Green ICT and Fibre Cabling Systems

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Agenda

▪ What is Green ICT and why is it important?
▪ What are the pressures towards Green ICT?
▪ Fibre – superior green credentials
  • “Green” Fibre Cabling is not only for Data Centres
  • “Green” Fibre Cabling in Commercial Buildings
  • Fibre Cabling and Total Cost of Ownership
▪ Organisations involved in Green ICT
▪ Conclusion
What is Green ICT?

ICT users and suppliers reducing the harmful environmental impacts of sourcing and using ICT equipment

If we do nothing the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP and could rise to 20% of GDP or more.

The costs of early action to reduce emissions can be limited to around 1% of global GDP each year.
Some figures about the impact of ICT on the environment

European Union’s energy consumption is approximately 20% higher than can be justified on economic grounds.

- The global information and communications technology industry accounts for approximately 2% of global CO2 emissions.
- Energy costs - typically around 10% of an IT budget - could account for 50% of the average IT budget in just a few years.

Source: Gartner
The Business Case for Green ICT

- Reduction of the impact and cost of energy consumption
- Meeting customers and employees expectations
- Enhanced Reputation/Brand
- Operational Excellence/Increased Efficiency
- Staying ahead of forthcoming regulations
- Third party certification
- Market Opportunities
- Risk Reduction
Environmental Impact of Buildings

- 65.2% of total U.S. electricity consumption
- 30% of total U.S. greenhouse gas emissions
- 136 million tons of construction and demolition waste in the U.S.
- 40% (3 billion tons annually) of raw materials use globally
Benefits of Green Buildings

- Economic benefits
  - Improve the bottom line
  - Increase building valuation and ROI
  - Decrease vacancy, improve retention
  - Reduce liability and risk

- Environmental benefits
  - Reduce the impacts of natural resource consumption

- Health and safety benefits
  - Enhance occupant comfort and health

- Community benefits
  - Minimize strain on local infrastructures and improve quality of life
Productivity Benefits of Green Buildings

- Improve occupant performance
  - Estimated $29 –168 billion in U.S. national productivity losses per year
- Reduce absenteeism and turnover
  - Providing a healthy workplace improves employee satisfaction
- Increase retail sales with daylighting
  - Studies have shown ~40% improvement
Copper versus Fibre – Fibre Advantages

- Physical size – fibre takes up much less volume than copper cables
  - UTP CAT6A cable - Diameter = 9 mm (for 1 port)
  - 216 fibres cable: - Diameter = 19.3 mm (for 108 ports)
  - 2 UTP CAT6A cables = same space as 1 single 216 fibre cable

- Weight – much lighter than copper cables
  - UTP CAT6A cable 70 g/m
  - 216 fibres cable - 300 g/m
  - 4 UTP CAT6A cables = same weight as 1 single 216 fibre cable

- Pull strength – much higher than copper cables
  - UTP CAT6A cable - 80 N
  - 2 fibre cable - 220 N

- Flammability issues reduced
Copper versus Fibre – Fibre

Advantages

- Less cable tray required
  - Lower cost
  - Less air blocking
  - Easier moves and changes
- Longer cable runs – copper maximum 100m
- Larger bandwidth – 40Gbit/s +
- No heat or power issues (distance)
- No cross-talk or interference or earthing issues
- No segregation from electrical cable
Density – Racks

- Both copper and fibre connectors are capable of presenting 48 ports in 1HU
- Copper patchcords are much larger/less flexible than fibre patchcords and take up more management space in the rack
- 48 duplex fibre patchcords can be managed in 1HU
Copper versus Fibre – Copper Advantages

- Lower cost electronics
- End user price of switch ports – cost per port
- Much activity on lowering the power for 10GBASE-T
- Auto negotiation
- PoE (Power over Ethernet)
- Known technology
- Easy to install
Centralised Architecture

Centralized Fiber Architecture
Designed for fiber (300 meters)

