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

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Agenda

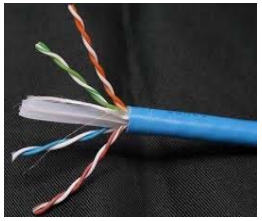
- Modern Data Networks
- Cabling Technologies
- Fiber To The Office (FTTO)
- Why FTTO
- Question & Answer

Modern Data Networks

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

Media Options

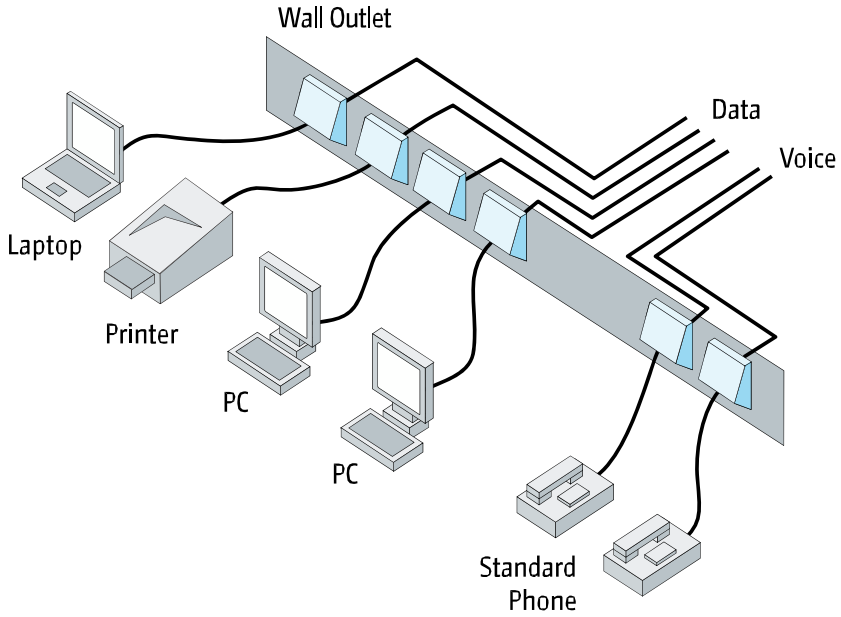
- Twisted pair copper cables
- Fiber optic cables
- Coaxial cables
- Wireless




