Amphenol Broadband Solutions

Standards and Emerging Technologies

The Efforts of Standards Organizations to Remain Relevant in today's Changing Networks

This white-paper addresses a few of the issues for standards organizations in order to remain current and ahead of emerging technologies, as related the explosion of new technologies and protocols for the broadband industry.

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How many acronyms are there presently, used to define the new and emerging technologies available to broadband service providers? I recently read another technical paper in which there was a table of acronyms, specific to the broadband world.

These acronyms were for current and future technologies. There were ninety-one in this list, and I could recall a few not included. The technology choices available to today's service providers is greater than any other time in the history of CATV and Broadband services. than any other time in the history of CATV and Broadband services.

With so many options, how does the industry decide which products to invest their future in, and plan? Moreover, how do they ensure the transition has minimal impact on the current network interfaces while providing the level of safety and performance required and expected?

Much of the anxiety and apprehension for safety and performance is alleviated by the work of active, forward thinking standards organizations. Organizations such as Society of Cable Telecommunications Engineers [SCTE], National Fire Protection Association / National Electric Code [NFPA/NEC], National Electric Safety Code / IEEE, and the International Electrotechnical Commission [IEC], work behind the scenes to ensure interoperability and safety are first and foremost with regards to products on the market and to provide minimal requirements for providers and manufacturers to reference during qualification processes. These few organizations are not the only ones who support the broadband industry but are some of the more commonly referenced. Others include, but not limited to, are as follows: Telecommunications Industry Association [TIA], American National Standards Institute [ANSI], Building Industry Consulting Service International [BICSI], Telcordia, & CableLabs.

Standards Organizations and the Broadband Industry

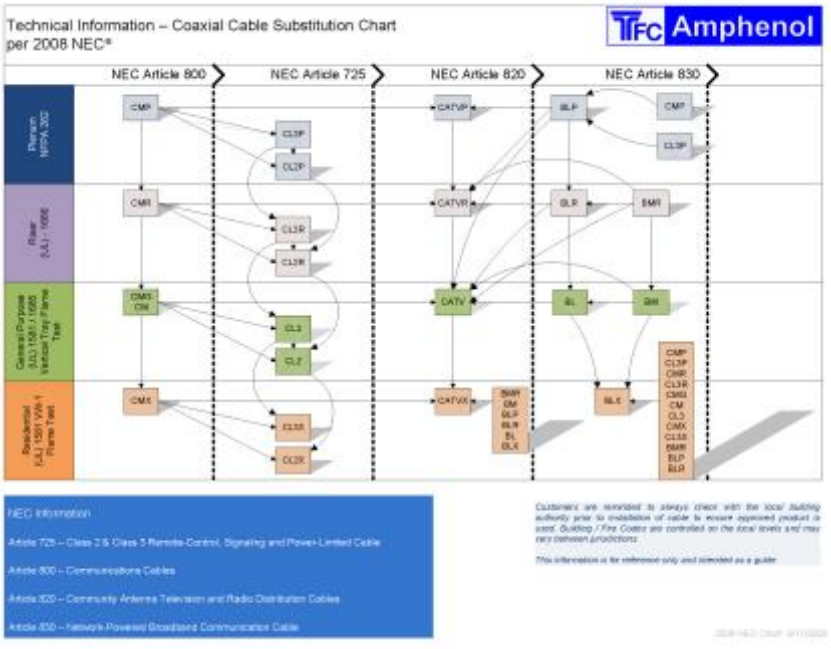
- Society of Cable Telecommunications Engineers [SCTE]
- National Fire Protection Association / National Electric Code [NFPA / NEC]
- National Electric Safety Code [NESC] / IEEE
- International Electrotechnical Commission [IEC]
- Telcordia
- Building Industry Consulting Service International [BICSI
- CableLabs
- Others…

With 35 years of industry experience, Tim Cooke has been a major contributor to the development of key technology and standards in the broadband industry. He is a member of the Cable TV Pioneer Class of 2013, SCTE Senior Member, SCTE IPS Working Group 3 Chairman, SCTE IPS 1218-1794 Task Force Chairman, NFPA NEC Code Panel 16, IEC US Tag Member, and IEEE NESC SC2, SC5, & SC7 Member. Amphenol Broadband Solutions is a global leader in communication technology development specializing in the engineering and manufacturing of cable, RF equipment and hardware, fiber optic products and wireless infrastructure.

Safety – the telecommunications/broadband industry has two primary organizations, which address safety issues for both provider and consumer. They are the NFPA/NEC and NESC, primarily. The National Electric Code, published by the National Fire Protection Association. The NEC consists of multiple code panels which are responsible for specific sections of the code. Each code panel consists of subject matter experts [SME] in the related fields of the article of the code to be reviewed. Members of each code panel represent other organization within the industry and include labor unions, building code inspectors and fire marshals, service providers, consultants, industry leaders, and a few product manufacturers. Each proposal is reviewed in detail, and a consensus has to be reached as to accept, accept in part, accept in principle, or reject the proposals for the coming code cycle. Safety is always the governing factor in these meetings and decisions.

The NESC works in much the same fashion as the NEC, with subcommittees to address items related to utilities, and constructions. Subcommittees include overhead lines, underground lines, bonding and grounding, and others. As the name implies, safety for the public and the utilities is paramount.