No electronics

Electronics

Standardized in TIA/EIA-568-B.1 & ISO-11801, 2nd Edition
Green ICT and cabling systems

- Power savings generated by FTTD architecture
  - Network adapter cards or switch ports: a 10G fibre optic card generally uses less power than a copper one
  - No heating of the cabling
  - Better saturation of active ports (90% vs. 60%), being centralised and available to all network users
- Data cabling floor distributors needs
  - No power
  - No air conditioning/fan systems
  - No active fire protections
  - No access control systems
  - No UPSs
- Plus smaller size and weight – better airflow around the cable
Fibre Cabling can help save power
VoIP with fibre using IP soft-phones
Fibre Cabling can help save power

- A soft-phone is a software phone that resides on the computer
- You can use it exactly like a normal phone, using headsets
- No need for POE, nor POE+ switches
- No need for Media Converters
Cost Model

• The TIA Fiber Optic LAN Section (FOLS) has a cost model for FTTD vs distributed systems

  ■ FTTD is conventionally cheaper than a distributed architecture with fibre in the backbone and copper in the horizontal in some situations
Green Considerations

- Copper – producing one tonne of copper is equivalent to about 3 tonnes of CO2
- Glass is made of silica – an inexhaustible resource?
- The faster a copper network runs the more energy it takes
  - Longer links require more energy
  - 10 watts per port plus for a copper switch at 10GBASE-T
  - New more energy efficient switches are being designed
  - Cable heats up from the energy – limiting the bundle size
- Fibre network takes about 1-4 watts per port regardless of speed
Fibre is more “Green” than Copper

- No metal inside
  - Easier disposal of waste
  - Copper is recyclable
- Less insulation, jacketing (and shielding)
  - Manufacturing process has lower environmental impact
  - Lower weight of cables -> Easier and cheaper to be shipped
- Fibre can ease reaching certifications for “green buildings”
  - LEED
  - Energy Star
  - Green Globes
  - Green Seal
LEED® Rating System

(Leadership in Energy and Environmental Design)

• LEED is a tool developed by the U.S. Green Building Council (USGBC) members that support the adoption of sustainable building

• LEED is a certification process for buildings
# Global Replication of USGBC

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UK Green Building Council

- Launched in February 2007
- Membership organisation
- Part of the World Green Building Council federation
- Campaign for a sustainable built environment
- Providing clear direction for the sector as a whole
- Campaign for Real Data - full, fast and smooth roll-out of Energy Performance Certificates and Display EnergyCertificates
LEED® Rating System

- LEED for New Construction – Project Checklist
  - Categories
    - Sustainable Sites
    - Water Efficiency
    - Energy & Atmosphere
    - Materials & Resources
    - Indoor Environmental Quality
    - Innovation & Design Process
# LEED® and Cabling Systems

- Where Fibre Cabling can help:

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<th>Product/ System</th>
<th>LEED Credit</th>
<th>Rationale</th>
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| Fibre To The Desk Cabling System | M&R 2.1-2.2 - Construction Waste Mgmt. | • Reduced cabling diameter reduces pathway infrastructure  
• Reduced cabling diameter reduces the use of cable jacket materials  
• Future-proof performance extends the lifecycle of the cabling, decreasing the frequency of cable removal/disposal and installation of additional cabling |
| | E&A 1 – Optimize Energy Performance | • Maximization of active port usage to limit the installation of unnecessary active equipment |
| | I&DP 1.1 – Innovation in Design | • FTDD with Centralized Architecture |
Energy Star

- Building rating system developed by the U.S. Environmental Protection Agency and Department of Energy
- The Guiding Principles call for
  - integrated design
  - energy performance
  - water conservation
  - indoor environmental quality,
  - materials
- Aimed at helping Federal agencies and organizations:
  - reduce the total ownership cost of facilities
  - improve energy efficiency
  - improve water conservation
  - provide safe, healthy, and productive built environments
  - promote sustainable environmental stewardship
European Energy Star Programme

- Voluntary energy labelling programme for office equipment.
- Helps consumers identify office equipment products that save them money and help protect the environment by saving energy.
- Covers computers, monitors, printers, fax machines, copiers, scanners and multifunction devices.
- Manufacturers, assemblers, exporters, importers and retailers register with the European Commission allowing them to use the Energy Star label.

