Challenges Facing Modern Cabling Installers

For years low voltage installers and integrators have heard the warnings that "digital IP integration" is coming and they need to prepare for the changes that will come with it. The time has finally arrived when nearly every low voltage system in the commercial space is either changing to IP or integrating IP into existing analog systems. There is a lot to absorb when we think about IP Integration; what types of systems are affected, what does IP actually mean, and what do installers need to know to be prepared for this paradigm shift to digital IP systems?

When we think of networks and data systems, places such as office buildings, hospitals or educational facilities are what typically come to mind along with computers accessing a variety of data sources. Besides the typical computer network there are other networked systems that are integrated into everyday life, hiding in plain sight. Systems like kiosks, electronic information signs, and transaction terminals at train stations, airports, parking garages, fuel stations, grocery and convenience stores are just a few of the many examples of systems that are making the change to digital/IP communications. The common link between these different systems is Ethernet and IP (Internet Protocol). Ethernet is flexible, inexpensive and brings many benefits but it also presents a variety of challenges to those who install the cabling infrastructure to support these systems.

As with many industries and technologies, cabling installation contractors are constantly trying to find the balance between winning bids and staying profitable. The two main costs of a job for an installer are the cost of materials and the cost of labor. Speaking specifically of the cabling materials, the costs for a job vary greatly based on the particular requirements of the contract which may be as vague as "Install network cabling for 500 workstations" to specifying the exact brand and model of the cable and connectors for the project. When specific materials are called, an installer finds himself on equal playing field with his competition, but when a job is less specific a contractor may be in the position of bidding against another who tries to improve their odds of winning by using lesser quality materials. On the labor side of the equation, contractors need to finish the job as quickly as possible to manage costs, but not at the expense of installation quality. Best practices for the installation of structured LAN cabling have been available for more than 20 years, but the fact remains that technicians may cut corners when under pressure to meet a deadline.

Today the most common variation of Ethernet deployed is Gigabit Ethernet which has a transmission rate of 1,000 Mbps (megabits per second). Contrary to some misconceptions, Gigabit Ethernet (GbE) is specified to operate on Category 5e (Cat 5e) or better twisted pair cabling. Some believe that Cat 6 is required and this misconception stems from the early days of Gigabit Ethernet. When first proposed, there were two sides debating how GbE should be deployed; there were 1000Base-T and 1000Base-TX technologies that were battling for market acceptance.

1000Base-TX was specified to operate at a signal rate of 250MHz and required Cat6

cabling. The advantage of this system was that lower cost network electronics (less sophisticated crosstalk cancellation) could be used with the higher performance Cat6 cabling resulting in a lower total cost for new network installations. The alternative, 1000Base-T system used more sophisticated and expensive network electronics but was able to operate at a signal rate of 100MHz meaning that existing 100Mbps Fast Ethernet networks could be upgraded to GbE performance without re-cabling a facility. Even with the higher cost of network electronics, the draw of increasing network throughput by a factor of 10 by simply swapping out network equipment was enough to make 1000Base-T the solution preferred by the market, resulting in the demise of 1000Base-TX.

Installers who are aware of subtleties like this and can explain the difference to their perspective customers may have an advantage over their competition. By explaining why higher cost Cat6 is not necessary to achieve GbE performance, the installer can work with the client to reduce unnecessary costs, potentially winning that installer the business. However, today's installers must also be keenly aware that not all cable and connectors perform to the level marked on the product. In race to the bottom pricing for commodity materials like network cable and connectors, there are vendors in the market, particularly pop-up internet resellers that prey on installers who are looking to tilt the profitability balance in their favor by saving money on materials. Two common methods of deceiving installers are rating materials as Cat5e or Cat6 that have not been independently verified, or by outright the counterfeiting of recognized name brands. Reputable manufacturers of cable and connectors use 3rd party testing laboratories like UL (Underwriter's Laboratories) or ETL (Intertek) to independently verify that the materials being sold perform to their advertised performance level. Unfortunately, the UL and ETL performance markings are sometimes used without the accompanying testing, leaving installers at risk of unknowingly using substandard materials. And aside from fraud there are also products that barely meet their minimum advertised performance level, leaving little room for shortcomings in installation or workmanship practices.

