Introduction to NEBS

Much work is required to ensure that a product is NEBS compliant.

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Welcome to NEBS 101. My goal for this column is to educate and inform the compliance engineering community about network equipment—building system (NEBS) requirements. For those familiar with NEBS, I hope to share my experience and thoughts about this important area.

I have worked in the field of compliance engineering my entire career, more than 22 years. For the past seven years, I have focused on NEBS, specifically with designing network equipment deployed in central offices (CO) and outside plants. I started my career as an approvals engineer for Factory Mutual Research Corp. (www.fmglobal.com). I worked for eight other companies as a compliance engineer, compliance manager, product integrity director, and now as a full-time consultant for Lorusso Technologies LLC (www.lorusso.com).

The World of NEBS

NEBS is a fascinating area of compliance engineering. It covers product safety, electromagnetic compatibility, and environmental requirements. There are hundreds of specific requirements: miss just one and your product is not NEBS compliant. A great deal of up-front work is required to become NEBS compliant. In each issue, this column will include tips and techniques to help engineers achieve this significant milestone.

To get a basic understanding of NEBS, please visit www.nebs-faq.com. That site also contains helpful information on NEBS design, maintenance, testing, and the checklists used by the Regional Bell Operating Companies (RBOCs). There's even a handy heat release calculator to aid in designing for NEBS compliance.

NEBS is not a legal requirement. It is a customer requirement. Specifically, it is a requirement for the RBOCs—Verizon, SBC, Qwest, and Bell South—and the Interexchange Carriers (IXCs). IXCs include AT&T, Qwest, Sprint, and WorldCom. These service providers, with a combined market capitalization of $260 billion, require manufacturers to meet NEBS requirements as a condition of installing their network equipment into the provider's facilities.

So if it's not required by law, why do these service providers want manufacturers to meet all of these stringent requirements? Network integrity is the short answer. The longer answer includes maintaining legal exemptions that have been in place for decades. The rest of this column examines these exemptions and explains their importance.

Public utilities, including the RBOCs, are exempt from certain Federal Communications Commission (FCC) regulations, local electrical codes, and local fire codes. So why is it so difficult to get a piece of network equipment into a carrier's central office? Carriers

police their networks to maintain their exemptions. They impose tough internal requirements for network equipment. Their first line of defense is for a product to be tested to NEBS requirements.

Carriers are exempt from the following regulatory requirements:

• National Electrical Code (NEC). Licensed electricians are not required in central offices.

• FCC. Part 15 EMC requirements do not apply to public utilities.

• Occupational Safety and Health Administration (OSHA). Listing of network equipment is not required.

• Fire codes. Sprinkler systems are not required.

NEC Exemption

The NEC is the basis for many local electrical codes. Many municipalities adopt it. The NEC provides electrical installation guidelines to ensure safety. The 2002 NEC, Section 90.2(B)(4) states that the code does not cover:

Installations of communications equipment under the exclusive control of communications utilities located outdoors or in building spaces used exclusively for such installations.

One benefit of this exemption is that it does not require that licensed electricians install equipment in a CO. This means that the carrier's trained craftpersons can carry out routine electrical installations and maintenance. This is a huge benefit for the carriers; it would be expensive for COs to use licensed electricians in their networks.

FCC Exemption

FCC 47 CFR 15.103 covers devices that are exempt from the FCC rules. Part 15.103(b) specifically exempts public utilities (RBOCs and IXCs):

Section 15.103 Exempted devices.

The following devices are subject only to the general conditions of operation in Sections 15.5 and 15.29 and are exempt from the specific technical standards and other requirements contained in this Part. The operator of the exempted device shall be required to stop operating the device upon a finding by the Commission or its representative that the device is causing harmful interference. Operation shall not resume until the condition causing the harmful interference has been corrected. Although not mandatory, it is strongly recommended that the manufacturer of an exempted device endeavor to have the device meet the specific technical standards in this Part.

15.103(b) A digital device used exclusively as an electronic control or power system utilized by a public utility or in an industrial plant. The term public utility includes equipment only to the extent that it is in a dedicated building or large room owned or leased by the utility and does not extend to equipment installed in a subscriber's facility.

Even though public utilities are exempt from certain FCC rules, Telcordia's GR-1089-CORE imposes stricter requirements on network equipment, requiring compliance from 10 kHz to 10 GHz. The understanding is that if a piece of network equipment causes interference, "The operator of the exempted device shall be required to stop operating the device...." Ceasing to operate would be unacceptable for call-processing equipment, so the service providers police themselves.

However, this requirement doesn't mean that each installed piece of network equipment complies with the GR-1089-CORE limits. A few frequencies could be over, as long as there is no harmful interference. This is why the exemption applies to "equipment... in a dedicated building...." The equipment is under the control of the service provider. This exemption gives the service provider a great deal of flexibility in putting network equipment into service.

OSHA Exemption

FCC 29 CFR 1910 Subpart S contains the OSHA regulations that address electrical safety requirements necessary for the practical safeguarding of employees in their workplaces.

The provisions of 1910.302 through 1910.308 of this subpart do not cover:

1910.302(a)(2)(iv) "Installations of communication equipment under the exclusive control of communication utilities, located outdoors or in building spaces used exclusively for such installations.

This section applies to COs and outside plant equipment that houses communications equipment. This section makes these locations exempt from the OSHA listing requirements. This exemption means that the listing of network equipment by a Nationally Recognized Testing Laboratory (NRTL) is not required. Telcordia's GR-1089-CORE does, however, recommend listing of ac-powered devices. Section 7 of GR-1089-CORE details electrical safety requirements. Note, however, that some RBOCs will ask for network equipment to be OSHA listed.

Fire Code Exemption

You typically won't find sprinklers in COs. The reason is obvious: water from sprinklers would destroy necessary telephone equipment. Because the telephone network provides federally mandated emergency 911 services, losing service could be disastrous.

Service providers police themselves by requiring network equipment to pass the fire resistance test of Telcordia GR-63-CORE. Passing this test minimizes the risk of fire spread within a CO. There would likely be smoke damage, but most of the equipment would be saved because a sprinkler system would not be present. If this exemption were removed, the result would be cost prohibitive to the telecommunications industry and to consumers.

Conclusion

Even though service providers are exempt from many legal requirements, they monitor the networks themselves to ensure network integrity. The cost of losing NEBS exemptions would be unreasonable. It is crucial that manufacturers design network equipment with these exemptions in mind.

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