Comments of John Langridge, KB5NJD / WG2XIQ, on the matter of a 630-meter amateur radio allocation in the United States

Abstract and Intent

The Petition for Rulemaking of the ARRL to Amend Parts 2 and 97 of the Commission's Rules to Create a New Medium-Frequency Allocation for the Amateur Radio Service is no trivial task. Numerous interests have a potential stake in the utilization of the band commonly referred to as “630-meters”, the frequency range bound by 472 kHz and 479 kHz. It is my intent to show, from the perspective of one very active Part 5 experimental station on the 630-meter band, that services can co-exist within this small piece of spectrum without causing interference or interruption of services.

Introduction

I, John Langridge, have held the amateur radio call sign KB5NJD since 1989 and have held both General Radiotelephone Operators License with Radar Endorsement and 2nd Class Radiotelegraph Operators License with Radar Endorsement since 2005. I hold advanced degrees in physical chemistry and have worked in radio and television broadcasting as both a staff engineer and consulting engineer in a “top-five” media market for over 10 years. I am currently the owner/operator/chief engineer of WG2XIQ, an FCC-licensed Part 5 experimental station located in Duncanville, Texas.

Position

I formally support the creation of a secondary allocation under Part 97 for the 630-meter band as

specified in ET-Docket number 15-99. If it is determined that a minimum setback distance from an existing PLC system is, in fact, necessary, I will support those rules. I would, however, like to see a logical and accurate means of making this determination and reasonable application of §97.303 (g) (1) if a limitation is instituted. I also support a 200-foot (60.96 meters) antenna structure height limitation in accordance with §97.15 (c). Furthermore, I support a power limitation of 5-watts EIRP in accordance with §97.313 (l).

Station Description

WG2XIQ, located in Duncanville Texas, is formally situated on a one-half acre lot surrounded by homes, trees and other obstructions. A 500-foot tall water tank, owned and operated by the City of Duncanville, Texas, is located one-quarter mile to the North-Northwest of WG2XIQ. Average ground conductivity, as specified by the Federal Communications Commission ground conductivity charts for this region, is reported as 30 mS/m. Situated 1.1 miles to the south of WG2XIQ is a 500-kilovolt single-lattice electrical distribution easement passing from Northwest to Southeast. The associated transmission line support towers are owned and operated by Oncor Delivery and are administered by ERCOT (Energy Reliability Council of Texas) on the behalf of the regulator, The Public Utility Commission of Texas. WG2XIQ is situated very close to the highest point in north central Texas at an elevation of 748-foot (227.99 meters). WG2XIQ's primary transmitting structure consists of an 80-foot (24.38 meters) tall monopole vertical antenna of telescoping aluminum. Three sets of guy ropes are used to secure the structure. The system utilizes both base and top-loading. The top-loading consists of two (2) single capacitive wires, 180-degrees apart,with asymmetric lengths of 100 and 200-foot, respectively. Base-loading is comprised of a motorized loading coil and variometer to allow continuous remote control of the resonant frequency of the structure and variable shunt elements are utilized to achieve a 50-ohm match to the coaxial feed line. Impedance is regularly measured with a

Rig Expert AA-600 Impedance Analyzer to account for variations in system resistance due to environmental changes (seasonal and weather-related variations). This information, in turn, is used to make determinations about the necessary drive power to achieve a maximum granted Effective Radiated Power of 10-watts, where applicable. Effective Radiated Power determinations are made utilizing antenna base current, which is measurable at the operating position, and the known system resistance. Real time system conditions are monitored at the operating position by sampling both the voltage and current and adjustments of both phase and magnitude can be made to ensure the system is operating in a resistively-matched conditions of 50 +j0 ohms.

The radial system for WG2XIQ consists of 130, 100-foot (30.48 meters) long radials. The radial field is generally symmetrical and homogeneous around the feed point of the antenna structure. An approximate 30 degrees span of radial end points to the south of the antenna have been adjusted to fit within the allotted location. This variation does not appear to create noticeable differences in relative field strength at distances of 1-kilometer, 5-kilometers, 10-kilometers, and 20-kilometers. In general, the relative field strength of this system on the ground-wave path is homogeneous on a variety of radials that are regularly tested at these prescribed distances.