Cabling Technologies

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

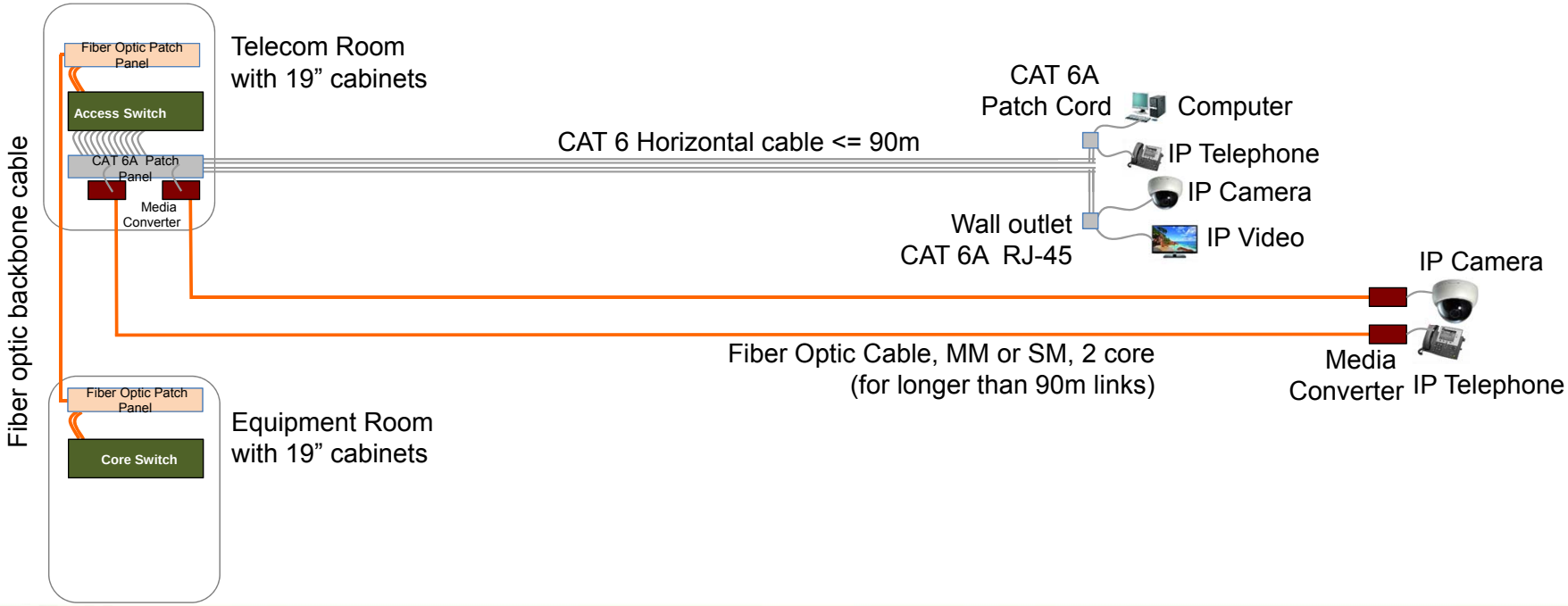
Copper Based Structured Cabling



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

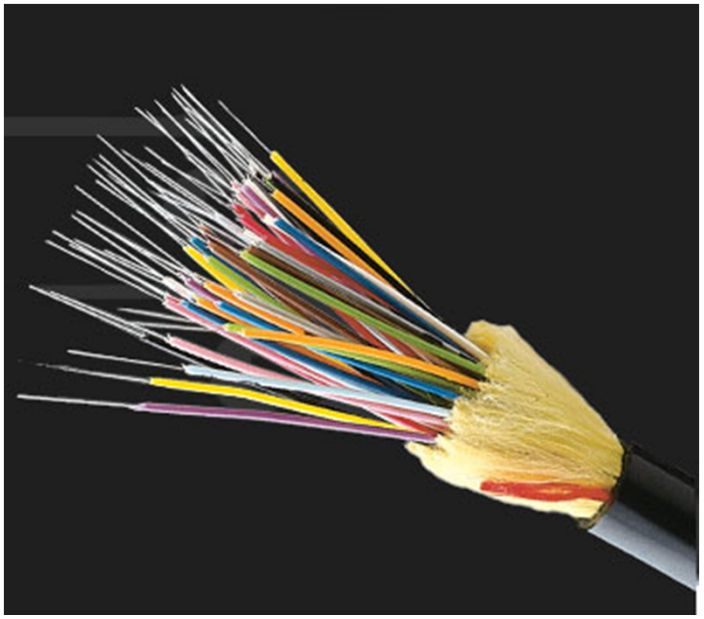


Future Proofed LAN Solutions

- 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



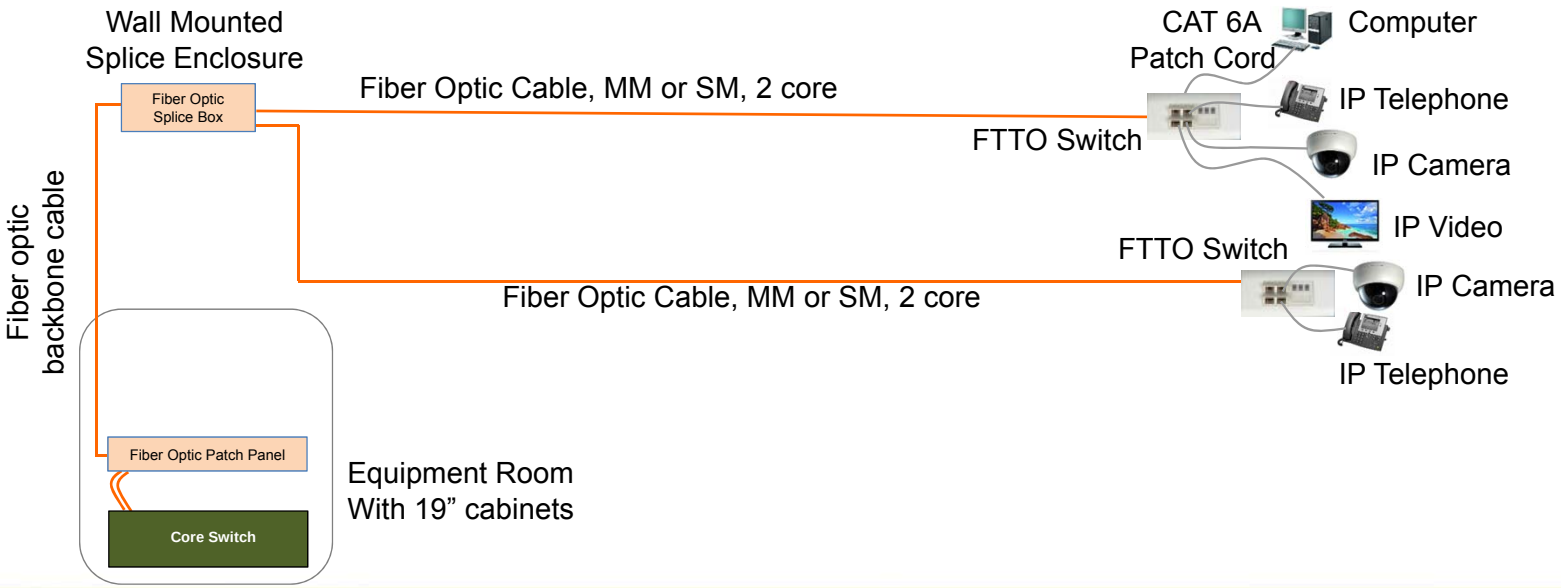
Advantages of Fiber Based SCN

- 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



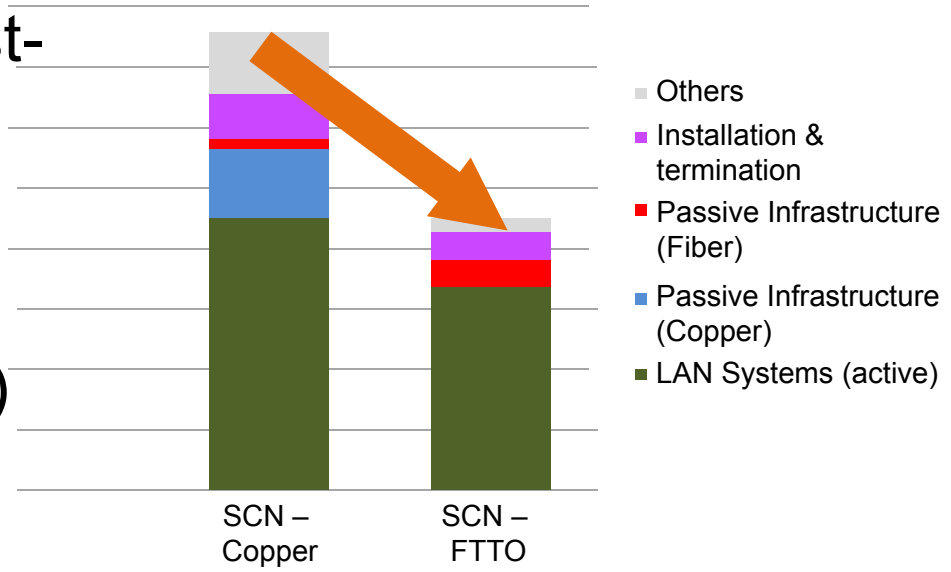
Fiber Based Structured Cabling

- 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

