(R)evolution in the Data Centre

Seizing opportunities from new challenges

Information

The critical corporate asset

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Topics

• The information tidal wave
• Global Survey
• Bandwidth Drivers
• Building ‘Information centers’
Information Tidal Wave
Challenging Future – tools

(Calculations per Second)

IBM ‘Toxic Terabyte’
“More transistors than rice grains produced in 2006! \((26\times10^{12})\)”


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Investment in cabling infrastructure technologies continue to be made on the basis of product quality, initial cost and technical performance.
As more and more employees depend on the company network, the impact of downtime on productivity loss, and ultimately on corporate costs, becomes an increasingly serious issue.
LAN Downtime

COST IMPACT OF DOWNTIME
- Minimal
- Bearable
- Major

% reduction in employee productivity when network is down/slow:
- 30
- 38
- 58

% IT support time spent on connectivity issues:
- 11
- 15
- 16

% IT support time spent monitoring network performance:
- 16
- 18
- 23

AVERAGE HOURS PER MONTH NETWORK IS DOWN OR PERFORMANCE IS DEGRADED/SLOW

COPPER
- Cat 5e: 2.0
- Cat 6: 1.9
- Cat 6A: 1.7

FIBER
- Singlemode: 1.9
- OM1/OM2 Multimode: 2.0
- OM3 Multimode: 1.7
Global Survey - Key Findings

- Speed Increasing
- Infrastructure Needs Growing to Match
- Cost Cutting Can Lead to Additional Expense
- Higher Performance Cabling Offsets Costs Related to Network Downtime, and Network Support, Management and Monitoring
Bandwidth Drivers
100G Ethernet (100GbE)
(not only 10GbE!)
## Bandwidth Drivers for 100GbE

### Survey Respondent Summary

<table>
<thead>
<tr>
<th>Organisation</th>
<th>Business Model</th>
<th>Bandwidth Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yahoo!</td>
<td>Portal/Content</td>
<td>Broadband/ Internet</td>
</tr>
<tr>
<td>Comcast</td>
<td>Residential Broadband</td>
<td>On Demand, HDTV</td>
</tr>
<tr>
<td>Cox Cable</td>
<td>Residential Broadband</td>
<td>P2P, Video</td>
</tr>
<tr>
<td>Cisco Systems</td>
<td>Network Vendor</td>
<td>DC Consolidation / Virtualisation</td>
</tr>
<tr>
<td>AMS-IX</td>
<td>Internet Exchange</td>
<td>Broadband/ Internet 10 GbE Services</td>
</tr>
<tr>
<td>Equinix</td>
<td>Internet Exchange</td>
<td>Data Centre to Data Centre links</td>
</tr>
<tr>
<td>LINX</td>
<td>Internet Exchange</td>
<td></td>
</tr>
<tr>
<td>IX in Japan</td>
<td>Internet Exchange</td>
<td></td>
</tr>
<tr>
<td>Level(3) Communications</td>
<td>Long Haul, ISP</td>
<td></td>
</tr>
<tr>
<td>Brookhaven National Lab</td>
<td>Research</td>
<td></td>
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<tr>
<td>Fermi National Lab</td>
<td>Research</td>
<td>High Performance Computing</td>
</tr>
<tr>
<td>Lawrence Berkeley Lab</td>
<td>Research</td>
<td>Moving large data sets over LAN and WAN links</td>
</tr>
<tr>
<td>Lawrence Livermore Lab</td>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>NERSC</td>
<td>Research</td>
<td></td>
</tr>
</tbody>
</table>

*Source: IEEE 802.3 HSSG CFI, July 2006*
IEEE HSSG Objectives for 100GbE

16 November 2006: HSSG adopted the following objectives:

- Support at least 100m on OM3 MMF
- Support at least 10km on SMF
- Support a speed of 100 Gb/s at the MAC/PLS interface
- Support full-duplex operation only
- Preserve the 802.3 / Ethernet frame format at the MAC Client service interface
- Preserve minimum and maximum frame size of current 802.3 Std

Very likely to use parallel optics technology for low cost implementation: Ideal for InstaPatch Plus solutions
Parallel Connectivity for Data Centers

• “Plug and Play” high density optical system
• Factory terminated and tested
• Fastest deployment and rearrangements
• High performance for today’s requirements and new parallel applications
Rough Estimate of Timeline for 100GbE Standard

Source: HSSG Nov 2006
## Ethernet: A Slice of History

<table>
<thead>
<tr>
<th>Ethernet Technology</th>
<th>Standards Approved</th>
<th>Economically viable for deployment $^1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>10BASE-T</td>
<td>1990</td>
<td>1994</td>
</tr>
<tr>
<td>100BASE-TX</td>
<td>1995</td>
<td>2000</td>
</tr>
<tr>
<td>1000BASE-T</td>
<td>1999</td>
<td>2005</td>
</tr>
</tbody>
</table>
| 10GBASE-T           | 2006               | 2012 (?)                               

