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Via Courier and E-mail
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Bruce Franca, Deputy Chief
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Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: Experimental Station WB9XVP (File No. 0136-
EX-ST-2004; Electric Broadband, LLC Experimentation
With Broadband Over Power Line System at
Cottonwood (Yavapai County) Arizona; Request
For Immediate Cessation of Operation and Revocation
Of Special Temporary Authorization

Gentlemen:

This office represents ARRL, the National Association for Amateur Radio, also known as the American Radio Relay League, Incorporated (ARRL). The purposes of this correspondence and the attached exhibit are to establish that (1) the ongoing experimental operation at Cottonwood, AZ involving Broadband Over Power Line Systems (BPL) being conducted by Electric Broadband, LLC (EBLLC), with the assistance of Arizona Power Systems (APS), has resulted in severe interference to Amateur Radio communications in the area; (2) that the levels of radiated RF energy on Amateur Medium Frequency (MF) and High Frequency (HF) allocations is extremely high, well in excess of those levels permitted by Section 15.109 of the Commission's Rules; (3) that the Cottonwood BPL system is therefore in violation of the specific conditions of the granted Special Temporary Authorization (STA) and the affirmative representations made to the Commission by EBLLC; and (4) both EBLLC and APS, well-aware of the

ongoing interference, continue to operate the facility, which constitutes willful and repeated interference in violation of both the Commission's Rules and the Communications Act of 1934, as amended. ARRL therefore insists that this STA and any other STAs granted for the same or nearby locations be immediately revoked; that the Cottonwood BPL system be instructed to shut down operation of all BPL operations immediately; and that they not resume operation unless all interference is demonstrably resolved. As support for these requests, ARRL states as follows:

The current STA for this operation in the name of Electric Broadband, LLC was effective March 15, 2004 and expires September 16, 2004. It succeeds a prior STA grant for the same facilities. It specifies operation between 2.46 and 38 MHz. Condition (3) of the Special Conditions of this STA states that "Licensee should be aware that other stations may be licensed on these frequencies and if any interference occurs, the licensee of this authorization will be subject to immediate shut down." Condition (6) requires a progress report every six months. The progress report is required, per Condition (7), to include a description of measurements and results demonstrating compliance with Section 15.109 of the Commission's Rules. On March 1, 2004, EBLLC submitted as an attachment to the STA application a statement that the trial was, in part, for the purpose of evaluating FCC compliance. The applicant stated unequivocally that "[t]he trial will be in compliance with Section 15.109 of the Rules."

Radio Amateurs have complained to EBLLC, APS, or both, about interference to Amateur Radio communications from this BPL system, but the system continues to operate, without any resolution or cooperation from either the operator or the utility. On or about June 21, 2004, the first complaints were filed with the Commission about this system. See, <http://gulfoss2.fcc.gov/prod/ecfs/retrieve/cgi?native_or_pdf=pdf&id_document=6516214253>. The complaint, filed by Mr. Michael Kinney, KU7W, states in part that the testing of the Verde Valley Amateur Radio Association in the 1.8-30 MHz range shows interference "of a magnitude that makes (attempts at) Amateur Radio communications useless." The interference on typical Amateur Radio equipment shows received undesired signal levels in excess of 60 dB over S9 on the receiver's signal strength meter. The complaint promised the filing of more detailed information in the near future. APS and EBLLC were contacted and no response was received.

On or about July 31, 2004, the Verde Valley Amateur Radio Association submitted a comprehensive report of approximately 70 pages to the Commission detailing the interference problem from this BPL test system. They report that their tests were initiated in January of 2004, in anticipation of the BPL test system commencing operations, and established baseline results of normal noise levels. Starting May 31, 2004 and to the present, tests were conducted to determine the extent to which the BPL systems was causing actual harmful interference to mobile stations in the vicinity of the test sites, and at the fixed station of Mr. David Kiggins, KB7KMR. Distances ranged from between 30-70 feet from BPL equipment to mobile stations, and between 0.56 mile and 0.71 mile from the Kiggins fixed station antenna. The equipment used by the Verde Valley group was typical Amateur radio equipment typically deployed at fixed and mobile Amateur stations. The results of the mobile tests and at the fixed station of Mr.

