



Leverage
Data Center
Innovation
for Greater
Efficiency and
Profitability

CORNING

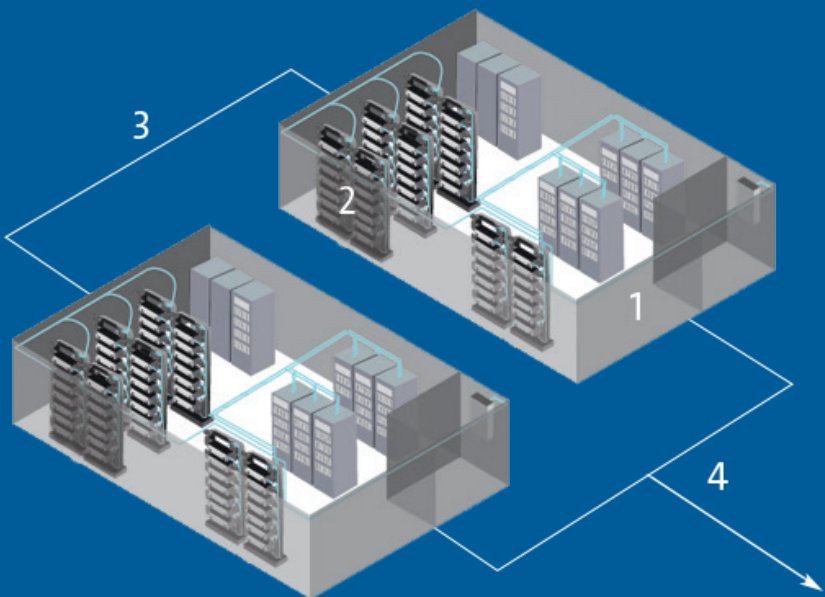
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Data Centers Are the Engines that Power Modern Connected Life

According to the Cisco Global Cloud Index, by 2020, a whopping 99 percent of global network traffic will pass through data centers, the new communications hubs of the world. The insatiable demand for more connected devices requiring higher bandwidth, faster service, and greater access is driving data center deployments at an unprecedented rate. This growth is fueled by the rapid advances in optical communications equipment needed to deploy the data center architectures of the future.

From the invention of low-loss optical fiber to the award-winning EDGE™ and EDGE8™ solutions for data centers, we continue to define what it means to be on the cutting edge of optical communications innovation. Let's take a look at four innovations you can leverage for greater data center efficiency and profitability:

1. Gain value, get more options out of next-generation transmission and performance
2. Maximize per-rack-unit density for better network scalability and improved link performance
3. Optimize connectivity density with extreme-density ribbon cable to enable next-generation architectures
4. Use advanced fibers in your metro data center for greater reach and more real estate choices

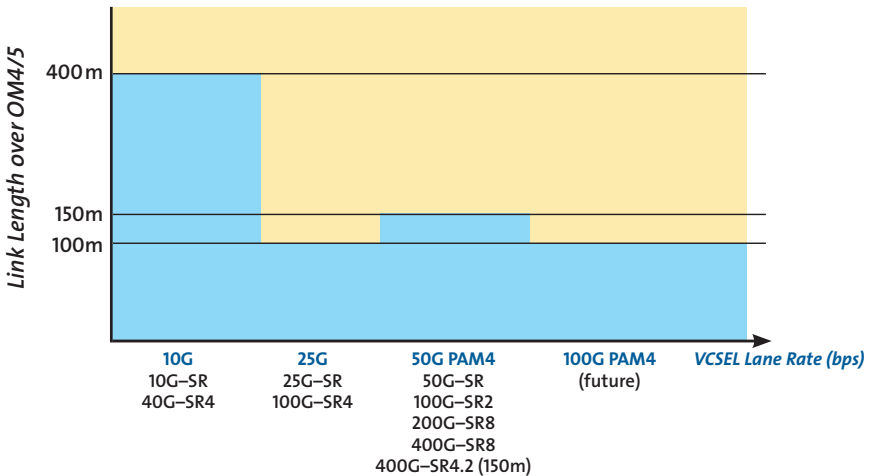


1. Gain Value, Get More Options Out of Next-Generation Transmission and Performance

Hyperscale data centers are continuing to drive the industry to faster, more capable, and more cost effective solutions for optical networking. The optics industry is banding together more strongly than ever before to create a strong set of 400G solutions which are now imminent and meet the wide array of customer applications. End-users can expect:

