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February 10, 2011

Via E-mail and U.S. Mail
rashmi.doshi@fcc.gov

Dr. Rashmi Doshi, Chief
Laboratory Division
Office of Engineering and Technology
Federal Communications Commission
7435 Oakland Mills Rd
Columbia MD 21046-1609

Re: Errors in Grant of Certification for BPL Regenerator Units and BPL Customer Access Units; International Broadband Electric Communications, Inc.; FCC Identifiers U9TBRUG320007 and U9TLCCAU10007; dates of grants 10/01/2007 and 08/24/2007.

Dear Dr. Doshi:

This office represents ARRL, the national association for Amateur Radio, formally known as the American Radio Relay League, Incorporated. The purpose of this letter is to request on behalf of ARRL that the Laboratory Division review and set aside the above-referenced (most recent) grants of equipment authorization issued to International Broadband Electric Communications, Inc. (IBEC) by the Commission for BPL Regenerator Units (BRUs) and Customer Access Units (CAUs). There are several reasons for this request, summarized hereinbelow and in the attached technical statement prepared by Mr. Ed Hare of the ARRL's Laboratory in Connecticut. ARRL suggests that there were several errors in the application for certification and in the laboratory test results showings for these devices, which should have, but did not cause the application to be denied or returned initially; and that testing subsequently of *in situ* BPL deployments by IBEC measure well in excess of the levels that should have been possible from Part 15-compliant BPL devices.

On the dates referenced in the caption above, the Commission granted the attached equipment authorizations to IBEC (*See, Exhibits A and B attached hereto*).

There are several errors in the IBEC application for certification discussed in the attached ARRL technical statement dated February 8, 2011, entitled "*Errors in the Certification Testing and Test Reports for the IBEC Model BRU and CAU Access BPL*

devices" prepared by Mr. Hare. There is also a substantial inconsistency between the test results submitted to the Commission by IBEC in support of the application for certification, and the power levels of IBEC systems that have been recently measured by ARRL representatives and others at a series of IBEC BPL installations.

ARRL's concerns are summarized as follows:

1. The results in the IBEC test data submitted with the equipment authorization application correlate very poorly with measurements made recently by ARRL and its representatives in several IBEC BPL deployments.[1]

2. During the testing for certification purposes, the equipment was apparently not operated at its maximum operating levels and/or data rates. 47 C.F.R. § 15.613.

3. The equipment was not tested across its full frequency operating range at each of the three typical overhead and underground locations tested, but was instead tested on each frequency-operating "mode" at only one overhead and one underground location. 47 C.F.R. § 15.613.

4. It is not clear from the reports that measurements were made at distances along overhead and underground wiring that would be required for systems that operate at the lower part of the IBEC-system operating range. 47 C.F.R. § 15.613.

5. IBEC did not establish by test data that the system is capable of achieving the required notch depths to protect local use of spectrum. 47 C.F.R. § 15.611(c)(i).

6. Measurements of conducted emissions between 535 kHz and 1705 kHz, if performed, were not reported. 47 C.F.R. § 15.613.

Of these issues, the one of most concern is #1 above: that radiated emission levels from these devices, which were reported as maximum operating levels in the certification test report are tens of dB lower than levels repeatedly measured in *several* IBEC-equipment systems in active deployment. This significant difference cannot be reasonably explained by site-to-site variations. The only reasonable conclusion from the disparity is that the equipment was *not* being operated at its maximum level at the time of the certification compliance testing, but it *was* operated at power levels that did not exceed the FCC emissions limits [See 47 C.F.R. § 15.611(b)] at the time. Afterward, when placed into service, the equipment was, and is still being operated at levels that are well in excess of the maximum levels permitted for BPL equipment pursuant to that same Rule Section.

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[1] See, Written *ex parte* submission of ARRL in ET Docket No. 04-37, dated and filed November 30, 2010, particularly Exhibits A, E and F thereto; and ARRL Complaint filed with the Chief, Spectrum Enforcement Division, Enforcement Bureau and the Chief, Office of Engineering and Technology, dated and filed December 29, 2010, also submitted in ET Docket No. 04-37.

Given the foregoing, as is more completely explained in Mr. Hare's statement attached, it is apparent that the certification grant was improperly made and should be set aside by the Commission pending retesting of the device and resubmission of an equipment authorization application for this device. On behalf of the more than 680,000 licensed radio amateurs in the United States, who have an interest in avoiding interference to and from these devices, ARRL respectfully requests that your office take the appropriate action with respect to these devices without delay.

