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Maximize your Data Center Budget with High Speed Point-to-Point Cables

Author: Ryan Harris, MBA, HSI Expert

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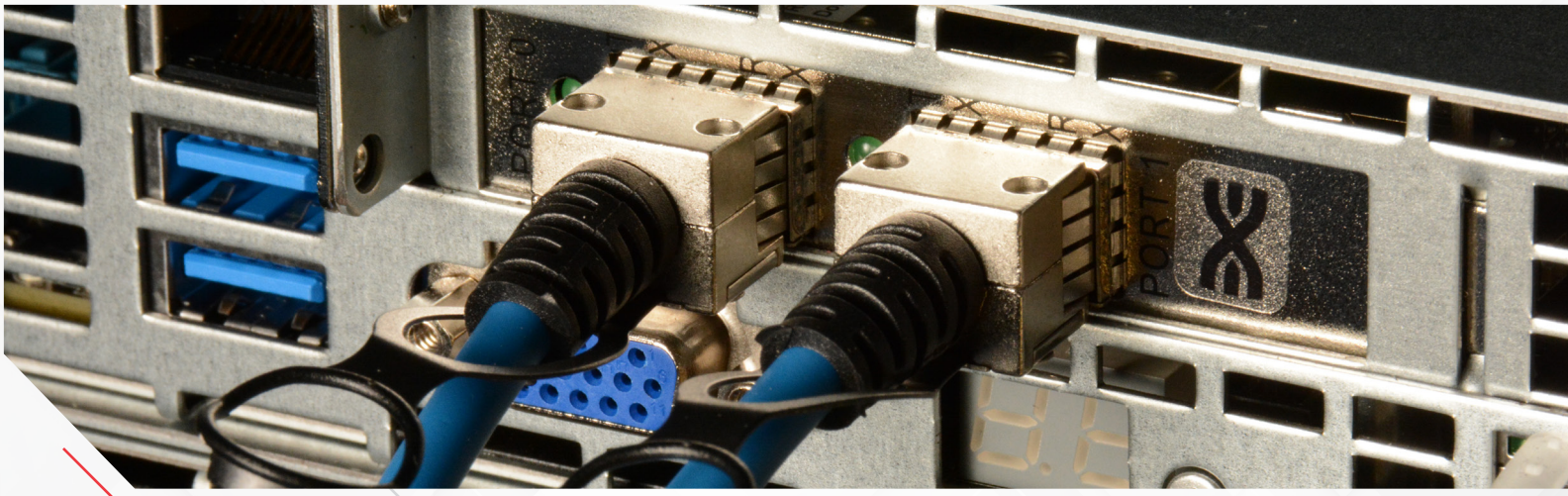
Point-to-Point Connections

The evolution of business approaches and work patterns have secured high speed networks and data centers as the fulcrum of critical operations for organizations around the world. Modern data centers must enable companies to scale existing capabilities, while supporting a range of new applications, including e-commerce, remote devices, digital services, usable data, artificial intelligence, and more. When planning data center deployments and upgrades, users should take a closer look at the cabling. There are many methods and topology options available, leveraging a wide variety of cabling types. Each solution has its own unique benefits and limitations, and to choose the best options for their own unique data center needs, users should approach with a wider view.

As the demand for access to information continues to grow, so does the importance of understanding and correctly incorporating High Speed Interconnects within your architecture designs to achieve the best business outcomes. High Speed Interconnects provide an efficient and cost-effective option in many data center environments; this is especially true for down-link connections in switch-to-server and storage applications. Choosing a complete point-to-point cable assembly with integrated transceivers that eliminate the need for separate cords and transceivers, such as Direct Attach Copper (DAC) or Active Optical Cables (AOC), has noteworthy advantages compared to using optical transceivers with fiber optic jumpers.

