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Test report

304460-1TRFWL

Date of issue: June 13, 2016

Applicant:

6harmonics Inc.

Product:

Television Band Device (TVBD)

Model:

GWS-4012-23

FCC ID:

2AASTGWS-4012-23

Specifications:

FCC 47 CFR Part 15 Subpart H

White Space Devices

www.nemko.com

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

FCC 15 H Date: March 2016



Test location

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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: 176392; IC: 2040A-4 (3 m semi anechoic chamber)

Tested by	Andrey Adelberg, Senior Wireless/EMC Specialist
Reviewed by	Kevin Rose, Wireless/EMC Specialist
Date	June 13, 2016
Signature of reviewer	

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 contained 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

1.3 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard. 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.

1.4 Exclusions

None

1.5 Test report revision history

Revision #	Details of changes made to test report
TRF	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 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)(3)	Relocation of fixed TVBD	Pass
§15.711(c)(2)(i)	Database access	Pass
§15.711(c)(2)(iii)	Low-power auxiliary device protection	Pass
§15.711(j)	Security	Pass

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	February 29, 2016
Nemko sample ID number	None

3.2 EUT information

Product name	Television Band Device (TVBD)
Model	GWS-4012-23
Serial number	620000098 (master); 620000097 (slave)

3.3 Technical information

Frequency band	470–698 MHz
Channel BW	12 MHz
Type of modulation	BPSK, QPSK, 16-QAM, and 64-QAM
Power requirements	120 VAC 60 Hz or 48 V _{DC} via PoE

3.4 Product description and theory of operation

The 6Harmonics Inc. GWS radios are a new class of radios designed for the global white space radio market. The GWS-4012-23 is designed to provide up to 23 dBm of transmit power, offer a sensitivity of up to -100 dBm, and provide 33 Mbps of UDP throughput in a 12 MHz television channel. The product can be used for Point to Point or Point to Multi-point operation.

3.5 Test configuration

The work station laptop was connected to network router and established a network connection to the internet and the EUT. Two separate samples of GWS-4012-23 were used in the setup. One sample was configured as Master and the second sample was configured as Slave. Master device was connected to a network router with direct access to the internet. Slave device was connected to master device using RF cables, attenuators and RF splitter. Slave device doesn't have direct internet access. It was able to access the internet only during master-slave coax link. All EUT's were controlled and monitored by a work station using Terminal sessions.

3.6 Setup photo

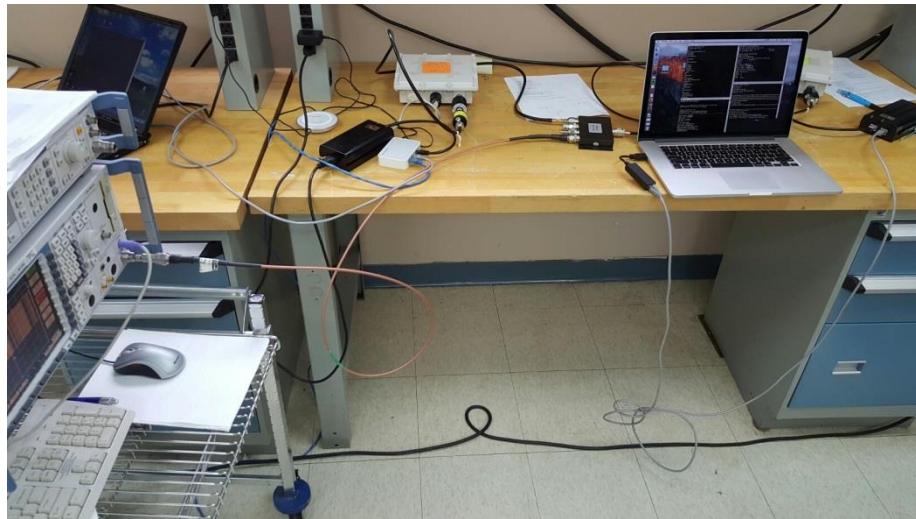


Figure 3.6-1: Setup photo

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

Nemko Canada Inc. has calculated measurement uncertainty and is documented in EMC/MUC/001 "Uncertainty in EMC measurements." Measurement uncertainty was calculated using the methods described in CISPR 16-4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC measurements; as well as described in UKAS LAB34: The expression of Uncertainty in EMC Testing. Measurement uncertainty calculations assume a coverage factor of K=2 with 95% certainty.

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	FSU	FA001877	1 year	Mar. 27/16

Note: NCR - no calibration required, VOU - verify on use

Section 8. Testing data

8.1 FCC 15.713(g) 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.

8.1.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.1.3 Observations, settings and special notes

EUT was configured with the proper registration information. Successful registration was verified with spectrum analyzer and by accessing WSDB registration interface and showing on the EUT status information page.

8.1.4 Test data

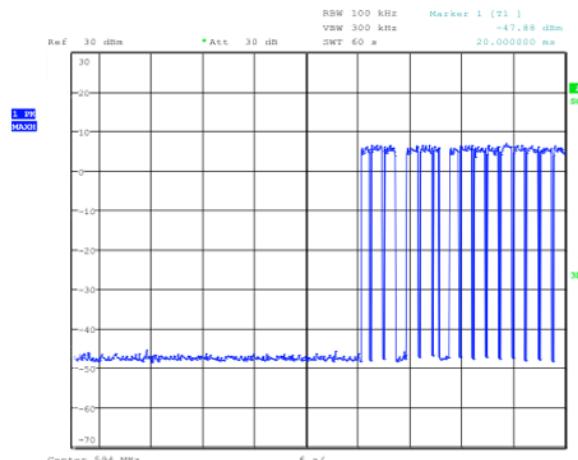
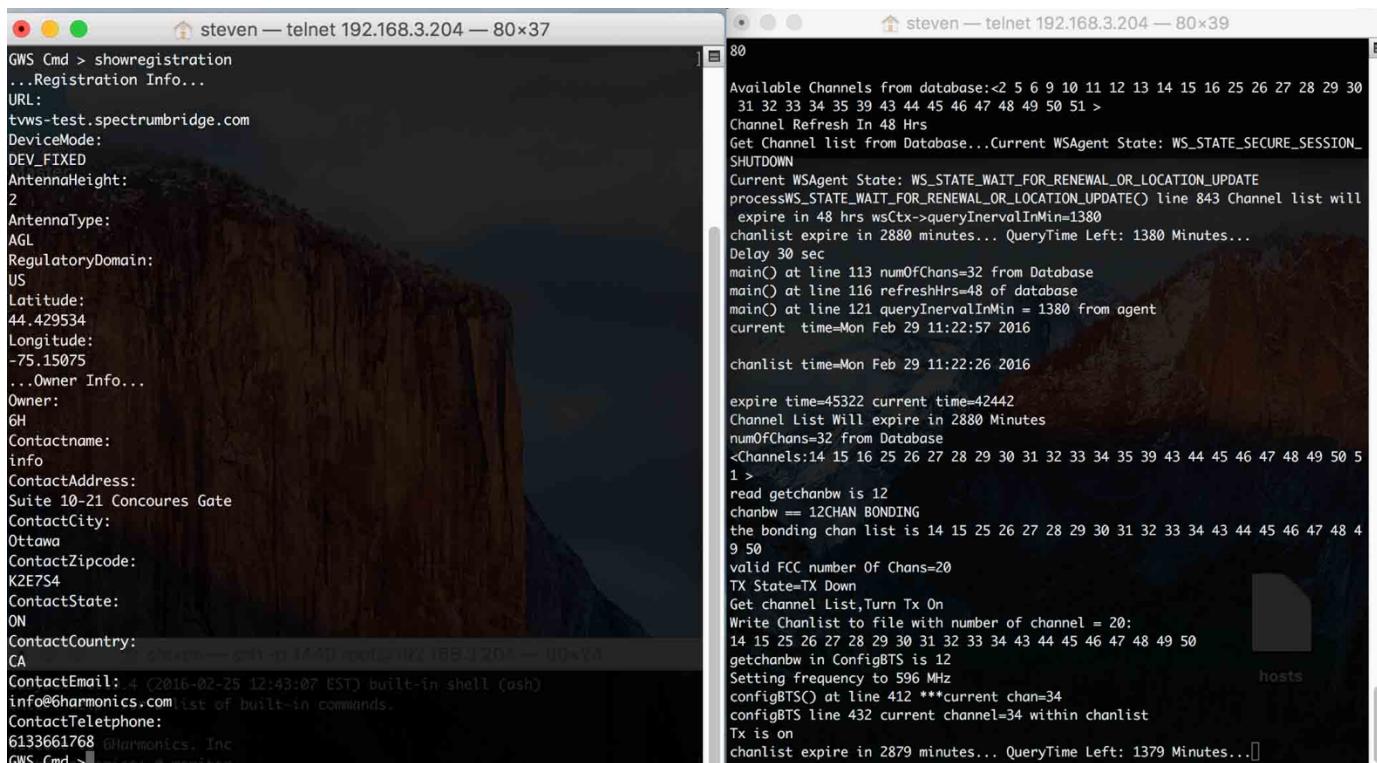


