

Data Center Cabling for 10GBASE-T

Siemon's Valerie Maguire Issues Cautions on Using Category 6 or Non-Compliant 26 AWG Cabling for Support of 10GBASE-T in the Data Center

A recent report by the industry market research firm IDC provided the record-breaking news: more than one million 10 Gigabit Ethernet ports were shipped during the 2nd quarter of 2010. A likely bet is that the majority of these switches are being deployed in the data center. As 10GBASE-T network equipment becomes increasingly available, data center decision makers will want to take advantage of the cost savings, convenience, and flexibility provided by deploying 10 Gb/s technology over balanced twisted-pair copper cabling. But to actually enjoy these benefits, care must be taken in the selection of twisted-pair cabling media.

Some vendors are positioning category 6 for support of 10GBASE-T in new data centers. While it is true that category 6 cabling may provide limited support of 10GBASE-T in some environments, its usage is limited to reduced-length channels in legacy installations and is subject to additional alien crosstalk mitigation and testing requirements that may prove challenging and time-consuming. To ensure 10GBASE-T capability, Siemon recommends Standards compliant category 6A or higher for data center environments.

This stance is supported by TIA and ISO/IEC data center Standards, which explicitly specify that the minimum grade of cabling to be deployed in the data center is category 6A. The working draft of ANSI/TIA-942-A states that category 6A is the recommended grade of horizontal and backbone cabling to install in new data centers. ISO/IEC 24764 states that main distribution cabling systems supporting data centers shall be designed to provide a minimum of class EA (equivalent to TIA category 6A) channel performance.

The Standards message is clear: **category 6 is not recommended for new 10 Gb/s data center deployments.**

According to Standards, previously installed legacy category 6 channels of less than 37 meters (121 feet) in length should support the 10GBASE-T application and channels between 37 meters and 55 meters (180 feet) may or may not support the application, depending upon the alien crosstalk environment and degree of alien crosstalk mitigation. Supporting 10GBASE-T over installed legacy category 6 requires alien crosstalk field tests on every channel, which can be time-consuming and not fully conclusive.

More troubling still is the recent trend towards using non-compliant cables constructed from 26 AWG (0.4 mm) conductors over a restricted length channel topology. Cables with 26 AWG conductors do not comply with any TIA or ISO/IEC Standard for horizontal cable requirements, which mandate the use of 24 AWG (0.5 mm) or larger conductors. Any claim that these cables are category 6A, 6, or 5e compliant is a violation of the Uniform Commercial Code.

Beyond the clear Standards view, there are other practical reasons to specify category 6A or higher cabling in the data center. Because category 6 UTP or 26 AWG cabling cannot support 10GBASE-T over full 100-meter channel topologies, the use of these media types limits design flexibility, including the ability to easily support data center expansions, equipment additions, and system upgrades. 10GBASE-T, operating in short reach mode, can reduce power consumption by approximately 1W per port when deployed over short length (30m or less) category 6A or higher cabling channels. Category 6 and 26 AWG cabling cannot take advantage of this power savings mode, therefore making it a potentially higher cost and certainly less environmentally friendly option.

Even in environments where reduced-length channels can be accommodated by design, 26 AWG cabling has performance drawbacks. Since these 26 AWG cables exhibit high dc loop resistance, temperature may rise in excess of the maximum 10° C allowed by IEEE 802.3at for PoE Plus deployment; calling into question the ability of these solutions to adequately support power delivery. Excessive heat not only adversely affects the operation of electronic equipment in the vicinity of the cabling system, but can result in premature aging of the dielectric materials that are used in the cable jacket and conductor insulation.

10GBASE-T over twisted-pair cabling is a very cost effective, flexible, and proven option for support of 10GBASE-T in the data center, but careful consideration of media type is critical. Specifying category 6 (or worse, specifying non-compliant 26 AWG) cabling for 10GBASE-T may seem like a way to save a bit of upfront cost, but its limitations can stack up quickly against category 6A or higher options.

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About the Author:

Valerie Maguire holds the position of Global Sales Engineer at The Siemon Company. Ms. Maguire received her B.S.E.E. degree from the University of Connecticut and actively participates in groups responsible for the development of telecommunications standards. Ms. Maguire's expertise is focused in the fields of balanced twisted-pair and optical fiber telecommunications cabling, connecting hardware, and cables. She is Vice Chair of the TIA TR-42 Telecommunications Cabling Systems Engineering Committee, Vice Chair of the TIA TR-42.7 Copper Cabling Subcommittee, TIA TR-42 appointed liaison to IEEE 802.3, and Treasurer of IEEE 802.3. In addition, Valerie has authored over 45 technical articles and engineering papers, holds one U.S. Patent, and received the 2008 Harry J. Pfister Award for Excellence in Telecommunications.

About Siemon

Established in 1903, Siemon is an industry leader specializing in the manufacture and innovation of high quality, high-performance network cabling solutions. Headquartered in Connecticut, USA, with global offices, manufacturing and service partners throughout the world, Siemon offers the most comprehensive suite of copper (unshielded and shielded twisted-pair) category 5e, category 6 (Class E), category 6A (Class EA) and category 7/7A (Class F/FA), and multimode and singlemode optical fiber cabling systems available. With over 400 patents specific to structured cabling, from patch cords to patch panels, Siemon Labs invests heavily in R&D and development of industry standards, underlining the company's long-term commitment to its customers and the industry.