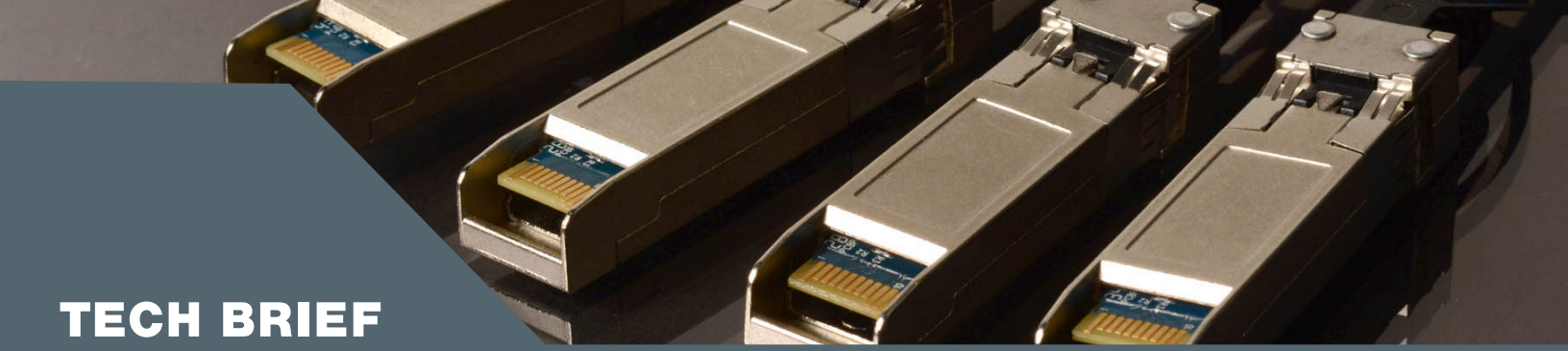


TECH BRIEF

Point-to-Point: High Speed Interconnects in the Data Center

Today's data centers contain three types of High Speed Interconnects; Direct Attach Copper Cables (DAC), Active Optical Cables (AOC) and transceiver/fiber cable assemblies, which connects active equipment within the racks. All contain strengths and weaknesses that significantly impact the overall goals of a new deployment or build out of an existing data center.

As the demand for access to information continues to grow and increase in speed, so does the importance of network engineers' understanding of the proper application of these High Speed Interconnects within their architecture designs. Opportunities are commonly overlooked that could provide significant lower initial and long term cost reductions such as; future-proofing, reduced install times, intuitive use of colored jackets and even reduced cooling costs.

Working with cabling specialists can create savings far beyond than just a lower cost per meter. An experienced application engineer offering quality cabling products can easily walk you through the selection process and reduce the risk of downstream issues.

Connections

Larger data centers including hyperscale, cloud and colocation venues; as well as, enterprise data centers often rely on top-of-rack topologies, where one switch in each rack connects to servers within that rack.

Newer data center topologies are using very dense end-of-row switches for high speed connections to several rows of cabinets filled with compute. To make these connections, today's network architects rely on high speed interconnects (HSI), 'point-to-point' cables that directly connect two pieces of active network equipment; such as: switch-to-server, switch-to-storage or switch-to-switch applications.

This is because point-to-point cables are faster to deploy and provide the agility to meet rapidly expanded data needs. To ensure these integral components of the data center provide optimal performance, several key points should be considered during the selection process.

Breadth and Depth

When choosing a point-to-point cable manufacturer, an important aspect to consider is the breadth and depth of their product line.

Typically, there are two types of point-to-point cable deployed on a regular basis:

- Direct Attach Cable (DAC) and
- Active Optical Cable (AOC)

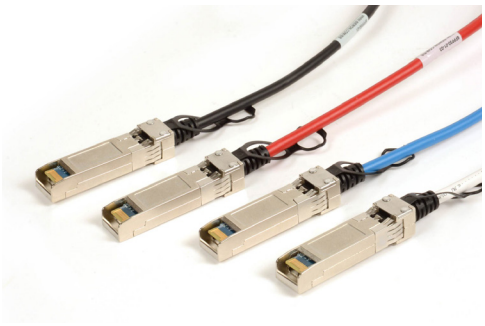
DACs are the most cost-effective solution and provide the broadest range of lengths and jacket colors. AOC's on the other hand are complete fiber assemblies offered in lengths of up to 100 meters. AOC's are generally priced higher than DACs but less expensive than transceivers, which require a passive fiber jumper cable with a transceiver on each end.

Availability of different speeds from 10G to 100G will ensure that facilities are sufficiently supported when updating network equipment. In addition, a variety of available cable lengths, breakout options and a range of jacket colors can play an important role in choosing the right cable manufacture for your network needs.

It is recommended to tailor lengths to the nearest half meter to allow for better cable management for unobstructed airflow and efficient cooling. Further, maintaining different colors makes it easier to identify, which cables are connected to the network after the systems are deployed. This is because the cables look similar for next gen cables 10G/40G to 25G/100G.

Performance

Contrary to popular belief, short reach copper cables offer the lowest latency and highest performance. This is because passive copper cables pass through the data with no latency delays created when converting electrical signals to optical signals and back to electrical signals again. In addition, short reach copper cables do not require FEC.



Forward Error Correction (FEC) is used in high speed connections to detect and correct errors. A DAC's gauge (AWG) can help in overcoming the need for FEC. Also, since passive copper cables do not have any active chips there is less heat in the overall system. However, you can't completely overcome FEC. For example, passive copper cables have a limitation in lengths. In longer reach connections FEC is required in both copper and AOC applications.

Keep in mind not all copper cables are created equally. It is important to work with a consistent proven high quality OEM partner. All Siemon cables are designed for optimal performance and have proven quality in volume. In addition, Siemon does 100% factory testing on all cables.

Active Equipment Manufacturers Bundle Play

High speed connections are often offered by network equipment manufacturers. This is because network engineers are concerned about 'compatibility' as many equipment manufacturers have unique EEPROM's for their products. OEM specific EEPROM's send warning messages if a third-party cable is connected. Although these manufacturers do not advertise this, the warning message only alerts the user that a cable from a different manufacturer is in use – it does not mean performance is affected. With this in mind, the recommendation is for customers to partner with cable manufacturers whose cords are fully compatible with the active equipment gear.

For example, cables labeled as "Cisco compatible" will fully function with Cisco equipment without triggering warning messages. In reality, OEM specific EEPROM's are unnecessary as all reputable manufacturers of high-speed interconnects and transceivers meet the standards that IEEE and SFF have established for high speed.

Let's Connect

When reviewing manufacturers for high-speed interconnects, customers need to take all factors into consideration, not just the initial cost. Considering factors such as equipment compatibility, the range of products offered, proven performance and quality are important aspects that should not be taken lightly.

Siemon is a trusted supplier partner to many tier 1 end users in mission critical applications like finance and healthcare. Siemon is committed to supporting data centers with high speed interconnects and works hard to fine tune the high-speed roadmap that includes next gen cables like 400G and beyond.

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