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

In the Matter of	)	
	)	
Amendment of Parts 2, 15, 80, 90, 97, and 101 of the Commission's Rules Regarding Implementation of the Final Acts of the World Radiocommunication Conference (Geneva, 2012)(WRC-12), Other Allocation Issues, and Related Rule Updates	)	**ET Docket No. 15-99**
	)	
Petition for Rulemaking of Xanadoo Company and Spectrum Five LLC to Establish Rules Permitting Blanket Licensing of Two-way Earth Stations with End-User Uplinks in the 24.75-25.05 GHz Band	)	**IB Docket 06-123**
	)	
Petition for Rulemaking of James E. Whedbee to Amend Parts 2 and 97 of the Commission's Rules to Create a Low Frequency Allocation for the Amateur Radio Service	)	
	)	
Petition for 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 of Nickolaus E. Leggett, Amateur Radio Operator (N3NL), GROL Licensee, Inventor, and Analyst

I am a certified electronics technician and an Extra Class amateur radio operator (call sign N3NL). I also hold an FCC General Radiotelephone Operator License with a Ship Radar

Endorsement. I am an inventor holding three U.S. Patents. My latest patent is a wireless bus for digital devices and computers (U.S. Patent # 6,771,935). I have a Master of Arts degree in Political Science from the Johns Hopkins University.

I am one of the original petitioners for the establishment of the Low Power FM (LPFM) radio broadcasting service (RM-9208 July 7, 1997 subsequently included in MM Docket 99-25). I am also one of the petitioners in the docket to establish a low power radio service on the AM broadcast band (RM-11287). I have filed a total of over 200 formal comments with the FCC over the years since the 1970s. I have filed comments with other Federal agencies as well including the USPTO, FAA, FERC, EPA, and the TSA.

My comment document consists of general comments followed by responses to specific questions and issues raised by the Commission. My responses are identified by paragraph numbers in the Report and Order and the Notice of Proposed Rulemaking (NPRM).

General Comments

I am strongly in support of the proposed allocation of 472-479 kHz (630 Meter Band) to the Amateur Radio Service [Paragraph 165]. In addition, I agree with the Commission's announced allocation of 135.7-137.8 kHz (2200 Meter Band) to the Amateur Radio Service [Paragraph 29] and the raised status of the Amateur Radio Service in the 1900-2000 kHz band [Paragraph 40] to primary status.

The lower radio frequencies are well suited for amateur radio operators to invent, design, and build radio equipment using discrete components. This building activity includes the making of individual passive components such as resistors, capacitors, and inductors, as well as the more challenging active components such as electron valves, for use in making radio circuits along with commercially-manufactured components.

There is a major opportunity to invent new discrete components that function in radio transmitting and receiving circuits. For example, one can design variable capacitors that use the motion of conducting fluid mixtures (within an insulating structure) instead of the commonly-used rotary motion of metal plates. The conducting fluid mixtures would be the functional equivalent of having moving metal plates. These fluid-motion variable capacitors can be built quite inexpensively and can provide a wide range of capacitance values. (Reference One)

Amateur Radio operators equipped with various tools could readily build passive components for these low and medium frequency ranges. In addition, they can take on the challenge of designing and building active circuit components such as diodes and various electron valves. Already, experimenters have built their own vacuum tubes. One experimenter used the constant application of a vacuum pump to maintain a fairly high vacuum in his vacuum tube (Reference Two). Homebrew solid-state components are also possible and have been demonstrated.

The building of one's own discrete components is attractive because you can apply one's knowledge of electron flows to develop components that have a significantly different geometry and structure compared to the conventional commercially-manufactured components. These components can be integrated directly into radio circuits that are radically different than the conventional circuit boards that are commonly used. For example, fluid-motion variable capacitors can be integrated into an amateur-built radio circuit that uses a liquid ground plane. Antennas using conducting liquid mixtures can also be directly connected to the liquid ground plane.

These new components and circuits are of special importance because they would be field-repairable and would generally be resistant to damage from current surges. Indeed, they

could be designed to be resistant to extreme emergencies such as electromagnetic pulse (EMP) events and solar geomagnetic storms. These new components and circuits would allow amateur radio operators to provide special public service communications during severe and extended emergency situations.

Specific Comments

My following comments are in response to specific questions and requests for comments from the Commission. My comments are identified by Paragraph number.

Proposed Amateur Radio Allocation on 472-479 kHz (Paragraph 165)

This allocation would be extremely valuable to the technical experimenter. He or she can design and build their own radio circuits and can contribute to the state of the art. The allocation also supports the amateur building of individual (discrete) radio parts. This would be a source of new inventions. I am interested in doing this type of activity at our planned retirement home in Massachusetts (West Tisbury, Ma).

