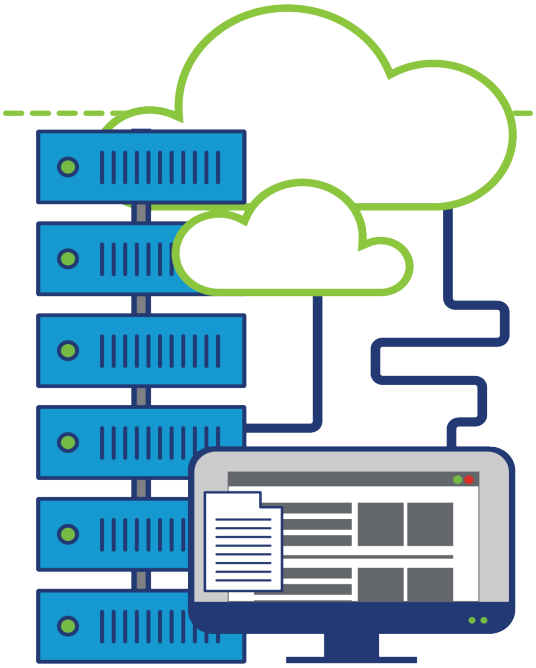
Cloud vs Enterprise

Data Center Networks



Data centers are rapidly evolving to address rising volumes of network traffic. Faced with demands for higher bandwidth and the need to adapt and scale quickly, many organizations with small or medium data centers have moved to cloud service providers or have outsourced to colocation facilities. Also, many large enterprise data centers with traditional three-tier architectures are moving to “flatter” leaf-spine architectures, creating lower latency and more scalable designs.

As these data centers adapt, one trend is clear: while both cloud data centers and enterprise data centers invest heavily in next-generation network infrastructure, they follow diverging migration paths, as they deploy different types of optics, network speeds, and cabling systems.

Trends in Network Speeds

Today, while 10 Gb/s transceiver modules make up a large portion of the market, 100 Gb/s is starting to make a big move, driven largely by cloud environments. By 2018, eight speeds will be available on the market, including 200 and 400 Gb/s, creating an unprecedented number of options for data center managers to evaluate and design their networks to support.

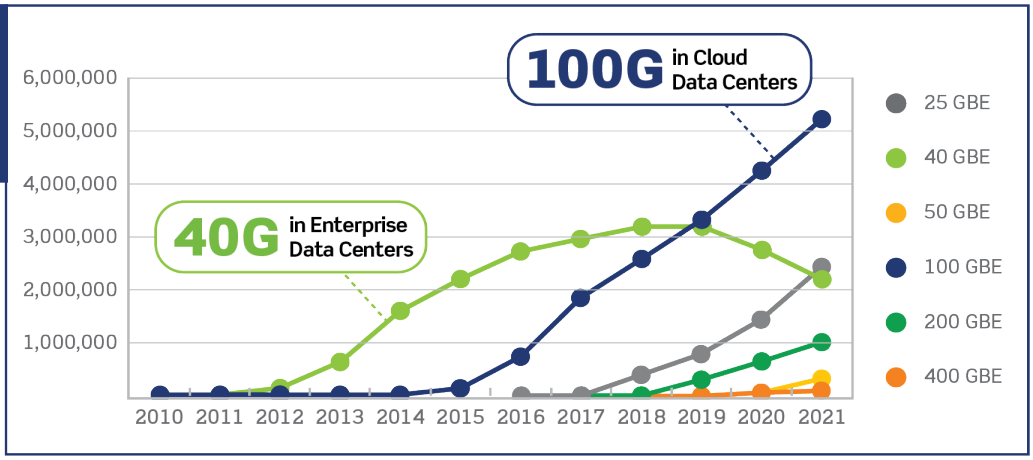
Narrowing to transceiver trends at 25Gb/s or faster, Figure 1 shows how 40 Gb/s adoption will begin to flatten in the next two years Interestingly, 25 Gb/s transceiver shipments will grow in parallel with 100 Gb/s.

These two rates are related, and their parallel growth is largely the result of the 2015 IEEE802.3bm standard defining 100G-SR4, which allows for 100 Gb/s using four 25 Gb/s lanes over an 8-fiber MTP® connection.