Kiggins were that Amateur radio communications on the MF and HF bands were precluded completely. This level of interference makes impossible any assistance otherwise regularly provided by Amateur Radio operators in the area to Federal, State and local authorities, and private served agencies such as the American National Red Cross and the Salvation Army. The complaint filed by the Verde Valley group included extensive exhibits detailing the methodologies used in the tests, and as well the qualifications of the individuals conducting the tests. The complaint and the report prepared and filed by the Verde Valley group sufficiently state a serious case of ongoing, harmful interference that violates condition (3) of the STA, and to the extent that this system could be said to be operating pursuant to the Commission's Part 15 rules, clearly a violation of Section 15.5 of those rules. Condition (3) of the STA is not specific about the nature of interference; "any" interference is sufficient to cause the station subject to the STA to shut down "immediately" and no instruction from the Commission is stated to be necessary.

Copies of the July 31, 2004 interference report were provided to various Commission staff persons, including Ms. Anh Wride, Mr. James Burtle, Mr. Riley Hollingsworth, and Mr. Alan Stillwell, among others. No substantive response has been received from the Commission, EBLLC, or APS.

Aside from the extensive harmful interference showing of the Verde Valley Amateur Radio Association, ARRL has conducted its own independent tests of the Cottonwood BPL system. Attached to this letter as Exhibit A is a report of field strength measurements taken by ARRL Laboratory Manager Ed Hare in Cottonwood on July 1, 2004. Mr. Hare found strong BPL noise levels across a wide geographical area surrounding the BPL site and made measurements that show that the system is operating at levels several orders of magnitude higher than the FCC Part 15 limits. When extrapolated to 30 meters distance using the accepted 20 dB/decade extrapolation factor, the field strength from the Cottonwood BPL test system was calculated to be at a level of 61.9 dBuV/m. This measurement is 32.4 dB higher than the limits permitted in Section 15.109. The measurements taken were consistent with the levels seen on the Amateur Radio station receiver signal strength meter by the Verde Valley group.

From the complaints filed by the Verde Valley group, and from the actual measurements taken by ARRL's laboratory manager using scientifically valid methods, it is apparent that (1) there is widespread interference to licensed Amateur Radio communications in an area within a mile of the test system; and (2) the radiated emissions from the BPL modems at the test sites are well in excess of what the Commission's regulations permit.

There has been no progress report filed to date by EBLLC, but that is of no consequence here, inasmuch as the specific representation of EBLLC was that the test system would be in compliance with Section 15.109 of the Commission's rules. EBLLC has misrepresented facts to the Commission, and it knows or should know that its representation was and is false. Furthermore, EBLLC and APS are well aware that this test system is causing actual harmful interference and neither has taken any steps to either

resolve it or terminate the test. The continued operation of the system without authorization due to violation of the condition constitutes willful and repeated interference, and both the utility and the BPL provider should be subject to monetary forfeiture as the result. Pursuant to Section 1.80 of the Commission's rules, misrepresentation carries the maximum statutory forfeiture amount for each service, and the base forfeiture for interference is \$7,000, subject to upward adjustment for both intentional violations and repeated or continuous violations. The standard forfeiture for exceeding power limits is \$4,000. The STA condition has been violated in any case, and it must be revoked immediately and the test site shut down. ARRL requests that this test station be shut down immediately and that the appropriate monetary forfeitures be imposed against both the Electric Broadband, LLC and Arizona Power Systems.

Kindly address all communications on this subject to the undersigned counsel.

Yours very truly,

Christopher D. Imlay

Christopher D. Imlay

Cc: Mr. James Burtles, FCC
Ms. Anh Wride, FCC
Mr. Riley Hollingsworth, FCC
Mr. Alan Stillwell, FCC

EXHIBIT A

ARRL Field Strength Measurements of the BPL System in Cottonwood, AZ on July 1, 2004

Report prepared by: Ed Hare, ARRL Laboratory Manager, W1RFI@arrl.org
Date: August 6, 2004

Executive Summary:

On July 1, 2004, ARRL Laboratory Manager Ed Hare made an assessment of the BPL system installed in Cottonwood, AZ. He found strong BPL noise levels across a wide geographical area surrounding the BPL site and made measurements that show that the system is operating at levels much higher than the FCC Part 15 limits. At one location, a field strength that extrapolated to 61.9 dBuV/m at 30 meters was found. This measurement is 32.4 dB higher than the limits permitted in Part 15.