When making a server connection, selecting a high speed interconnect assembly for point-to-point connections can offer significantly lower upfront costs compared to using a pair of transceivers with jumper cables. A single transceiver end is approximately 2-3x the total cost of a point-to-point (DAC or AOC) alternative. The savings can quickly add up when deploying server systems in volume, although the initial component cost is not the only place where users can achieve savings using a direct attach high speed interconnect approach. Considering that the two transceiver ends still need a fiber optic cable to connect them, using a complete cable assembly can save installation and testing



High speed interconnect assemblies can offer a significantly lower upfront cost over transceivers and jumper cables.

time by removing the need to confirm the correct fiber optic cable type and transceiver-to-transceiver compatibility. As complete, integrated assemblies, point-to-point DACs and AOCs allow users to easily find the right solution for connecting each end of their network equipment. These assemblies are both factory terminated inside of the pluggable housing and factory tested, providing users peace of mind on their performance and reliability. In addition, they reduce the complexity in down-link connections by eliminating unnecessary connection points.

Point-to-point cables also consume less power, with DACs drawing practically zero power compared to a transceiver that consumes over 1W per end. The higher the speed and density, the more power required to maintain performance. Transceivers have lasers designed to transmit light (i.e., the signal) from one end of the link to the other and compensate for link-loss created by multiple connections in the data center. AOCs also utilize lasers, but consume less power than transceivers.

This is because AOCs are purpose-built with optimized active chips that do not require link-loss compensation. Numerous data center studies show a multiplier effect where saving one watt at the server level can save over 2.5 watts at the data center level. For users deploying hundreds of server connections, implementing a server power management strategy can provide significant long-term power savings.

Siemon's QSFP28 100G AOC Assembly

Power usage comparison of 500 server connections using point-to-point cables vs. transceivers

Transceiver (per end)	W Max Per end	No. Server Connections	Total W	kW at Server Connections	kW with 2.5W Multiplier
25G SR SFP28	1.2	500	600	0.60	1.50
100G-SR4 QSFP28	3.5	500	1750	1.75	4.38
Siemon Point-to-Point Cables (per end)					
DAC Passive 25G SFP28	0.05	500	25	0.03	0.06
DAC Passive 100G QSFP28	0.05	500	25	0.03	0.06
AOC 25G SFP28	0.8	500	400	0.40	1.00
AOC 100G QSFP28	1.78	500	890	0.89	2.23

Figure 1: The chart above shows a power usage comparison of 500 server connections using point-to-point cables vs. transceivers.

In today's high speed data centers, servers make up a large proportion of the total power consumed. **Choosing point-to-point cables at the server level instead of transceivers can quickly provide measurable energy savings.** In *figure 1*, we can see that when deploying 500 server connections, users save over 1kW at the data center level by using DACs instead of transceivers. AOCs do not provide energy savings as quickly as DACs, but when considering the multiplier effect, it does not take long to achieve a 1kW energy saving by deploying point-to-point cabling options at this level.

It is important to understand that these high speed interconnect cables are not ideal for every data center application. For example, multi-connection fiber trunking and patching would be the best choice when connecting network equipment located in a different room, or if the cabling is hard to access. Ideally, point-to-point cables are best suited for environments where the network equipment is within the same room. In addition to making server connections, point-to-point cable assemblies can also be used for switch uplinks in lengths up to 30 meters. These assemblies are most commonly used within data center cabinets connecting compute to the network at lengths up to 3 meters. Understanding these different cable options and where each is best suited is key to achieving maximum ROI. Point-to-point cables have significant strengths in data center expansions and new deployments, but they also have limits that make them less than ideal in some applications. When planning data center deployments, expansions, or upgrades, users should consider the complete cost and performance implications of their high speed cabling, including day one material costs, ease of deployment and long-term maintenance, and day two energy savings. Fortunately, there are cabling specialists available who can assist in determining the best solution for each user's unique needs.

Meet Ryan Harris

Ryan is a Sales and Market Manager for High Speed Interconnects with Siemon. Ryan has over 12 years of experience in supporting network equipment OEMs, hyperscale end-users, ODMs and system integrators with point-to-point cabling solutions, specializing in the rapid deployment of system connections within the data center.

https://www.siemon.com/en/sis/forms/hsi-datacenter

Ryan_Harris@siemon.com

408-674-4814

North America
P: (1) 860 945 4200

Asia Pacific
P: (61) 2 8977 7500

Latin America
P: (571) 657 1950/51/52

Europe
P: (44) 0 1932 571771

China
P: (86) 215385 0303

India, Middle East & Africa
P: (971) 4 3689743

Siemon Interconnect Solutions
P: (1) 860 945 4213
www.siemon.com/SIS