Should any additional information be called for, please contact either the undersigned, General Counsel for ARRL, or Mr. Hare, whose contact information is listed on the attached technical statement. Thank you very much for your consideration of this request.

Kind regards,

Christopher D. Imlay

Christopher D. Imlay
General Counsel, ARRL

Copy: Mr. Brent Zitting
Vice President of Engineering
International Broadband Electric Communications, Inc.
285 Dunlop Blvd. S.W., Suite K
Huntsville, AL 35824-1103
(IBEC, Inc.)
W/attachment

COPY

FEDERAL COMMUNICATIONS
COMMISSION
WASHINGTON, D.C. 20554

COPY

GRANT OF EQUIPMENT
AUTHORIZATION
Certification

International Broadband Electric
Communications, Inc.
285 Dunlop Blvd. SW, Suite K
Huntsville, AL 35824-1103
United States

Date of Grant: 10/01/2007

Application Dated: 07/18/2007

Attention: Brent Zitting , Vice President of Engineering

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: U9TBRUG320007
Name of Grantee: International Broadband Electric Communications, Inc.
Equipment Class: Access Broadband Over Powerline System
Notes: BPL Regenerator Unit (BRU)
Modular Type: Does not apply

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15G	2.0 - 34.0			

This device is approved only with the coupler(s) as described in this filing.

Mail To:
David Schramm, EMC Department Manager
Intertek
1950 Evergreen Blvd Suite 100
Duluth, GA 30096

EA631346

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FEDERAL COMMUNICATIONS
COMMISSION
WASHINGTON, D.C. 20554

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GRANT OF EQUIPMENT
AUTHORIZATION
Certification

International Broadband Electric
Communications, Inc.
285 Dunlop Blvd. SW, Suite K
Huntsville, AL 35824-1103
United States

Date of Grant: 08/24/2007

Application Dated: 05/18/2007

Attention: Brent Zitting , Vice President of Engineering

NOT TRANSFERABLE

EQUIPMENT AUTHORIZATION is hereby issued to the named GRANTEE, and is VALID ONLY for the equipment identified hereon for use under the Commission's Rules and Regulations listed below.

FCC IDENTIFIER: U9TLCCAU10007
Name of Grantee: International Broadband Electric Communications, Inc.
Equipment Class: Access Broadband Over Powerline System
Notes: Low Cost Customer Access Unit
Modular Type: Does not apply

Grant Notes	FCC Rule Parts	Frequency Range (MHZ)	Output Watts	Frequency Tolerance	Emission Designator
	15G	2.0 - 7.0			
	15G	3.0 - 13.0			
	15G	13.5 - 23.5			
	15G	24.0 - 34.0			

Mail To:
David Schramm, EMC Team Leader
Intertek
1950 Evergreen Blvd Suite 100
Duluth, GA 30096

EA187061

Exhibit C

Errors in the Certification Testing and Test Reports for the IBEC Model BRU and CAU Access BPL devices.

February 8, 2011

Ed Hare
ARRL Laboratory Manager
225 Main St
Newington, CT 06111
Tel: (860) 594-0318
Email: w1rfi@arrl.org

Scope

This report analyzes the test-result reports provided by to IBEC to the Commission in order to obtain certification of its BPL Repeater Unit (BRU) and Customer Access Unit (CAU) BPL equipment.

There are multiple, significant errors and omissions in the test-reporting, which demonstrate that the testing of this equipment was not complete and inconsistent with the requirements of the Commission's Part 15 rules for BPL equipment.

The results in the IBEC test data are very poorly correlated with measurements made recently by ARRL in several IBEC BPL deployments. [1] ARRL's measurements revealed in each case that the operating level of the BPL systems exceeded the FCC emission limits by tens of dB, and as high as 41.7 dB over FCC Part 15 maxima. A device emitting RF at this level is emitting more RF noise than 10,000 properly certificated and legally operating BPL devices.

The following significant errors and omissions are found in the IBEC BPL-system test-result reports:

- It does not appear that the equipment was operated at its maximum possible operating levels
- It is not clear from the reports that the equipment was operated at its maximum data rate, vs the "typical" data rate reported
- The equipment was not tested across its full frequency operating range at each of the three typical overhead and underground locations tested, but was instead tested on each frequency-operating "mode" at only one overhead and one underground location
- It is not clear from the reports that measurements were made at distances along overhead and underground wiring that would be required for systems that operate at the lower part of the IBEC-system operating range
- It is not possible to determine from the test data that the system is capable of achieving the required notch depths to protect local use of spectrum
- Measurements of conducted emissions between 535 kHz and 1705 kHz were not performed or reported

Frequency use during testing

The IBEC report on its customer-access unit describes the frequencies that were used for testing the IBEC BPL system. The following table is from the IBEC test-result report:

[1] See, Written *ex parte* submission of ARRL in ET Docket No. 04-37, dated and filed November 30, 2010, particularly Exhibits A, E and F thereto; and ARRL Complaint filed with the Chief, Spectrum Enforcement Division, Enforcement Bureau and the Chief, Office of Engineering and Technology, dated and filed December 29, 2010, also submitted in ET Docket No. 04-37. These documents establish that the IBEC BPL systems were being operated at field strengths as high as 41.7 dB over the Part 15-permitted field strength maximum.