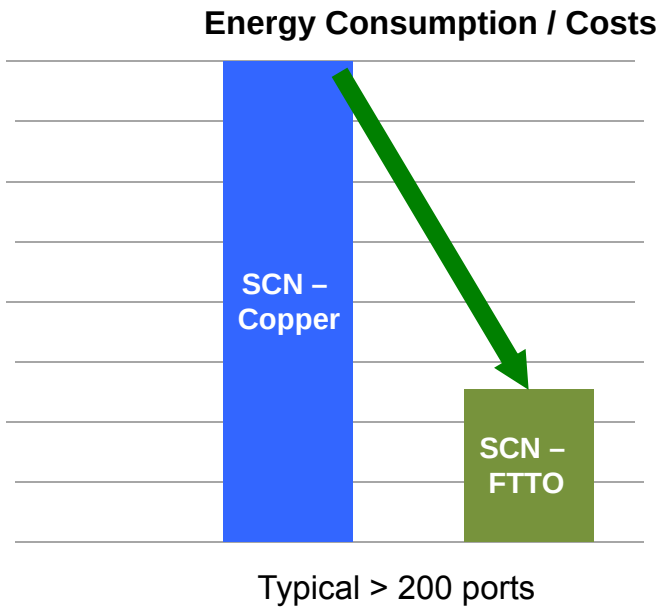
FTTO Makes Gigabit Ethernet Cost-Effective for medium to large IT-Infrastructures

- 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 CO_2-Footprint and less impact on the environment
  - Less technical rooms also means more useable area

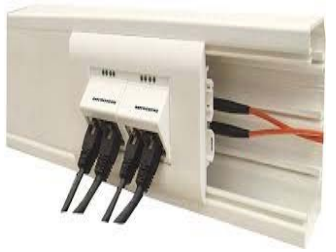


Fiber Requires Less Energy

- 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



0.5-1 W/port

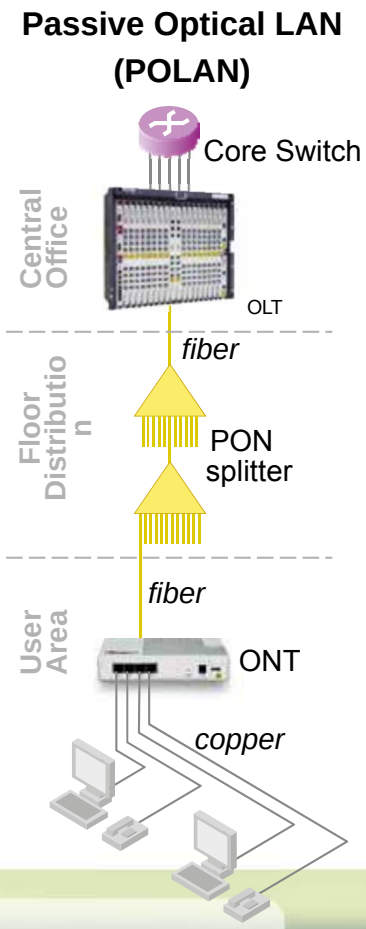
3-4 W/port

FTTO is Energy Efficient

- FTTO micro-switches support "Eco-Mode" and Energy Efficient Ethernet (IEEE 802.3az)