Figure 8.1-1: Successful registration of master device. Spectrum plot shows that prior to the registration of the EUT there is no transmission and the transmission started right after the successful registration.

Note: there were no emissions from the Master Device detected, on any channels, until it has successfully registered.



The image shows two terminal windows side-by-side. Both windows have a title bar 'steven — telnet 192.168.3.204 — 80x37'.

The left terminal window displays the command 'GWS Cmd > showregistration' followed by a large amount of configuration information for a device. The right terminal window displays a log of channel availability and management commands.

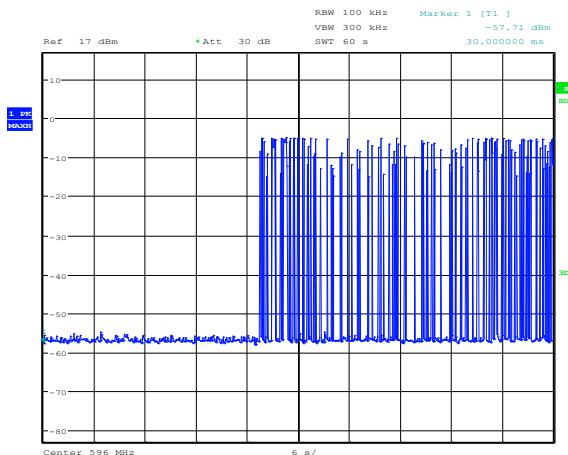
Left Terminal Window (GWS Cmd > showregistration):

```
GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail: 4 (2016-02-25 12:43:07 EST) built-in shell (ash)
info@Gharmonics.com (list of built-in commands.
ContactTelephone:
6133661768 Gharmonics, Inc
GWS Cmd >
```

Right Terminal Window (Logs):

```
Available Channels from database:<2 5 6 9 10 11 12 13 14 15 16 25 26 27 28 29 30
31 32 33 34 35 39 43 44 45 46 47 48 49 50 51 >
Channel Refresh In 48 Hrs
Get Channel list from Database...Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE
processWS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE() line 843 Channel list will expire in 48 hrs wsCtx->queryIntervalInMin=1380
chanlist expire in 2880 minutes... QueryTime Left: 1380 Minutes...
Delay 30 sec
main() at line 113 numChans=32 from Database
main() at line 116 refreshHhrs=48 of database
main() at line 121 queryIntervalInMin = 1380 from agent
current time=Mon Feb 29 11:22:57 2016
chanlist time=Mon Feb 29 11:22:26 2016
expire time=45322 current time=42442
Channel List Will expire in 2880 Minutes
numOfChans=32 from Database
<Channels:14 15 16 25 26 27 28 29 30 31 32 33 34 35 39 43 44 45 46 47 48 49 50 51 >
read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
valid FCC number Of Chans=20
TX State=TX Down
Get channel List,Turn Tx On
Write Chanlist to file with number of channel = 20:
14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
getchanbw in ConfigBTS is 12
Setting frequency to 596 MHz
configBTS() at line 412 ***current chan=34
configBTS line 432 current channel=34 within chanlist
Tx is on
chanlist expire in 2879 minutes... QueryTime Left: 1379 Minutes...]
```

Figure 8.1-2: Data log of successful registration of master device



Date: 29.FEB.2016 13:46:52

Figure 8.1-3: Successful registration of slave device. Spectrum plot shows that prior to the registration of the EUT there is no transmission and the transmission started right after the successful registration.

Note: Prior to registration, Slave Device did not transmit on any channels except for the channel where it saw a beacon from the Master Device. Only the Slave device is permitted to transmit prior to registration for the purposes of registering only on a channel where it sees a beacon from a Master Device. To achieve this, the SLAVE must perform a passive scan.

```

GWS Cmd > showregistration
...Registration Info... American_television_frequencies
URL:
tws-test.spectrumbridge.com WSN PNP Java 不谈抄袭，纯粹从剧情出发
DeviceMode:
DEV_FIXED
AntennaHeight: 512      513.25    512.31    517.75
2_22                   518        519.25    518.31    523.75
AntennaType:             518        519.25    518.31    523.75
AGL:                    524        525.25    524.31    529.75
RegulatoryDomain:       US_A       530        531.25    530.31    535.75
Latitude:               44.429534  536        537.25    536.31    541.75
Longitude:              -75.15075  542        543.25    542.31    547.75
...Owner Info...
Owner:                  548        549.25    548.31    553.75
6H
Contactname:             554        555.25    554.31    559.75
info
ContactAddress:          560        561.25    560.31    565.75
Suite 10-21 Concours Gate
ContactCity:              566        567.25    566.31    571.75
Ottawa
ContactZipcode:           572        573.25    572.31    577.75
K2E7S4
ContactState:             578        579.25    578.31    583.75
ON
ContactCountry:            584        585.25    584.31    589.75
CA
ContactEmail:              590        591.25    590.31    595.75
info@Ghamonics.com
597.25      598.31    597.75

Connected to ac:ee:3b:02:08:88
-58 dBm / -90 dBm (SNR 32) 270 ms ago
RX: 39.2 MBit/s, MCS 7      3022 Pkts.
TX: 39.2 MBit/s, MCS 7      271 Pkts.

Database Access:spectrumbridge
Node is EAR With
HWaddr AC:EE:3B:02:08:89
13:21:02 up 23 min, load average: 0.12, 0.22, 0.23
MemFree:            38988 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 33.000000 dBm
Min Tx Power: 17.000000 dBm
Channel Expire In 2865 Minutes
Query Time Left In 1365 Minutes
Radio Link Up Time...
years - 0
months - 0
days - 0
clock - 0:1:36

```

```

steven — telnet 192.168.3.203 — 80x32
User-Agent: HTMLGET 1.0
Current WSAgent State: WS_STATE_WAIT_FOR_CHANNEL_RESPONSE
Received a message:HTTP/1.1 200 OK
Cache-Control: private
Content-Length: 348
Content-Type: application/xml; charset=utf-8
Server: Microsoft-IIS/8.5
SBI-Version: 3
SBI-Status: 0
X-Powered-By: ASP.NET
Date: Mon, 29 Feb 2016 18:05:50 GMT
Connection: close
<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><ChannelCount>32</ChannelCount><ChannelList>2,5,6,9,10,11,12,13,14,15,16,25,26,27,28,29,30,31,32,33,34,35,39,43,44,45,46,47,48,49,50,51</ChannelList><RefreshIn>48</RefreshIn></ChannelResponse>
HTTP Status:200
WhiteSpace Status :0
processWS_STATE_WAIT_FOR_CHANNEL_RESPONSE() line 649 wsCtx->queryIntervalInMin=13
80
Available Channels:<2 5 6 9 10 11 12 13 14 15 16 25 26 27 28 29 30 31 32 33 34 35 39 43 44 45 46 47 48 49 50 51 >
Channel Refresh In 48 Hrs
Get Channel list from Database...
Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE
chanlist expire in 2865 minutes... QueryTime Left: 1365 Minutes...

