Cable & Connectivity Fundamentals for Health Care Facilities

By Brian Hansen, Leviton Specification Engineer

Fast, reliable data plays a critical role in the health care sector, as reliance on digital health resources continues to grow. A large part of this growth in the United States comes from the move to electronic health records (EHRs), as nearly all health care organizations will implement some form of EHRs by the end of this year in support of “meaningful use” objectives set by the federal government.

In addition to EHRs, organizations are embracing other types of IT initiatives. Telehealth services, such as transmitting medical images for diagnosis, electronic prescriptions, or video conferences between patients and health care providers, have seen dramatic growth. Funding for clinical data analysis — or “big data” analysis — has skyrocketed in the past three years. And hospitals are adopting connected technology that is IP-based and using Ethernet, including advanced diagnostics, smart beds and pumps, and RFID tags.

While structured cabling makes up a small percentage of overall health care IT budgets, it is critical for successfully implementing these emerging technologies. For example, transmitting medical images over a 10 GbE network infrastructure can greatly enhance efficiency when it comes to retrieval, diagnosis, and collaboration. One MRI scan may contain enough individual images to make a complete file that is as large as 20 Gigabytes. Access to this file over a 1 GbE network can take up to 2 minutes and 40 seconds. Over a 10 GbE network, access time would drop to as little as 16 seconds.

New Virginia Hospital Provides World-Class Patient Care

Inova Health System looks to Berk-Tek Leviton Technologies for end-to-end cabling system.

Construction of Inova Health System’s Fairfax, Virginia medical campus, which broke ground in 2010 and is scheduled for completion by early 2016, will offer the highest level of services to all patients in a world-class environment. The most expansive construction undertaking is the new combined Inova Women’s Hospital/Inova Children’s Hospital (IWHICH), a new 12-story facility replacing an existing 50-year-old building.

When completed, this 660,000-square-foot hospital will include:
308 patient rooms (192 for women’s services and 116 for pediatric services); a 108-bassinet neonatal intensive care unit (NICU); 8 operating rooms for women’s surgery; 33 labor/delivery suites; a 13-bed labor and delivery triage; a 48-bed high-rise prenatal unit; and an antenatal testing center.

“This is where most families in Northern Virginia come to have their babies, and it is listed as the fifth most highly sought-after women’s hospital in the U.S.,” states Matt Odell, RCDD, director of technology for S2N Technology Group, LLC, the Bethesda, Maryland – headquarterd general contractor for this project. S2N designed, selected and oversaw the installation of the infrastructure, consisting of copper and fiber cabling solutions from Berk-Tek Leviton Technologies (BerkTekLevitonTechnologies.com).

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This kind of speed and bandwidth requires the right network infrastructure. Yet when many hospitals and health care facilities update their active network equipment every three to five years, they often fail to upgrade their cabling and connectivity. Because of this, their active gear is not achieving maximum performance, with new systems running at the same speed as before.

Cabling standards can help health care IT managers and facility managers get the most out of their networks. There are cabling standards that specifically address health care facilities, but they are relatively new compared to other building standards. In July 2010, the Telecommunications Industry Association (TIA) published TIA 1179, Healthcare Facility Telecommunications Infrastructure Standard, and the BICSI-004 health care standard was introduced in 2012. However, there is no single document or standard that covers every aspect of a health care facility. Many standards and codes from IEEE, NFPA, AIA, and others should be addressed, so installers and contractors can use multiple sources of expertise.

Let’s take a closer look at some general recommendations for health care facilities, from both TIA and Leviton.

► **Support at the Point of Care**

In work areas like patient rooms, nurse stations, and critical care, TIA recommends high-density wallplates in order to get multiple outlets in a small amount of space. We also recommend extra deep oversized back boxes behind these high-density wallplates, and color-coding the connectivity and cable to identify different applications.

Specialized spaces such as operating rooms may use movable arms or “booms”, containing connections for various services as well as network cabling. This type of deployment calls for installing high-quality, high-performance stranded conductor cables to allow for a long flex-life within the pathway without a loss of performance.

Multi-User Telecommunications Outlet Assemblies (MUTOAs) — often used in areas like emergency and ambulatory care — are a convenient way to distribute the last few feet of horizontal cabling in places that see renovations or frequent reconfigurations. This is a specific application for specific environments and not recommended for new installations.

► **Horizontal Cabling Throughout the Facility**

Once a hospital starts receiving patients it becomes a 24/7 operation, and disruptions for cabling upgrades create a significant negative impact on workflow. More importantly, infection control measures may include complete containment of a section of the building in order to guarantee the safety of patients and staff. For these reasons, facilities would be wise to plan for a physical layer with a longer life, installing a cabling system that will require fewer “rip and replace” projects. Category 6 or higher cable is recommended, and both TIA and BICSI recommend Category 6A for new installations.

