Before the

FEDERAL COMMUNICATIONS COMMISSION

Washington, DC 20554

In the Matter of Amendment of the FCC Rules to implement the Final Acts of WRC-12 to create an allocation for the Amateur Radio Service at 135.7-137.8 kHz (the 2200 meter band) and at 472-479 kHz (the 430 meter band).	)))))	ET Docket No. 15-99

To The Commission

REPLY COMMENTS OF THE AMATEUR RADIO RESEARCH AND DEVELOPMENTCORPORATION (AMRAD)

1. AMRAD is a 501(c)(3) corporation registered in the Commonwealth of Virginia. Its purpose is to promote experimentation, education and research into various aspects of communications and computer science. It is composed largely of licensed radio amateurs and in the past has participated in the development of a number of innovations in amateur radio. It conducted experiments in the amateur use of Ultra-wideband (UWB) radio beginning in March 1981 under FCC Special Temporary Authority, and wrote an amateur handbook on that subject that has been available for sale via the Amateur Radio Relay League (ARRL). AMRAD created and launched an amateur radio satellite (AMRAD OSCAR-27) in September 1993. It created the AX-25 packet radio protocol and participated in the implementation of packet radio networks. During the period January 15-19, 1999 AMRAD members conducted field tests at Nags Head, NC, listening for LF signals from Europe since there was no U.S. allocation for the band. AMRAD members also conducted tests in Manassas, Virginia to determine the potential for interference

to amateur radio and other HF operations from the operation of Broadband over Power Line (BPL) systems.

2. In February, 1999 the Commission issued to AMRAD an experimental license (call sign WA2XTF) permitting twelve stations to operate in the Northern Virginia area on 136.75 kHz and valid for about one year. This was followed by the Commission's issuance in May, 2002 of a Notice of Proposed Rulemaking (NPRM) proposing, *inter alia*, the creation of an amateur allocation at 135.7-137.8 kHz. Since then, AMRAD has followed closely the LF and MF testing done under the FCC's Part 5 experimental authorizations and is actively engaged in developing hardware for use when these allocations are created. We are a joint sponsor, along with the Radio Society of Great Britain (RSGB) and the Deutscher Amateur Radio Club (DARC), of the Bobek Award. This was to be given to the first amateurs in the U.S., Canada and Europe to establish two-way contacts across the Atlantic in the 136 kHz band. The award to a Canadian amateur has been made; that to a U.S. ham awaits the creation of an allocation in this band. Needless to say, AMRAD supports the creation of these allocations in accordance with the Final Acts of WRC-12, and offers the following comments and suggestions.

3. The Commission has proposed that amateur operation be prohibited within 1 km of a power transmission line. However, it has itself raised a serious question about the ability of the average person to distinguish between a transmission line and a distribution line, on which PLC operation is not permitted. Commenters have noted that structures supporting power lines often carry both types, so some means of clearly identifying transmission lines is needed. Also, comments filed by several parties have pointed out that the use of PLC is declining and PLC technology is being gradually replaced by wireless communications and fiber optic systems. This

is clearly in the interest of the industry, since carrying control and status signals along the very wires they are intended to protect and control is a potentially self-defeating strategy. These facts indicate that however unlikely interference between PLC and amateurs is today, the likelihood will diminish with time.

4. The improbability of interference from amateurs to PLC is further shown by two facts. First, as comments have noted, power lines are electrically noisy. Low-level received signals (as would be expected from an EIRP of one, or even five watts) would likely be overridden by RFI from a power line, making amateur operation close to a high-voltage line impractical whether or not it is carrying PLC. Extremely sensitive receivers would be needed to hear amateur signals, and would increase an amateur's vulnerability to line noise. Secondly, standard amateur practice is to listen before transmitting. This would reduce the likelihood that amateur stations would transmit on top of a PLC carrier. A number of comments have pointed out that given the broad spectrum made available to PLC (9-490 kHz), it is unlikely that any given transmission line will, in fact, be carrying PLC signals that overlap one of the proposed amateur bands. This point is made by the ARRL and by Dr. Fritz Raab in his comments filed 6/22/15, and we agree. To prohibit amateur operation within a kilometer of <u>all</u> transmission lines will, then, needlessly restrict amateur operations with no benefit accruing to the power distribution system. The only rational approach is to determine in advance which power lines, if any, proximate to a proposed amateur operation actually carry PLC signals in or overlapping the amateur band to be used. Steps can then be taken to protect PLC as necessary with minimal restrictions on amateur operations. This protection should consider accommodations by the PLC operator as well as the amateur operator.

5. It was proposed by Nikolaus Leggett, in comments filed 5/4/15, that a web-accessible database should be constructed showing the locations of PLC-carrying power lines and the frequencies being used on each of them. Ronald R. Douglass, Sr, in comments filed 7/14/15, says that he requested and was given, by two local power companies, information on the location and frequency of PLC operations near his proposed station. However, the power industry has historically been reluctant to make this information public, citing security concerns. Still, its availability is essential to the reasonable regulation of amateur and PLC operations. An appropriate method of making it available is a matter the Commission should determine and state in its final Report and Order on this matter.

6. Dr. Raab, in his comments cited above, has made the point that coordination is necessary between the amateur service and PLC operators, and we concur. Raab suggests that PLC operators be required to identify power lines that actually carry PLC signals overlapping an amateur band. Given the industry's reluctance to publicize this information, a notification procedure might be employed under which an amateur proposing to commence operation in these bands would advise the UTC (the entity filling the Commission's requirement for a central repository of PLC frequency and location information). The UTC would then within a specified period of time, such as 30 days, provide any objections and its reasons for objecting. In the absence of such a timely objection, the amateur would be free to commence operation and thereafter no objection would be considered barring a significant change of operating conditions by the amateur operator. If the UTC foresees a problem, an organization representing the amateur radio community, (perhaps the ARRL) could provide coordination. It

would be incumbent on the power industry to justify its concern through the use of tests or reasonable calculations.

7. It follows that once an amateur station has built or procured the appropriate equipment and started operation, industry should not later be able to install replacement equipment that is more vulnerable to interference. PLC equipment frequency or design changes that make compatibility impossible should not be the responsibility of the amateur operator. The Commission should require that all new and replacement PLC systems be operated on frequencies that do not overlap the amateur bands, as suggested by Dr. Raab. Given the wide range of frequencies available for PLCs—9 to 490 kHz—this should not work a hardship on the power industry. Further, over some reasonable period of time—Raab suggests 3 to 5 years—the industry should be required to retune its equipment to frequencies that do not overlap the amateur bands. Much if not all PLC equipment in current use has sufficient frequency agility to permit such retuning, and the time period suggested will minimize any expense incurred by the industry since some of this equipment will require replacement during this period anyway.

8. Finally, the UTC has proposed that the Commission should elevate the status of PLC systems over that of the amateur service. It is proposing, that is, that PLC operations should have the privileges of a licensed service with none of the responsibilities. It asserts that a PLC link could be forced to shut down if interfered with by an amateur station, while in fact the worst result would be a requirement to retune the PLC link to a different frequency. Coordination before amateur operation commences, as discussed above, would preclude most such interference in the first place. UTC would prefer that it should, rather, be able to shut

down an amateur station which, having only a very limited choice of operating frequencies, could not retune. We note that if the proposals made by Dr. Raab, cited above and with which we totally agree, should be implemented it would be highly unlikely that interference would ever occur, either upon initial operation of an amateur station or at any time thereafter.

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