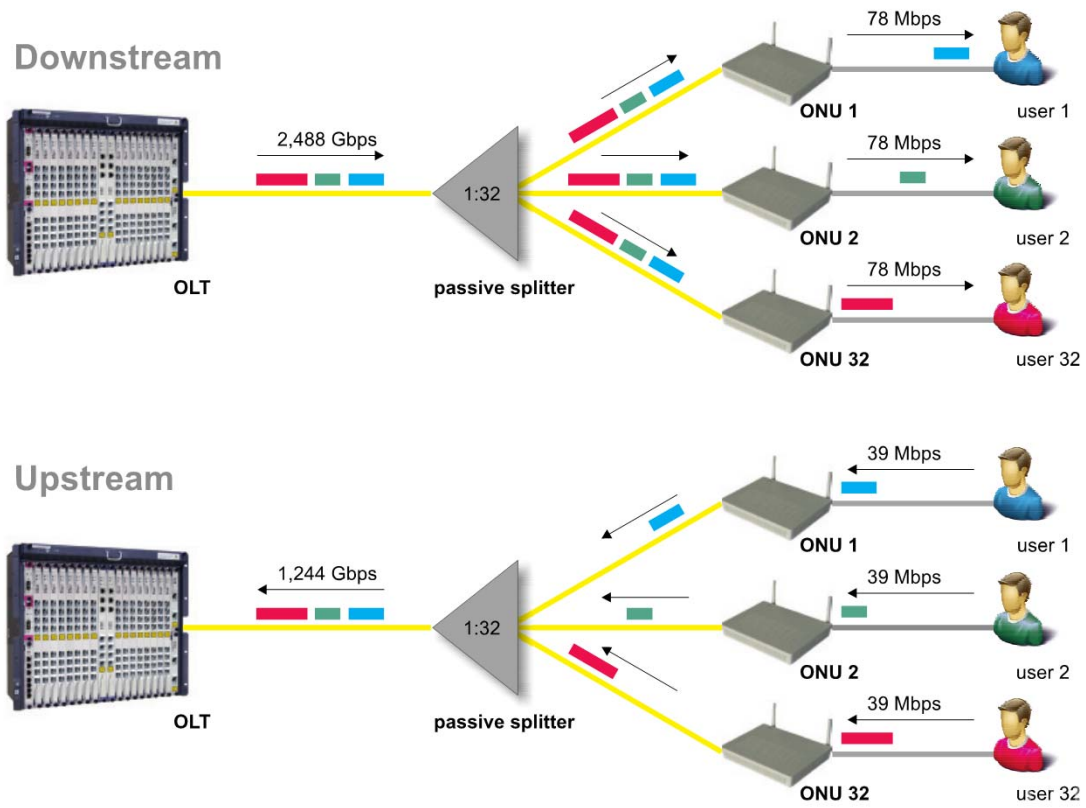
POLAN

- 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



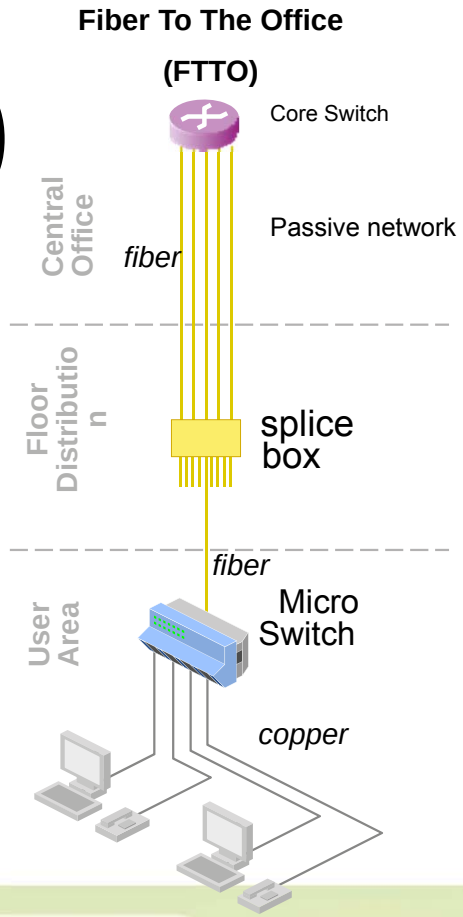
POLAN Disadvantages

- Shared bandwidth
- Time Division Multiplexing
- OLT/ONT from single vendor
- Link upgrades
- Building automation services



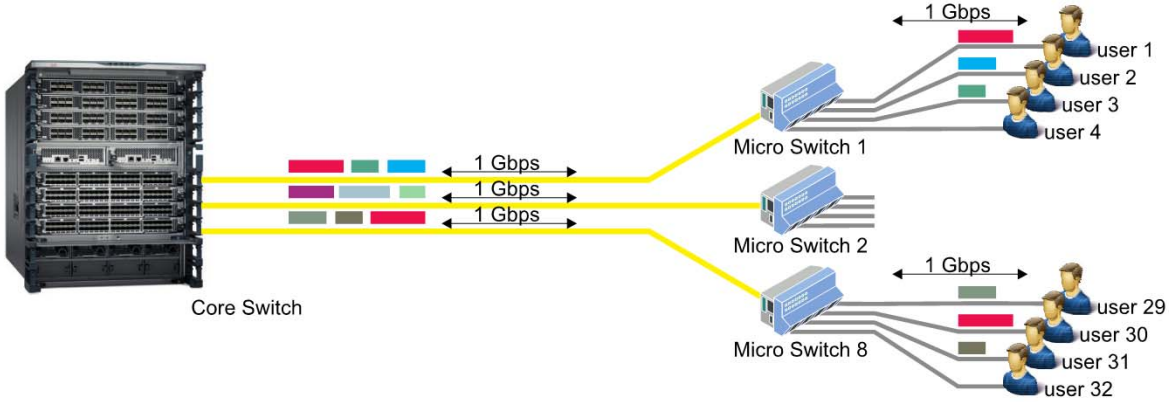
Fiber-To-The-Office (FTTO)