- 400G solutions for both multimode and single-mode fiber platforms will feature the new OSFP and QSFP-DD interfaces, each supporting 8 channels and capable of handling the higher power requirements
- OM4 multimode fiber solutions continue to deliver at least 100 m and beyond with new 16F and 8F fiber infrastructure
- Parallel fiber infrastructure continues to provide the most flexible and cost effective platform for both multimode and single-mode fiber
- 400G breakout applications will be supported to both 50G and 100G over multimode fiber, and to 100G over single-mode fiber

Most enterprise and many hyperscale applications will continue to be well served by low cost, low power 10G/40G/100G and now 400G VCSEL based transceivers supporting at least 100 m. This is enabled by next generation multimode transmission technologies such as forward error correction, PAM4 modulation, and wavelength division multiplexing (WDM) technologies. Corning® ClearCurve® OM3/4/5 fibers are a suite of products optimized and ready for these new multimode technologies.



In addition to the standard base 8 fiber infrastructure, a new multimode 16 fiber platform is being introduced to support 400G breakout to 50G. This new solution is being standardized under IEEE 802.3cm and will feature a 16 fiber wide MPO connector with angle polish.

2. Maximize Per-Rack-Unit Density for Better Network Scalability and Improved Link Performance

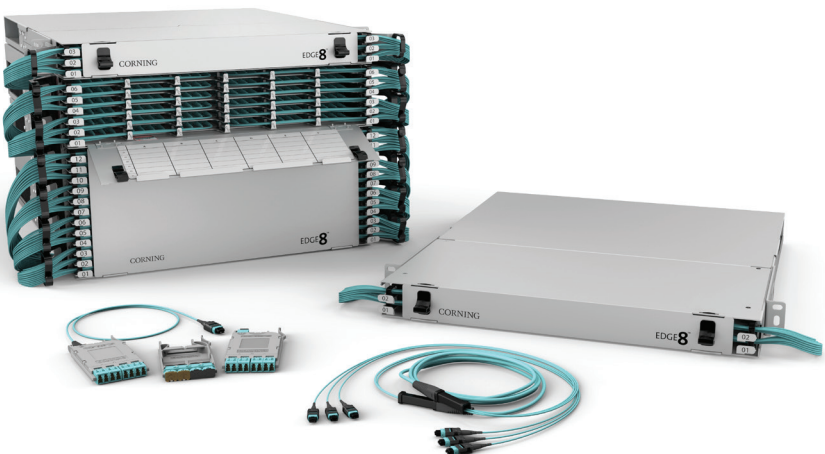
Our EDGE™ solutions were the industry's first preterminated optical cabling systems specifically designed for the data center environment, and the value that EDGE provides to the industry continues to be proven. Density, network uptime, speed, simplicity, and a clear migration path to meet future requirements... the EDGE solution addresses it all with a standard Base-12 design. However, technology road maps clearly indicate that transmission speeds ranging from 40 to 400G will be based on either 2- or 8-fiber connectivity solutions.

That's the motivation behind EDGE8™ solutions. All the value of our original EDGE solutions, with the added superior network scalability, improved link performance, and 100 percent fiber utilization of a Base-8 design.

