High costs associated with optical cabling and top of rack switches have delayed widespread adoption of 10Gb Ethernet in many data centers. 10GBASE-T overcomes these cost barriers, opening the doors for cost-effective migration to 10GbE throughout the data center.

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Executive Summary

With the increase in server consolidation through virtualization in the data center, the resulting data demand has exceeded traditional 1Gb/s throughput capabilities. Today these virtualized servers are typically configured with multiple 1Gb/s ports in order to keep up with the I/O demands. The transition to a 10Gb/s network overcomes these 1Gb/s bandwidth limitations while dramatically simplifying cabling requirements, and also is the next natural progression in Ethernet speed. The recent availability of 10GBASE-T over common CAT 6a unshielded twisted pair (UTP) at attractive market prices enables rapid, large-scale adoption of 10GbE throughout the data center. This paper describes the details of 10GBASE-T and UTP media, its benefits, and why now is the right time to make the switch to 10GbE.

10Gb/s Ethernet

HP Generation8 multi-core, multi-socket servers with the E5-2600 processors allow users to increase the number of virtualized servers — and therefore, the number of applications — running on a single server, resulting in a significantly increased demand for I/O. The accelerated adoption of server virtualization consolidates the number of physical servers and increases the I/O demand well beyond the capabilities of a 1Gb/s port.

The deployment of 10Gb/s networks addresses these I/O bottleneck issues. In recent years, data center managers have been migrating portions of their data center to 10Gb/s networks using a combination of Direct Attach Copper (DAC) cables for short distances (up to 7 meters) and fiber optic cabling for longer distances (hundreds of meters, or more). Direct Attach Cables provide the connectivity from the 10GbE adapter to the Top of Rack Switch, while fiber cabling connects to a switch at the end of the data center row.

While 10GbE deployments using SFP+ connections to accommodate either fiber optics or DAC connectivity improves the I/O capabilities for virtualized servers, the costs associated with a top of rack switch and expensive cabling limited the wide spread adoption. Industry analysts expect the adoption of 10GBASE-T to accelerate dramatically, becoming the predominant 10GbE connection for data center networks.
10GBASE-T to the Rescue

10GBASE-T over structured UTP cabling solves these problems and makes 10GbE available to a much broader market. 10GBASE-T with CAT 6a UTP cabling is the most flexible solution for most data center 10GbE networking applications. The raw cost of the cable itself is far less than either optical fiber or SFP+DAC cables. Additional benefits include:

• Longer reach than SFP+ DAC
  – While Direct Attach Copper (twinax) cables have been moderately successful over very limited distances, the more familiar UTP cabling – which has become so ubiquitous in today’s data centers – affords an even lower cost solution with much longer reach; up to 100 meters. This makes CAT 6a UTP cabling the best universal solution for 10 GbE requirements in today’s data centers.

• Lower deployment cost than Optical Cabling
  – CAT 6a UTP cable is low cost and widely available. While optical fiber cable is a great solution for long distance (100s of meters, or more) 10GbE network backbone requirements, for connections less than 100 meters – typical for data center installations – CAT 6a cabling provides the optimum low cost, easy to use solution.

• Easier to install than Optical Cabling
  – CAT 6a cable is easy to install and maintain, allows for customized length, can be field installed, and is compatible with existing 1GbE switches and NICs.
  – Inexpensive wire cutting and crimping tools
  – Familiar cables and RJ45 connectors
  – Easy installation skill set

• Ease of migration
  – CAT 6a UTP cabling is backward compatible with existing 1000BASE-T networks, allowing the cabling to be upgraded before upgrading the network switches and adapters. This allows for a smooth transition path for data centers that have an installed base of CAT 5e cabling that they need to upgrade.

By solving these key challenges with 10GbE deployment, 10GBASE-T has become the catalyst that finally makes 10GbE affordable and effective for use across the data center.
10GBASE-T adapters are now available

The Broadcom based 10GBASE-T adapters are now available from HP. Key benefits of the 10GBASE-T adapters include:

• Backward compatibility – Can be deployed on 1GbE and 10GbE networks, providing easy migration to 10GbE
• Higher bandwidth and superior server virtualization than existing 1GbE
• Uses familiar CAT 6a cabling in the data center
• Cable distance support up to 100 meters
• Cable and port consolidation vs. multiple 1GbE connections
• Eliminates the need for top of rack switches

Below are the part numbers and key features for the HP 10GBASE-T adapters:

• HP 530T stand-up NIC: 656596-B21
• HP 533FLR-T FlexibleLOM for Rack: 700759-B21
• Supported on HP Gen 8 Rack and tower servers
• Compatible with CAT 6a UTP cabling up to 100 meters
• Support for Energy Efficient Ethernet (EEE) to reduce power consumption up to 27% in network idle mode
• Inbox driver support for Windows, Linux, and VMware
• Virtualization support including SR-IOV, Microsoft VMQ and VMware NetQueue, and MSI-X
• Stateless Offload support including LSO, TSO, RSS, TSS and IPv 4 and 6 offloads
• TCP/IP Offload Engine (TOE)
• Superior Small Packet Performance
• Powered by Broadcom NetXtreme BCM57810S controller

Conclusion

The 10GbE standards are mature, reliable and well understood. 10GBASE-T breaks through important cost and cable installation barriers in 10GbE deployment as well as offering investment protection via backwards compatibility with 1GbE networks. Deployment of 10GBASE-T will simplify the networking transition by providing easier path to migrate the HP Generation 8 servers to 10GbE infrastructure in support of higher bandwidth needed for virtualized servers. The HP 530T and 533FLR-T are the ideal solutions for data center managers considering the migration to 10GbE networks and they are available today!

Learn more at
hp.com/go/proliantnics
go.broadcom.com/HPGen8