```

Figure 8.1-4: Data log of successful registration of slave device

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

8.2.1 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));

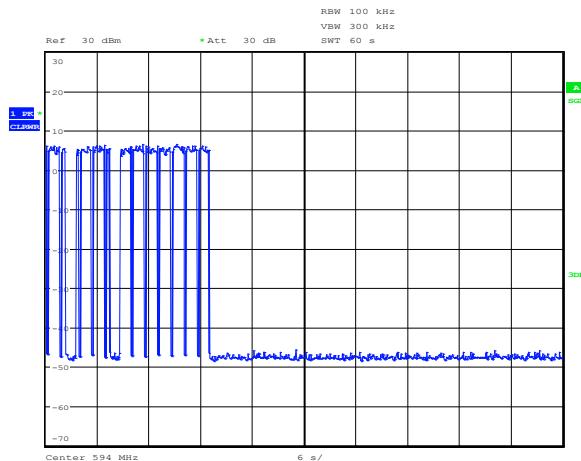
8.2.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.2.3 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: 31.5 and longitude: -106.9. The registration process was re-initiated with the invalid coordinates. After database rejection, the EUT stopped the transmission as can be seen in figure 8.2-1. Conversely, if the device was initially configured with invalid coordinates, the device will not transmit since the registration will be rejected. The test was repeated for a Master Device Fig 8.2-1 and a Slave Device Fig 8.2-3.

8.2.4 Test data



Date: 29.FEB.2016 11:54:44

Figure 8.2-1: Unsuccessful registration with restricted coordinates of master device. Spectrum plot shows that prior to the unsuccessful registration the EUT was transmitting and the transmission stopped right after the EUT detected missing information in the registration form.

```
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
GH
Contactname:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
^C

No station connected
Database Access:spectrumbridge
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:17:35 up 1 min, load average: 0.16, 0.06, 0.02
MemFree: 39052 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
GWS_Ready
Channel Expire In 2880 Minutes
Query Time Left In 1380 Minutes
^C

        getlatitude
44.429534      getlongitude
-75.15075
    setlatitude 31.5
    setlongitude -106.9
```

```
***** Database Access:spectrumbridge
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:25:07 up 8 min, load average: 0.17, 0.12, 0.06
MemFree: 39212 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down

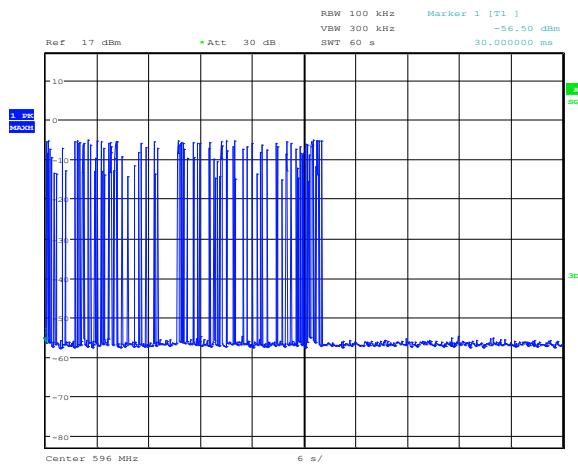
steven — telnet 192.168.3.204 — 80x39
Registration Request Message:PUT https://tws-test.spectrumbridge.com/v3/devices/US/2AASTGWS-4012-23/620000098 HTTP/1.1
Host: tws-test.spectrumbridge.com
Content-Type: Application/xml
Connection: close
Content-Length: 580

<RegistrationRequest xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.WhiteSpaces.Services.v3"><AntennaHeight>2</AntennaHeight><ContactCity>Ottawa</ContactCity><ContactCountry>CA</ContactCountry><ContactEmail>info@6harmonics.com</ContactEmail><ContactName>info</ContactName><ContactPhone>6133661768</ContactPhone><ContactState>ON</ContactState><ContactStreet>Suite 10-21 Concours Gate</ContactStreet><ContactZip>K2E7S4</ContactZip><DeviceOwner>GH</DeviceOwner><DeviceType>8</DeviceType><Latitude>31.5</Latitude><Longitude>-106.9</Longitude></RegistrationRequest>

Current WSAgent State: WS_STATE_WAIT_FOR_REGISTRATION_RESPONSE
Received a message:HTTP/1.1 200 OK
Cache-Control: private
Server: Microsoft-IIS/8.5
SBI-Version: 3
SBI-Status: 9
SBI-HC: 0.000
X-Powered-By: ASP.NET
Date: Mon, 29 Feb 2016 16:25:07 GMT
Connection: close
Content-Length: 0

HTTP Status:200
WhiteSpace Status :9
Registration Failed
Registration HTTP Status:200 WS Error code:9
Error: LOCATION OUTSIDE REG DOMAIN
Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
```

Figure 8.2-2: Data log of unsuccessful registration with restricted coordinates of master device



Date: 29.FEB.2016 13:50:08

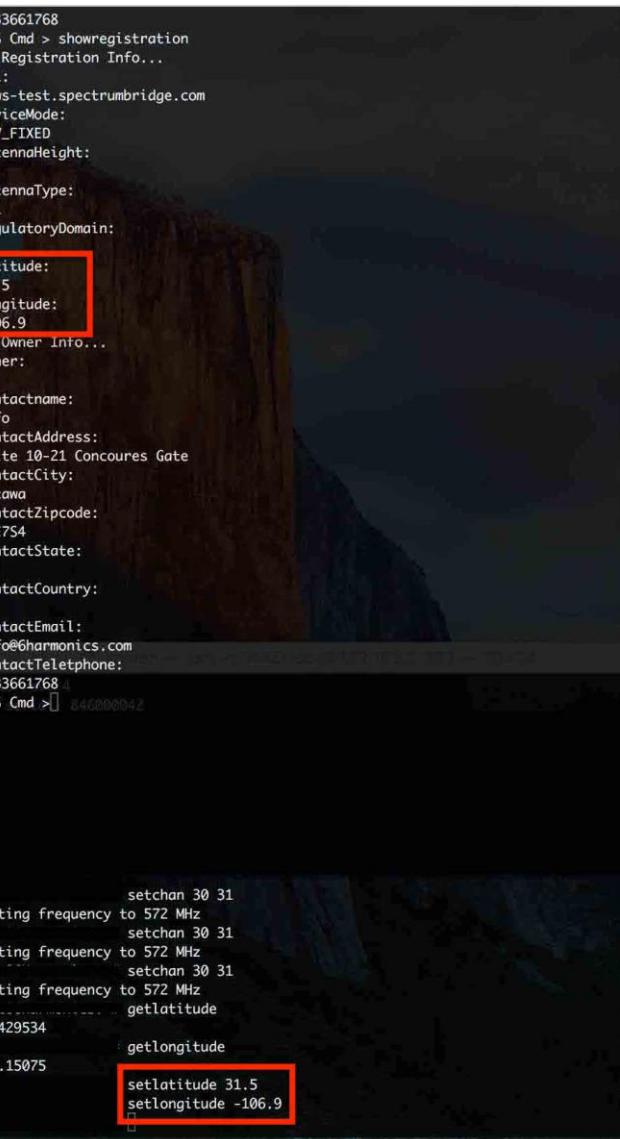
Figure 8.2-3: Unsuccessful registration with restricted coordinates of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT was transmitting and the transmission stopped right after the EUT detected missing information in the registration form.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
twis-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude: 31.5
Longitude: -106.9
...Owner Info...
Owner:
6H
Contactname:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768
GWS Cmd > 846000042

setchan 30 31
Setting frequency to 572 MHz
setchan 30 31
Setting frequency to 572 MHz
setchan 30 31
Setting frequency to 572 MHz
getlatitude
44.429534
getlongitude
-75.15075
setlatitude 31.5
setlongitude -106.9

