



BPL and Standards: Safety and EMC

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BPL Standards

- Safety
 - Review of existing safety standards applicable to BPL deployment
 - Suggestions for IEEE role
- EMC
 - EMC concerns
 - Concerns over interference to wireline systems
 - Suggestions for IEEE role

Applicable Safety Standards

- Two type of standards are required to achieve safety
 - Installation standards
 - National Electrical Code (NEC)
 - National Electrical Safety Code (NEESC)
 - Product standards
 - Listing standards
 - UL 60950 (IEC 60950), etc.
 - IEEE standards
 - Project P1675 - Standard for Broadband over Power Line Hardware
 - Other standards
- Installation and product standards work together and must be compatible
- Installation standard may require that equipment conform to a product standard

Installation Standards NEC Scope

- This Code covers the installation of electric conductors, electric equipment, signaling and communications conductors and equipment, and fiber optic cables and raceways for the following:
 - (1) Public and private premises, including buildings, structures, mobile homes, recreational vehicles, and floating buildings
 - (2) Yards, lots, parking lots, carnivals, and industrial substations
 - FPN: For additional information concerning such installations in an industrial or multibuilding complex, see the ANSI C2-1997, National Electrical Safety Code.
 - (3) Installations of conductors and equipment that connect to the supply of electricity
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Installation Standards NEC Scope

- This Code does not cover the following:
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 - (5) Installations under the exclusive control of an electric utility where such installations
 - a. Consist of service drops or service laterals, and associated metering, or
 - b. Are located in legally established easements, rights-of-way, or by other agreements either designated by or recognized by public service commissions, utility commissions, or other regulatory agencies having jurisdiction for such installations, or
 - c. Are on property owned or leased by the electric utility for the purpose of communications, metering, generation, control, transformation, transmission, or distribution of electric energy.
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Installation Standards NESC Scope

- These rules cover supply and communication lines, equipment, and associated work practices employed by a public or private electric supply, communications, railway, or similar utility in the exercise of its function as a utility. They cover similar systems under the control of qualified persons, such as those associated with an industrial complex or utility interactive system.
- The NESC covers utility facilities and functions up to the service point.
 - NOTE: The National Electrical Code (NEC), NFPA 70-1999 covers utilization wiring requirements beyond the service point.
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Product Safety Standards UL 60950 Scope

- This standard is applicable to mains-powered or battery-powered information technology equipment, including electrical business equipment and associated equipment, with a RATED VOLTAGE not exceeding 600 V and designed to be installed in accordance with the Canadian Electrical Code, Part I, CSA C22.1; CSA C22.2 No. 0; the National Electrical Code, NFPA 70; and the National Electrical Safety Code, IEEE C2.
- The standard is also applicable to equipment, unless otherwise identified by a marking or instructions, designed to be installed in accordance with Article 645 of the National Electrical Code, NFPA 70, and the Standard for the Protection of Electronic Computer Data-Processing Equipment, NFPA 75.
- This standard is also applicable to such information technology equipment:
 - designed to use the AC MAINS SUPPLY as a communication transmission medium (see note 4 of clause 6 and note 3 of clause 7).

Product Safety Standards IEEE P1675 Scope

- The scope of this standard will be to provide testing and verification standards for the commonly used hardware, primarily couplers and enclosures, for Broadband over Power Line (BPL) installations, and provide standard installation methods to ensure compliance with applicable codes and standards. This project will not cover repeater/node hardware, data transmission, protocols, or other aspects of BPL related to the internal workings of this technology.

Installation Standards

- Existing standards cover BPL
 - NEC for components at customer premises
 - NESC for components installed in outside plant
- Changes may be need to adequately address all safety concerns for BPL deployment
 - Example: installation of BPL equipment in communication space
- IEEE Role
 - NESC task group to propose review the technology and propose any needed IEEE amendments
 - NESC revisions may need to be in form of TIAs (Tentative Interim Amendments) due to time constraints

Product Safety Standards

- UL 60950
 - Applicable safety standard for BPL equipment to be installed inside premises
 - May require revision in scope if equipment connects ahead of main disconnect
 - Changes may be need to adequately cover all safety concerns for BPL deployment
- There seems to be no applicable existing standard for equipment installed on supply and communication lines (outside plant)
 - IEEE Project P1675 seems to address this gap

