By Tracy Ford

National Codes Boost Public-Safety DAS

The importance of reliable communications will become even more imperative as public-safety personnel use data communications to perform their jobs. Imagine being able to see — in real time — a floor-by-floor map of the building where an emergency has occurred, or watch surveillance video when an alarm has been set off. These data communications will give responders more information about emergency situations, enabling the most efficient response.

Of course, the underlying infrastructure needed to communicate, whether by voice or by data content, is a reliable wireless network. However, RF signals have trouble propagating into buildings. Steel and concrete degrade wireless signals. More buildings are constructed to Leadership in Energy and Environmental Design (LEED) specifications but LEED requirements, like low-emission glass, are not conducive to an RF signal, which makes the need for in-building wireless coverage even more important.

"The new reliance on land mobile radios necessitates in-building amplification," said Bob Butchko, partner and executive vice president of Lord & Company Technologies. "In effect, the land mobile radio has gone from a nice-to-have tool to a critical operational effectiveness and life-safety tool."

DAS Basics

Distributed antenna systems (DAS) amplify the RF signal inside a building through a combination of coaxial and/or fiber-optical cable, antenna nodes and base station hotels. While early DAS installations often used coaxial cable, newer installations can be fed by fiber optics, bringing more intelligence to the network and extending its reach, said Chris Nolte, senior RF engineer, Tempest Telecom Solutions.

A passive DAS typically is for a single building that is less than 120,000 square feet, and includes a donor antenna, bidirectional amplifier, coaxial cable, directional couplers, splitters and omni antennas. An active DAS typically is installed when the building or campus is larger than 120,000 square feet. Active DAS solutions use all of the previous equipment plus remote amplifier units that are connected via fiber-optic cable to the head-end equipment. The use of fiber optics extends the possible coverage area up to 1.24 miles from the head-end equipment.

Building Codes

Two codes adopted in 2009, the National Fire Protection Association (NFPA) 1 public-safety radio code and the International Fire Code (IFC), address in-building wireless coverage for voice-based public-safety communications at 800 MHz, said Butchko. Before the national codes were adopted, municipalities often wrote their own codes. The problems with locally written codes were that requirements varied from county to county, were open to multiple interpretations and often couldn't be enforced.

In contrast, the national codes are robust and comprehensive, technically accurate, legally defensible and easy for cities, counties and states to reference, Butchko said. Among other things, the codes require in-building public-safety radio coverage for new structures that are larger than 25,000 square feet and have sub-grade space such as parking garages.

The voice coverage standards require -95 dBm signal strength throughout 95 percent of the building. Fire codes will be expanded to include data communications once codes are developed for Long Term Evolution (LTE) technology.

However, codes just sit on a shelf until a municipality adopts them, said Seth Buechley, president, SOLiD Technologies USA. Once the codes become law, building owners must install a DAS and often carry the brunt of the cost associated with the system. While some building owners may oppose an unfunded mandate, others want to offer robust commercial wireless communications for their tenants. In some cases, public safety and commercial wireless may choose to share a DAS, although there are pros and cons associated with this, including cost, management responsibility and a preference for stand-alone systems.

Regardless of whether one or more in-building amplification systems are deployed, the networks must be tested to ensure they don't cause interfere with other RF signals in the building and the surrounding area, Nolte said. It can take three to six months for the systems integrator and the building owner to approve a DAS design. After the DAS is deployed, continued monitoring is important because the RF landscape can change.

A good working relationship between public-safety officials, cellular operators, building owners and DAS service experts can result in improved wireless coverage inside buildings. This will mitigate the risk for the first responders and enhances the lives of the people who emergency workers seek to protect. ■

Tracy Ford is director of the DAS Forum, a membership body of PCIA – The Wireless Infrastructure Association. For more information, email tracy.ford@pcia.com.

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