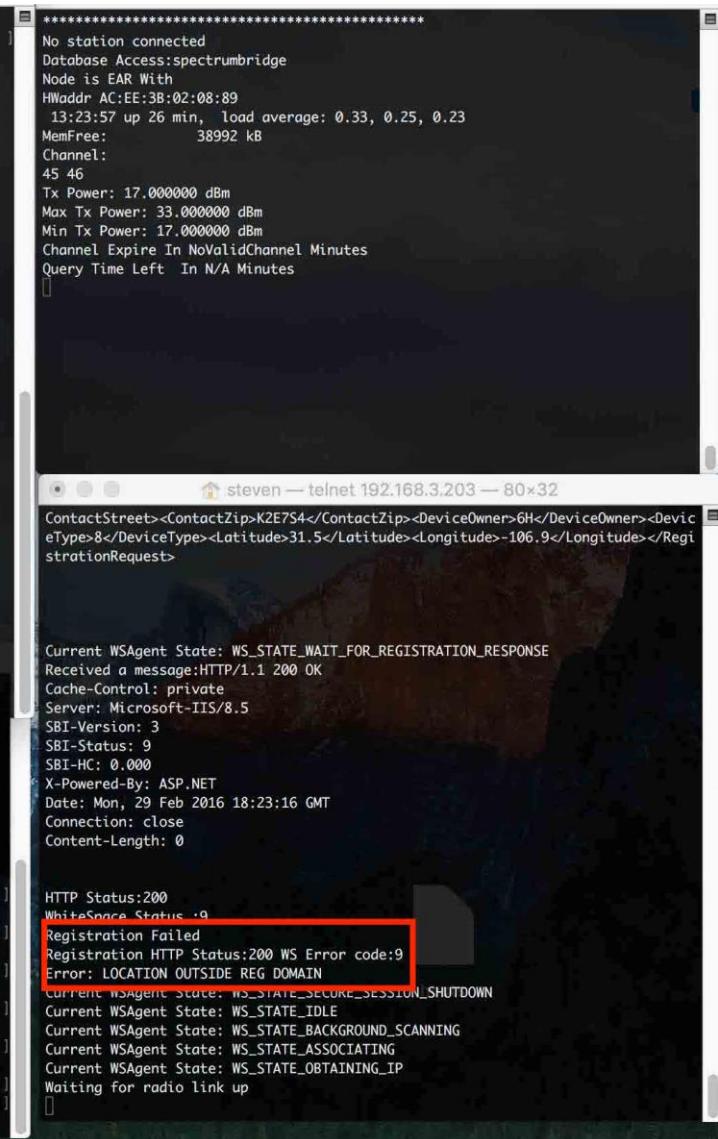
```



```

*****
No station connected
Database Access:spectrumbridge
Node is EAR With
HWaddr AC:E8:02:08:89
13:23:57 up 26 min, load average: 0.33, 0.25, 0.23
MemFree: 38992 kB
Channel:
45 46
Tx Power: 17.000000 dBm
Max Tx Power: 33.000000 dBm
Min Tx Power: 17.000000 dBm
Channel Expire In NoValidChannel Minutes
Query Time Left In N/A Minutes

```



```

*****  

ContactStreet><ContactZip>K2E7S4</ContactZip><DeviceOwner>6H</DeviceOwner><DeviceType>8</DeviceType><Latitude>31.5</Latitude><Longitude>-106.9</Longitude><RegistrationRequest>  

Current WSAgent State: WS_STATE_WAIT_FOR_REGISTRATION_RESPONSE  

Received a message:HTTP/1.1 200 OK  

Cache-Control: private  

Server: Microsoft-IIS/8.5  

SBI-Version: 3  

SBI-Status: 9  

SBI-HC: 0.000  

X-Powered-By: ASP.NET  

Date: Mon, 29 Feb 2016 18:23:16 GMT  

Connection: close  

Content-Length: 0  

HTTP Status:200
WhiteSpace Status :9
Registration Failed
Registration HTTP Status:200 WS Error code:9
Error: LOCATION OUTSIDE REG DOMAIN
current msagent state: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_IDLE
Current WSAgent State: WS_STATE_BACKGROUND_SCANNING
Current WSAgent State: WS_STATE_ASSOCIATING
Current WSAgent State: WS_STATE_OBTAINING_IP
Waiting for radio link up

```


Figure 8.2-4: Data log of unsuccessful registration with restricted coordinates of slave device

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

8.3.1 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

8.3.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.3.3 Observations, settings and special notes

EUT was configured with incomplete information: owner 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, the EUT stopped the transmission.

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 such that the contact information was missing. The registration process was re-initiated with the missing contact information. The device Software detected the incomplete registration information and did not send a request to the database, but rather ceased to transmit as can be seen in Fig 8.3-1. Conversely, if the device was initially configured with invalid contact information, the device will not transmit or attempt to register. The test was repeated for a Master Device Fig 8.3-1 and a Slave Device Fig 8.3-3.

8.3.4 Test data

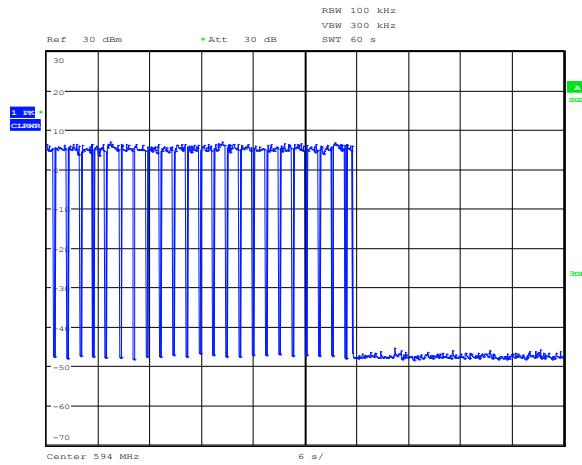


Figure 8.3-1: Unsuccessful registration with missing owner of master device.
Spectrum plot shows that prior to the unsuccessful registration the EUT was transmitting and the transmission stopped right after the EUT detected missing information in the registration form.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner: [REDACTED]

Contactname:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768
GWS Cmd >

getlatitude
44.429534
getlongitude
-75.15075
setlatitude 31.5
setlongitude -106.9
setlongitude 44.429534
setlatitude 44.429534
setlongitude -75.15075
setlatitude 31.5
setlongitude -106.9
setlatitude 44.429534
setlongitude -75.15075
setowner

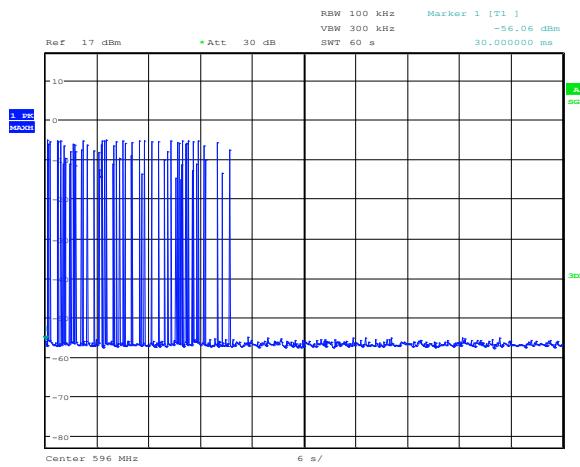
***** Database Access:spectrumbridge *****
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:31:34 up 15 min, load average: 0.15, 0.18, 0.11
MemFree: 39708 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down

[REDACTED] steven — telnet 192.168.3.204 — 80x38
expire time=45328 current time=42450
Channel List Will expire in 2878 Minutes
numOfChans=32 from Database
<Channels:14 15 16 25 26 27 28 29 30 31 32 33 34 35 39 43 44 45 46 47 48 49 50 5
1 >
read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 4
9 50
valid FCC number Of Chans=20
TX State=GWS_Ready
main() at line 234 ***current chan=34
main line 254 current channel=34 within chanlist
[GWS Cmd > restartwsagentcar
main() at line 110 numOfChans=0
main() at line 113 numOfChans=0 from Database
main() at line 116 refreshHhrs=0 of database
main() at line 121 queryInervalInMin = 0 from agent
current time=Mon Feb 29 11:31:07 2016

chanlist time=Sun Jan 0 00:00:00 1900
expire time=0 current time=42451
Channel List Will expire in -42451 Minutes
Channel List Expired
numOfChans=0 from Database
<Channels:>
GWS Cmd >read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is
valid FCC number Of Chans=0
Turn Tx Off
netval = 1 serialNumber = 620000008
[REDACTED] Contact info can not be empty. Please add OwnerName in registration
txoff() at line 64 clear shared memory
[REDACTED]
Delay 30 sec
[REDACTED]

