



Technology Watch

LAN Newsletter

2nd Quarter 2009

Table of Contents

1.0 General Technology Trends..... 1

2.0 Desktop Virtualization..... 1

3.0 Copper LAN Cabling..... 2

 3.1 Converged Enhanced Ethernet (CEE)..... 2

 3.2 Aquantia Delivers Quad 10GBASE-T Solution 4

 3.3 Technology: SFP+ Direct Attach 5





1.0 General Technology Trends

Network convergence continues to be the predominant news in the evolution of the data center. Ethernet as a protocol is being elevated as the network fabric of choice for data centers and enterprise networks as the move towards the consolidation of LAN, SAN and HPC applications becomes more defined. Thus, virtualization of all aspects of the networking infrastructure is an important trend that cable manufacturers must address as they develop their business strategies for the next three years.

2.0 Desktop virtualization

Virtual desktops are an increasingly important part of the data center and enterprise network consolidation equation. A recent IDG Research Services Group survey indicates that 41% of the companies they surveyed in 2008 indicated their desire to adopt desktop virtualization solutions for their networks. Most suggested that this was a way to save on PC networking costs while reducing the carbon footprint (power usage) of their total networking infrastructure. A device produced by Pano Logic uses only 5W of power compared to 150 W for a typical desktop.

This technology puts the computing power back on a remote server in the data center thus relieving the local hard drive of managing application software, files, and other networking functions. Access to information and network services are therefore controlled through a centralized server rather than at the local desktop

computer. There are two main reasons for adopting this technology:

1. Cost savings on application software
2. Better security control over sensitive data



System in use at the University of Maryland

Caveats to Desktop Virtualization

There are some important considerations when using desktop virtualization:

- For those who travel frequently or must access company information offline as a regular part of conducting business, a hosted desktop model is not feasible.
- The four main players in this arena, Citrix, VMware, Symantec and Microsoft, each offer different product variations, so it would be difficult to standardize on any one system.
- While suitable for call centers, hospitals and similar organizations where control of sensitive data is crucial, virtual desktops are less suitable for enterprises



where any downtime on a central server could be disastrous for business.

- Video transmission is slow and lacks quality when compared to the standard PC solutions. A new installation may require the purchase of thin clients and similar devices, plus network upgrades to get a complete system up and running.

A recent Forrester Research report indicates that the licensing costs and infrastructure upgrades needed to institute a virtual desktop network can limit any cost savings previously assumed over the standard PC solutions. The savings are potentially derived from better help desk support and more control over sensitive corporate data. The licensing costs can range from \$150 to \$250 per desktop to be virtualized, which is in addition to the licensing fees for the applications being used. The report goes on to say that on the application virtualization side, there is usually a one-time fee of \$2,000 to \$5,000 for the application virtualization studio (administration console) needed to design, repackage and virtualize applications. On the infrastructure side, at least 100 kilobits of bandwidth per user might be required to handle spikes in computational requirements. It's also common to install more duplication disk space on the server side to avoid installing space on the client/desktop end.

3.0 Copper LAN Cabling

3.1 Converged Enhanced Ethernet (CEE)

There are three predominant networking standards currently being used in data centers, each with their own niche and role to play;

- Ethernet for client server IP LAN traffic;
- Fiber Channel (FC) for block mode data storage transfer; and
- InfiniBand for High Performance Computing (HPC) clusters.

Each standard's suitability for these applications is determined by the unique features of their protocols and thus the quality of service (QoS) they deliver. Ethernet has found it difficult to compete in storage and HPC applications due to higher latency and lower I/O throughput. This disadvantage may disappear, however as new IEEE and IETF standards introduce new features that will require higher performance and thus position Ethernet as a serious competitor in these data center applications.

Data center managers therefore, have had little choice but to run and administer three disparate and physically separate networking solutions to ensure business service levels are met. This situation has made the data center network complex, difficult to manage, less productive and more expensive due to extra costs for hardware, administration and maintenance.



