

# PRODUCT FOCUS

## Multimode fibre extends the reach

**Choice is all well and good, but, for IT managers considering their LAN wiring options, it does complicate matters. Roy Rubenstein catches up with Corning to find out why.**

Today's data centres are predominantly wired up with multimode fibre – both within storage-area networks and for connecting switches and servers. Multimode fibre is also widely used within local-area networks (LANs), spanning a building's floors or connecting a wiring closet to users' desktops. As such, equipment end-points rarely exceed 300 m. However, with the move to Gigabit Ethernet and the need for its aggregation, 10 Gbit/s transmission is becoming commonplace and IT managers are having to reconsider their cable plants.

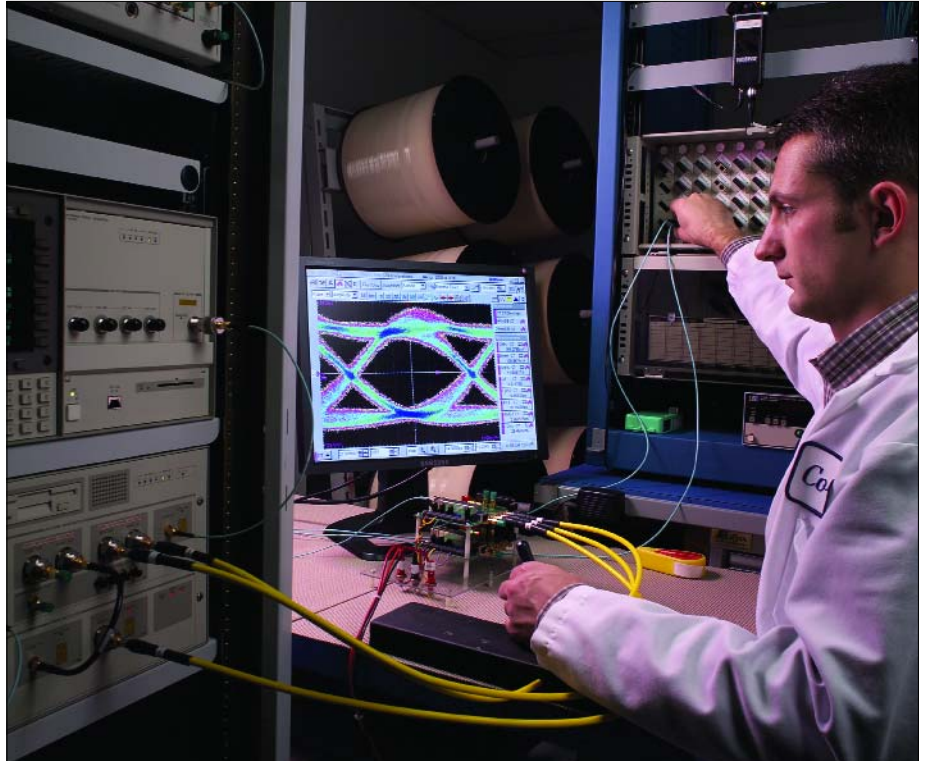
One option is to retain the existing, installed multimode fibre and add sophisticated transceivers. Conventional multimode fibre can be pushed to its limit using the 10GBASE-LX4 standard to achieve transmission distances of up to 300 m, but LX4 requires four-channel transceivers at each end and thus can be costly.

Alternatively, IT managers can bite the bullet and install new cabling. Here too they face choices. For short distances – up to around 15 m – they can opt to use copper wire. Indeed, copper's reach is set to top 100 m once the 10GBASE-T standard has achieved market maturity (although this will require newer Category 6e or Category 7 cabling). However, for LAN spans to reach 300 m at 10 Gbit/s, optical fibre is really the only sensible option.

"There are many options out there," agreed Peter Ronco, assistant product line manager in Corning's optical fibre business. Corning has added to the mix with its most recent extended-reach, laser-optimized multimode fibre, which has been dubbed InfiniCor eSX+. "This [laser-optimized multimode suited for 10 Gbit/s] is the one we push as the lowest-cost solution for greenfield [installations], considering future 40 Gigabit Ethernet capability," he said.