```

Figure 8.3-2: Data log of unsuccessful registration with missing owner information of master device



Date: 29.FEB.2016 13:52:35

Figure 8.3-3: Unsuccessful registration with missing owner of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner: [REDACTED]
ContactName:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768
[GWS Cmd > address; D4:CA:60:9C:B2:11
d

----- f setchan 30 31
Setting frequency to 572 MHz
      setchan 30 31
Setting frequency to 572 MHz
      setchan 30 31
Setting frequency to 572 MHz
      getlatitude
44.429534
      getlongitude
-75.15075
      setlatitude 31.5
      setlongitude -106.9
      setlatitude 44.429534
      setlongitude -75.15075
      setchan 34 35
Setting frequency to 596 MHz
      setowner

*****[REDACTED]*****
No station connected
Database Access:spectrumbridge
Node is EAR With
HWaddr AC:EE:3B:02:08:89
13:26:30 up 28 min, load average: 0.36, 0.24, 0.23
MemFree: 38808 kB
Channel:
42 43
Tx Power: 17.000000 dBm
Max Tx Power: 33.000000 dBm
Min Tx Power: 17.000000 dBm
Channel Expire In NoValidChannel Minutes
Query Time Left In N/A Minutes

steven — telnet 192.168.3.203 — 80x32
Received a message:HTTP/1.1 200 OK
Cache-Control: private
Content-Length: 348
Content-Type: application/xml; charset=utf-8
Server: Microsoft-IIS/8.5
SBI-Version: 3
SBI-Status: 0
X-Powered-By: ASP.NET
Date: Mon, 29 Feb 2016 18:24:59 GMT
Connection: close

<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.W
hiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><Ch
annelCount>32</ChannelCount><ChannelList>2,5,6,9,10,11,12,13,14,15,16,25,26,27,28
,29,30,31,32,33,34,35,39,43,44,45,46,47,48,49,50,51</ChannelList><RefreshIn>48</
RefreshIn></ChannelResponse>
HTTP Status:200
WhiteSpace Status :0
processWS_STATE_WAIT_FOR_CHANNEL_RESPONSE() line 649 wsCtx->queryIntervalInMin=13
80

Available Channels:<2 5 6 9 10 11 12 13 14 15 16 25 26 27 28 29 30 31 32 33 34 3
5 39 43 44 45 46 47 48 49 50 51 >
Channel Refresh In 48 Hrs
Get Channel list from Database...
Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE
[GWS Cmd > restartwsagentear
[GWS Cmd > serialNumber = 620000002
Contact info can not be empty. Please add OwnerName in registration
clearshm() at line 64 clear shared memory

```

Figure 8.3-4: Data log of unsuccessful registration with missing owner information of slave device

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

8.4.1 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

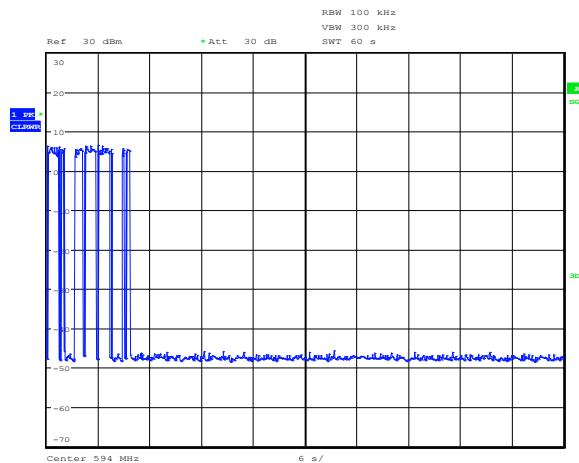
8.4.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.4.3 Observations, settings and special notes

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

8.4.4 Test data



Date: 29.FEB.2016 11:59:07

Figure 8.4-1: Unsuccessful registration with missing contact name of master device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname: [REDACTED]
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@gharmonics.com
ContactTelephone:
6133661768
GWS Cmd >]

44.429534      getlatitude
-75.15075      getlongitude
                  setlatitude 31.5
                  setlongitude -106.9
                  setlongitude 44.429534
                  setlatitude 44.429534
                  setlongitude -75.15075
                  setlatitude 31.5
                  setlongitude -106.9
                  setlatitude 44.429534
                  setlongitude -75.15075
                  setowner
                  setowner 6H
                  setcontactname

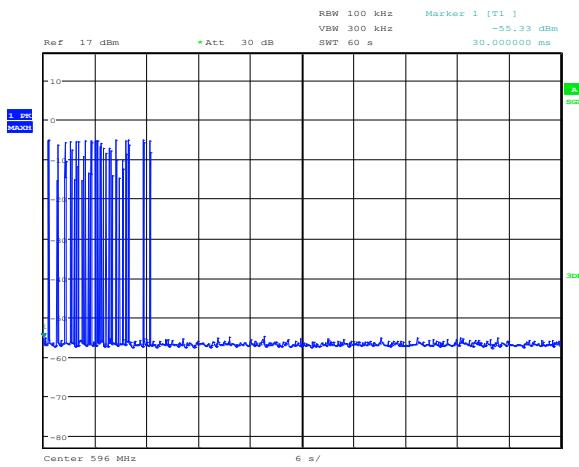
***** *****
Database Access:spectrumbridge
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:32:55 up 16 min, load average: 0.27, 0.22, 0.13
MemFree:           39632 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down [REDACTED]

steven — telnet 192.168.3.204 — 80x38
read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 4
9 50
valid FCC number Of Chans=20
TX State=TX Down
Get channel List,Turn Tx On
Write Chanlist to file with number of channel = 20:
14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
getchanbw in ConfigBTS is 12
Setting frequency to 596 MHz
configBTS() at line 412 ***current chan=34
configBTS line 432 current channel=34 within chanlist
[GWS Cmd > restartwsagentcar
main() at line 110 numOfChans=0
main() at line 113 numOfChans=0 from Database
main() at line 116 refreshHrs=0 of database
main() at line 121 queryInervalInMin = 0 from agent
current time=Mon Feb 29 11:32:41 2016

chanlist time=Sun Jan 0 00:00:00 1900
expire time=0 current time=42452
Channel List Will expire in -42452 Minutes
Channel List Expired
numOfChans=0 from Database
<Channels:>
[GWS Cmd >read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is
valid FCC number Of Chans=0
Turn Tx Off
retval = 1 serialNumber = 620000098
Contact info can not be empty. Please add ContactName in registration info
txoff() at line 64 clear shared memory [REDACTED]
hosts
Delay 30 sec

```

Figure 8.4-2: Data log of unsuccessful registration with missing contact name of master device



Date: 29.FEB.2016 13:54:34

Figure 8.4-3: Unsuccessful registration with missing contact name of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during the initial power up, the device will not attempt to register with the database, will not transmit and will flag3 the error to the user.