Converged Enhanced Ethernet offers solution

Converged Enhanced Ethernet (CEE) incorporates new features designed to eliminate packet loss and timeouts and thus enhances Ethernet performance.

As data centers migrate towards a consolidated network, CEE has the potential to enable a single unified networking fabric, which could replace physically separate networks to run IP LAN traffic, storage and cluster computing and meet the majority of customer requirements. Since Ethernet is ubiquitous and is accepted as the de-facto network standard worldwide, it is the obvious choice for network managers, engineers, administrators and system developers alike. With lower hardware costs, 'plug and play' features, high bandwidth and long reach over copper as well as fiber, Ethernet is more desirable than other competing technologies such as Fiber Channel and InfiniBand.

New Ethernet Standards and Features

The new protocol standards collectively called Converged Enhanced Ethernet are being developed by the IEEE and IETF standards bodies under the following working groups:

- Priority Flow Control (IEEE 802.1Qbb)
- Congestion notification (IEEE 802.1Qau)
- Shortest path bridging (IEEE 802.1aq)
- Link layer routing protocol (IETF – TRILL)
- Enhanced Transmission Selection (802.1Qaz)

In essence, all of these new features will create lower latency and higher I/O throughput through 'smoother' transportation of lossless Ethernet packets. Traffic congestion will be eliminated; although this may result in reduced speeds, dropped packets and timeouts will also be eliminated, resulting in higher network efficiencies. Virtual lanes with dedicated bandwidth assigned to various traffic types ensure prioritized traffic is not compromised; at the same time lower priority traffic can utilize any unused bandwidth from higher priority traffic. Security is maintained through VLAN functionality.

Such performance enhancements coupled with current 10G speeds will encourage market adoption of Fiber Channel over Ethernet (FCoE) and the Ethernet-based storage protocol iSCSI.

End-User Benefits

A single unified Ethernet network fabric for LAN, SAN and HPC offers simplicity, ease of management, administration, maintenance and reduced costs. Further savings are realized through lower hardware costs and lower operating costs with less specialized network engineers.

A single network would also offer current and future high bandwidth capability: 10G, 40G & 100G capabilities reduce system bottlenecks and offer a migration path for future growth and expansion.



Unlike 10GBASE-CX4 Ethernet and InfiniBand, 10GBASE-T extends the reach from 15m to 100m over copper and offers network and cabling infrastructure design flexibility, enabling patching between any two points in the network. Clustering of servers for HPC can be distributed throughout the data center to balance power load distribution and cooling, leading to greater energy efficiencies and cost savings.

Conclusion

Data center infrastructure design has changed to meet new demands driven by server consolidation and virtualization, quad core processors and increased processor power. Reducing energy consumption is now at the top of the agenda and is driving new developments in power and cooling distribution and management at every level. Redesigning infrastructures to meet demanding changes and challenging targets is complex and becomes increasingly difficult when too many variables exist.

A unified Ethernet network fabric offers the opportunity to eliminate system complexity, offer the highest design flexibility and meet business service level performance requirements.

3.2 Aquantia Delivers Quad 10GBASE-T Solution

The competence center has been following the developments in power reduction trends for chips used in conjunction with balanced twisted-pair cabling. The argument in the industry was that chip manufacturers had to reduce power dissipation in these components to maintain cost parity with fiber solutions at 10G data transmission.

Aquantia recently announced the validation of the world's first 40nm Quad 10GBASE-T PHY, significant for twisted-pair copper cabling because we now have the critical power, density and cost performance levels needed to promote copper in the 10 Gbps arena. Server, switch and storage equipment manufacturers can now support volume deployment in the data center and enterprise world. Some of the key attributes of this new chip are:

- IEEE 802.3an compliance
- Power dissipation at 10m on CAT6A/CAT7 cable is 2.0W per port
- 3.5W per port at 100m on CAT 6A/CAT7 cable
- Multi-rate capability, 10G/1G/100M
- High-performance XAUI/RXAUI/XFI interface



The introduction of Aquantia's new chip also bolsters the value proposition for installing CAT 6A and above copper cables for 10G speeds within the data center, not only for future-proofing but also to justify a better total cost of ownership (TCO) within a typical data center application.