$^1$ Note 1: Defined as a typical price of US $100 - $200 per NIC or can be implemented as LOM (LAN-on-motherboard) technology
10GBASE-T Products

Tehuti Networks  
TN7588-S, TN7588-D  
10GBASE-T Adapter

Chelsio Communications  
S310E-BT & N310E-BT  
10GBASE-T Adapter

Solarflare 10GBASE-T Demo Transceiver Board

PRESS RELEASES

IRVINE, Calif — March 12, 2007

Solarflare Communications and SMC Networks team-up to deliver high-performance, standards-compliant 10 Gigabit networking solutions—including a new 10GBASE-T product line—for data center and enterprise networks.
ISO/IEC Class $E_A$ is the most stringent specification.
(Information) Data Centers
Asia Pacific Structured Cabling Market Opportunity 2005-2010

India 2005-2010
- Structured cabling market grew CAGR 22%.
- DC cabling market grew CAGR 46%.
- Contribution of DC cabling grew from 24% to 36%
- Hyper-growth

SC Compounded Annual Growth Rate (CAGR) = 11%
DC SC CAGR = 33%

Source: AMI Partners
Data Centre General Trends and Issues

• Increasing power and cooling requirements
• Consolidation of servers into large centres
• Virtualization of servers and storage
• Greater focus on Tier level rating
• Life cycle of facility vs. electronics
• Automation of processes
**Infrastructure Standards for Data Centres**

- *Draft EN 50173-5:200x*: Information Technology – Generic Cabling Systems, Part 5: Data Centres
- **TIA/EIA-942 (SP-3-0092)**: Telecommunications Infrastructure Standard for Data Centres
- *Draft ISO/IEC 24764*: Generic cabling for data-centres

**Recognized Media in the Data Centre documents**

<table>
<thead>
<tr>
<th>Media</th>
<th><strong>EN 50173-5</strong></th>
<th><strong>TIA/EIA-942</strong></th>
<th><strong>ISO 24764</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper</td>
<td>Minimum Class E</td>
<td>Cat 6 and Cat 6A</td>
<td>Class E_A</td>
</tr>
<tr>
<td>Fibre</td>
<td>Minimum OM2 OS1</td>
<td>OM3 recommended OS1</td>
<td>OM3 recommended OS2</td>
</tr>
<tr>
<td>Connector</td>
<td>SFF (1-2 Fibers)</td>
<td>MPO (&gt; 2 fibers)</td>
<td>LC (1-2 Fibers)</td>
</tr>
</tbody>
</table>
Data Centre Infrastructure Drivers
(Source: Infonetics Research)

- Corporate Policy: 39%
- Speed of Deployment: 47%
- Total Cost of Ownership: 52%
- Ease of Management: 63%
- Control: 78%
- Availability of Data Center Resources: 79%
- Performance: 85%
- Security: 90%
# India- Drivers/Assumptions

| **FDI Inflow** | Rapid growth in FDI inflow over the last few years. 964 new projects were started in 2006, a drastic increase of almost 63% from 2005. Top 5 MNCs (in terms of number of projects) investing in India are Cognizant Technology Solutions (CTS), Oracle, Intel, LG Electronics and Microsoft.  
Impact: **IT & Network equipment spend to increase tremendously in the coming years.** |
| **Job Creation** | Indian ITeS-BPO industry is growing rapidly having clocked export revenues of $6.3 billion in FY2005-06. Nasscom has iterated that technology jobs will double to 1.7 million over the next four years.  
Impact: **Enterprise Structured cabling will see fabulous growth in the coming years along with Network equipment growth.** |
| **Residential Construction** | Residential construction remains very strong. India is set to experience a demand supply gap of 17.9mn housing units by 2010.  
Impact: **Residential Structured cabling component will take off in the coming years.** |
| **New Enterprise Construction** | Commercial real estate demand is expected to be around 350mn sq ft in 2010 out of which IT/ITES and organized retailing sector should contribute around 300mn sq ft.  
Impact: **This bodes extremely well for Enterprise Structured cabling demand in the coming years.** |
| **Data Center Trends** | • Indian Data Centre market is worth about 100 million USD and is likely to grow to 200 million USD by 2009. The Indian Data Centre market is growing at a CAGR rate of 21%.  
• The factors driving Indian Data Center Market are  
  – Increasing supply and decreasing cost of Internet bandwidth  
  – Domestic companies looking to host their mission-critical applications such as ERP CRM in third-party data centers  
  – Advantage of time-difference and cost  
• Google is set to open a billion-dollar data center in Andhra Pradesh, India, as the company's proposal has been cleared by the Indian government's Board of Approvals. The search and advertising giant is reportedly planning a facility with about 1 million square feet of floor space in one of India's Special Economic Zones  
Impact: **Data Center Structured Cabling will see exceedingly strong demand in the next few years.** |
| **Other Factors** | Convergence refuses to wait for regulations as India’s leading cable operators and telcos have begun rolling out triple play  
Impact: **Structured Cabling will see strong demand in the next few years.** |
Summary

• The information tidal wave – is here, NOW!
• Global Survey – cabling is now an investment NOT a cost
• Bandwidth Drivers – look beyond 10GbE
• Building ‘Information centers’ – well designed DC’s will give Enterprises competitive advantage
• India............