The screenshot shows a terminal window with two panes. The left pane displays a command-line interface for a device configuration. The right pane shows the system's response to the command.

Left Pane (Command Line):

```
6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname: [REDACTED]
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768 12-23$
```

Right Pane (System Response):

```
No station connected
Database Access:spectrumbridge
Node is EAR With
HWaddr AC:EE:3B:02:08:89
    13:28:37 up 30 min, load average: 0.16, 0.23, 0.23
MemFree:           39192 kB
Channel:
43 44
Tx Power: 17.000000 dBm
Max Tx Power: 33.000000 dBm
Min Tx Power: 17.000000 dBm
Channel Expire In NoValidChannel Minutes
Query Time Left In N/A Minutes

Received a message:HTTP/1.1 200 OK
Cache-Control: private
Content-Length: 348
Content-Type: application/xml; charset=utf-8
Server: Microsoft-IIS/8.5
SBI-Version: 3
SBI-Status: 0
X-Powered-By: ASP.NET
Date: Mon, 29 Feb 2016 18:27:25 GMT
Connection: close

<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.W
hiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><Ch
annelCount>32</ChannelCount><ChannelList>2,5,6,9,10,11,12,13,14,15,16,25,26,27,28
,29,30,31,32,33,34,35,39,43,44,45,46,47,48,49,50,51</ChannelList><RefreshIn>48</
RefreshIn></ChannelResponse>
HTTP Status:200
WhiteSpace Status :0
processWS_STATE_WAIT_FOR_CHANNEL_RESPONSE() line 649 wsCtx->queryIntervalInMin=13
80

Available Channels:<2 5 6 9 10 11 12 13 14 15 16 25 26 27 28 29 30 31 32 33 34 3
5 39 43 44 45 46 47 48 49 50 51 >
Channel Refresh In 48 Hrs
Get Channel list from Database...
Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE
[GWS Cmd > restartwsagentear
[GWS Cmd > serialNumber = 620000097
Contact info can not be empty. Please add ContactName in registration info
clearshm() at line 64 clear shared memory
```

Figure 8.4-4: Data log of unsuccessful registration with missing contact name of slave device

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

8.5.1 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

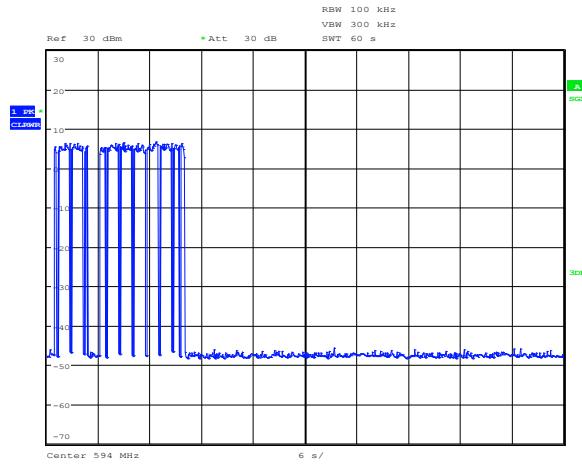
8.5.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.5.3 Observations, settings and special notes

EUT was configured with incomplete information: contact address field was left intentionally blank (instead of Suit 10-21 Concourse Gate). 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 re-initiated. Once the device detects an invalid registration field, the device ceased to transmit and flagged the error in the GUI. The test was repeated when the device is configured as a Master as well as a Slave. If incomplete registration information is detected during the initial power up the device will not attempt to register and will flag the error to the user.

8.5.4 Test data



Date: 29.FEB.2016 12:00:05

Figure 8.5-1: Unsuccessful registration with missing contact address of master device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during the initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname:
info
ContactAddress:[REDACTED]
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768
GWS Cmd >[REDACTED]

-75.15075
    setlatitude 31.5
    setlongitude -106.9
    setlongitude 44.429534
    setlatitude 44.429534
    setlongitude -75.15075
    setlatitude 31.5
    setlongitude -106.9
    setlatitude 44.429534
    setlongitude -75.15075
    setowner
    setowner 6H
    setcontactname
    setcontactname info
    getcontactaddress
Suite 10-21 Concours Gate
    setcontactaddress
[REDACTED]

```

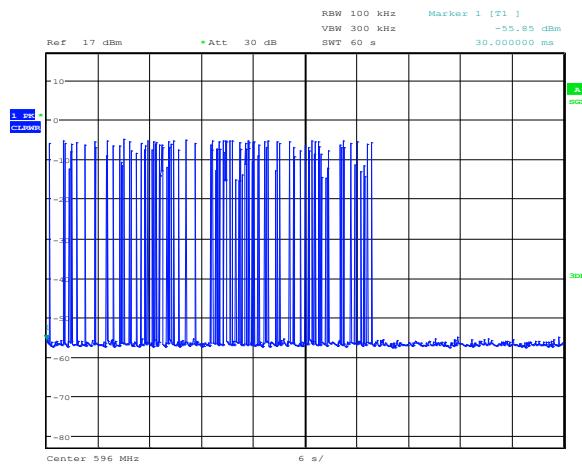
```

*****
Database Access:spectrumbridge
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:34:11 up 17 min, load average: 0.32, 0.23, 0.14
MemFree: 39560 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down

steven — telnet 192.168.3.204 — 80x38
chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
valid FCC number Of Chans=20
TX State=TX Down
Get channel List,Turn Tx On
Write Chanlist to file with number of channel = 20:
14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
getchanbw in ConfigBTS is 12
Setting frequency to 596 MHz
configBTS() at line 412 ***current chan=34
configBTS line 432 current channel=34 within chanlist
Tx is on
[GWS Cmd > restartwsagentcar
main() at line 110 numOfChans=0
main() at line 113 numOfChans=0 from Database
main() at line 116 refreshHrs=0 of database
main() at line 121 queryIntervalInMin = 0 from agent
current time=Mon Feb 29 11:34:00 2016
chanlist time=Sun Jan 0 00:00:00 1900
expire time=0 current time=42454
Channel List Will expire in -42454 Minutes
Channel List Expired
numOfChans=0 from Database
<Channels:>
[GWS Cmd >read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is
valid FCC number Of Chans=0
Turn Tx Off
setval 1 configNumber = 62000000
Contact info can not be empty. Please add ContactAddress in registration info
txoff() at line 64 clear shared memory
hosts
Delay 30 sec

```

Figure 8.5-2: Data log of unsuccessful registration with missing contact address of master device



Date: 29.FEB.2016 13:58:47

Figure 8.5-3: Unsuccessful registration with missing contact address of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

```

6133661768
GWS Cmd > showregistration
...Registration Info...
URL:
twss-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
Z
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
GH
Contactname:
info
ContactAddress: [REDACTED]
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@harmonics.com
ContactTelephone:
6133661768
GWS Cmd > [REDACTED] frequency to 596 MHz

```

File Explorer window showing registration info:

- ContactAddress: [REDACTED] (highlighted with a red box)
- ContactCity: Ottawa
- ContactZipcode: K2E7S4
- ContactState: ON
- ContactCountry: CA
- ContactEmail: info@harmonics.com
- ContactTelephone: 6133661768