Equipment Used:

Amateur mobile station:

ICOM 706MKIIG HF/VHF transceiver, 0 – 54 MHz

Preamplifier: Off

Bandwidth: 3000 Hz SSB (3K0J3E)

8000 Hz AM (8K0A3E)

Antenna: Hustler brand loaded vertical mobile whip, 54-inch with resonators for each
Band tested

Feed line: 18 feet of RG-58

Test Equipment:

Manufacturer	Model	Description	Calibration date
ICOM	PCR-1000	Computer-controlled receiver	1 Apr 2004 ¹
AH Systems	SAS-563B	Active magnetic loop antenna	11 Mar 2004
Tektronix	2701	Step attenuator	Self-cal, ARRL Jan 2004
Rohde and Schwarz	ESH-2	EMC Receiver	5 Feb 2004
Marconi	2041	Signal generator	17 Dec 2003
HP	HP-339A	Audio test set	16 Dec 2003
HP	HP-437B	Microwattmeter	16 Dec 2003
Compaq	Armada 1700	Laptop computer	N/A
Custom	N/A	Custom applications software	N/A

¹ Calibrated by ARRL Laboratory staff using the Marconi 2041 signal generator and HP-339 audio-measurement set using the test procedures described in the “ARRL Test Procedure Manual”, <http://www.arrl.org/~ehare/testproc/testproc.pdf>.

Pre-Testing Investigation:

On July 1, 2004, Mike Kinney and Robert Shipton accompanied ARRL Laboratory Manager Ed Hare to the BPL test areas in Cottonwood, AZ. Mr. Hare was there to assess the interference potential of the system and to make field strength measurements using a calibrated amplified loop antenna.

Prior to making actual measurements, Mr. Kinney drove Mr. Hare to two of the BPL test locations in Cottonwood to assess the noise levels and to select a site for measurements. Mr. Kinney used his mobile amateur radio station, consisting of an ICOM IC-706MKIIG transceiver and an HF mobile whip antenna installed in a late-model pickup truck to demonstrate the interference levels from the BPL installation.

They visited two general areas: near the Sawmill Cove apartment installation (Cottonwood Street) and the American Heritage Academy site². In addition, BPL signals could easily be heard for a considerable distance in the general vicinity, at moderate to strong levels, depending on the distance from either site. At both locations, BPL interference was reading S9 to S9+40 dB on the receiver's signal-strength meter on several amateur bands. On other amateur bands, BPL signals could still be heard, although at a reduced level.³

Testing:

A location near 2300 block Cottonwood St was deemed to be an area where signal strength was somewhat higher than other areas near the Sawmill Cove site. The coordinates of this location are:

Latitude N 34 degrees 43 minutes 42.8 seconds
Longitude W 112degrees 00 minutes 5.3 seconds
Datum NA27 Conus. GPS accuracy 21 ft.
Coordinates taken using a Garmin Etrex Summit GPS

Testing was begun at 11:00 AM. The vehicle was stopped, the engine turned off and the AH Systems antenna loop was set up at a height of 1.5 meters. It was located 7 meters horizontally from the power line, with a visual estimate of the height of the power line of 12 meters. This was a slant-range distance of 12.7 meters between the loop antenna and the nearest part of the power line. Traffic was very light on this road. The weather was clear and dry.

² Extensive documentation of the harmful interference from these areas was provided to the FCC through a complaint filed on or about July 31, 2004 by the Verde Valley Amateur Radio Association.

³ A level of S9 typically represents 50 microvolts across 50 ohms at the receiver input. This is a received signal level of approximately -103 dBW. Each S unit is approximately 6 dB. The calibration of signal-strength meters varies from receiver to receiver, so this is an estimate only. Attachment A to this report is a chart that approximately relates signal strength readings to received signal levels in dBW.

The test fixture and measurement software made the following measurements, estimated as quasi peak field strength in a 9 kHz measurement bandwidth⁴:

3.52 MHz:

69.2 dBuV/m

68.7 dBuV/m

69.1 dBuV/m

69.0 dBuV/m

70.9 dBuV/m

Average: 69.4 dBuV/m

These signals were monitored by ear during the testing and they have all of the characteristics of multi-carrier OFDM BPL signals. They were present only in those areas of Cottonwood where BPL couplers and equipment could be observed on power lines, diminishing slowly with distance along the lines leading away from those areas.

FCC Limits are Exceeded by 32.4 dB in This System:

When these results are extrapolated to 30 meters distance using a 20 dB/decade extrapolation factor, the field strength from that system is estimated to be at a level of 61.9 dBuV/m. This measurement is 32.4 dB higher than the limits permitted in Part 15. This is consistent with the levels seen on the station receiver's signal-strength meter.