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

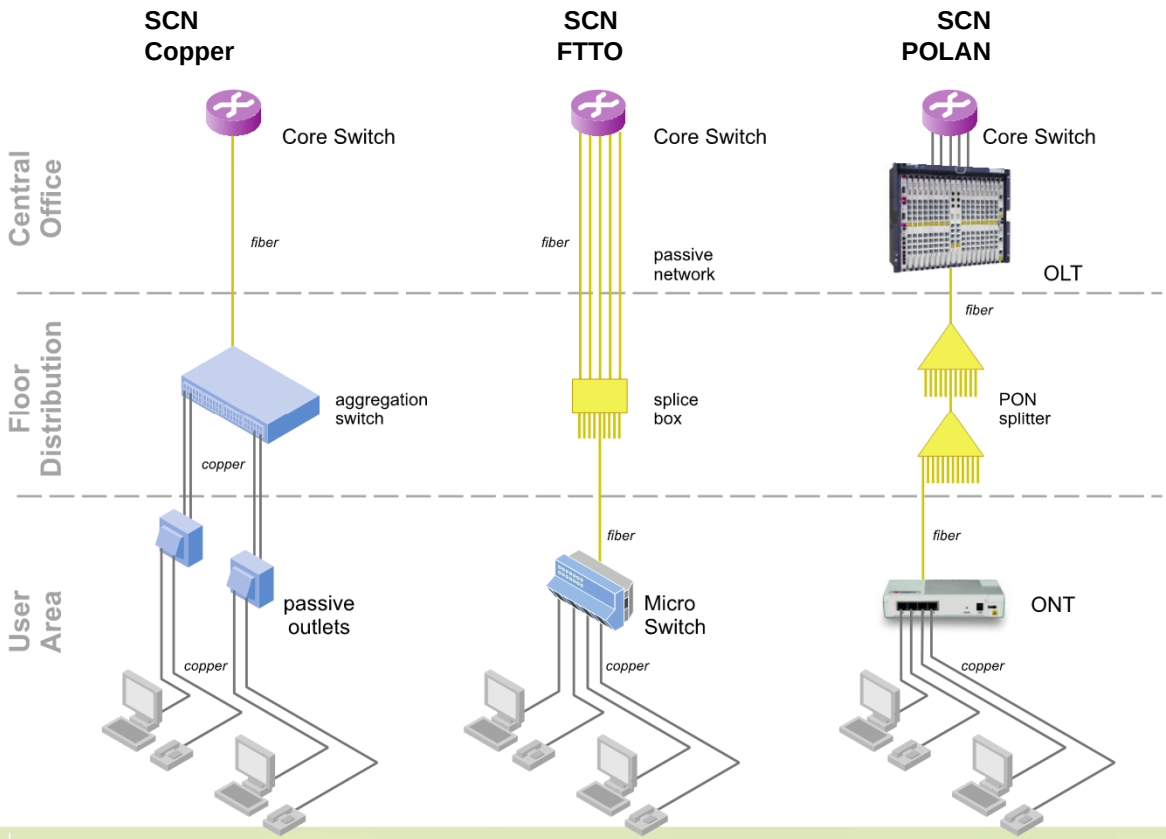


FTTO Advantages

- 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

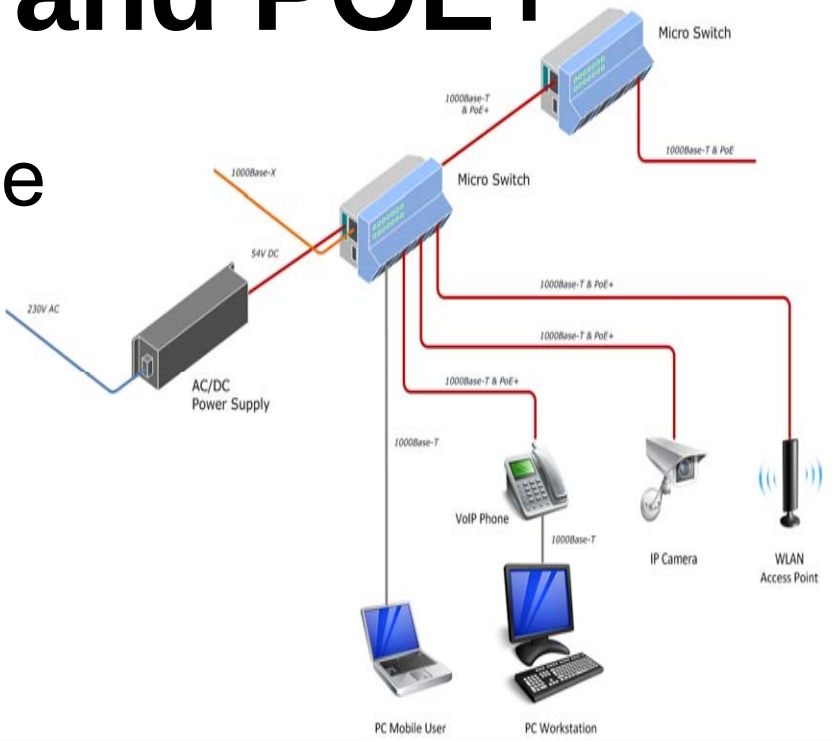


FTTO Switch

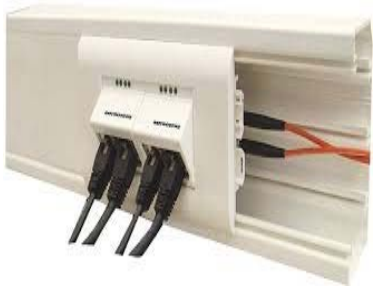
- Easy installation and operation
- Compact dimensions, universal 45x45 design
- Universal snap-In mounting into
  - Cable trunks, sub-floor boxes, wall boxes
  - In wall / desktop (desktop box, laboratory unit)
  - Distribution racks (DIN-rails)
- Simple configuration and monitoring via network management

