Nexans

Technology Watch

LAN Newsletter

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Nexans

TECHNOLOGY WATCH

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1.0 General Market Trends

We were dazzled by the displays at the opening and closing ceremonies of the 2008 Summer Olympics held in Beijing China this summer. Not only were there innovations in the architecture of the Olympic stadium (the "Bird's Nest") and the water cube (swimming and diving venue), but unique data networking innovations were also prominent. China Netcom developed several technologies including:

1. An Automatic Switched Optical Network (ASON) -based intelligent optical transmission network used to improve the quality and security of the video transmission and other services for the games;
2. Light-compressed high-definition (HD) video transmission technology, which allowed the long distance delivery of non-compressed video signals. This technology enabled TV viewers to watch events at almost the exact time as spectators at the live event with little or no time delay in TV transmission;
3. IPv6-based video monitoring used to offer real-time viewing 24 hours a day, 7 days a week end-to-end at the Olympic command center;
4. Media at Olympic venues offered broadband access and high-speed internet services using an IC card with no limit on flow;
5. VLAN-based multimedia real-time transmission services used to connect Olympic venues and the press center for various news organizations and to allow data from each organization to be run on its own, independent virtual network.
6. Overall communications services between host cities achieved through a GPS-based, wireless call system. This system allowed Olympic families, citizens and visitors to get emergency assistance and be automatically identified by ID, language and location. Users received the support in their native language or English on first contact.

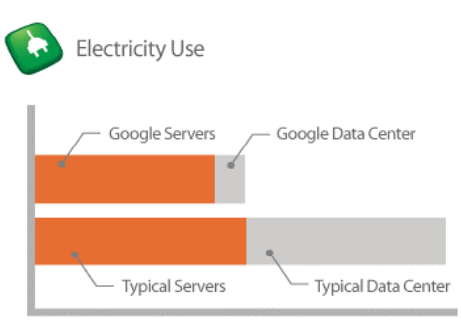
Do I hear the rumblings for Intelligent Networking, and is this the prelude for Intelligent Cabling?

2.0 The Green Datacenter, Sustainability the Google way

Many articles have been written about the amount of power consumed by data centers, with most of the power dissipated as heat from servers. Google, the most used internet search engine, has embarked on a program to reduce power consumption in their data centers in a model that is not just efficient, but is also sustainable over time. They have gone beyond the basics and have adopted a five point plan towards reducing energy consumption, namely:

1. Minimize electricity used by servers;
2. Reduce energy used by data centers themselves;
3. Conserve fresh water by using recycled water for cooling;
4. Reuse or recycle all electronic equipment that leaves their facility;
5. Engage all associates to advance smarter energy practices.

The success of their efforts is made evident by comparing the electrical use of a typical data center server to one of Google's. See graph below.



Google states that about 1/3 of the energy used by a server is consumed during electricity conversion, AC to DC, i.e., from AC power supply voltage to low power DC voltage. Another source of wasted energy occurs in the voltage regulator circuitry that sits on the motherboard. Google servers only lose about 15% of the electricity pulled from a typical wall outlet during the power conversion process, less than half of what is lost in a typical server. The annual power savings Google realizes from this is about 500 kWh per server over a typical system. Savings are realized in a number of ways including the elimination of the graphic chips typically found in these servers. In addition, fan power is managed automatically by adjusting the fan speed (output) based on demand; in essence, fans are controlled to spin only as fast as necessary to keep the server temperature below a designated threshold.

In many data centers, cooling alone is responsible for about 30 to 70% overhead in energy usage. Google has adopted a simple way of removing this heat by using the cooling effects that result when water is allowed to evaporate. The extensive use of cooling towers facilitates this process. This process also minimizes the amount of time that chillers need to run. Cooling towers operate in a mode Google calls "free cooling" where the chillers are off most of the time, saving valuable energy and making the operation nearly "free."

Energy savings are also achieved by good water management. Where possible, recycled water or non-potable water is used to generate electricity in the power plants. Since, on the whole, Google data centers use less electricity; hundreds of millions of gallons of drinking water are saved every year.

3.0 Copper LAN Cabling

3.1 Technology

The desire to increase flexibility and reduce energy consumption is driving development of the "Data Center in a Box." Several manufacturers have or will be deploying such data centers within the confines of a tractor trailer container housing a complete data center in the equivalent of about 4,000 square feet. Some of the familiar names include: Sun Microsystems, Microsoft, and Hewlett Packard. Each of these 40-foot containers could include more than 3,500 computer nodes or 12,000 hard drives and in the case of the HP offering, display a power capacity per rack of up to 27

kilowatts. The conventional access to all equipment includes front, rear, and overhead with management of this Performance Optimized Data Center (POD in the case of HP) is achievable by remote control or locally. A key advantage of these data centers is the flexibility given to designers in upgrading or extending the capacity of the physical infrastructure to meet specific business needs. For companies looking to deploy data centers in a short time frame, for example as a temporary expansion, a disaster recovery solution or just for basic expansion, this modular solution is ideal. The "PODs" are also transportable as freight via railway or by truck to a designated site. The HP PODs are built to order and can typically be shipped within 6 weeks.