Health care environments usually have areas within the facility with higher levels of EMI, magnetic fields, RFI, and radiation. Sources of EMI within a health care facility include microprocessor-based patient monitoring and therapeutic equipment. RF noise sources can be attributed to EEG/EKG/ECG equipment. This can lead to interference in the network cabling. Shielded cable and connectivity will help mitigate this ambient noise in the network, and is a good alternative to installing Electrical Metallic Tubing conduit (EMT), which can be costly to implement.

► **Data Centers and Telecom Rooms — The Backbone**

High-bandwidth applications supported by horizontal cabling will be aggregated over the network backbone, requiring even greater capacity in these channels. In order to meet bandwidth demands from services to clients, more health care facilities are migrating to 10, 40, and even 100 Gigabit Ethernet. TIA recommends using laser-optimized multimode fiber cable and connectors. In addition, we recommend high-density 24-fiber connectivity, as it reduces the amount of cabling required, allows for fewer cable pathways, and improves airflow in data centers. Interlocking armored fiber cable has become common in health care facilities due to its mechanical protection of the fiber and reduced installation time.

Since the evolution of voice over IP (VoIP) and IP paging systems, the need for Cat 3 UTP backbones has decreased significantly. The same is true in health care facilities, and TIA recommends Cat 6A cabling for all new copper backbone installations — allowing for speeds up to 10 Gigabits per second — and a minimal amount of Cat 3 for analog applications.

Learn more about Leviton Solutions for Health Care Facilities at Leviton.com/ns/healthcare.
"Inova selected the Berk-Tek Leviton Technologies cable and connectivity solution, which was selected through presentations by manufacturers, even though Inova was previously hard-spec’d with a different specific cable and connectivity manufacturer," states Odell. "Burt Jackson from Capitol Network Solutions, and John Wright of Leviton brought in a lot of products and let Inova IT and the S2N team examine the hardware. It helped to facilitate some ‘whiteboarding’ of the install," he adds.

The design and installation of the network were carried out according to specific internal standards of the hospital’s IT department, as well as incorporating the TIA and BICSI industry standards that provide guidelines for integration of the infrastructure — ANSI/TIA-1179 Healthcare Facility Telecommunications Infrastructure Standard and ANSI/BICSI 004-2012 Information Technology Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities.

Even though TIA health care standards recommend installing the highest-bandwidth UTP cable for new installations, which is Category 6A, Inova’s internal specifications call for Category 6 copper cable as their horizontal cable to the devices. “We are still living in a one-gig world on top of dealing with very tight and crowded pathways, including booms and columns, so Category 6 was a better fit,” states Odell.

“We recommended an enhanced Category 6 cable, Berk-Tek’s LANmark-1000, which exceeds the TIA-568 standards for Category 6 electrical performance,” states Burt Jackson, principal of Capitol Network Solutions. “LANmark-1000 is recommended for health care environments, especially for running multiple IP applications as it is backed by third-party test results, and has undergone in-depth stress tests performed at the Nexans (Berk-Tek) lab. Together with the Leviton connectivity, the channel performance also exceeds the IEEE documentation for 1000BASE-T systems, and we are able to provide a limited lifetime warranty for the Berk-Tek Leviton Technologies enhanced Category 6 end-to-end system.”

In previous Inova facilities, the voice and data connections in the telecom rooms were separated and terminated into 110 blocks. With this new configuration, all the Berk-Tek cable is connected with Leviton eXtreme® Cat 6 QuickPort® connectors, which use a patented Retention Force Technology that protects tines from damage and adds longevity to the connection.

The connectors are loaded in Leviton 72-port high-density Cat 6 QuickPort patch panels in the telecom rooms.

“When completed there will be more than 3 million feet of Category 6 cable, which, converted into miles, exceeds the distance from the Fairfax campus to Philadelphia,” observes Murphy. “For this quantity of cable we would either request the cable on reels or multiple 1,000-foot boxes. However, we used Berk-Tek’s new 1,500-foot box option, called SmartPAK, which makes great sense to me as it drastically cuts down cable scrap and there are fewer boxes on the jobsite,” he adds.

“With the typical 1,000-foot boxes, we usually end up with at least 30 feet of scrap per box. With SmartPAK there are more pulls per box and even if we end up with 30 feet of scrap per box, in total there would be less overall scrap, as it has 50% more cable per box. For a job this size, we are also looking at 500, 1,500-foot boxes on the jobsite versus 750 if we had ordered the 1,000-footers. In addition to cable-scrap savings, there is a lot of labor savings, especially transporting from the dock to the floors to pulls,” Murphy adds.

This article excerpt was originally featured in Cabling Installation and Maintenance Magazine, February 2015 Issue.
New Leviton Cabling Systems

Leviton kicked off 2015 with the release of three cutting-edge innovations. These new systems enable copper migration to Cat 8 and 40GBASE-T, consolidate patching in racks for ultra-high density fiber optic systems, and allow contractors to increase their business with commercial audiovisual applications across education and enterprise projects.