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

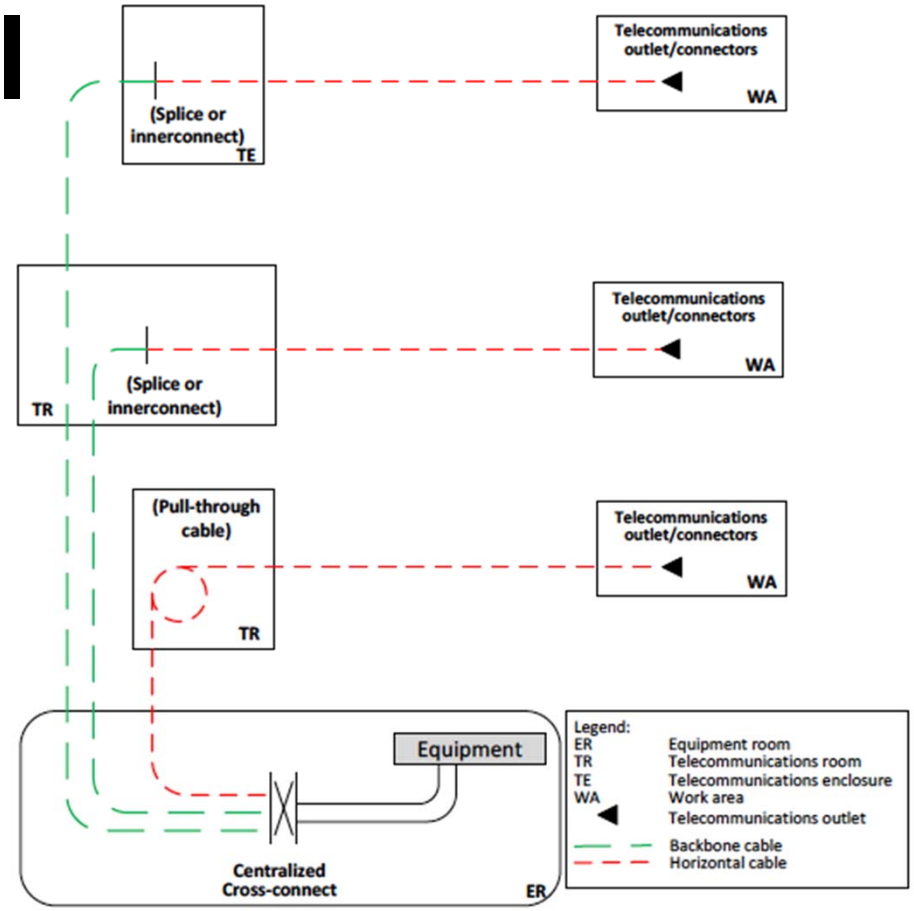
Recognized as FTTD and centralized optical architecture (COA)