4.0 Optical Technologies

4.1 Market

The thought of OM4 fiber invading the LAN and data center environment is not going over well in the standards body of IEEE 802.3ba. Corning initially wanted an OM3+ type of 50um Multimode fiber to address the market's need for longer transmission runs but studies show that only 1% to 5% of the data center market requires lengths longer than 100 meters. Corning would rather promote a Single Mode fiber. The consensus therefore in the standards body is that for 40G and 100G, an OM3 fiber using 850nm VCSEL will be sufficient for the transmission needs of data centers.

4.2 Technology

4.3 Where FTTH Falls Short

A recent article published in Lightwave suggests that if fiber to the home (FTTH) were to go directly into the home where the customer actually uses it, wireline service providers could see wider use of their services. Current wireline FTTH service providers focus on getting fiber service to the NCU (what does this stand for?) and then stops there. The business model of the wireless service providers shows that they actually deliver the service right to the device and end user, not just to the backbone. Verizon, Cingular/ATT and other wireless providers partner with the likes of Motorola, Nokia and other hand-held device makers to bring service right to the customer through cell phones, PDAs, etc. This service results in attracting more and more customers, generating better revenue streams for the service providers while simultaneously creating brand loyalty. This model also fosters more innovation in application diversity.

If the FTTH service providers were to adapt this model of bringing fiber capabilities directly to the device, instead of supporting only a 56-kbit/sec service on a laptop and scrambled, latency-affected viewing on a TV set, customers could enjoy all the real benefits of broadband services that fiber technology allows. The entertainment experience of HDTV and lightning-fast internet service would be applications for which many customers would be willing to pay a little bit extra. Verizon has taken up the challenge and is spending $23 billion through 2010 to build a new fiber network directly into people's homes. Consumers will no longer be restricted to(by?) bandwidth or have their networking speeds arbitrarily curbed, but instead will have enough bandwidth to indulge in applications such as weather and traffic reports on demand. The first such project has been initiated on the Upper East side of Manhattan in New York.

4.4 Ultra-wideband Update: WiQuest Loses Luster

A recent EE Times report states that WiQuest, the most successful of the ultrawideband (UWB) chip makers, has closed its doors. The company was the leader in a technology that delivered high bandwidth transmission for short distances. As the first technology to be adopted for personal area network (PAN) applications under IEEE 802.15 PAN, it appeared that UWB would supersede all others as the wireless technology of choice. Its speed exceeded that of 802.11. It was plagued, however, by unwelcome battles in standards committees and eventually lost the support of industry giants such as Microsoft and Intel, thus sealing its fate. All of this debate caused delay in UWB's implementation at a time when WiFi and WiMax were gaining wider acceptance in the wireless industry. At a recent consumer electronics show (CES), manufacturers including Kodak, Toshiba and Dell displayed products utilizing UWB interfaces but interest and sales never took off, further eroding the desire for the WiQuest product. This technology, although superior in bandwidth transmission could not secure Intel's backing and thus a good technology will probably go by the wayside unless adopted by another company with significant industry clout.

4.5 Next Generation Wireless Network using Visible Light

The US government is funding research into using next-generation LED lighting as data network access points replacing the current WiFi method. Room or street lamps would link with devices (iPhone, TV, computer, thermostat, etc.) using visible light, carrying data over existing power lines making a more ubiquitous and safe data transmission network. This technology is trying to enhance energy-efficient lighting as well as create the next generation of secure wireless communications as we switch from incandescent and compact florescent lighting to LEDs. Because the technique uses LEDs to build the network, such networks would have the potential of offering users greater bandwidth than current RF technology would allow. Additionally, since the white light does not penetrate opaque surfaces such as walls there is a higher level of security, as eavesdropping is not possible. The system will work on a similar principle to that of a television remote control unit except white LED light will send and receive data from device-to-device. with each LED acting as an access point to the network.

The research is being spearheaded by Boston University, Rensselaer Polytechnic Institute and the University of New Mexico under an initiative known as “Smart Lighting Engineering Research Center”. This technology could spawn a disruptive wave of new networking applications which meet the sustainability and energy efficiency criteria that the industry desires. Listed below is a brief comparison on the relative merits of this technology VS standard RF transmission:

Attribute	RF @ 2.4GHz	LED Optical
Security/ Privacy	Penetrates walls	Does not
Transmission Speed	100 Mb/s	Comparable, with volume for higher aggregate speed
Estimated comparative cost	<$20	<$2 (based on IrDA)
Cost of additional bandwidth spectrum	Very high when available	None (yet)
Path redundancy	Achieved with multiple access points	Achieved with multiple LEDs
Interference	Other users on same frequency slows transmission speed	Natural (sun) and man made light slows transmission speed

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.

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