Although the measurement was made at a point deemed to be the maximum signal strength that was found, the search for that point was not exhaustive, nor was it significantly higher than the signals observed over the larger area of the entire system. Separate measurements were also made on other parts of the 3.5 MHz Amateur allocation, with levels about 3 dB lower elsewhere in the band.

⁴ The test method used is described in more detail in Attachment B of this document.

Attachment A:

S unit	Received signal level (dBW)
S9	-103 dBW
S8	-109 dBW
S7	-115 dBW
S6	-121 dBW
S5	-127 dBW
S4	-133 dBW
S3	-139 dBW
S2	-145 dBW
S1	-151 dBW

This shows the approximate correlation between receiver signal-strength-meter S units and received signal level. The actual levels vary from receiver to receiver. The signal strengths reported by amateurs on the 3.5 MHz band will typically represent the levels in a 2500 to 3000 Hz receiver bandwidth.

Typical 75 M SSB Amateur Station

Table 2: This shows the typical characteristics of a home amateur station used on the 3.5 MHz amateur allocation.

The typical SSB amateur station communicates with other SSB using F layer propagation.

Characteristics	Values	
Frequency Band (MHz)	3.75-4.0	
Channel Spacing	Random	
Information Rate	Speech	
Emission Type(s)	2K50J3E	
Transmitter Power (dBW)	31.7	
Transmission Line Loss (dB)	Transmit 0.2	Receive: 0.2
Antenna Polarization	Horizontal; Vertical	
Antenna Maximum Gain (dBi)	7	
Maximum e.i.r.p. (dBW)	38.5	
Receiver IF Bandwidth	SSB:2500 Hz	
Receiver Noise Figure (dB)	13	
Receiver System Noise (dBW)	-135	
Receiver Signal-to-Noise Ratio (dB)	+6	
Maximum Long-Term Interference Power [dB(W/Hz)]	To be determined	
Maximum Path Length (km)	Depends on propagation mode	

Attachment B: Description of Test Method

Test Fixture:

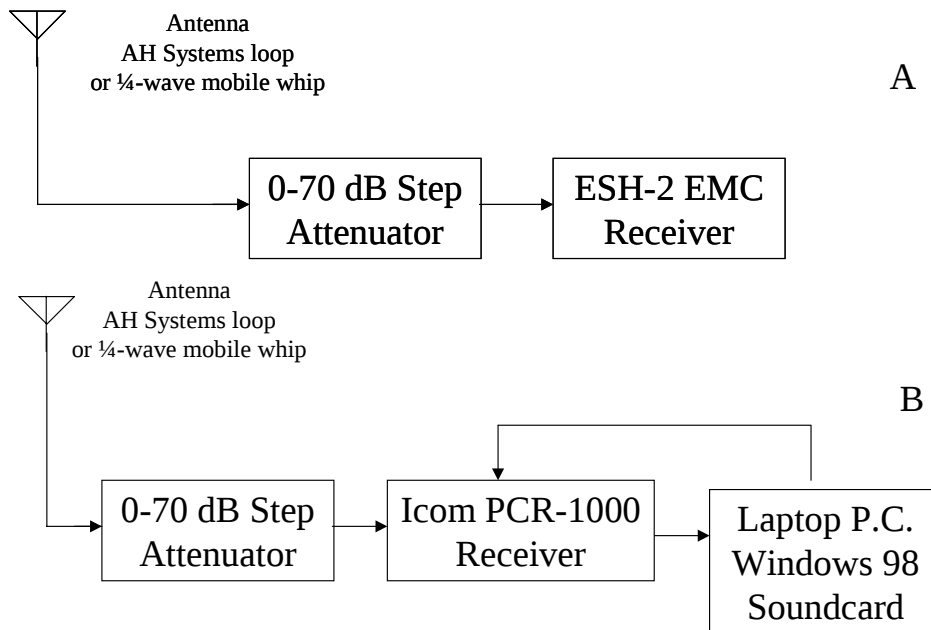


Figure 1:

- (A) The ESH-2 receiver was used to verify the accuracy of the measurements made using the PCR-1000 receiver and P.C. sound card.
- (B) On 28.5 MHz, the PCR-1000, attenuator and sound card were used to make field strength measurements at various locations.

Test Method:

The test method used the ICOM PCR-1000 receiver⁵ and a computer with sound card to measure received signal levels from an antenna with a calibrated antenna factor and gain. A step attenuator was used to keep the measured noise signal within the linear range of the receiver, at a level lower than would engage the receiver's automatic gain control circuitry.

