The Fibreoptic Industry Association

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THE CHANGING FACE OF INSTALLATION OF OPTICAL FIBRE IN DATA CENTRES

by

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By the time you read this article, IEEE may have selected the solutions for the physical implementation of 40 Gigabit and 100 Gigabit Ethernet over multimode optical fibre. It is certain that array devices (i.e. multiple VCSEL sources and detectors within a single connector) will be involved. Whether it is a 4x10Gb array to support 40 GbE or the equivalent 100 GbE array, one thing is for sure - the installation of multimode optical fibre over short distances in data centres will have changed forever.

There will be other implementations of these applications using singlemode optical fibre but these are unlikely to be economic over short distances. The maximum supportable distances using multimode optical fibre are unknown at this time but it is unlikely that they will exceed 200 metres. For longer links singlemode transmission equipment will be the only solution - but at significant cost.

This leaves the region below 200 metres (and specifically below 100 metres) retaining a cost advantage for multimode optical fibre. However, transmission distance is not the key issue. Instead, the array transmission systems place constraints on the installation of optical fibre which are only just beginning to be understood. The principal issue may be skew - the difference in time of transmission between the fastest route down the shortest optical fibre and the slowest route down the longest.

The concept of a delay skew limit is well-known to balanced cabling installers - every installed link is tested against the skew requirements. There are three important points: first, the delay skew limit is length-independent (it does not matter how long the link is); second, it applies across the four pairs of a cable and third, cable designs ensure that it is achieved.

In comparison, the concept of skew is alien to users/installers of optical fibre. Control of the differential lengths of optical fibre between two panels has never been a critical aspect of installation. It is recognised that basic techniques and yield factors for both field termination and splicing of pigtails produces different lengths - it may be that such variations become unacceptable in the future which forces us to consider the installation of pre-terminated cables with multi-fibre MPO or MTP interfaces. Many of the major systems suppliers predict this transition but most of the industry, including users, has not yet fully considered the implications of such systems.

The use of pre-terminated cables, primarily as a means to assist rapid installation, is not a new idea. Many system-suppliers have had solutions in place since the mid-1990s. However, a move towards an automatic introduction of such solutions as a day-to-day installation solution brings with it a number of challenges. Within data centres the primary design issues are cabinet cooling and overall energy efficiency. The presence of increased quantities of spare cables, as a result of inaccurate length allocation within pre-terminated cabling solutions, under floors and inside cabinets is in direct conflict with these aims.

So how are the technology demands for skew control in support of “next generation” applications going to be implemented? One approach is the significant integration of cabling, cabinets and cable management systems in order to allow accurate length determinations. Another involves the use of cabling “buffer” spaces which allow spare cables to be stored without impact on the energy efficiency of the overall data centre - but at the expense of cabinet real estate. The future appears not to be one of transmission technology but of systems design - but, have no doubt, we are all facing a change in installation approach and associated skills.

Further information will become available on the FIA web-site (www.fia-online.co.uk). Enquiries can be e-mailed to jane@fiasec.demon.co.uk.or, alternatively, you can contact the FIA Secretariat in 01763 273039.