```

***** No station connected *****

Database Access:spectrumbridge
Node is EAR With
HWaddr AC:EE:3B:02:08:89
13:30:36 up 32 min, load average: 0.45, 0.27, 0.24
MemFree: 39044 kB
Channel: 46 47
Tx Power: 17.000000 dBm
Max Tx Power: 33.000000 dBm
Min Tx Power: 17.000000 dBm
Channel Expire In NoValidChannel Minutes
Query Time Left In N/A Minutes

```

```

Received a message:HTTP/1.1 200 OK
Cache-Control: private
Content-Length: 348
Content-Type: application/xml; charset=utf-8
Server: Microsoft-IIS/8.5
SBI-Version: 3
SBI-Status: 0
X-Powered-By: ASP.NET
Date: Mon, 29 Feb 2016 18:29:04 GMT
Connection: close

<ChannelResponse xmlns="http://schemas.datacontract.org/2004/07/SpectrumBridge.W
hiteSpaces.Services.v3" xmlns:i="http://www.w3.org/2001/XMLSchema-instance"><Ch
annelCount>32</ChannelCount><ChannelList>2,5,6,9,10,11,12,13,14,15,16,25,26,27,28
,29,30,31,32,33,34,35,39,43,44,45,46,47,48,49,50,51</ChannelList><RefreshIn>48</
RefreshIn></ChannelResponse>
HTTP Status:200
WhiteSpace Status :0
processWS_STATE_WAIT_FOR_CHANNEL_RESPONSE() line 649 wsCtx->queryInervalInMin=13
80

Available Channels:<2 5 6 9 10 11 12 13 14 15 16 25 26 27 28 29 30 31 32 33 34 3
5 39 43 44 45 46 47 48 49 50 51 >
Channel Refresh In 48 Hrs
Get Channel list from Database...
Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN
Current WSAgent State: WS_STATE_WAIT_FOR_RENEWAL_OR_LOCATION_UPDATE
GWS Cmd > restartwsagentear
GWS Cmd >serialNumber = 62000097
Contact info can not be empty. Please add ContactAddress in registration info
clearshm() at line 64 clear shared memory

```

Figure 8.5-4: Data log of unsuccessful registration with missing contact address of slave device

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

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

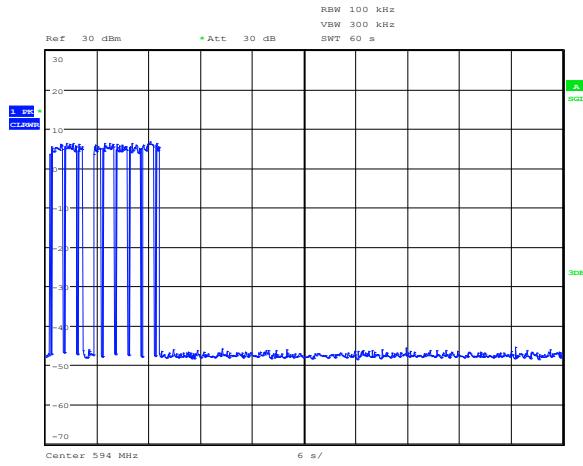
8.6.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.6.3 Observations, settings and special notes

EUT was configured with incomplete information: 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, 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 re-initiated. Once the device detects an invalid registration field, the device ceased to transmit and flagged the error in the GUI. The test was repeated when the device is configured as a Master as well as a Slave. If incomplete registration information is detected during the initial power up the device will not attempt to register and will flag the error to the user.

8.6.4 Test data



Date: 29.FEB.2016 12:01:25

Figure 8.6-1: Unsuccessful registration with missing contact (state) of master device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tvws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname:
info
ContactAddress:
Suite 10-21 Concours Gate
ContactCity:
Ottawa
ContactZipcode:
K2E7S4
ContactState:[REDACTED]
ContactCountry:
CA
ContactEmail:
info@harmonics.com
ContactTelephone:
6133661768
GWS Cmd >

setlongitude -106.9
setlongitude 44.429534
setlatitude 44.429534
setlongitude -75.15075
setlatitude 31.5
setlongitude -106.9
setlatitude 44.429534
setlongitude -75.15075
setowner
setowner 6H
setcontactname
setcontactname info
getcontactaddress
Suite 10-21 Concours Gate
    setcontactaddress
    setcontactaddress Suite 10-21 Concours Gate
    setcontactstate
]

***** Database Access:spectrumbridge *****
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:35:32 up 19 min, load average: 0.11, 0.19, 0.13
MemFree: 39564 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down[REDACTED]

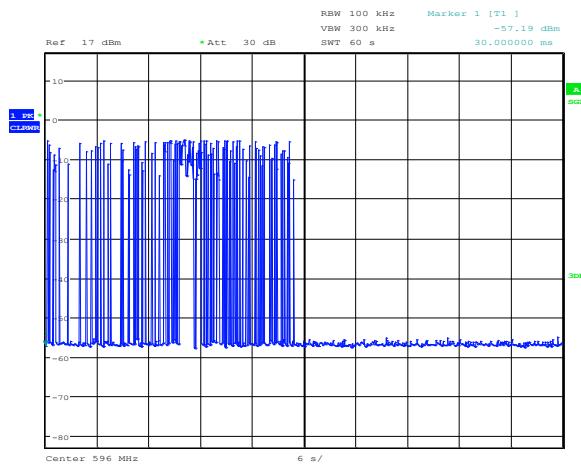
chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
valid FCC number Of Chans=20
TX State=TX Down
Get channel List,Turn Tx On
Write ChanList to file with number of channel = 20:
14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
getchanbw in ConfigBTS is 12
Setting frequency to 596 MHz
configBTS() at line 412 ***current chan=34
configBTS line 432 current channel=34 within chanlist
Tx is on
[GWS Cmd > restartwagentcar
main() at line 110 numChans=0
main() at line 113 numChans=0 from Database
main() at line 116 refreshHrs=0 of database
main() at line 121 queryIntervalMin = 0 from agent
current time=Mon Feb 29 11:35:16 2016

chanlist time=Sun Jan 00:00:00 1900
expire time=0 current time=42455
Channel List Will expire in -42455 Minutes
Channel List Expired
numOfChans=0 from Database
<Channels>
[GWS Cmd >read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is
valid FCC number Of Chans=0
Turn Tx Off
netval = 1 serialNumber = 620000008
Contact info can not be empty. Please add ContactState in registration info
txoff() at line 64 clear shared memory[REDACTED]
hosts

Delay 30 sec
]

```

Figure 8.6-2: Data log of unsuccessful registration with missing contact state of master device



Date: 29.FEB.2016 14:00:49

Figure 8.6-3: Unsuccessful registration with missing contact t state (province) of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact name during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

The screenshot shows a terminal window with several panes displaying command-line output and system status.

Left Pane: A text-based configuration or log file. It includes device parameters like URL (tws-test.spectrumbridge.com), DeviceMode (DEV_FIXED), and AntennaHeight (2). It also lists owner information (Owner: GH, Contactname: info, ContactAddress: Suite 10-21 Concourses Gate, ContactCity: Ottawa, ContactZipcode: K2E7S4). The **ContactState:** field is highlighted with a red box.

Middle Top: A terminal window showing system status. It lists network interface details (No station connected, Node is EAR With, HWaddr AC:EE:3B:02:08:89, up 37 min, load average 0.08, 0.18, 0.21), memory usage (MemFree: 39108 kB), and channel information (Channel: 43 44, Tx Power: 17.000000 dBm, Max Tx Power: 33.000000 dBm, Min Tx Power: 17.000000 dBm). A specific error message is highlighted with a red box: **Channel Expire In NoValidChannel Minutes**.