The test software first makes an RMS measurement of the receiver output voltage when terminated in a 50-ohm non-radiating load. This reading is stored in memory. The receiver is then connected to an antenna. If necessary, the step attenuator can be adjusted by the test engineer to keep the input signal level within the linear range of the receiver. The software then compares the second RMS reading to the reading made with no input signal. Because the receiver noise floor is known, having been previously measured in the ARRL Laboratory, the second reading allows a calculation of the received signal

⁵ The use of conventional receiving equipment to make measurements allows measurements to be made at a lower level than can typically be made with commercial test equipment.

level being measured by comparing the two voltage levels⁶. The software also measures the peak-to-RMS ratio of the receiver output voltage, using the values stored from the sound-card waveform. These levels are then used to make received-signal level calculations based on the externally measured receiver noise floor. The results were then adjusted for bandwidth to obtain an estimate of the quasi-peak level in a 9 kHz bandwidth. Several comparative measurements between this test fixture and the use of the ESH-2 EMC receiver and AH Systems calibrates loop showed correlation of 2 to 4 dB for various noise signals.

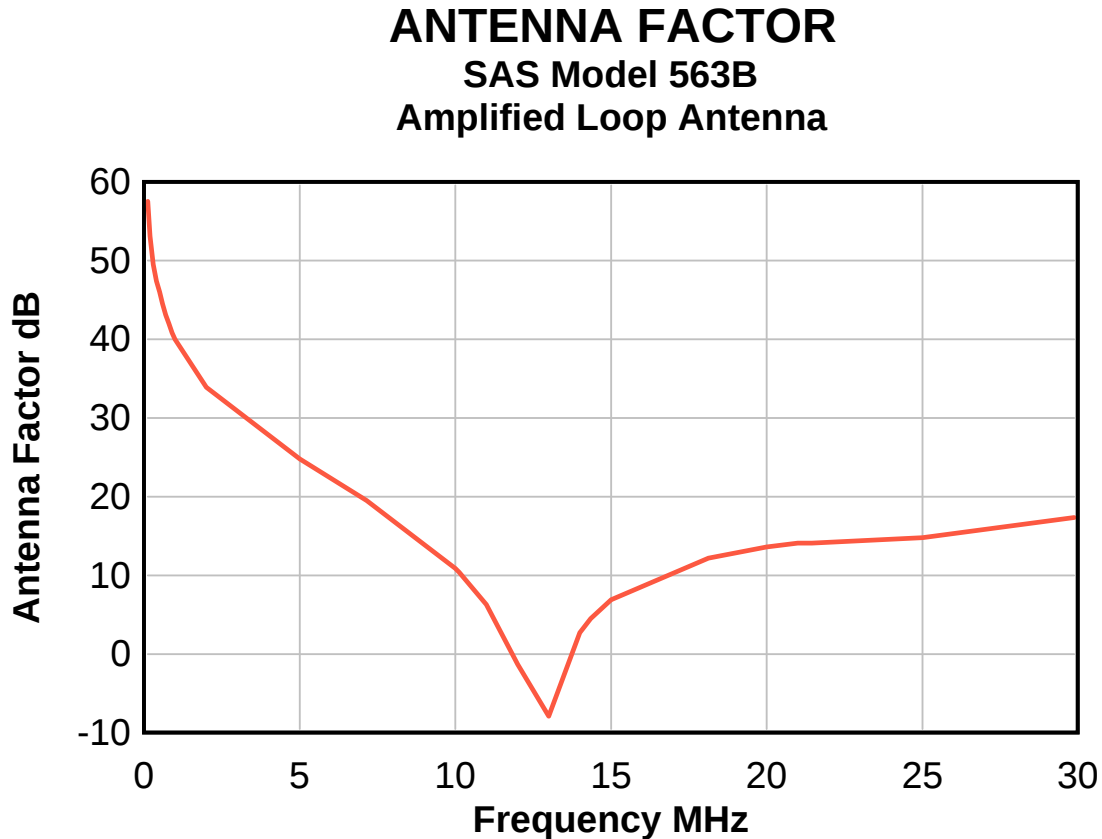


Figure 2: These are the antenna factor data for the amplified loop antenna used in these tests.

⁶ It is necessary to subtract the noise floor power from the measured signal+noise-floor measurement to get the actual signal level. The test software makes this correction.