Classification of Transmission Frequency Bands (Modes)				
Mode #	1	2	3	7
Minimum frequency of band (MHz)	3	13.5	24	2
Maximum frequency of band (MHz)	13	23.5	34	7

It is clear from the IBEC test data, both from actual graphs made of the data and from the captions used on IBEC's tables, that not all locations were tested using each of these "modes." For that reason, each frequency range was not fully tested at 3 typical overhead and 3 typical underground locations.

Customer Access Unit frequency use

The following table outlines which frequency "modes" were in operation for the testing of Customer Access Units (CAU) located on utility space, connected to LV and MV wiring:

Location	OVH/UND/LV/MV	Frequency range operated during testing
Location 1	OVH/LV	2-7 MHz (Mode 7)
Location 1	OVH/MV	13.5-23.5 MHz (Mode 2)
Location 4	OVH/LV	2-7 MHz (Mode 7)
Location 4	OVH/MV	24-34 MHz (Mode 3)
Location 6	OVH/LV	2-7 MHz (Mode 7)
Location 6	OVH/MV	3-13 MHz (Mode 1)
Location 2	UND/LV	2-7 MHz (Mode 7)
Location 2	UND/MV	13.5-23.5 MHz (Mode 2)
Location 3	UND/LV	2-7 MHz (Mode 7)
Location 3	UND/MV	24-34 MHz (Mode 3)
Location 5	UND/LV	2-7 MHz (Mode 7)
Location 5	UND/MV	3-13 MHz (Mode 1)

From this table, it is clear that the equipment operating on LV wiring from the house to the overhead or underground coupler was operated only from 2-7 MHz. It is not clear from the test reports whether the LV equipment is capable of operating on other frequency ranges, although with the programmability of the DS2 chipsets used in the equipment, it is likely that the equipment could be configured to operate in other frequency ranges than the frequencies tested. Some of this programmability would be required by Part 15 rules.

For CAUs located in utility space on MV wiring, the equipment was operated only as follows:

Frequency range	Locations tested
3-13 MHz	1 overhead, 1 underground location
13.5-23.5 MHz	1 overhead, 1 underground location
24-34 MHz	1 overhead, 1 underground location

BPL Repeater Unit (BRU) frequency use

The following table outlines which frequency "modes" were in operation for the testing of BPL Repeater Units (BRU) located on utility space, connected to MV wiring:

Location	OVH/UND	Frequency range operated during testing
Location 1	OVH	3-13 MHz
Location 2	OVH	24-34 MHz
Location 3	OVH	13.5-23.5 MHz
Location 4	UND	24-34 MHz
Location 5	UND	13.5-23.5 MHz
Location 6	UND	3-13 MHz

It is clear that the BRU equipment can be configured to operate on various frequency ranges from 3 to 34 MHz. However, from the information in the tables provided by IBEC, each frequency range was tested at only 1 underground-wiring and 1 overhead-wiring location. Inexplicably, for most of the testing above 30 MHz, the devices were configured to operate only below 30 MHz.

For BRUs located in utility space on MV wiring, the equipment was operated only as follows:

Frequency range	Locations tested
3-13 MHz	1 overhead, 1 underground location
13.5-23.5 MHz	1 overhead, 1 underground location
24-34 MHz	1 overhead, 1 underground location

Distances along power lines

For all of the testing, even though the devices were configured to operate only for limited frequency ranges for each test within the 2-34 MHz frequency range, devices were tested at distances representing a mid-point frequency of 16 MHz. For measurements made from 2-7 MHz, this does not represent a distance of even 0.5 wavelengths at the mid-point of the 2-7 MHz emission. For measurements made of 24-35 MHz, the distances measured miss the major emissions peaks that would be expected to occur at distances of 0.25 and 0.5 wavelengths at the midpoint of the 24-34 MHz emissions.