Even with high-quality, name brand materials, installers must also make the best use of labor time to keep a project profitable. Two of the quickest ways to turn a project from profitable to unprofitable are repeating work that should have been done properly the first time and dealing with disputes over the causes of network performance problems. Unfortunately, whenever questions about poor network performance arise, fingers are often pointed at the cable installer first. By this time, the cable installer is usually long gone and it's quite easy to blame the person who isn't there to defend himself. What can the cabling installer do to protect their profitability, reputation and time? In many cases, proper testing of an installation can eliminate any question as to the cabling installation being the source of network performance issues, protecting the installer's reputation and profit margins.

Installation testing has traditionally come in two forms, verification and certification. Verification is also known as wiremap or "Modtap" testing. This form of testing is nothing

more than a simple continuity test to ensure that the conductors of a twisted pair cable are terminated to a connector in the correct order without any shorts, opens, crossed-pairs or other physical faults. Unfortunately wiremap testing does nothing to determine the performance of the cabling. Some installers mistakenly assume that if a cable link passes the wiremap test it will pass data without any errors.

The first type of tester that measured the performance of a network cable was the Certifier. Certifiers are very sophisticated testers that measure a myriad of electrical characteristics of cables at frequencies as high as 1,000 MHz (not to be confused with 1,000 Mbps). Certifiers are governed by two international standards which are the TIA 568-C/1152-A and the ISO 11801. These standards define the specific tests and pass/fail limits for various categories of twisted pair cabling. For example, a Category 5e cabling link is certified by testing a number of parameters from 1 to 100 MHz which examine the electrical properties of the cable. A passing test implies that the cable should support Gigabit Ethernet transmission even though contrary to popular belief the certification test does not transmit data across the cable. Certifiers have been the accepted standard in data cable performance testing for 20 years, and until lately they have been the only tool available that tested to a common standard assuring user that regardless brand, all testers met the same set of requirements. When choosing a certifier, the differentiators are not the tests they perform or the accuracy of the tests, rather it's the ancillary features that help a person decide which model to choose. The drawback of certifiers is their cost which can be $9,000 or more depending on the configuration.

A different type of test called a transmission test offers installers a more affordable option that also offers the security of testing to a recognized international standard. Transmission testers have been used for years in the WAN/telecom community but had been too unwieldy for installers of smaller Ethernet LANs. A transmission tester works by simulating a functional network and measuring the transfer of data rather than the electrical properties of a cable. In the case of GbE, the governing standard is the IEEE (pronounced "I triple E") 802.3ab. The standard defines a number of data frames that must successfully transit the cable compared to the number that are lost. In the case of Gigabit Ethernet, a total of 10 billion bits of data must be passed without losing a single bit to meet the requirement. LAN transmission testers have two distinct advantages over certifiers which are cost and the ability to test both cabling links and live networks. Transmission testers are able to pass data trough network switches, something certifiers cannot do, giving a transmission tester the ability to "stress test" a, operational network. The cost advantage of LAN transmission testers over certifiers is from 4:1 to 6:1, meaning a cable installer can purchase up to six LAN transmission testers for the cost of one certifier allowing them to equip more crews and increase their company's productivity. Transmission testers also have advantages in setup and configuration. A transmission tester does not need to be configured for a particular cable category, test frequency or test standard. Misconfiguring a certifier can actually cost an installer additional money if a crew needs to be sent to retest a job that was originally tested with the wrong tester configuration. With speed and efficiency being so critical to profitability, a simplified

transmission tester is the perfect tool for installers who want to test every job for their own security, regardless of the customer's requirements. By performing a transmission test of installed cabling, the installer can rest assured that the combination of materials and workmanship come together to provide performance the client expects of the system. A proof of performance report can be used to refute claims that the cable is to blame, protecting the installers professional reputation, saving time and ensuring profitable results.

Ends - 1817 Words