Centralized Optical Fiber Cabling

ANSI/TIA-568.1-D

Commercial Building Telecommunications

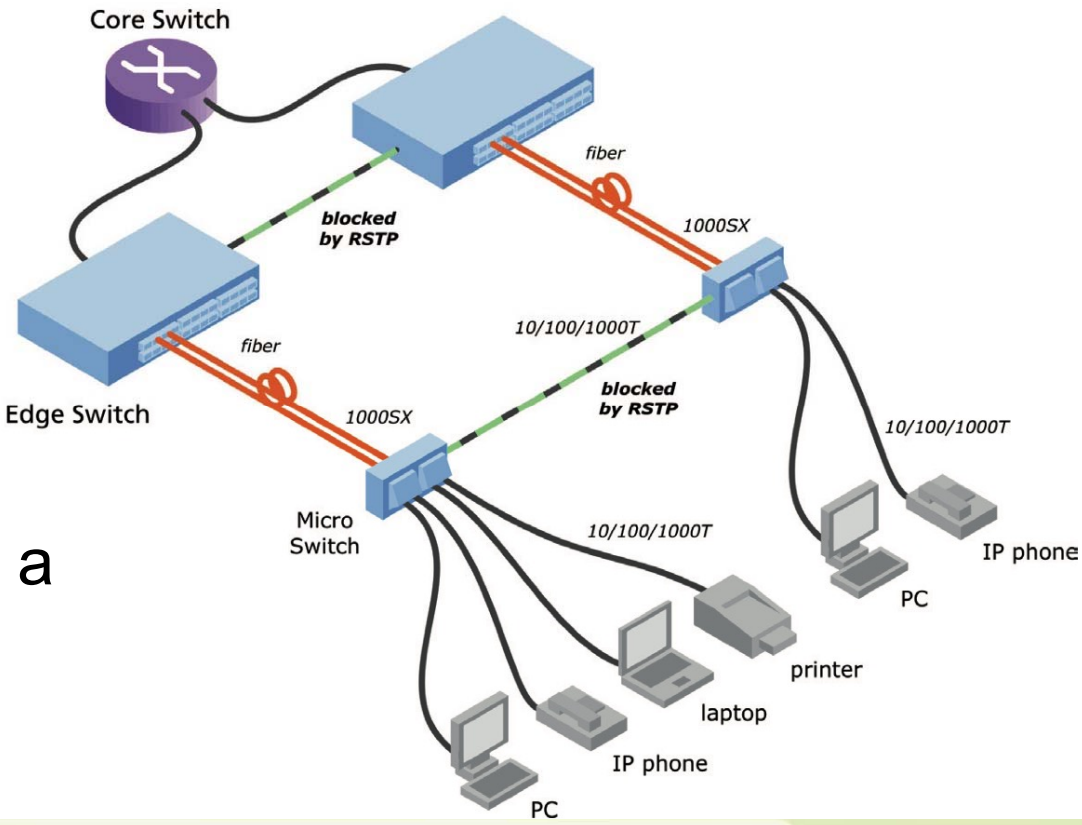
Cabling Standard



FTTO Redundancy – Variant 1

Classical FTTO with Cascading via Copper

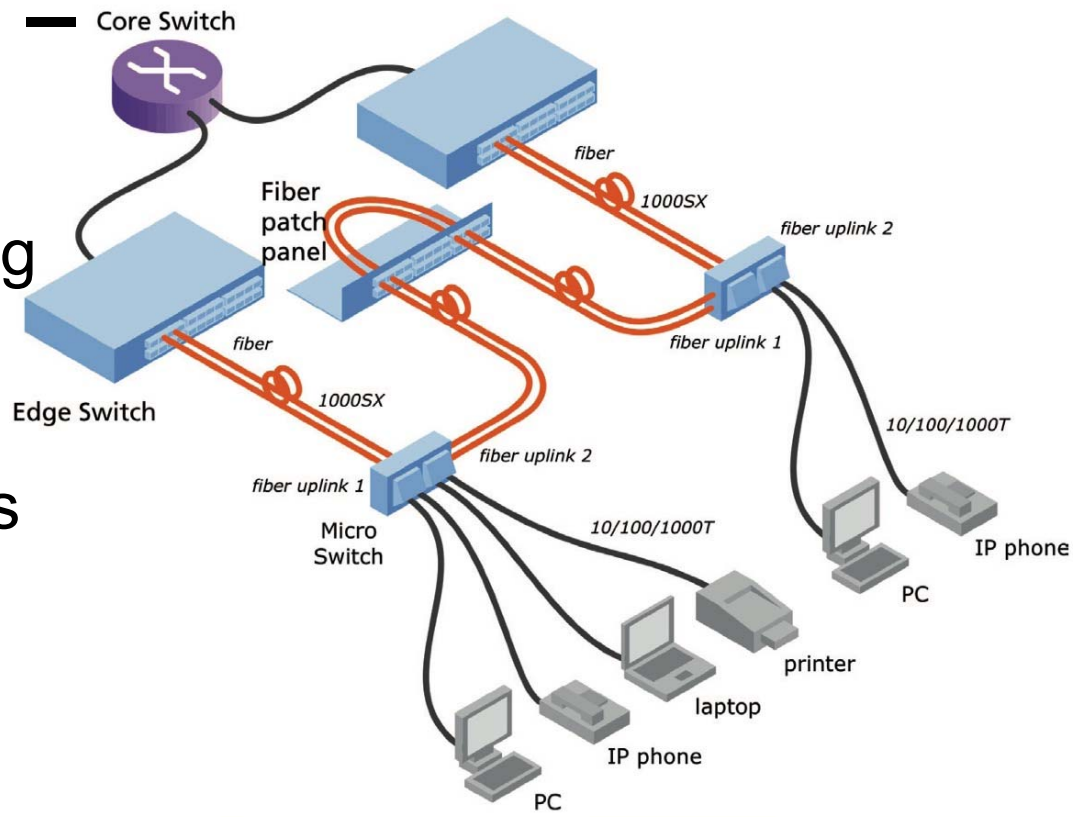
- The simplest form of redundancy: Two micro switches are connected via a copper patch cable.



FTTO Redundancy – Variant 2

Classical FTTO with Cascading via Fiber Optics

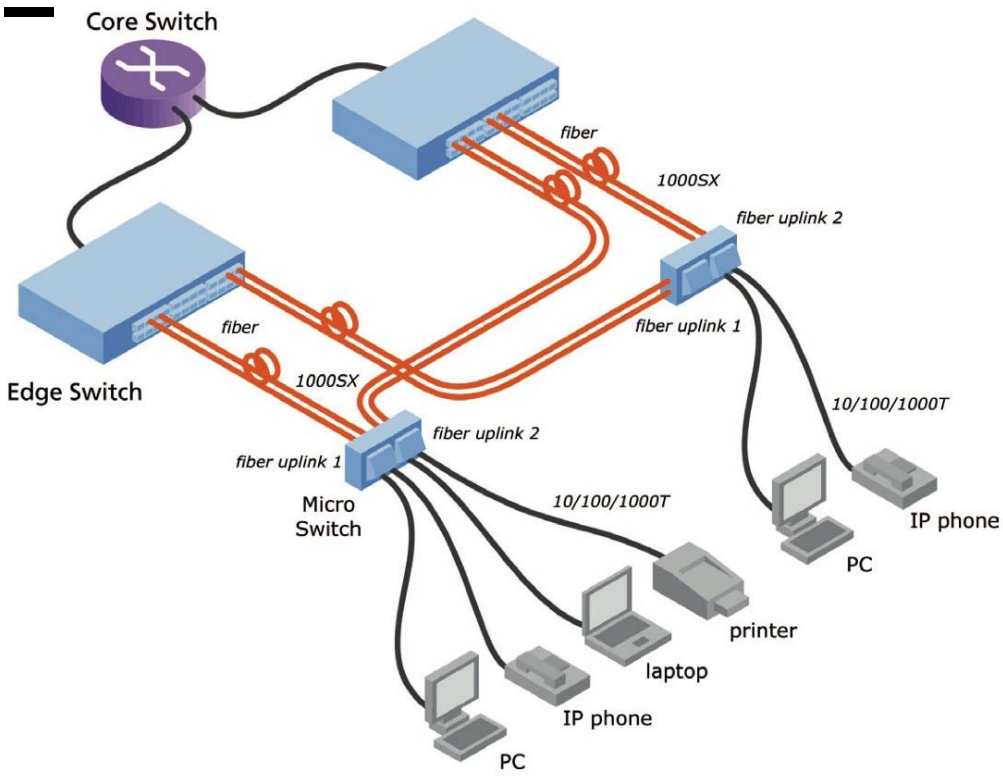
- Cascading via fiber optics: One port of a micro switch is connected with a core switch, the second with another micro switch



