

APPENDIX A RELEVANT PART 15 PROVISIONS

Part 15 provisions regarding field strength limits and compliance measurements are quoted or paraphrased below. Observations relevant to the application of these provisions to BPL systems are presented in footnotes.

A.1 PROVISIONS REGARDING FIELD STRENGTH LIMITS

§15.15(c) "*Parties responsible for equipment compliance should note that the limits specified in this part will not prevent harmful interference under all circumstances.*"

§15.109(a) "*...the field strength of radiated emission from unintentional radiators at a distance of 3 meters shall not exceed the following values...*" ¹

§15.109(e) "*Carrier current systems used as unintentional radiators...shall comply with the radiated emission limits for intentional radiators provided in §15.209 for the frequency range 9 kHz to 30 MHz.*"

§15.109(g) "*As an alternative to the radiated emission limits shown in paragraphs (a) and (b) of this section, digital devices may be shown to comply with the standards contained in the Third Edition of International Electrotechnical Commission ("IEC"), International Special Committee on Radio Interference ("CISPR") Pub. 22 (1997)...*"

§15.113(b) "*The operating parameters of a power line carrier system (particularly the frequency) shall be selected to achieve the highest practical degree of compatibility with authorized or licensed users of the radio spectrum.*" ²

§15.113(c) "*Power line carrier system apparatus shall be operated with the minimum power possible to accomplish the desired purpose.*"

§15.205(a) "*...only spurious emissions are permitted in any of the frequency bands listed below:...*" ³

§15.209(a) "*...emissions...shall not exceed the field strength levels specified in the following table...*" ⁴

¹ NTIA recommends a uniform ten (10) meter measurement distance. See Section 7.5.

² In Section 7, NTIA has identified potential means for enhancing compatibility of BPL systems with radio systems.

³ NTIA recommends consideration of excluding BPL use of certain narrow frequency bands, but further study is needed to determine whether these exclusions can be specified on a geographical basis. Generally, BPL systems should not operate in certain frequency bands in order to protect distress, alarm, urgency or safety communications in accordance with ITU Radio Regulations (see RR No. 4.22).

⁴ NTIA recommends a uniform ten (10) meter measurement distance. See Section 7.5.

A.2 PROVISIONS SPECIFYING COMPLIANCE MEASUREMENTS

§15.31(a) *"The following measurement procedures are used by the Commission to determine compliance with the technical requirements of this part."*

§15.31(a)(6) Digital devices are to be measured using procedures specified in American National Standards Institute (ANSI) C63.4-1992 to determine compliance with the technical requirements of Part 15.

§15.31(b) *"All parties making compliance measurements on equipment subject to the requirements of this part are urged to use these procedures."*

§15.31(d) Measurements are to be made at a calibrated test site to the extent possible. CCS are cited as a case where measurements can be made only at an installation site. Measurements *"...shall be performed at a minimum of three installations that can be demonstrated to be representative of typical installation sites."*⁵

§15.31(f) *"To the extent practical, the device under test shall be measured at the distance specified in the appropriate rule section."* The measurement distance is applied horizontally with respect to a boundary around the device and any interconnection cables.⁶

§15.31(f)(1) *"At frequencies at or above 30 MHz,...measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment."*⁷ *"When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of ..."*⁸

§15.31(f)(2) *"At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field." "...when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance..."*

⁵ See Section 7.9.

⁶ None of the three proprietary access-BPL measurement reports reviewed by NTIA applied §15.31(f). Instead, these measurements were performed on radials at distances measured from the "telephone" pole on which the BPL device was mounted.

⁷ NTIA's Phase 1 Study indicates that BPL emissions must be measured in the near-field because of its large expanse.

⁸ NTIA's Phase 1 Study shows that BPL radiation characteristics may not be consistent with the extrapolation factors specified in §15.31(f). Further study is needed.

§15.31(f)(4) *"When measurements of 30 meters or less are specified in the regulations, the Commission will test the equipment at the distance specified unless measurement at that distance results in measurements being performed in the near field."*

§15.31(f)(5) *"The maximum field strength at the frequency being measured shall be reported in an application for certification."*⁹

§15.31(g) *"Equipment under test shall be adjusted, using those controls that are readily accessible to or are intended to be accessible to the consumer, in such a manner as to maximize the level of emissions. For those devices to which wire leads may be attached by the consumer, tests shall be performed with wire leads attached. The wire leads shall be of the length to be used with the equipment if that length is known. Otherwise, wire leads one meter in length shall be attached to the equipment."*¹⁰

§15.31(h) *"For a composite system that incorporates devices contained either in a single enclosure or in separate enclosures connected by a wire or cable, testing for compliance with the standards in this part shall be performed with all of the devices in the system functioning."*¹¹

§15.31(i): *"The emission tests shall be performed with the device and accessories configured in a manner that tends to produce maximized emissions within the range of variations that can be expected under normal operating conditions."*

§15.31(j): *"If the equipment under test consists of a central control unit and external or internal accessory(ies) (peripheral) and the party ...applying for a grant of equipment authorization manufactures or assembles the central control unit and at least one of the accessory devices that can be used with the control unit, testing of the control unit and/or the accessory(ies) must be performed using the devices manufactured or assembled by that party, in addition to any other needed devices which the party does not manufacture or assemble."*

§15.31(k): *"If the individual devices in a composite system are subject to different technical standards, each such device must comply with its specific standards. In no*

⁹ Regardless of whether certification ultimately is required for BPL authorizations, under NTIA's recommended measurement provisions (Section 7) the maximum field strength at a given measurement frequency is determined from measurements made while operating the BPL system at each frequency at which it is capable of operating.

¹⁰ The "consumer" for outdoor BPL devices normally will be the BPL system operator, whereas the consumer for indoor BPL devices normally will be the BPL subscriber. The length of outdoor "wire leads" used with access and in-house BPL devices vary substantially among the potential BPL installation sites and, as recommended by NTIA (Section 7.9), the representative power lines selected for BPL testing should encompass various features that significantly affect peak field strength levels. In no case can a one-meter or other short length of power line be used for BPL compliance measurements because standing waves associated with peak field strength will not be manifest.

¹¹ NTIA interprets §§15.31(h), (i), (j) and (k) to mean that at any frequency, during measurement and operational use, a network of BPL devices may not generate an aggregate field strength that exceeds the field strength limit for BPL systems. See Section 7.3.

event may the measured emissions of the composite system exceed the highest level permitted for an individual component."

§15.33(b)(1) "...the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table..."

§15.35(a): The limits are based on measurement using a CISPR quasi-peak detector and related bandwidths.¹²

¹² See Publication 16 of the International Special Committee on Radio Interference (CISPR) of the International Electrotechnical Commission. Measurement bandwidths of 9 kHz and 120 kHz are to be used with a quasi-peak detector at frequencies below and above 30 MHz, respectively.