Fiber To The Office (FTTO) For Future-Proofed, Energy-Efficient and Economical Premise Cabling

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Agenda

• Modern Data Networks
• Cabling Technologies
• Fiber To The Office (FTTO)
• Why FTTO
• Question & Answer
Modern Data Networks

- High performance infrastructure
- Flexibility
- Fault tolerance
- Security
- Investment protection
- Economic efficiency
- Green and sustainable
Media Options

- Twisted pair copper cables
- Fiber optic cables
- Coaxial cables
- Wireless
Copper Based Structured Cabling

- Structured Cabling Network – Copper
- Structured Cabling Network – Fiber
  - Passive Optical LAN (POLAN)
  - Fiber To The Office (FTTO)
Copper Based Structured Cabling
Copper Based Structured Cabling

- Strict length limitations (90 m)
- Many wiring cabinets for termination
- High fire load and susceptibility to EMI
- Electromagnetic and radio frequency interferences
- Average bandwidth per user is limited
  - one central switch port is shared by up to 24 or 48 users
Copper Based Structured Cabling

- Copper based structured cabling includes components such as:
  - CAT 6A RJ-45 Patch Cord
  - Fiber optic backbone cable
  - Wall outlet
  - Access Switch
  - CAT 6A Patch Panel
  - Fiber Optic Patch Panel
  - Fiber Optic Patch Panel
  - Core Switch
  - Telecom Room with 19" cabinets
  - Equipment Room with 19" cabinets

- The network infrastructure consists of:
  - CAT 6A Horizontal cable <= 90m
  - Fiber Optic Cable, MM or SM, 2 core (for longer than 90m links)
  - Telecommunication Room with 19" cabinets
  - Equipment Room with 19" cabinets
  - CAT 6A Patch Cord
  - Computer
  - IP Telephone
  - IP Camera
  - IP Video
  - Media Converter
  - IP Telephone

FTTTo
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Future Proofed LAN Solutions

• Applications on LANs keep increasing
• Scalable infrastructure for future-proof solution
• Optical fiber is the best medium
• Fiber based LAN concept combines the advantages of fiber with the requirements of modern enterprise networks
Advantages of Optical Fiber

• Higher data rates
• Larger line lengths
• Freedom from EMI/RFI
• Smaller pathways
• High security
Advantages of Fiber Based SCN

- Future-proof (scalable, flexible, sustainable)
- Investment protection/life cycle
- Secure network
- Low investment cost
- Low maintenance cost/simple administration
- Quick and simple realization
- Up to 70% less energy consumption
Fiber Based Structured Cabling

- Fiber is distributed to the workplace (connection point)
- Fiber to copper conversion via intelligent Fiber To The Office (FTTO) micro-switches
- Up to four twisted pair (TP) devices can be connected via the micro-switch to one fiber port
- Power over Ethernet (PoE+)
- Simple and flexible network roll-out
Fiber Based Structured Cabling

- Fiber Optic backbone cable
- Wall Mounted Splice Enclosure
- Fiber Optic Splice Box
- Fiber Optic Cable, MM or SM, 2 core
- Equipment Room With 19" cabinets
- Core Switch
- Fiber Optic Patch Panel
- Fiber Optic Patch Panel
- FTTO Switch
- FTTO Switch
- CAT 6A Patch Cord
- Computer
- IP Telephone
- IP Camera
- IP Video
- IP Camera
- IP Telephone
Fiber Based Structured Cabling

- No need for floor telecom rooms
- 60% less installation time
- Low cable volume
- High bandwidth reserves thanks to fiber
- No grounding or earthing problems
- No problems with electromagnetic interference
- Simple redundancy up to the network outlet
- Up to 40% less TCO (Total Cost of Ownership)
FTTO Reduces Cost

FTTO Makes Gigabit Ethernet Cost-Effective for medium to large IT-Infrastructures

• CAPEX (Capital expenditure)
• OPEX (Operational expenditure)
• Flexibility
FTTO – Green and Sustainable

- FTTO saves up to 70% in energy costs
- FTTO is the greenest network solution
- No need for energy hungry floor distribution rooms
  - Less power consumed
  - Less active equipment also means less CO2-Footprint and less impact on the environment
  - Less technical rooms also means more useable area
Fiber Requires Less Energy

Due to fibre physics, less energy is required to transport data over fibre.

