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
Cabling Technologies

- 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

- **Telecom Room with 19" cabinets**
  - Fiber Optic Patch Panel
  - Access Switch
  - CAT 6 Horizontal cable <= 90m

- **Equipment Room with 19" cabinets**
  - Fiber Optic Patch Panel
  - Core Switch
  - Fiber Optic Cable, MM or SM, 2 core (for longer than 90m links)

- **Fiber Optic Backbone Cable**
  - CAT 6A Patch Panel
  - Wall outlet CAT 6A RJ-45
  - CAT 6A Patch Panel
  - CAT 6A Patch Cord
  - Computer
  - IP Telephone
  - IP Camera
  - IP Video
  - Media Converter
  - IP Telephone

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

- No need for floor telecom rooms
- 60% less installation time
- Low cable volume (one fiber cable instead of 4 copper cables)
- High bandwidth reserves thanks to fiber
- No grounding or earthing problems
- No problems with electromagnetic interference
- Simple redundancy up to the network outlet (optional)
- 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

Energy Consumption / Costs

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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)
POLAN

- 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
- Point-to-multi-point
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
- Standardized as Centralized cabling
- Singlemode cable can now be used in horizontal

EN 50173
Recognized as collapsed backbone cabling

ISO 11801
Recognized as FTTPD 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

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
FTTO for Healthcare

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
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Leipzig Medical University, Germany

Cannes Hospital, France
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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

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FTTO Installations

Four Star Hotel Complex
Bora Bora, French Polynesia

Władysław Biegański Regional Specialist Hospital, Grudziądz, Poland
FTTO Newest Project
Bahrain Airport

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.
Summary

- 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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