May 5, 2020

Bodega Marine Lab
Deedee Shideler
dashideler@ucdavis.edu
707-875-1906

CenCOOS
Henry Ruhl
hruhl@mbari.org

Alex Harper
aharper@mbari.org

Greetings all,

Freedom Technologies, Inc. (FTI) has been tasked by NOAA to assist in the relocation of oceanographic radar operations from the FCC's Experimental Licensing System (ELS) to the FCC's Universal Licensing System (ULS) to operate in the International Telecommunications Union (ITU) HF radar allocated frequency bands[1] (provided below in Table 1).

Information about your system was obtained from three sources: the NOAA HFRnet[2] (dated June 1, 2017)[2], the Scripps Institution of Oceanography Website[3], and the FCC experimental license (Call Sign: WC2XQG). The data obtained from these sources are shown in Tables 2, 3, and 4.

An application to acquire licensing under ULS requires an FCC ID, which the three manufactures of oceanographic radars have yet to obtain from the FCC. We have provided briefs on the FCC certification process to the representatives of each these manufactures and at least two are in the process of getting their equipment certified. We currently don't know the timeframe for this certification process, but it is estimated that it could take least six months.

[1]Report ITU-R M.2321
[2]http://hfrnet.ucsd.edu/sitediag/stationList.php
[3]https://cordc.ucsd.edu/projects/mapping/maps/

To ultimately operate under a FCC ULS license, we recommend obtaining new experimental licenses for operations within the ITU HF radar allocation bands, as soon as feasible and where economically and operationally possible. This action is recommended to accomplish three objectives:1) to obtain authorization to continue your operations, 2) to gain experience of interference-free use of these channels, and 3) to use the successful operations of these channels as a basis to acquire permanent frequency assignments. We believe this course of action will lead to a successful transition within the FCC deadline of March 29, 2022.

Operation in the new bands will require that the radars operate with necessary bandwidths equal to or less than the allocated bandwidth. For your long-range radars, three 25 kHz channels are available in the bands 4.438-4.488 MHz and 5.250-5.275 MHz. Use of these channels would require that that they be centered at 4.4505 MHz, 4.4755 MHz, and 5.2625 MHz. The use of the listed bandwidths of 25.7339 kHz would exceed the above bandwidth limitation. The bands 13.45-13.55 MHz and 16.1-16.2 MHz can accommodate bandwidths up to 100 kHz with center frequencies 13.5 MHz and 16.5 MHz, respectively.

The following information would greatly assist us with development of recommendations concerning the operating frequencies for the application of the experimental licenses and ultimately ULS under the Part 90 Rules:

- The verification that the system as described below in Table 2 is an accurate representation of your system.
- The identification of any potential problem with moving existing frequency use to center frequencies within the nearest ITU allocated bands.
- The identification of any potential problem with operating with a reduced transmitter bandwidth such that operations would be entirely within the allocated bands.
- Your thoughts on our suggestion that you apply for and operate under an experimental license before the requirement to obtain a FCC ULS license.
- The identification of planned expansion, if any.

Please address any questions regarding this request as well as your response to:

Bill Crandall
gc@ftidc.com
410-212-9764

Mike Doolan
mdoolan@ftidc.com
443-365-0814

Thanks in advance for your consideration of this request.

Table 1. ITU Allocations for HF Radar[1]

ITU Region 1			ITU Region 2			ITU Region 3		
Lower Frequency (MHz)	Upper Frequency (MHz)	Bandwidth (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Bandwidth (MHz)	Lower Frequency (MHz)	Upper Frequency (MHz)	Bandwidth (MHz)
4.438	4.488	0.05	**4.438**	**4.488**	0.05	4.438	4.488	0.05
5.250	5.275	0.025	**5.250**	**5.275**	0.025	5.250	5.275	0.025
9.305	9.355	0.05	No Allocation		0	9.305	9.355	0.05
13.450	13.550	0.1	**13.450**	**13.550**	0.1	13.450	13.550	0.1
16.100	16.200	0.1	**16.100**	**16.200**	0.1	16.100	16.200	0.1
24.450	24.600	0.15	**24.450**	**24.650**	0.2	24.450	24.600	0.15
26.200	26.350	0.15	**26.200**	**26.420**	0.22	26.200	26.350	0.15
Total Below 30 MHz		0.625	Total Below 30 MHz		0.695	Total Below 30 MHz		0.625
39.000	39.500	0.5	No Allocation		0	**39.000**	**39.500**	0.5
42.000	42.500	0.5	No Allocation		0	No Allocation		0
Total Available		1.625	Total Available		0.695	Total Available		1.125
US and Korea Only			**41.015**	**41.665**	0.65	**41.015**	**41.665**	0.65
			43.35	**44**	0.65			
Bold text indicates primary allocation								

The US Table of Frequency Allocations[4] (Region 2) by the addition of footnotes5.132A, 5.145A, and 5.161Aessentially downgrades these allocations to a secondary status and puts oceanographic radars on a non-interference basis.