- Fibre transmission can halve energy requirements in comparison with traditional copper cabling solutions.
- Fibre optic cables can carry signals with much less energy loss than copper cable as copper wires lose signal energy as heat (P=I^2R) due to their resistance.
FTTO Consumes Low Power

Micro FTTO switch consumes low power, i.e. 0.5 – 1 W per port for data transmission – as against 3-4 W per port for traditional rack mounted switches.
FTTO is Energy Efficient

FTTO micro-switches support “Eco-Mode” and Energy Efficient Ethernet (IEEE 802.3az)
- Passive Optical LAN
- Originated from WAN
- Similar to FTTH
- Uses PON components in an indoor environment
- Optical fiber (single mode) is deployed almost all the way to the end user
POLAN

Disadvantages

- Shared bandwidth
- Time Division Multiplexing
- OLT/ONT from single vendor
- Link upgrades
- Building automation services
Fiber To The Office (FTTO)

- Developed for LAN sector
- Ethernet Switches at central position
- Future proof concept
- Gigabit performance
FTTO Advantages

• 1 Gb shared by only 4 users, dynamic allocation
• Multi vendor products can be used
• Cabling infrastructure is application-neutral
• Selective upgrades to higher data rates (10G)
• Support multiple redundancy options
Comparison of Technologies
FTTO Switch

- Easy installation and operation
- Compact dimensions, universal 45x45 design
- Universal snap-In mounting into
  - Cable trunks, sub-floor boxes, wall boxes
  - In wall / desktop (desktop box, laboratory unit)
  - Distribution racks (DIN-rails)
- Simple configuration and monitoring via network management
FTTO Power Supply and PoE+

- IEEE Std. 802.3at, compatible according to PoE+ (802.3at)
- Up to 30 W per end device
- min. operating voltage 50V (typ. 54V)
FTTO Installation Options
FTTO is Standard Compliant

**ANSI/TIA-568.1-D**
- Standardised as Centralized cabling
- Singlemode cable can now be used in horizontal cabling

**EN 50173**
- Recognized as collapsed backbone cabling

**ISO 11801**
- Recognized as FTTO and centralized optical architecture (COA)
Centralized Optical Fiber Cabling

ANSI/TIA-568.1-D

Commercial Building Telecommunications Cabling Standard
FTTO Redundancy – Variant 1

Classical FTTO with Cascading via Copper

• The simplest form of redundancy: Two micro switches are connected via a copper patch cable
FTTO Redundancy – Variant 2

Classical FTTO with Cascading via Fiber Optics

- Cascading via fiber optics: One port of a micro switch is connected with a core switch, the second with another micro switch
FTTO Redundancy – Variant 3

Classical Dual Homing – Double Fiber Connections

• Dual homing: micro switch with two mutually independent fiber optic connections, connected with two separate switches
FTTO Redundancy – Variant 4

Dual Homing with Single Fiber

- Dual homing with single fiber: switches with BiDi-SFPs
FTTO for Commercial Buildings

- Future proof hardware
- Reduced energy consumption
- Flexible configuration management
- Tamper proof housing
- Innovative installation concept
FTTO for Airports

Reliable in-house networking architecture for airports

- Almost no length limitations
- Minimal wiring cabinets needed
- No EMI susceptibility and very high network reliability
- Easily expandable by using downlink port
- High bandwidth per user
Flexible applications for triple play throughout the entire clinical environment

- Applications in patient care, operating theatre and administrative areas
- Direct integration into ceiling-mounted units
- Integration of IP-based call systems
- Suitable for IP-based patient monitoring systems
FTTO for Campus/Universities

Flexible wireless network access to educational content and information systems

- Integrated powering of wireless equipment and VoIP telephones via Power-over-Ethernet
- Usable with all important security protocols (authentication in accordance with IEEE 802.1X, RADIUS)
- Future-proof thanks to IPv6 support
FTTO Installations

Dubai International Airport
World's busiest international airport

Concourse A and D
FTTO Installations

DNU - Det Nye Universitetshospital

Denmark’s fiber-based hospital of the future
FTTO Installations

College de l'oise, France

Ministry of Justice, Kiel/Germany
FTTO Installations

Leipzig Medical University, Germany

Cannes Hospital, France
FTTO Installations

Munich University, Germany

Copernicus Airport, Wroclaw, Poland
FTTO Installations

The Territorial Hospital Centre (CHT) of New Caledonia, a French territory in the South Pacific

E.ON Ruhrgas AG
Essen/Germany
FTTO Installations

Four Star Hotel Complex
Bora Bora, French Polynesia

Władysław Biegański Regional Specialist
Hospital, Grudziądz, Poland
Bahrain awards $1.1bn contracts for new airport terminal

By Neil Halligan Sunday, 24 January 2016 4:40 PM

Bahrain has awarded a contract worth $1.1 billion to construct a brand new terminal at Bahrain International Airport to a joint venture of between the UAE’s Arabtec and TAV Construction from Turkey.
• Fiber based structured cabling is more beneficial in many ways
• FTTO is a future proofed and profitable network concept
• CAPEX and OPEX are lower than conventional copper based structured cabling
• Fiber based SCN is green and sustainable
• Increasing number of projects with FTTO
QUESTIONS?
Thank you for listening

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