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# **United States Federal Communications Commission (FCC) Rules for Broadband over Power Line (BPL)**



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# OUTLINE

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- **Potential Benefits of Access BPL**
- **Existing rules**
- **Notice of Proposed Rule Making (NPRM)**



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# Potential Benefits of Access BPL

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- **Added competition in the broadband market**
- **Broadband access to rural and under-served regions**
- **Management tool for electric utility distribution networks**



# Existing Rules for BPL

- **BPL devices are “carrier current systems”** [15.3(f)]
- **Part 15 interference requirements**
  - Must not cause harmful interference
  - Must accept interference from other devices
- **Emission limits for carrier current devices**
  - Conducted limits [15.107]
    - Devices operating < 30 MHz: 1000 uV in 535 – 1705 kHz
    - Devices operating > 30 MHz: Same as digital device limits (150 kHz – 30 MHz)
  - Radiated limits
    - < 30 MHz Intentional radiator limits [15.209] (1.705-30 MHz: 30 uV/m at 30 m)
    - > 30 MHz Unintentional radiator limits [15.109]
      - 30-88 MHz: 90 uV/m at 10 m (Class A); 100 uV/m at 3 m (Class B)
- **Field strength measurements are “in situ”**
  - Minimum of 3 installations that are “representative of typical installation sites”



# Notice of Proposed Rule Making (NPRM)

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- **In-house BPL**

- No change to existing rules
- New measurement guidelines

- **Access BPL**

*Definition: A carrier current system that transmits radio frequency energy by conduction **over electric power lines owned, operated, or controlled by an electric service provider**. The electric power lines may be aerial (overhead) or underground*

- Existing rules remain in place
  - Clarifies that conducted limits do not apply to access BPL
  - Clarifies that Class B radiated limits apply to all low-voltage lines
- New rules added to support interference mitigation
- New measurement guidelines



# New Rules Proposed by NPRM

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- **New requirements for access BPL devices**
  - Incorporate adaptive interference mitigation techniques such as dynamic or remote reduction in power and adjustment in operating frequencies in order to avoid site-specific, localized use of the same spectrum by licensed services
  - Incorporate shut down feature to deactivate units found to cause harmful interference
  
- **New requirement for operators of access BPL devices**
  - Notification requirement: Supply information to publicly accessible database
    - Installation locations
    - Frequency bands of operation
    - Type of modulation used



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# Measurement Guidelines Proposed by NPRM

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- **All BPL**

- EUT operated at maximum power and maximum duty factor
- Antenna type and height
  - < 30 MHz: magnetic loop antenna at 1 meter height
  - > 30 MHz: electric field sensing antenna scanned from 1 to 4 meters heightNPRM seeks comments on higher antenna heights or use of correction factors for emissions from overhead lines
- Measurement distance: 10 meters horizontal distance
  - Extrapolate to distance specified in rule. Use slant range from overhead power line for extrapolation.



# Measurement Guidelines Proposed by NPRM (continued)

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- **Access BPL**
  - 3 installations with overhead lines and 3 with underground lines
  - Underground wiring
    - 16 radials around in-ground transformers
  - Overhead wiring
    - Fixed distance from overhead line and various distances down line from coupler
  
- **In-House BPL**
  - 3 installations
    - No metal siding or shielded wiring (e.g.: conduit, or BX electric cable)
    - Combination of buildings with overhead lines and underground lines
    - Install EUT on outside wall of building—ground floor or 1st floor
  - Measurement locations
    - 16 radials around building
    - Fixed distance from overhead feed line and various distances from building connection



# NPRM Status

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- **Dates**

- NPRM released Feb 23, 2004
- Comments due May 3, 2004 (1139 comments received)
- Reply comments due Jun 1, 2004

- **Proposed rules and guidelines may be modified based on comments received from the public**

- **Next step: Report and Order**

- Specifies the new rules
- Specifies effective date and application to existing devices



# Web Sites

- **FCC NPRM on BPL**
  - [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-29A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-29A1.pdf)
- **Electronic Comment Filing System (ECFS)**
  - <http://www.fcc.gov/cgb/ecfs/>
  - Select “Search for Filed Comments”
  - Enter the following information on the form
    - Proceeding      04-37
    - Document Type
      - **NP** to retrieve the NPRM
      - **CO** to retrieve comments
      - **RC** to retrieve reply comments
- **NTIA Report**
  - <http://www.ntia.doc.gov/ntiahome/fccfilings/2004/bpl/index.html>



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# BACKUP CHARTS



# Harmful Interference

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- **Any emission, radiation or induction that endangers the functioning of a radio navigation service or of other safety services or seriously degrades, obstructs or repeatedly interrupts a radiocommunications service operating in accordance with this Chapter. [15.3(m)]**



# Proposed Rule

- **Section 15.109 Radiated emission limits.**
  - (e) Carrier current systems, including BPL systems, used as unintentional radiators or other unintentional radiators that are designed to conduct their radio frequency emissions via connecting wires or cables and that operate in the frequency range of 9 kHz to 30 MHz, including devices that deliver the radio frequency energy to transducers, such as ultrasonic devices not covered under Part 18 of this Chapter, shall comply with the radiated emission limits for intentional radiators provided in Section 15.209 for the frequency range of 9 kHz to 30 MHz. As an alternative, carrier current systems used as unintentional radiators and operating in the frequency range of 525 kHz to 1705 kHz may comply with the radiated emission limits provided in Section 15.221(a). At frequencies above 30 MHz, the limits in paragraph (a), (b) or (i) of this Section, as appropriate, continue to apply. For all BPL systems, the requirements of this paragraph and paragraph (a) of this section shall also apply to the emissions from all low-voltage lines from the distribution transformer to all in-building wiring.



# Proposed Rule (continued)

- **Section 15.109 Radiated emission limits.**
  - (f) Access BPL systems shall incorporate adaptive interference mitigation techniques such as dynamic or remote reduction in power and adjustment in operating frequencies, in order for Access BPL installations to avoid site specific, localized use of the same spectrum by licensed services. Access BPL systems shall incorporate a shut down feature to deactivate units found to cause harmful interference.
  - (g) Entities operating Access Broadband over Power Line systems shall supply to a Federal Communications Commission/National Telecommunications and Information Administration recognized industry operated entity, information on all existing, changes to existing and proposed Access BPL systems for inclusion in a data base. Such information shall include the installation locations, frequency bands of operation, and type of modulation used. No notification to the FCC is required.



# Types of Equipment Authorization

- **VERIFICATION**
  - Self-approval
  - Manufacturer or importer makes measurements or takes the necessary steps to ensure that the equipment complies with the appropriate technical standards
  - Examples: business Class A computer equipment, TV and FM receivers, and non-consumer Industrial, Scientific and Medical (ISM) equipment
- **DECLARATION OF CONFORMITY (DoC)**
  - Self-approval
  - Accredited test lab makes measurements
  - Examples: Class B personal computers and peripherals; CB receivers; super-regenerative receivers; TV interface devices; and consumer Industrial, Scientific and Medical (ISM) equipment.
- **CERTIFICATION**
  - Requires a grant of equipment authorization by the FCC Laboratory or a Telecommunication Certification Body (TCB) (reference Section 2.960)
  - Application submitted to the FCC includes technical description of the product and a measurement report showing compliance with the FCC technical standards
  - Examples: high power transmitters operating in Licensed Radio Services; low power transmitters such as cordless telephones; garage door opener controls; radio control toys, and security alarm systems and scanning receivers.