This frequency range has different propagation characteristics compared to the amateur radio high-frequency allocations. This provides for new opportunities for public service communications. During a serious emergency, the entire band would be applied to emergency communications by the amateur radio operators.

This frequency allocation would encourage the use of very narrow bandwidth communication modes such as those invented by Joe Taylor (K1JT). (Reference Three) Yet it would also accommodate conventional narrow-bandwidth modes like Morse Code (continuous wave) and teletype. The compatible usage of the various modes should be the responsibility of the Amateur Radio Service itself using consensus agreements (band plans) and individual

responsible operating. These mode decisions should not be specified by the Commission (Paragraph 180)

Protecting Electric Utility Power Line Communications (PLC)

(Paragraphs 168 and 169)

The concept of specifying a minimum fixed distance between amateur radio stations operating on this proposed allocation and electric transmission lines appears initially to be a reasonable step for protecting the power line communications (PLC) and control used on high-tension power lines. This distance would be based on the maximum output power allowed for the amateur radio communications. It would be preferable if a simple output power limit was specified in the rules. Alternatively, the Commission could base a power limit on the input to the final amplifier and the type and size of antenna used.

If the distance between the amateur radio station and the power line is to be used, then there should be an official online data base with a mapping feature that would allow the amateur operator to determine the presence and distance of the relevant power lines. Without an official determination mechanism for calculating the distance, there could be numerous controversies and even litigation about the relative locations of the amateur radio station and the power lines. This situation would discourage amateurs from using the band.

It would be desirable to avoid having to construct an elaborate model of each specific power line situation in order to determine the allowed separation distance (Paragraph 177). If an elaborate mathematical model should be required, then the model's software should be approved and provided by the Commission or a designated third-party organization. This would keep everyone on the same page as far as the facts are concerned.

All of these possible protective steps could get to be rather elaborate. What about the option of keeping all PLC operations off of the narrow frequency bands allocated to the Amateur Radio Service? Would that be hard to do? This combined with the power limit could provide the protection without complexity.

Respectfully Submitted,

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Reference One

One of the amateur radio operators affiliated with the Xtal (Crystal) Set Society developed a variable capacitor consisting of salt water in a plastic bottle. The salt water acts as one plate of the capacitor and aluminum foil on the outside of the bottle serves as the other plate. He used this variable capacitor in a radio receiver.

Reference Two

H.P. Friedrichs, Instruments of Amplification: Fun with Homemade Tubes, Transistors, and More

Reference Three

Dr. Joe Taylor K1JT (Noble Laureate in Physics) describes his communications protocols in his speech to the 2014 ARRL National Centennial Convention (available on DVD)

Note: Experimenters have operated for years under FCC Part 15 rules on 160 – 190 kHz (1750-meter band) using a limit of one Watt of input power and deliberately inefficient antenna systems. The Amateur Radio allocations would greatly expand opportunities for experimentation and invention.

Appendix A – My Patents and Document References

Some of my document references are listed below:

United States Patent 6,771,935, Wireless Bus August 3, 2004
United States Patent 3,280,929 Ground-Effect Machine October 25, 1966
United States Patent 3,280,930 Ground-Effect Vehicle October 25, 1966

"Demonstration and Development of Amateur Radio Applications of Natural Vacuum Electronics"; Nickolaus E. Leggett, N3NL - 22nd AMSAT Space Symposium and Annual Meeting October 8-10, 2004 in Arlington, Virginia

"A 'Lighthouse' Protocol for Random Microwave Contacts", Nickolaus E. Leggett, N3NL, QEX The Experimenter's Exchange – Technical Notes July/August 2004 – American Radio Relay League, Newington, CT.

Wireless bus invention – U.S. Patent # **6,771,935**

Abstract

In order to avoid mechanical assembly problems and transmission of undesired electrical currents among circuit cards or boards in a telecommunications switch or similar digital device, a conventional hard-wired midplane bus is replaced by a wireless bus. The wireless bus includes a radio frequency or light wave transceiver on each card. Antennas on respective cards can either be oriented within direct line-of-sight of each other, or can project into a waveguide which directs the transmitted signals past all the other antennas. For example, the waveguide may be a metal enclosure which surrounds all the cards. Alternatively, respective aligned apertures in the cards can define a continuous transmission path. A data rate exceeding 1 megabit per second and a transmission power on the order of 1 milliWatt are preferred, since the bus is intended for use within a single switch housing. Radio frequencies in the middle to high microwave range or light frequencies in the visible range are preferred for providing sufficient bandwidth and to facilitate servicing.