Before the
Federal Communications Commission
Washington, D.C. 20554

REGARDING:

Amendment of Parts 2, 15, 80, 90, 97 and 101 of the Commission's Rules regarding implementation of The Final Acts of the World Radiocommunications Conference (Geneva 2012) (WARC-12), Other Allocation Issues and Related Rule Updates.

Petition of Rulemaking of ARRL to Amend Parts 2 and 97 of the Commission's Rules to Create A New Medium-Frequency Allocation for the Amateur Radio Service.

To The Commission:

Comments From John W. Molnar
Amateur Radio Extra Class Licensee WA3ETD
FCC Part 5 Grantee WG2XKA

I agree with the Commissions proposal to allocate two additional amateur radio bands at 2200m and 630m in accordance with WARC-12 and appropriate modifications to **Part 97.** I believe operations in the proposed bands can coexist with existing and future PLC devices. I also support the 5W proposed EIRP, as well as **reasonable** set-back distances from primary utility transmission lines, if deemed necessary.

The commentor has been a licensed amateur since 1962, and holds a FCC Part 5 grant to operate experimentally in the frequency range of 460-490 kilohertz. This grant was issued on 24 October 2012. WG2XKA has operated almost daily from that date to the present with no interference issues or complaints. Responder also holds a FCC GROL (grandfathered from original First Class Radiotelephone license) with radar endorsement. Responder has experience as a broadcast engineer at commercial FM and UHF Television stations.

The following comments are limited to the proposed amateur band at 472-479

kilohertz (630m) as I have considerable experience operating there as WG2XKA.

REGARDING SPECIFIC PARAGRAPHS IN ET DOCKET No. 15-99
Comments requested by the Commission

166. Generally, based upon the operating history of Part 5 Experimental stations, amateur operations **do** coexist with current PLC technology without interference. The ARRL MF Experimental Stations (WD2XSH/nn) have logged over 150,000 hours of operation, nationwide, with no reported interference. The current independent Part 5 stations, many representing densely populated areas (where close proximity to a PLC is likely) have experienced no interference issues. Responders station, WG2XKA, has transmitted at a level of 1W ERP for 2400 hours (~800 days, 12 hrs/day, 25% actual transmit duty cycle) with no issues.

168. The overall framework of mandating distance separation between transmission lines and amateur operations is reasonable. However, a separation distance of over 0.5 km seems excessive, also considering that the two services in question are most likely cross polarized (PLC horizontal, amateur vertical), offering an additional ~20 dB of isolation.

Fixed station operation only should **not** be mandated. The amateur operator should be aware of transmission power lines/substations in the vicinity of portable operation before transmitting. Additionally, considering the nature of portable/mobile operations, employing highly inefficient (at the frequency in question) antennas, the possibility of PLC interference is minimal. Limiting operation to a fixed station precludes the possibility of deploying a temporary station for emergency traffic handling.

I would also encourage the power industry to cite specific examples of other service interference to a PLC system for analysis.

169. Responders station WG2XKA typically operates at 475 kHz, using 4-FSK (WSPR, Weak Signal Propogation Reporter) at 1W ERP. The antenna system is a T-Vertical (Marconi) consisting of 13m thin vertical wire with two, parallel 30m horizontal wires spaced 1m as capacitive top loading. The entire physical antenna is below and surrounded by old growth pine trees in the near field. The vertical is resonated by a variable inductor (variometer) in series with the vertical and matched to 50 +-j0
ohms. Eighty (80) on-the-ground radials of lengths ranging between 10 and 40m placed symmetrically around the feed point provide the ground system. The

transmitter exciter is a Class E 5W transverter driving a Class D power amplifier. Both exciter and amplifier are self constructed and both employ 5-pole Chebyshev low-pass filters. Additionally, a second harmonic parallel trap is employed, centered at 950 kHz. Observed spectral purity indicates a second harmonic 59dB below carrier, important as that harmonic falls with the AM Broadcast Band. A self-designed antenna monitoring system, based on a microcontroller, is employed to shut down the transmitter instantly should antenna failure occur.

