Reduce Your Losses:
Fiber Cassettes in Data Centers

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Data centers are information incubators. Global data generation – upwards of exabytes – must be sufficiently stored and managed each year. To meet this demand, outcroppings of data centers have been burgeoning and have created a need to carefully plan the cabling plant for today and tomorrow.

One of the main concerns with cable installations in today's data centers is space efficiency, especially as it relates to airflow, which is critical for the safe and effective operation of the active equipment. This hot topic focuses on reducing cable congestion, which has opened the doors for installing MTP™/MPO pre-terminated fiber optic cabling systems. These systems increase port density and offer superior performance due to increased bandwidth over copper-based systems. So, selecting smaller diameter pre-terminated fiber cable assemblies, together with high-density MPO cassettes, is the smart choice when designing your data center's cabling infrastructure.

Fiber MTP/MPO cassettes provide the transition from the multi-fiber array backbone to individual patching. This "plug and go" factory tested and terminated technology makes installation easier and provides more reliable performance. But when selecting fiber cassettes, link-loss budgets must be carefully considered. Since pre-terminated fiber solutions include many components, such as cassettes, cable, connectors and patch cords, the total loss needs to be less than the maximum specified by the networking system budget.

Each application specification, such as 10GBASE-SR, dictates the allowable channel link loss. For example, within the 10G fiber optic standard, inhibitors such as intersymbol interference (ISI) have been recognized to cause bit errors when adjacent data pulses spread and overlap. The impact of ISI is affected by the cable's modal bandwidth, which varies depending on the type of 50-micron laser-optimized fiber used. The modal bandwidth itself is limited by the fiber's characteristic of differential modal delay (or DMD), which actually causes ISI.

SUM OF ITS PARTS

The overall performance of a fiber-based cabling solution needs to be viewed at the system level, which includes the sum of the performance of the individual components. Each component is allowed a certain loss budget that contributes to the overall system loss budget. And, some fiber cassettes have been improved to offer combined lower component, and ultimately channel, insertion loss. Simply put, to achieve the high-performance needed, you should be aware of what to look for when shopping for a cassette. Here are some factors to help you decide:

Patch Cord Selection: Make sure that you have selected the proper patch cords and cable types that mate to your cassettes to build the full fiber channel. There are a variety of adapter interface options available. The LC interface is the most popular (and recommended) because it allows the best combination of high-density, low-loss and compatibility with active equipment vendors. There are other options, such as the SC and MT-RJ. Follow the proper connectivity methods, defined

The Momentum pre-terminated modular fiber optic system enables quick deployment, eliminates the possibility of optical performance flaws, and provides the utmost in flexibility for network design.

Reel Time

by TIA to maintain optimal polarity and fiber performance in your data center. (See "Reel Time" from the February issue.)

Low-loss Cassettes: Select a cassette that incorporates high-performing 50 micron, laser-optimized multimode fiber (LOMF) with matching performance LC patch cords and backbone cables. For example, the Momentum™ cassettes from Ortronics/Legrand offer two grades of low-loss cassettes, which mate high-performing LC patch cords with Berk-Tek's GIGAlite-10XB LOMF fiber. The two grades include a premium performance with 0.5 dB total insertion loss and a high-performance cassette with 0.75 dB total insertion loss. Lower insertion loss per channel means more cassettes can be used in the channel – allowing greater flexibility in your data center.

Protect your array fibers: Multi-fiber backbone cables are terminated into the back of the cassettes through MTP™/MPO array connectors. These cables can be tight buffered with ribbon fiber or even reduced-diameter loose tube round cables that have ribbonized ends that are terminated in the MTP/MPO connectors. Care needs to be taken to protect these cables when terminated into the cassettes. The cassettes are inserted into the fiber patch panels and can mount in standard 19-inch or 23-inch rack-mount cabinets, wall-mount enclosures and under-floor boxes. However, many cassettes are designed with the array connections protruding from the back of the cassette. This increases the chance that they will be inadvertently bumped and damaged. Cassettes with recessed connections in the back of the cassette housing provide better protection.

Internal fiber management: Not only do you need to make sure that the outside connectors are protected, it is equally important to make sure that the individual fibers, once broken out from the array within the cassette, adhere to proper bend radius. Make sure that the cassette that you choose has internal guides to keep the fibers from bending too tightly.

Outside Durability and Safety: In addition to the internal protection of the fibers, make sure that the cassette housing is rugged – metal is stronger and more durable than plastic. Some are even available with front shutters and dust covers that not only protect the fibers, but also provide eye safety to the installers.

Performance Documentation: One of the biggest benefits to selecting fiber cassettes is that they are factory terminated and tested, so there is no time-consuming field preparation or testing involved during installation. But, how can you be assured of the test results? Sometimes this data is often misfiled, lost, or even located inside the cassette, so it is difficult to find. Make sure that test data from all the components is provided in the form of a visible label affixed to the cassette housing. This way any field-testing results can be verified quickly and easily and you are getting what you thought you paid for.

While data rates and applications in the 10 Gb/s still seem in their infancy, it won't be long before data centers will be taxed with accommodating 100 Gb/s and ultimately yottabytes (Yb/s). To prepare for the barrage of tomorrow's data storage requirements, you need to take advantage of the most advanced technologies and data center practices available today. Being educated on the many different choices of components available will work towards your benefit and certainly result in the best return on your investment.

(For more information on the new generation of low-loss, modular cassette-based systems, refer to the white paper, "Fiber in the Data Center" by Rudy Montgelas, Senior Fiber Product Manager with Ortronics/Legrand, and Lisa Huff, Data Center Applications Engineer with Berk-Tek.) ■

"Reel Time" addresses cable topics including both copper and fiber constructions, applications, installation practices and standards updates. If you have a particular cable issue, please send an E-mail to: carol.oliver@nexans.com and we will feature the solution in an upcoming issue.