EMC Concerns

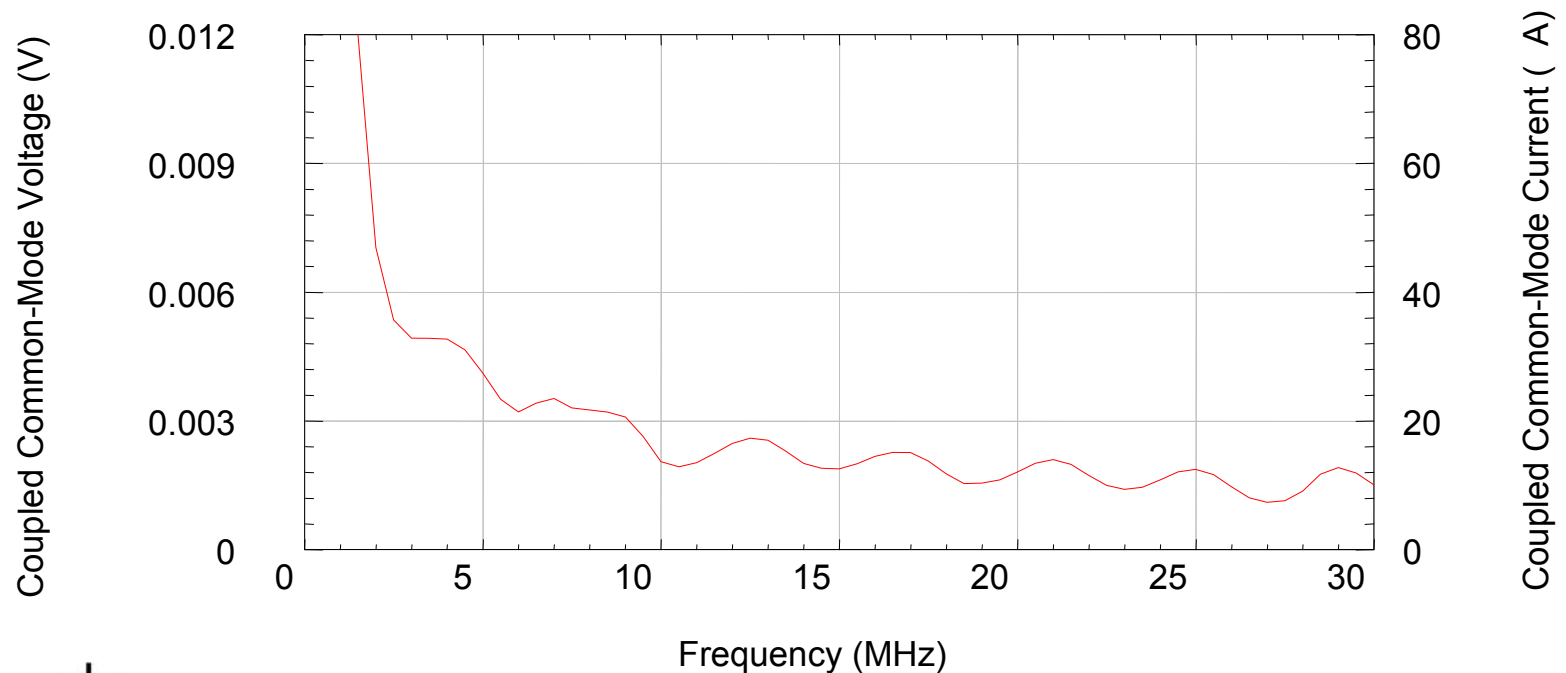
- Interference to radiocommunication services
 - Concern expressed by various parties
- Interference to wireline communication services
 - Potential interference to broadband services over
 - Telecommunication networks: DSL
 - Coaxial cable networks
 - LAN
 - Impact of BPL on wireline communications is not well understood at the present time

Interference to Broadband Wireline Services

- Possibility of interference to broadband services exists
 - BPL and other broadband services operate in an overlapping frequency range
 - Coupling between power system and other systems can occur due to proximity of conductors
 - Distribution conductor
 - Power service conductors and communication drop wires or cables
 - Inside the premises

Interference to Broadband Wireline Services

- Preliminary example of coupling calculation
 - Calculation using method of moments
 - Assumes common-mode current scaled so that the field emissions just meet FCC rules
 - Assumes 150 telecom common-mode impedance



BPL EMC Standardization Efforts

- ITU-T Study Group 5
 - New Question: *EMC related to broadband access networks*
 - An important issue is the possibility of interference from power-line broadband technologies (access Power Line Communication, PLC) to telecommunication access systems.
- IEEE Role?
 - Develop a practice on approaches for BPL operators to mitigate interference from BPL systems to other wireline broadband systems
 - Perhaps under auspices of IEEE 776 committee



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