

Getting Over Copper Twisted-Pair Cable at 10G and Beyond



Copper twisted-pair at higher data rates, including 10 Gb/s, is oversized, overweight, overheated and overcapacity. In the data center, it's time to get over copper and make the move to fiber optics.

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Overdesigned

Electrical transmission has always had its inherent limitations, including cross-talk, which only increases at higher frequencies and operating powers, like those required for 10 Gb/s transmission. Because of this, twisted-pair copper cable manufacturers have had to continually re-engineer their cables in order to meet bandwidth demand. One of the latest salvos in the battle against obsolescence at 10 Gb/s is Augmented Category 6 (CAT 6A) cables, which increase the already-bulky outside diameter of the previous generation of copper cable by about 40 percent in an attempt to mitigate cross-talk concerns. This unwieldy cable design is more challenging to route through network pathways and requires far more complex testing and field termination methods than a slender fiber optic cable.

Overweight

A typical plenum CAT 6A weighs 46 lbs per 1000 ft of cable. To serve 108 10G circuits installed 200 ft away, the accumulated weight of the CAT 6A will be approximately 1000 lbs, compared with just 40 lbs for the same length of a 216-fiber optical cable. The 25x greater weight of those CAT 6A cables will require additional hardware costs to support the load and may contribute to cable strain-relief issues in your hardware, as well as compression issues in trays and conduits.

And in the ultimate of ironies, that heavy CAT 6A cable is a real lightweight when it comes to stress, with installers having to ensure not to exceed its puny 25-lb tensile rating, while even a single-fiber jumper boasts a 50-lb tensile rating and a multifiber cable can have a tensile strength of 600 lbs!

Overheated

Can your data center afford to install a technology that is going to increase your operating costs now and in the long term? The truth is, those oversized twisted-pair cables will wreak havoc with your utility bills. The increased outside diameter of 10 Gb/s-capable twisted-pair copper cables means it will take even fewer cables to choke your pathways and disrupt airflow. Furthermore, 10G copper port density is expected to be limited to 4-8 ports per card due to the huge power requirements of 10-15 watts per port, as well as the limitations of heat dissipation and cross-talk issues. More power consumption per port means greater cooling and humidity control.

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And keep this in mind: these 10G copper electronics are also expected to be more expensive per port than 10G optical electronics. That's more money out the door.

Compare this to today's 10G optical switches, which support up to 16 ports per line card with a maximum power dissipation of 4 watts per port, and emerging SFP+ optical transceivers that will support up to 48 ports per line card with a maximum power dissipation of 1 watt per port.

Overcapacity

Twisted-pair copper cable has been struggling to keep up with bandwidth demands virtually since it entered the enterprise market. There have been six generations of copper cable in just the past 20 years – each one designed to address the next wave of bandwidth demand and each one becoming more complex to design around and install. A single generation of multimode optical fiber has outlived, and continues to surpass the bandwidth capability of every one of those copper designs, not to mention the fact that fiber has gotten easier – not harder – to design with and install.

Why deploy a cabling infrastructure that will be made obsolete by your network's own growth and will require you to remove it and deploy a next-generation cable design just to “keep up”? Fiber optic cabling infrastructures can be deployed once and meet your needs now, and 20 years from now.

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