### Cost control

Though multimode fibre is more expensive than singlemode, once the transceivers are considered the overall system cost is actually lower. "LX4 uses 1300 nm lasers. It's not



**Check it out: Corning technicians verify the performance of the InfiniCor laser-optimized multimode fibre with a variety of commercial 850 nm VCSEL-based transceivers, under real-world conditions.**

that LX4 is expensive, but that the cost-reduction path, given its component count, is especially challenging when compared with Gigabit Ethernet," explained Daryl Inniss, research manager for components at market research firm Ovum-RHK. "LX4 needs to get to 10 times the performance at double the price of Gigabit Ethernet, which is now at \$20 to \$25 a transceiver."

In contrast, multimode fibre can use 10GBASE-SR transceivers that are based on 850 nm vertical-cavity surface-emitting lasers (VCSELs). Such transceivers cost around \$300 (€250), which is half the price of an LX4 transceiver. "It [SR] has a much better chance of competing with Gigabit Ethernet on price," said Inniss.

As for the fibre, the laser-optimized multimode is more expensive than the standard version, but it delivers enhanced performance and also a degree of future proofing. Ronco says that fibre makers previously struggled to control the refractive index at the centre of multimode fibre. "Multimode fibres have historically had a problem with the fundamental mode because of refractive-index profile errors at the centre of the core,"

he explained. The result was a loss of fibre bandwidth due to intermodal dispersion.

Laser-optimized fibre counters this problem, however, by ensuring improved control of the refractive index at the core. This means that a laser launched into the fibre no longer needs to avoid its centre. "With a laser-optimized fibre, the power contained in all mode groups will arrive at the receiver at the same time, with minimal modal dispersion," explained Ronco.

Corning launched its InfiniCor eSX+ product in response to customer demand to go beyond 300 m. Data centres have been the main driver for this extended reach as they increase in size and their data transmission requirements continue to rise. End-user markets include credit-card brokerage firms, oil and gas industries, and hospitals that increasingly need to transmit video images.

However, Ronco admits that, to date, demand for the extended-span (above 300 m) laser-optimized fibre has been limited. Overall, since laser-optimized multimode fibre first came to market back in 2001, it now accounts for some 15 to 20% of all multimode fibre sales. >>

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“The biggest opportunity for new fibre is the data centre,” agreed Inniss. “Every three to seven years, all of the data centre’s equipment is changed – and the decisions [about which fibre to use] are being made on a yearly basis.” But why should an IT manager upgrading the cable plant choose laser-optimized multimode fibre over singlemode with its superior bandwidth? The decision, says Ronco, depends on how much data are likely to be transported.

Next March an IEEE working group will likely decide on the next increment in Ethernet – whether it will be 40 or 100 Gbit/s. “Our eSX+ fibre achieves 10 Gbit/s at dis-

tances of up to 550 m and we are quite certain it will support 40 Gbit/s, though that will likely not be a serial solution [i.e. 40 Gbit/s over WDM],” explained Ronco. Furthermore, using laser-optimized fibre delivers the lowest system cost. “If it’s 100 Gbit/s transmission and beyond in the near future – three to five years’ time – one could entertain using singlemode.”

Corning has four 50/125 µm laser-optimized fibre product offerings. The spans for 10 Gigabit Ethernet are 82, 150, 300 and (with the new eSX+) 550 m. For spans of up to 300 m, laser-optimized fibre is between 1.5 to 1.8 times as expensive as standard

multimode, notes Ronco. For eSX+, the price increment is 1.5 to 2.5 times.

“This [laser-optimized fibre] technology is quite an accomplishment,” added Inniss. “To achieve 10 Gbit/s across hundreds of metres using multimode is difficult, and now there are suppliers doing this.” The fibre also falls into line with the industry’s current technology requirements. “There is now demand for 10 Gbit/s. This is certainly a feather in the cap of the fibre makers.”

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