Regulation (EC No 106/2008) requires EU institutions and central Member State government authorities to use energy efficiency criteria no less demanding than those defined in the ENERGY STAR programme when purchasing office equipment.
Green Globes

- The Green Globes is an assessment and rating system currently used in Canada and the USA

Criteria

- Examples
  - Project Management Policies and Practices
    - Environmental purchasing, green specifications, energy-saving, high efficiency equipment
  - Energy
    - Energy demand minimization through space optimization
  - Resources – Systems options and building materials selection
    - Use of durable, low-maintenance materials
    - Construction and demolition waste reduction
Green Seal

- Green Seal works with manufacturers, industry sectors, purchasing groups, and governments at all levels to "green" the production and purchasing chain.

- Green Seal's specific programs include:
  - *Standards and Certification* — development of environmental leadership standards for specific product categories and certification of products and services that meet them
  - *Greening Your Government* — technical assistance to all levels of government in their purchasing, operations, and facilities management
  - *Choose Green Reports* — technical reports on products in a variety of categories giving specific brand recommendations of those that meet screening criteria
  - *Greening the Lodging Industry* — long-term project with hotels and motels to green their operations and purchasing, including certification of specific properties
  - *Policy* — leadership in green procurement policy (product recommendations), international policy for ecolabeling, etc.
Code of Conduct for Data Centres

- Aimed at Data Centre Owners and Operators (Participants) & supply chain and service providers (Endorsers)
- Aims to minimise energy consumption in data centres
- Covers IT load and facilities load (electrical consumption)
- Covers new and existing data centres
- Participants agree to a set of improvement actions in a set time scale
- Endorsers (Vendors, Consultancies, Utilities, Government Industry Associations/Standards bodies - develop products, solutions and programmes to enable data centre owners and operators to meet the expectations of the Code of Conduct.
- Best practice supplement
Guide to Sustainable Office Fit-outs

- Issued by the Ministry of Environment of New Zealand
- Practical suggestions and checklists to help make sustainable decisions when undertaking office refits

Cabling and Wiring

- **Main recommendations for design:**
  - Minimise wiring runs
  - Install voice-data-video (VDV) cable that can serve upgraded networks so that cable will not become obsolete as quickly
  - Minimise electromagnetic fields. Rely on 'prudent avoidance' strategies to minimise exposure of building occupants to electromagnetic fields

- Specify halogen-free products
- Use fibre-optic cable
  - Fibre optics require less insulation and jacketing than copper wiring because they transmit light signals instead of electricity
  - It may be possible to run fibre-optic trunk lines to smaller copper distribution lines, thus reducing total insulated cable use
How FTTH can help the Environment

- Study Shows Fibre to the Home is a Green Technology
- "Updating the last mile in telecommunications networks with high-bandwidth, direct fibre optic connections to homes and businesses will deliver substantial environmental benefits in the short term - outweighing the environmental costs of deployment in as little as six years - according to a study released by the consulting firm PricewaterhouseCoopers (PwC)"

- Source: FTTH Council
- http://www.ftthcouncil.org/?t=294
Conclusion

- There is a **real need** to reduce the impact and cost of energy consumption in ICT
- **Green ICT** can help customers and employees expectations
- **Green ICT** can help with keeping ahead of forthcoming regulations
- Fibre improves the *lifecycle cost or total cost of ownership* of the cabling and networking enterprise system
- Fibre has a longer lifespan than copper cable – will run 40 & 100Gbit/s – less refurbishment
- **FTTD** cheaper than a distributed architecture with fibre in the backbone and copper in the horizontal *in some situations*
Any Questions?

1979

2003

Source: NASA