Middle Bottom: A terminal window titled "steven — telnet 192.168.3.203 — 80x32". It shows an incoming HTTP request from Microsoft-IIS/8.5. The response header includes Cache-Control: private, Content-Length: 348, Content-Type: application/xml; charset=utf-8, Server: Microsoft-IIS/8.5, SBI-Version: 3, SBI-Status: 0, X-Powered-By: ASP.NET, Date: Mon, 29 Feb 2016 18:33:34 GMT, and Connection: close.

Right Pane: Another terminal window showing channel-related logs. It lists available channels (2, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 39, 43, 44, 45, 46, 47, 48, 49, 50, 51) and a Channel Refresh In 48 Hrs. It also shows a Current WSAgent State: WS_STATE_SECURE_SESSION_SHUTDOWN and a warning message: **Contact info can not be empty. Please add ContactState in registration info**. This message is also highlighted with a red box.

Figure 8.6-4: Data log of unsuccessful registration with missing contact state of slave device

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

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

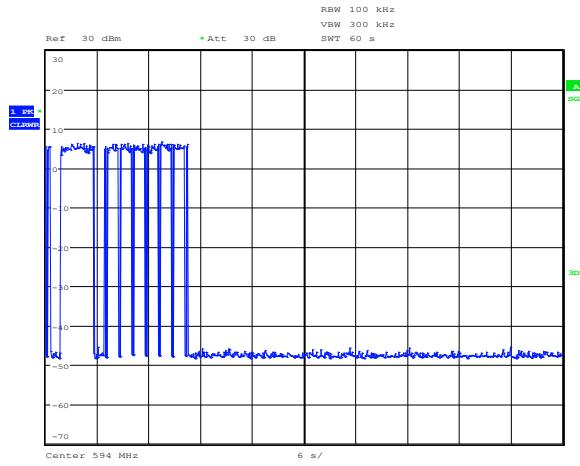
8.7.2 Test summary

Test date	February 29, 2016	Temperature	22 °C
Test engineer	Andrey Adelberg	Air pressure	1004 mbar
Verdict	Pass	Relative humidity	32 %

8.7.3 Observations, settings and special notes

EUT was configured with incomplete information: contact zip 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 re-initiated. Once the device detects an invalid registration field, the device ceased to transmit and flagged the error in the GUI. The test was repeated when the device is configured as a Master as well as a Slave. If incomplete registration information is detected during the initial power up the device will not attempt to register and will flag the error to the user.

8.7.4 Test data



Date: 29.FEB.2016 12:02:52

Figure 8.7-1: Unsuccessful registration with missing contact zip code of master device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact zip code during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

```

6133661768
[GWS Cmd > showregistration
...Registration Info...
URL:
tws-test.spectrumbridge.com
DeviceMode:
DEV_FIXED
AntennaHeight:
2
AntennaType:
AGL
RegulatoryDomain:
US
Latitude:
44.429534
Longitude:
-75.15075
...Owner Info...
Owner:
6H
Contactname:
info
ContactAddress:
Suite 10-21 Concourses Gate
ContactCity:
Ottawa
ContactZipcode: 
ContactState:
ON
ContactCountry:
CA
ContactEmail:
info@6harmonics.com
ContactTelephone:
6133661768
GWS Cmd >

setlatitude 31.5
setlongitude -106.9
setlatitude 44.429534
setlongitude -75.15075
setowner
setowner 6H
setcontactname
setcontactname info
getcontactaddress
Suite 10-21 Concourses Gate
setcontactaddress
setcontactaddress Suite 10-21 Concourses Gate
setcontactstate
setcontactstate ON
getcontactzipcode
K2E7S4
setcontactzipcode 

***** Database Access:spectrumbridge *****
Node is CAR With Ethernet MAC:
HWaddr AC:EE:3B:02:00:88
11:36:49 up 20 min, load average: 0.11, 0.18, 0.14
MemFree: 39484 kB
Channel:
34 35
Tx Power: 17.000000 dBm
Max Tx Power: 23.000000 dBm
Min Tx Power: 7.000000 dBm
TX Down 

chanbw == 12CHAN BONDING
the bonding chan list is 14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
valid FCC number Of Chans=20
TX State=TX Down
Get channel List,Turn Tx On
Write Chanlist to file with number of channel = 20:
14 15 25 26 27 28 29 30 31 32 33 34 43 44 45 46 47 48 49 50
getchanbw in ConfigBTS is 12
Setting frequency to 596 MHz
configBTS() at line 412 ***current chan=34
configBTS line 432 current channel=34 within chanlist
Tx is on
[GWS Cmd > restartwsagentcar
main() at line 110 numChans=0
main() at line 113 numChans=0 from Database
main() at line 116 refreshHrs=0 of database
main() at line 121 queryIntervalInMin = 0 from agent
current time=Mon Feb 29 11:36:39 2016

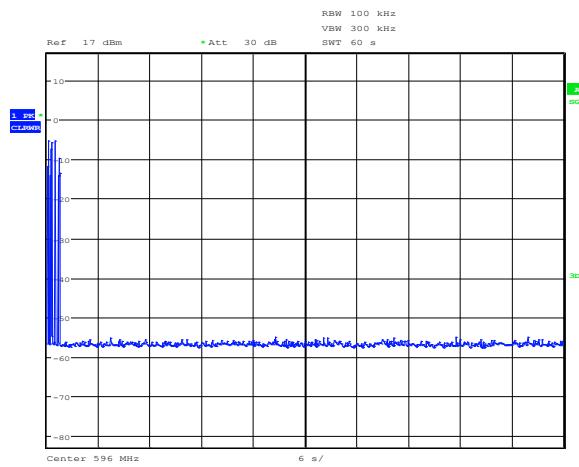
chanlist time=Sun Jan 0 00:00:00 1900

expire time=0 current time=42456
Channel List Will expire in -42456 Minutes
Channel List Expired
numOfChans=0 from Database
<Channels:>
read getchanbw is 12
chanbw == 12CHAN BONDING
the bonding chan list is
valid FCC number Of Chans=0
Turn Tx Off
GWS Cmd >notval 1 serialNumber 62000000
Contact info can not be empty. Please add ContactZip in registration info 
txoff() at line 64 clear shared memory 
hosts

Delay 30 sec 

```

Figure 8.7-2: Data log of unsuccessful registration with missing contact zip code of master device



Date: 29.FEB.2016 14:03:12

Figure 8.7-3: Unsuccessful registration with missing contact zip code of slave device. Spectrum plot shows that prior to the unsuccessful registration the EUT had been configured with valid information and was transmitting. Subsequently when a registration request was initiated with invalid data the transmission stopped right after the EUT detected missing information in the registration form. If the EUT detects a missing contact zip code during initial power up, the device will not attempt to register with the database, will not transmit and will flag the error to the user.

The screenshot shows a desktop environment with several windows open:

- Terminal Window (Left):** Displays command-line logs for device configuration. It includes commands like "GWS Cmd > showregistration", "setlatitude 44.429534", and "setlongitude -75.15075". A red box highlights the "ContactZipcode:" field, which is empty.
- File Explorer Window (Top Center):** Shows a file tree with "Favorites" including "All My Files", "Cloud Drive", "Applications", "Desktop", "Documents", "Downloads", and "AirDrop".
- Terminal Window (Right):** Displays system status and configuration. It includes "No station connected", "Database Access:spectrumbridge", and "Tx Power: 17.000000 dBm". A red box highlights the "Channel Expire In NoValidChannel Minutes" message.
- Terminal Window (Bottom Right):** Shows a telnet session with the host "steven" and port "192.168.3.203". It displays SBI-Version: 3, SBI-Status: 0, and X-Powered-By: ASP.NET. A red box highlights the "Contact info can not be empty. Please add ContactZip in registration info" message.

Figure 8.7-4: Data log of unsuccessful registration with missing contact zip code of slave device