It is also not apparent from the test data that any measurements were made at the additional distances down the line that would be required because the lowest frequency of operation extends below the mid-band frequency by more than a factor of 2. Although it is possible that these extended distances will not represent maximum emissions locations (and thus not be reportable), it is not likely, especially for the lower frequency emissions, that *none* of these extended locations would have emissions that were reportable, especially considering the significant additional test-data reporting that was included with the IBEC test-result reports.

EUT data rates

The test report indicates that the device was configured to operate using a data stream that the manufacturer believes represents "typical use" of the equipment. In most engineering cases, "typical" is not the same as "maximum," so it is not apparent from the test result reports that the BPL equipment was tested at its maximum data rates.

Operating levels of the BPL equipment

The FCC test method requirements incorporated by reference in the Part 15 rules stipulate that the BPL equipment shall be operated at its maximum possible operating level and the attenuation necessary to operate it at the emissions limits be described in the test report.

The IBEC test-result reports do not show any indication that attenuation was required to meet the FCC rules, or any indication as to the specific power level that was employed during testing. It can only be presumed, therefore, that the resultant reports were represented by IBEC to be of equipment operating at its maximum operating levels, as required by the FCC test procedures and rules for BPL-system certification.

It must be noted that the levels that were reported as maximum operating levels in the certification test report are tens of dB lower than levels measured in several actual IBEC-equipment systems in active deployment. This significant difference cannot be reasonably explained by site-to-site variations. The only reasonable conclusion from the disparity is that the equipment was not being operated at its maximum level during the certification testing, but was operated at a power level that did not exceed the FCC emissions limits.

Notch depth

There is nothing in the test reports that indicates that measurements were made of the ability of the equipment to achieve a notch depth of at least 20 dB on frequencies below 30 MHz and 10 dB on frequencies above 30 MHz.

Conducted emissions on the frequency range of 535-1705 kHz

There is nothing in the test reports that indicates that measurements of conducted emissions on frequencies from 535-1705 kHz were made.

General test-reporting requirements

Despite the fact that it is a requirement of C63.4 (included by reference in FCC rules) to include spectral graphs in test reports, showing typical spectral occupancy of the equipment under test, spectral graphs are entirely lacking from the IBEC test-result reports. This is unfortunate, as such graphs would help to demonstrate that the BPL system was actually in operation on the frequencies being measured, rather than being operated on different frequencies, with the resultant measurements being inadvertently of spurious emissions, rather than the on-channel emissions that the Commission intends to be measured for BPL-device certification.

Poor correlation between the levels in the certification test-report data and in-situ measurements made in IBEC BPL systems in Virginia and Pennsylvania

In March and December, 2010, ARRL staff and consultants made in-situ measurements of IBEC BPL systems in Indiana and central Virginia. These measurements were provided to the Commission by ARRL in an *ex parte* filing in ET Docket 04-37 document on 30 November 2010. The test-result reports in the Exhibits provided as part of that submission clearly show that the IBEC systems were being operated significantly above the permitted emissions limits.

Those findings are very poorly correlated with the levels reported in the IBEC certification test-result reports. Below 30 MHz, the difference between the measured results in these actual BPL deployments is as much as 27 dB. Above 30 MHz, the measurements showed operation at much higher levels – as much as 42 dB over the levels provided by IBEC in its test-result reports.

While several dB of difference could be explained by differences in sites, these measurements made at multiple locations at multiple sites show operating levels at much higher levels than could be explained by site-to-site variations. (If such variations *were* a reasonable explanation for the findings, either the sites chosen for certification testing are carefully selected to be *atypically* low in emissions, or else the entire premise that 3 typical locations as sufficient to reasonably represent BPL-device operation is demonstrably false).

The simplest and most likely explanation for the very large difference between the levels represented in the IBEC certification test-reports and the measurements seen in IBEC field deployments is that the testing done for certification was not performed at the maximum operating level of the equipment. The large differences could also be explained, at least in part, by the fundamental errors in testing that are demonstrated in this paper. [2]

The operating levels of the deployed BPL systems measured by ARRL is so much greater than the permitted emissions limits and the levels reported in the certification test results that the validity of the certification of the equipment generating these substantially excessive radiated emission levels should be re-evaluated by the Commission..

[2] It should be noted that the pattern of BPL systems as deployed showing maximum emissions significantly above those provided as part of certification test data has been consistent over several years. As one example, the FCC may refer to measurements made of the Ambient BPL system formerly in operation in Briarcliff Manor, NY, provided to the Commission by ARRL in the ET Docket 04-37 proceeding, in the context of a formal complaint about harmful interference and emissions-limits violations by BPL companies.