These 25 Gb/s lanes enable the next wave of high-speed networking, as more data centertech refreshes will include 100 Gb/s uplinks at the switch and 25 Gb/s down to the server. The majority of these lanes — around 75 percent — will use 4-fiber or 8-fiber MPO/MTP connections for short-reach applications at 500 meters or less. Long-reach applications over single-mode largely use an LC interface over two fibers.

Figure 1

Transceiver Shipments of 25 Gb/s and Greater



Source:LightCounting, 2016

Enterprise Data Center Network Migration

Current enterprise data centers primarily use 10 Gb/s switches and 1 Gb/s servers. These networks are migrating to 25 or 40 Gb/s uplinks and 10 Gb/s servers. The majority of enterprise data centers already have multimode cabling installed, and 85 percent of these optic links are 150 meters or less.

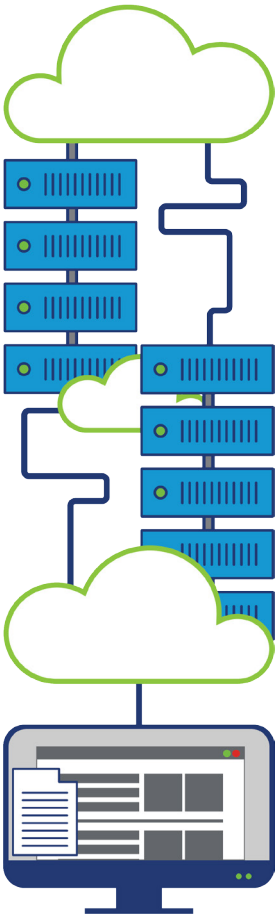
The migration path for enterprise data centers, as seen below in Figure 2, will take advantage of existing multimode cabling while moving to 10, 40, and 100 Gb/s in the future. With over 12 different 40 Gb/s transceiver options and 10 different 100 Gb/s transceiver options available on the market, infrastructure engineers must design their networks to be flexible and able to support any of these potential topologies.

Cloud Provider Network Migration

Figure 2

Current vs Future Network Configurations

	Enterprise Data Centers		Cloud Data Centers	
	Server	Uplinks	Server	Uplinks
Current Network Speeds	1G	10G	10G	40G
Future Network Speed Options	10G	40G	10G	100G
	10G	25G	50G	200G
			100G	400G



Cloud networks have operated at 40 Gb/s uplinks and 10 Gb/s at the server for the past several years. These networks will move to 100 Gb/s uplinks and 25 Gb/s at the server in the near future, as shown in Figure 2. We can also expect future migrations to 200 and 400 Gb/s uplinks and 50 and 100 Gb/s at the server. When comparing optical fiber systems for these higher speeds, cloud service providers are increasingly adopting single-mode over multimode systems.

In 2016, Microsoft Azure, a market leader in cloud services, moved the vast majority of its data center fiber cabling to single-mode. In fact, Microsoft is now 99 percent single-mode, using parallel single-mode with MTP® connections more than any other fiber type. Also, Facebook has undergone efforts to shorten their data center cable links to 500 meters or less. Actions like these from companies with such major purchasing power have reduced the cost of single-mode optics to the point where the cost for 100 Gb/s single-mode optics dropped tenfold over the past two years, bringing it in line with multimode fiber.

As this trend continues, the market in general will find single-mode a more enticing option. For example, 100G-PSM4 single-mode technology, created in 2014 by a multi-source agreement group, is currently the same price as 100G-SR4 multimode transceivers. PSM4 transceivers were specifically designed as a low-cost option for 500 meters or less, using an 8-fiber MPO/MTP connection. Just as important, the price for long-reach single-mode solutions such as 100G-LR4 has dropped and will continue to drop over the next several years.

Smart Migration Requires Forward-Thinking Cabling Systems

Regardless of the type or size of the data center, IT managers are looking for cabling systems that can weather multiple generations of tech upgrades with minimal disruption, dark fibers or changes. Leviton recommends using a 24-fiber trunk cable backbone in these systems as a key piece in establishing the most flexibility when migrating to 400G.

Leviton's single-mode and multimode cabling syste ms not only meet current bandwidth requirements, but also provide the flexibility needed to meet future network demands, including 100G, 400G, and beyond.

These systems include high density patching, solutions for fast deployment, and customizable trunks and cable assemblies that give data center managers the exact solution they need, delivered fast. To see example migration paths for both enterprise and cloud data centers, download our white paper.