This announcement by Aquantia keeps the power trends on track and ensures the use of 10GBASE-T copper cabling solutions for some time to come.

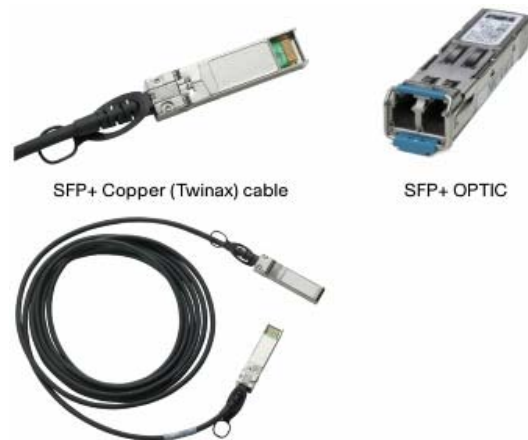
3.3 Technology: SFP+ Direct Attach

As the data center footprint continues to get smaller and more compact, the functions performed by servers, switching and storage devices will be deployed as a POD (self-contained racks) or mobile container. These racks will contain all the functionality necessary to accomplish the networking tasks in most data centers. Increased modularity requires that the I/O devices become smaller and more flexible for use in top-of-rack connectivity. This condition will accelerate the use of SFP+ direct attach cables whether in a passive or active cable assembly. The proliferation of 10GBASE Ethernet applications for the data center, enterprise or wiring closet will cater to these devices. Some of the features and benefits include:

- Small 10G form factor
- Hot-swappable input/output

- Flexibility of interface choice: copper/fiber
- Supports a "pay-as-you-populate" business model

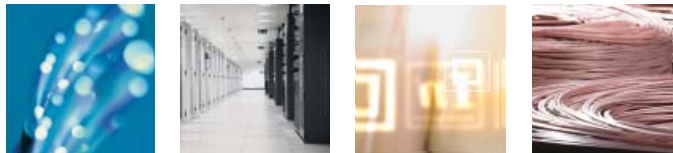
Such products are now being used by Cisco as shown in the picture below.



These cables are able to transmit at 10Gigabit full duplex speeds over a distance of 10 meters and offer transceiver latency which is 15 -25 times less than 10GBASE-T CAT6, CAT6A or CAT7A cabling systems. These cables will gain greater acceptance as the interconnect requirements between top-of-rack equipment become more demanding in flexibility and high data rate transmission. These devices also prolong the life of copper interconnect in the data center albeit with a twin-axial design. "Direct attach" cables in their copper format offer a competitive challenge to any fiber solution at these short cable lengths and performance criteria, giving a distinct advantage to the data center designer.

Data Communications Competence Center

Nexans' Data Communications Competence Center, located at the Berk-Tek Headquarters in New Holland, Pennsylvania, focuses on advanced product design, applications and materials development for networking and data communication cabling solutions. The Advanced Design and Applications team uses state-of-the-art, proprietary testing and modeling tools to translate emerging network requirements into new cabling solutions. The Advanced Materials Development and Advanced Manufacturing Processes teams utilize sophisticated analytical capabilities that facilitate the design of superior materials and processes. The Standardization and Technology group analyzes leading edge and emerging technologies and coordinates data communication standardization efforts to continuously refine Nexans' Technology Roadmap. An international team of experts in the fields of cable, connectors, materials, networking, standards, communications and testing supports the competence center. The competence center laboratories are a part of an extensive global R&D network that includes eight competence centers, four application centers and two research centers dedicated to advanced technologies and materials research.



Global expert in cables and cabling systems

NHCC09081001