I also note that the original implementation of WG2XKA was a minimal station that exhibited surprising capability during the winter of 2012. In that case, the antenna was a very short vertical (8m) over a marginal radial system placed over ledge rock (<1mS/m ground conductivity). At a transmitter power of 90W (49.54 dBm), WG2XKA was received nationwide and in Central Europe using the WSPR digital mode. ERP was estimated to be well below 0.25W. Using narrowband digital modes such as MSK (minimum shift keying), PSK (phase shift keying) and CW (continuous wave) offers good performance even when operating a low power, antenna challenged station. A Rig Expert AA-30 antenna analyzer is used to monitor antenna system tuning on a daily basis.

171. Responder station WG2XKA is located 1.5 km from a substantial substation operated by Green Mountain Power (VT), co-located with a hydroelectric facility and solar farm. It is not known if a PLC is employed there. No interference from that facility has been received – a wideband SDR (software defined radio) based receiver with visual display is used, allowing monitoring of the entire 630m band.

177. Considering the separation distance, determination of the same should simply be the horizontal distance between tower/pole and antenna, easily done with a handheld GPS device or topographic chart.

THE EIRP ISSUE

The Commission asks what methodology should be employed to determine the radiated power of a given 630m station. One suggestion is to limit the actual transmitter output power, based on antenna characteristics. The other is to mandate a maximum EIRP of 5W. **I support the EIRP method.** It is impossible to compare the absolute performance of given antenna systems, considering the variables of ground conductivity, loading inductor losses, near field losses, etc. Thus mandating a PEP (peak envelope power) to a given antenna length does not level the playing field. That same antenna with radials in a seaside salt flat will

outperform the antenna over bedrock, resulting in a significant EIRP difference. The seaside system when driven with 100-200W PEP can easily exceed 5W EIRP.

Imposing the EIRP limit levels the field. The less efficient station should be allowed to use whatever transmitter power is necessary to achieve 5W EIRP, within limits imposed by FCC Part 97.313.

At WG2XKA, ERP is determined using field strength measured at a distance from the transmitting vertical. This system employs a ten turn receiving loop with an area of exactly $1.0m^2$, calibrated with a HP 3586c SLM (selective level meter). Construction of this relatively straightforward field strength meter is described by John Andrews, W1TAG[(1)].

MY COMMENTS

As indicated by FCC, the 630m band will offer many possibilities for amateur experimentation. Considering the 7 kHz bandwith of the allocation, general radiotelephone communication is unlikely. Instead, the possibilities for research into low frequency propagation abound – an example is the effect of the solar cycle on nighttime sky wave performance. Little commercial equipment is available to users of 630m, offering the dedicated amateur the opportunity to build, test, and implement one's own equipment. This concept is foreign to most users of existing amateur allocations. I also agree with ARRL that General, Advanced, and Amateur Extra licensees should have access to 630m as well as 2200m.

EMERGENCY COMMUNICATIONS

Amateur radio is considered a **service.** Since its inception, amateurs have provided emergency communications in times of disaster, presently by offering long haul message handling capability and local communications *via* portable FM repeater systems. The proposed 630m band offers a unique opportunity for short term emergency communications. Daytime ground wave propagation is highly reliable and predictable over several hundred km, allowing temporary and minimal portable stations to provide emergency communications.

Example: During the summer of 2013, daily daytime (at solar noon) groundwave testing was conducted over an approximate 100 km path. For this experiment, the transmitting station was WD2XSH/14, operated by Dr. Fritz Raab, W1FR, the

coordinator of the ARRL 630m experiment. The receiving station was WG2XKA in Benson, VT, operated by myself.

Raab's station could be considered minimal, consisting of a re-purposed 13.1m commercial vertical over a few short radials at 100W transmitter power. A CW message was continously transmitted for several hours, and the relative strength noted at the receiver. Current solar characteristics during the period were noted and logged, as well as local weather.

The results of this test indicated that groundwave signal strengths were essentially constant, regardless of weather, solar weather or time of day. Such a system could have provided highly reliable emergency communications.

CONCLUSION

Considering the possibilities for experimentation, research and public service, I encourage the Commission to implement the 630m and 2200m bands and allow amateur radio operations, especially considering that **NO REPORTED INSTANCES OF INTERFERENCE TO OTHER SERVICES** have occurred resulting from experimental operations in the bands.

The Commission's consideration is appreciated.

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(1) *https://www.google.com/?gws_rd=ssl#q=W1TAG+field+strength*