Opt-X® UHD Fiber Optic Enclosure System

The new Opt-X UHD Fiber Optic Enclosure System integrates Leviton HDX Cassettes and Berk-Tek’s small-diameter Micro Datacenter Plenum (MDP) cable to offer the highest fiber density per rack unit and the smallest structured cabling footprint in the industry. The system meets the needs of IT managers looking to capitalize on existing network infrastructure space, while providing easier port identification and cable management, improving airflow and minimizing heavy cable loads associated with ultra-high density fiber installations.

Learn more at Leviton.com/OptXUHD

New Atlas-X1 UTP and shielded connectors are independently tested and guaranteed across Cat 5e, Cat 6, and Cat 6A to exceed component, permanent link and channel margins, delivering performance above the ANSI/TIA-568-C.2 and ISO/IEC 11801 requirements. Atlas-X1 connectivity with Berk-Tek cable has been tested to meet performance standards found in the current draft 2.0E of the TIA-568-C.2-1 Category 8 proposed standard (October 2014), and can support the operation of IEEE 802.3bq 40GBASE-T applications up to 30 meters. Atlas-X1 Cat 8 shielded connectors will be available upon standard ratification.

Learn more at Leviton.com/AtlasX1

New Leviton IT/AV Systems are the first in the industry to combine category-rated structured cabling with audiovisual signal extenders over HDBaseT™ certified links, creating plug-and-play solutions with no programming required. The enterprise-grade systems allow contractors to extend AV signals over twisted-pair cabling with the same tools used for installing a datacom infrastructure. They can then test and certify the installation to Ethernet standards to ensure high-signal performance after they leave the jobsite.

Learn more at Leviton.com/ITAV

ASK THE EXPERTS

Q: Do I need a pulling eye on both ends of my trunk cable?
A: A pulling eye is a loop placed on the end of a trunk cable so that the trunk can be pulled through a conduit or a raceway. Usually you would only need a pulling eye on one end of a cable. But if your application requires a pulling eye at both ends then you can simply select that option from Leviton. Our pulling eyes are rated for 150 lbs of pull force.

Learn more at Leviton.com/CROSSTALK
INDUSTRY

In January, BICSI released updates to its data center standards. The ANSI/BICSI 002-2014 Data Center Design and Implementation and Best Practices standard expands information on data center design and infrastructure topics, including data center infrastructure management (DCIM) and multi-data center architecture.

Businesses in North America are losing almost $4 million a year to downtime related to information and communication technology (ICT), according to Infonetics Research. The survey, The Cost of Server, Application, and Network Downtime, found that the most common causes of ICT downtime come from failure of equipment, software, and third-party services; power outages, and human error. The survey also reports that businesses’ top strategies for reducing ICT downtime include adding network monitoring, building more redundancy into systems, and training staff.

Research organization BSRIA reported in January that while 40G and 100G combined to account for 3 percent of switch-to-server connections in 2014, those connections will reach 26 percent in 2016.

The HDBaseT standard was approved by the IEEE Standards Association for adoption in January. HDBaseT enables all-in-one transmission of ultra-high-definition video through a single 100m/328ft Cat 6 cable, delivering uncompressed 4K video, audio, control signals, and up to 100 watts of power.

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COMPANY

Leviton donated $10,000 to the Morganton Community House renovation project in Morganton, North Carolina. The historic Community House has served as a gathering place for the city since the 1930s. Leviton started manufacturing in North Carolina in the 1960s, and has expanded its operations in Morganton over the past several years. Leviton also plans to donate products for the project.

In March, Leviton launched four mobile applications (apps), available for any iOS device through the iTunes store and Android device through Google Play.

► Leviton 2 Go helps customers discover and research the entire Leviton line of products. They can also scan Leviton or competitor bar codes to generate the corresponding Leviton part number. Users can access all product information, including instruction sheets, spec sheets, “how-to” videos and product drawings. The app also keeps customers up to date on the latest news and tips through push notifications or directly from the app’s “News” button.

► The Leviton Library allows customers to seamlessly navigate through a comprehensive collection of Leviton’s brochures and catalogs, including the new 2015 Network Solutions catalog. Users can view brochures grouped by specific product families or by application.

► The Leviton Title 24 provides easy access to information on California Title 24 2013 lighting controls code requirements.

► Leviton’s Captain Code NEC is an easy-to-use tool based on Leviton’s popular Captain Code literature series for electrical contractors, distributors, inspectors and all electrical professionals for every code cycle.

WEB

In February, Berk-Tek Leviton Technologies introduced new copper system solutions for Category 6A, 6, and 5e. Many of these systems include new Atlas-X1™ connectivity. You can learn more about these systems and download solution data sheets at BerkTekLevitonTechnologies.com/Copper.

Have a question? Would you like to subscribe or unsubscribe to CrossTalk? Drop us a line at crosstalk@leviton.com.

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