8.8.2 Test summary

Test date June 27, 2019

8.8.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact zip (postal) code field was left intentionally blank (instead of K2E7S4). It was verified, that after detecting missing contact information, EUT did not send any form request to database, the EUT stopped the transmission. To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.8.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Restat Save	
Warning! Missing Information. Cannot leave any blanks!	

Figure 8.8-1: Unsuccessful registration with missing owner contact zip (postal) code

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact zip code
FCC Part 15 Subpart H



Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	
https://sandbox-paws.wsdh.uk	
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	
Restat Save	
Warning!	
Missing Information. Cannot leave any blanks!	

Figure 8.8-2: Data log of unsuccessful registration with missing operator contact zip (postal) code

8.9 FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact city

8.9.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vii) Address for the contact person

8.9.2 Test summary

Test date June 27, 2019

8.9.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact city field was left intentionally blank (instead of *Ottawa*). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.9.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wscdb.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	
State/Region:	ON
Country:	CA
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	Ottawa
State/Region:	ON
Country:	CA

Warning!
Missing Information. Cannot leave any blanks!

Figure 8.9-1: Unsuccessful registration with missing owner contact city

Section 8
Test name
Specification

Testing data
FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact city
FCC Part 15 Subpart H



Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846505	Longitude:	-112.883884
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information			
Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Reset Save		Save	
Warning! Missing Information. Cannot leave any blanks!			

Figure 8.9-2: Unsuccessful registration with missing operator contact city

8.10 FCC 15.713(g)(3)(vii) Unsuccessful registration due to incomplete information – contact country

8.10.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(vii) Address for the contact person

8.10.2 Test summary

Test date June 27, 2019

8.10.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact country field was left intentionally blank (instead of CA). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.10.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	Ottawa
State/Region:	ON
Country:	
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1:	Suite 10-21
Address Line2:	Concours Gate
City:	Ottawa
State/Region:	ON
Country:	CA

Warning!
Missing Information. Cannot leave any blanks!

Figure 8.10-1: Unsuccessful registration with missing owner contact country

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846505
Longitude:	-112.883884
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information	
Name:	6H
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Country:	
Warning!	
Missing Information. Cannot leave any blanks!	

Figure 8.10-2: Unsuccessful registration with missing operator contact country

8.11 FCC 15.713(g)(3)(viii) Unsuccessful registration due to incomplete information – contact email

8.11.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(viii) Email address for the contact person

8.11.2 Test summary

Test date June 27, 2019

8.11.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact email field was left intentionally blank (instead of *info@6harmonics.com*). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.11.4 Test data

Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWSS002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846505	Longitude:	-112.883884
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdb.uk
Owner Information			
Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:		City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Reset Save		Save	
Warning! Missing Information. Cannot leave any blanks!			

Figure 8.11-1: Unsuccessful registration with missing owner contact email



Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846505	Longitude:	-112.883884
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdh.uk
Owner Information			
Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:		City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Reset Save		Save	
Warning! Missing Information. Cannot leave any blanks!			

Figure 8.11-2: Unsuccessful registration with missing operator contact email

8.12 FCC 15.713(g)(3)(ix) Unsuccessful registration due to incomplete information – contact telephone

8.12.1 Definitions and limits

- (3) The white space device registration database shall contain the following information for fixed white space devices:
(xi) Phone number for the contact person

8.12.2 Test summary

Test date June 27, 2019

8.12.3 Observations, settings and special notes

EUT was configured with incomplete information: owner/operator contact telephone field was left intentionally blank (instead of +16133661768). It was verified, that after detecting missing contact information, EUT did not send any form request to database.
To test this feature the device was initially configured with valid information and allowed to transmit on the channel. The registration information was then modified to render it invalid and a registration request was not re-initiated. Once the device detects an invalid registration field, the device flagged the error in the GUI.

8.12.4 Test data

Device Characteristics:	
Manufacturer ID:	6harmonics
Model ID:	GWS5002
FCC TvbdDevice Type:	FIXED
FCC ID:	TEST-FCC-ID
Location:	
Latitude:	33.846508
Longitude:	-112.883876
Database Parameters:	
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40
Database Weblisting:	https://sandbox-paws.wsdw.uk
Owner Information	
Name:	6H
Telephone:	
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Operator Information	
Name:	Smith
Telephone:	+16133661768
Email:	info@6harmonics.com
ZIP/Post Code:	K2E7S4
Address Line1: Suite 10-21	
Address Line2: Concours Gate	
City: Ottawa	
State/Region: ON	
Country: CA	
Address Line1: Suite 10-21	
Address Line2: Concours Gate	
City: Ottawa	
State/Region: ON	
Country: CA	
Reset Save	
Warning! Missing Information. Cannot leave any blanks!	

Figure 8.12-1: Unsuccessful registration with missing owner contact telephone

Testing data
FCC 15.713(g)(3)(ix) Unsuccessful registration due to incomplete information – contact telephone
FCC Part 15 Subpart H



Device Characteristics:			
Manufacturer ID:	6harmonics	Antenna Height (0-100m):	2
Model ID:	GWS5002	Antenna Height Type:	AGL
FCC TvbdDevice Type:	FIXED	Antenna Gain:	9
FCC ID:	TEST-FCC-ID	Height Uncertainty:	0
Location:			
Latitude:	33.846505	Longitude:	-112.883884
Database Parameters:			
Token:	d-9d0be3d8-d424-4d80-a2bd-5357cc4f1c40	Database Weblisting:	https://sandbox-paws.wsdbs.uk
Owner Information			
Name:	6H	Address Line1:	Suite 10-21
Telephone:	+16133661768	Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA
Operator Information			
Name:	Smith	Address Line1:	Suite 10-21
Telephone:		Address Line2:	Concours Gate
Email:	info@6harmonics.com	City:	Ottawa
ZIP/Post Code:	K2E7S4	State/Region:	ON
		Country:	CA

Restat

Save

Warning!
Missing Information. Cannot leave any blanks!

Figure 8.12-2: Unsuccessful registration with missing operator contact telephone