5.132A Stations in the radiolocation service shall not cause harmful interference to, or claim protection from, stations operating in the fixed or mobile services. Applications of the radiolocation service are limited to oceanographic radars operating in accordance with Resolution 612 (Rev.WRC-12).

5.145A Stations in the radiolocation service shall not cause harmful interference to, or claim protection from, stations operating in the fixed service. Applications of the radiolocation service are limited to oceanographic radars operating in accordance with Resolution 612 (Rev.WRC-12).

5.161A *Additional allocation:* in Korea (Rep. of) and the United States, the frequency bands 41.015-41.665 MHz and 43.35-44 MHz are also allocated to the radiolocation service on a primary basis. Stations in the radiolocation service shall not cause harmful interference to, or claim protection from, stations operating in the fixed or mobile services. Applications of the radiolocation service are limited to oceanographic radars operating in accordance with Resolution 612 (Rev.WRC-12). (WRC-12)

[4]https://transition.fcc.gov/oet/spectrum/table/fcctable.pdf

Table 2. Eight BML Stations from HFRnet – station list[2]

Station	Station Name	Frequency (MHz)	Bandwidth (kHz)	Latitude (DD)	Longitude (DD)
BML1	Bodega Marine Laboratory, CA	12.15686	75.3636	38.31732	-123.072
BMLR	BML Long Range	4.78495	25.7339	38.31948	-123.074
BRAG	Fort Bragg, CA	4.78495	25.7339	39.43802	-123.816
GCVE	Sonoma County	13.53275	75.3636	38.56718	-123.332
PAFS	Point Arena Field Station	4.78495	25.7339	38.92843	-123.728
PREY	Point Reyes, CA	13.41246	75.3636	38.04715	-122.989
SHEL	Shelter Cove, CA	4.78495	25.7339	40.03337	-124.079
TRIN	Trinidad, CA	4.78495	25.7339	41.07357	-124.158

Table 3. Eight BML Stations from the Scripps Website[3]

Station	Station Name	Frequency (MHz)	Bandwidth (kHz)	Latitude (DD)	Longitude (DD)
BML1	Bodega Marine Laboratory, CA	12.157	75.3636	33.3173	-123.0725
BMLR	BML Long Range	4.785	25.7339	38.3195	-123.0763
BRAG	Fort Bragg, CA	4.785	25.7339	39.4380	-123.8161
GCVE	Sonoma County	13.533	75.3636	38.5672	-123.3315
PAFS	Point Arena Field Station	4.785	25.7339	38.9284	-123.7278
PREY	Point Reyes, CA	13.412	75.3636	38.0472	-122.9891
SHEL	Shelter Cove, CA	4.785	25.7339	40.0334	-124.0789
TRIN	Trinidad, CA	4.785	25.7339	41.0736	-124.1578

Table 4. Five BML Stations from FCC License WC2XQG

Station	Station Name	Frequency (MHz)	Bandwidth (kHz)	Latitude (DMS)	Longitude (DMS)
BML1	Bodega Marine Laboratory, CA	Note 1	115	38-19-02	123-04-19
BMLR	BML Long Range	Note 2	40	38-20-16	123-03-02
~~BRAG~~	~~Fort Bragg, CA~~				
GCVE	Fort Ross	Note 1	115	38-34-03	123-19-48
PAFS	Point Arena Field Station	Note 2	40	38-55-43	123-43-38
PREY	Point Reyes, CA	Note 1	115	38-02-52	122-59-19
~~SHEL~~	~~Shelter Cove, CA~~				
~~TRIN~~	~~Trinidad, CA~~				

Note 1: Frequencies (MHz): 12.06, 12.14, 12.2, 13.46, 13.51, 13.57,and 13.63 with Emission 115KP0N
Note 2: Frequencies (MHz): 4.6 and 4.795 with Emission Designator 40K0P0N