Operational Facts

WG2XIQ has been operational since September 12, 2012, logging close to 10000 hours of radio frequency emissions utilizing a variety of modulation types including 150HA1A, 62H0F1B, 62H0G1D and 62H0J2B. Power levels have ranged from 1-watt Effective Radiated Power as prescribed by the original grant, dated September 12, 2012, to the modification granted on August 12, 2014 (File number 0118-EX-ML-2014) that allowed an increase in Effective Radiated Power to 10-watts. **To date, ZERO interference complaints have been reported by licensed or unlicensed services.**

A series of fixed-portable experiments, located in Duncanville, Texas, were undertaken in January 2014 to determine the feasibility of modifying existing amateur radio antennas for use on the 630-meter band and to determine if reasonable performance could be expected from such “micro” antenna systems. These “micro” antennas ranged from an eight-foot tall base-loaded monopole to a half-wave dipole antenna that was base-loaded and configured as Marconi-T vertical antenna. These experiments utilized 4-FSK (commonly referred to as WSPR – Weak Signal Propagation Reporter) with an Effective Radiated Power estimated to range from .01-watts to 1-watt. At the closest point, the antennas under test were only one-quarter mile away from the transmission line easement. **ZERO interference complaints were reported by licensed or unlicensed services during the 3-week period that encompassed these experiments.**

These instances represent a small sample of experimental operations on 630-meters that are occurring throughout the United States every day and have been occurring since the early 2000's. With no instances of interference complaints for **ANY** Part 5 experimental station associated with radio frequency communications on the 630-meter band, co-existence with other services appears to be a very viable mode of operation.

Band Utilization by the Amateur Radio Operator

In the interest of satisfying the goals of Part 97 with respect to the intent of the amateur service, Part 97.1 (b) states, “Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.” Amateurs have always been at the forefront of technological advancement and many of the luxuries that we enjoy today might not have been possible without an amateur taking the time and showing the interest to experiment. One of the advancements that has

come out of the work done by many Part 5 experimental stations on 630-meters is the development of weak signal modulation schemes that allow for two-way communications to occur in less than optimal conditions, whether those conditions be caused to atmospherics or a minimalist approach to building and operating a station. These facts have significant implications for other subparts of Part 97, such as 97.1 (a), which states, “Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.” One of the capabilities that 630-meters offers the amateur, which can be utilized in the public interest, is a long-range regional communication system that does not require an infrastructure and is not subject to solar conditions by utilizing the very nature of ground wave radio propagation that is well documented at these frequencies. In fact, on a winter day, WG2XIQ can effectively cover a 500-600 mile radius utilizing ground wave propagation. These signals are consistent and repeatable through solar noon.

Beyond strict ground wave regional communications, 630-meter skywave currently supports nationwide coverage and even trans-oceanic communications for Part 5 experimental stations. Effective sky wave communications have been well documented (logs available on request) utilizing traditional Morse (150HA1A), which is comfortably usable to near -10db S/N at 18-20 words per minute in a 500 Hz bandwidth, in addition to low-baud rate, narrow band weak signal modes like JT9 (an FSK derivative) and MSK derivatives which can routinely allow for practical two-way communications in the -20 db to -30 db S/N range in a 2.5 kHz bandwidth. 630-meters is a practical communications band for those that are willing and interested in putting forth the effort and the result, over the long term, will no doubt result in the development of new modulation techniques which stand to serve the public interest through innovation and advancement of the radio arts.

Closing

At this time the Federal Communications Commission Office of Engineering Technology lists thirty-five independent Part 5 experimental stations that are explicitly involved in radio frequency communications on the 630-meter band in the United States. This number does not include the forty-six stations that are currently assigned to the American Radio Relay League's experimental grant under the call sign WD2XSH. Many stations have been operating for a number of years with a variety of modulation techniques and power levels. The signals that have originated from these stations have propagated around the world, being reported in Europe, Asia, Oceania and points in between. Not a single complaint of service disruption has ever been reported from these transmissions. Coexistence can work. Innovation and technical achievement have already been realized through the work of experimental stations that are currently utilizing or have previously utilized 630-meters and there is no reason to believe that forward progress is decreasing. Practical communications, both in the interest of international goodwill and public service, will be served through the granting of a secondary amateur allocation on the 630-meter band.

Respectfully Submitted,

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