So, what does this history lesson for safety organizations, have to do with emerging technologies and the broadband network? Quite a bit. In today's landscape, there is a merging of utilities and service providers at an unprecedented rate. Telco's venturing into the video and HSD, traditional broadband MSOs expanding into the wireless and cellular business, as each vies for the connected consumer's attention and monthly subscription dollar. DAS, Small Cell, 5G, IEEE 802.15 WPAN [Wireless Personal Area Network}, DOCSIS Full-Duplex, and the list goes on… The lines between the various utility groups are blurred, and it is often difficult to know where jurisdiction lines are, and which code applies.



Nine years ago, the chart to the left depicted the NEC substitution table for coaxial cables, covering chapters 7 and 8 of the code. Jump ahead to the current code, NEC 2017, and this chart needs to be updated. (reminder to self) Article 840 now needs to be included in this document, as well as reference to the newer –LP designations as a result of Power over Ethernet [PoE] integration and use becoming more prevalent.

This unique practice and use were highly debated in the last NEC code cycle and scheduled for continued discussion in the upcoming NEC 2020 cycle.

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Fortunately, the SMEs in code panels understand the risk and potential for PoE, and investigations continue, so the most informed decisions are reached.

PoE and other emerging technologies have caused the management teams of the NFPA and NESC to realize the need to form collaborating groups to work together on these types of subjects. Collaboration is being done to ensure consistency and safety are first and foremost in the standards issued, and that neither document contradicts the other. NESC has formed a new working group titled Emerging Technologies, with the purpose of identifying new technologies and practices that are being deployed in the utility work space, and then make the permanent subcommittees aware of these technologies and address if necessary.

Performance & Interoperability - There are two primary standards organizations which address the performance and interoperability of products for the broadband and communications industries. In North America, the Society of Cable Telecommunications Engineers [SCTE] is the predominant organization. For Europe and Asia, the International Electrotechnical Commission [IEC] is more commonly referenced.

As stated earlier, the proliferations of new technologies and protocols has dramatically increased within the industry. The SCTE is focused on addressing topics from a standards basis, with the creation of new emphasis groups as follows:

- IPS 1218-1794MHz Task Force / DOCSIS 3.1
- DDS Internet of Things [IoT], Working Group 1
- DVS Next Generation Systems
- EMS Energy 2020
- Network Operations Subcommittee [NOS]
- Others…

These groups zero in on the leading-edge technologies based on requests from service providers and the market place. As focus groups identify the need for specifications and procedures, often the work is conducted by the regular working parties of the organization.

The IEC also has established focus groups to develop standards and procedures for the next generations of products and applications which are transforming the broadband industry. As an international standards organization, participation, and awareness of technologies and momentum resulting from a more global perspective. The pool of subject matter experts seems to be a little deeper, for in many cases, standards and research are the participant's primary responsibility.

Standards Organizations and the Broadband Industry

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The Dilemma – It is this author's opinion, there is a struggle to keep current with emerging technologies, irrespective of the standards organization, no matter how diligent each is committed to doing so. This is due in part that the rate these changes and new technologies are released to the market. Companies are investing millions of dollars into research and trials to be the first to market for the next wave of technology. Many times, these technologies are co-developed with the service providers, and therefore there are levels of intellectual property that have to be protected and secured. Often, the technology and products are released, without consideration of the impact on the building codes, standards for interoperability, or an adjacent industry.

One example that comes to mind is Long-Term Evolution or [LTE]. Spectrum was released for use by the wireless service providers, which also happened to be the same frequency bands utilized by the broadband [CATV] providers. We know what has transpired since. Millions of dollars of spending to develop products, test equipment, and operational practices to attempt to mitigate the ingress of the signal from one system type, onto the other. What was thought to be adequate, no longer was? Standard organizations then reacted with investigations and standard revision to address this emerging technology and application. The entire "standard" at which the CATV system had operated for years, was suddenly turned upside down and new products installed. Has this change improved the quality of service to the consumer? Yes, but at what expense?

Another area that standards organizations struggle with is Subject Matter Experts [SME]. This is particularly the case, as the emerging and new technologies are released and fill the market place. The specialists in these fields are those who develop and conduct the research for the particular discipline or field. As we know, not everyone is "suited' for standards work. Standards are not the priority for these individuals. These statements are not meant as an insult or in a demeaning way, just not on their priority list. I have been involved in standards for 25 years, plus, and have noticed that the pool of SME, is getting smaller in most cases, and much less infusion from the new generation of Engineers and Researchers. Guess it isn't glamorous enough.

As future standards and products are being released and networks become more specialized with software platforms, a 'Collaborative Trend" is occurring within the industry where standards and protocols are being created in unison with the development of the products.

In closing, standards are vital to the development processes, and growth of an industry. I can't imagine what the broadband industry would be, if not for those pioneers who formed the SCTE and the IEC. Would the amount of growth and success we are now enjoying occurred? No way! New technologies will be developed and released, and standards bodies will react and address as best as we can. We discuss the emergence and future developments, but at the same time, we need to remember our legacy and the mentoring of the next generation of SMEs. It all must work in unison for success.

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