EDGE8 solutions strengthen your data center in four key areas:

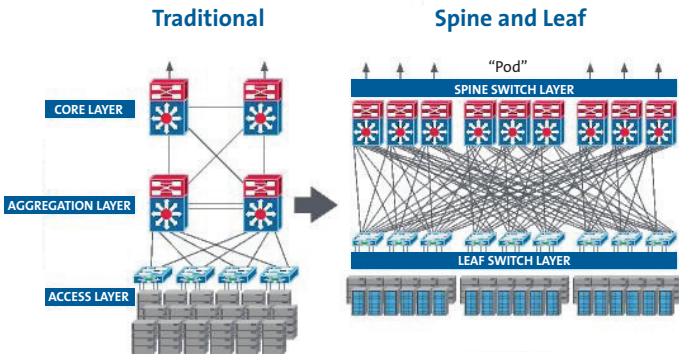
- Enables high-density, cost-effective 10G deployments
- Increased asset utilization, with reduced jumper complexity and the elimination of stranded cabling assets
- Technology adoption due to 100 percent fiber utilization without the need for conversion modules, which leads to cost savings and improvements
- Risk avoidance, providing a simple path to 40, 100, and even 400G
- Reduced total cost of ownership (TCO) with port disaggregation using SR4 technology

Our EDGE8 solution is the most future-ready data center connectivity solution available for simple, efficient, and cost-effective migration.



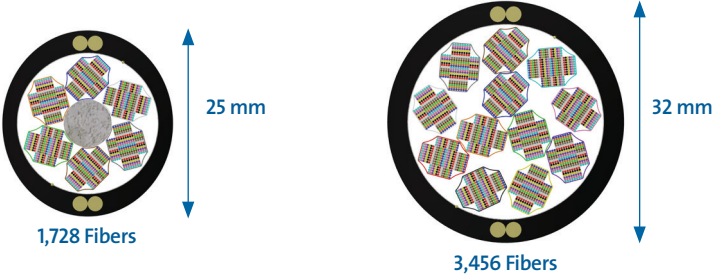
3. Optimize Connectivity Density with Extreme-Density Ribbon Cable to Enable Next-Generation Architectures

Driven by virtualization, data center operators desire smarter, faster systems, so they're migrating from traditional architectures to spine-and-leaf architectures. This migration dramatically increases the number of fibers it takes to serve a data center campus.



Only a few years ago, 864-fiber cables were standard in campus networks. Today, 1728-fiber cables are common, and even higher fiber counts, such as 3,456 fibers, are starting to be used – all within typical 2-in duct systems.

RocketRibbon™ extreme-density cables



In this space, ribbon cables offer key benefits:

- Very high fiber counts in a single cable – up to 700 percent more fibers than traditional loose tube cables
- Mass fusion splicing, which is up to 80 percent faster and 60 percent less expensive than single-fiber splicing
- Faster cable restoration in the event of cuts, reducing the cost of unplanned downtime

In addition, Corning's RocketRibbon™ extreme-density cables maintain the traditional solid ribbon matrix and feature routable, peelable sub-units to eliminate ribbonization and furcation for easier, faster installations.

4. Use Advanced Fibers in Your Metro Data Center for Greater Reach and More Real Estate Choices

As more users watch video over the internet, content providers are adapting their data center infrastructure to bring video content closer to the user to reduce latency and enhance user experience. Not only does this trend drive an increase in the number and scale of metro-based data centers, but it demands more bandwidth in metro data center interconnects, typically characterized by:

- Distance-dependent variety of transmission systems and cable fiber counts
- 100G over metro-like distances
- Point to point, unamplified, unrepeatered

Up to 40 km, low-cost transceivers with high-fiber-count cabling are typical and ribbon cables again add value. Above 40 km, many data center interconnect links use WDM transceivers, and Corning® SMF-28® ULL fiber is positioned to offer significant reach extension over typical G.652 single-mode fibers.

SMF-28 ULL fiber extends the range of data center interconnect links by up to 25 percent and enables access to approximately 50 percent more data center locations compared to typical single-mode fiber, resulting in:

- Greater access to suburban customers
- More options for data center locations (e.g., potentially lower real estate prices and utility cost; closer proximity to renewable energy sources)
- Increased network resilience to power outages

Corning® TXF™ optical fiber combines both ultra-low-loss and a larger effective area. As a result, long-haul DCI with TXF fiber can be designed more efficiently, eliminating amplification sites and minimizing the number of regenerators needed, even as higher data rate upgrades with more stringent OSNR requirements are planned.