FTTO Redundancy – Variant 3

Dual Homing – Double Fiber Connections

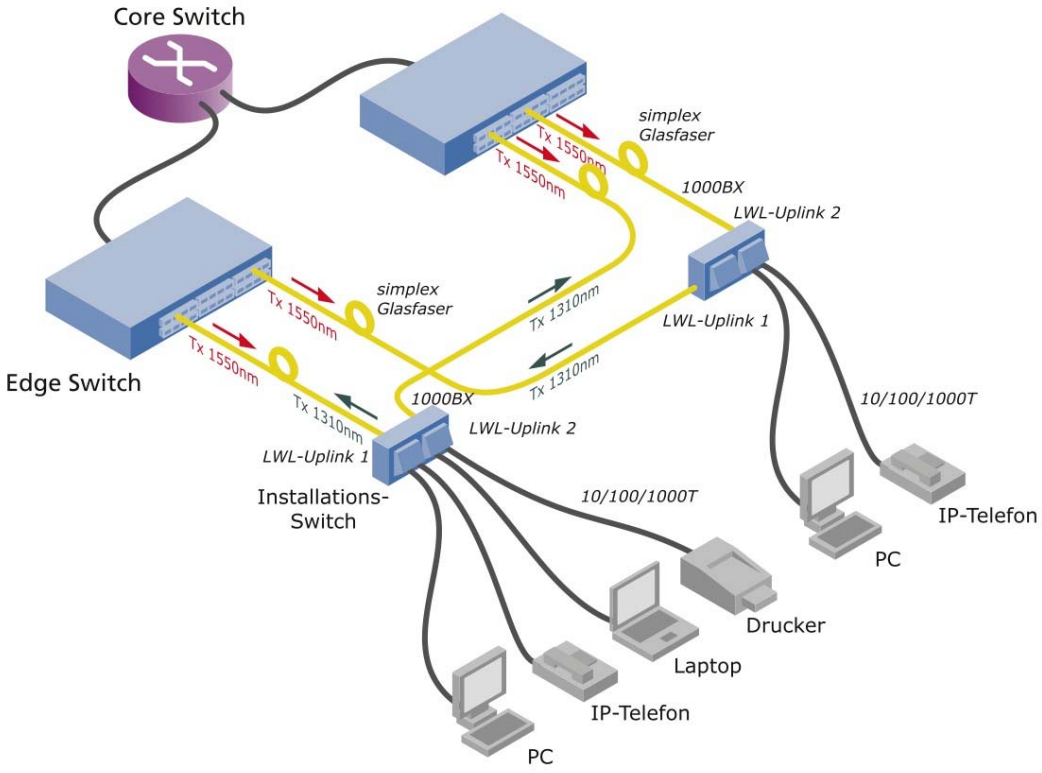
•Dual homing: micro switch with two mutually independent fiber optic connections, connected with two separate switches



FTTO Redundancy – Variant 4

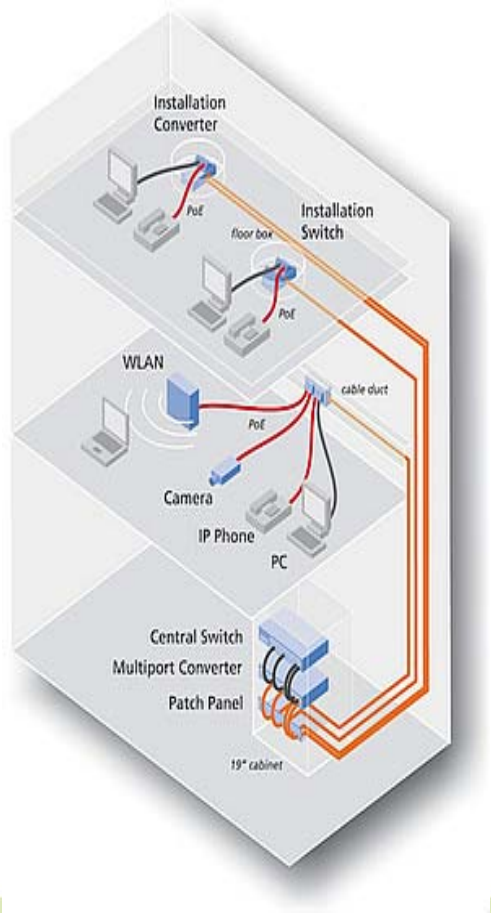
Dual Homing with Single Fiber

- Dual homing with single fiber: switches with BiDi-SFPs



FTTO for Commercial Buildings

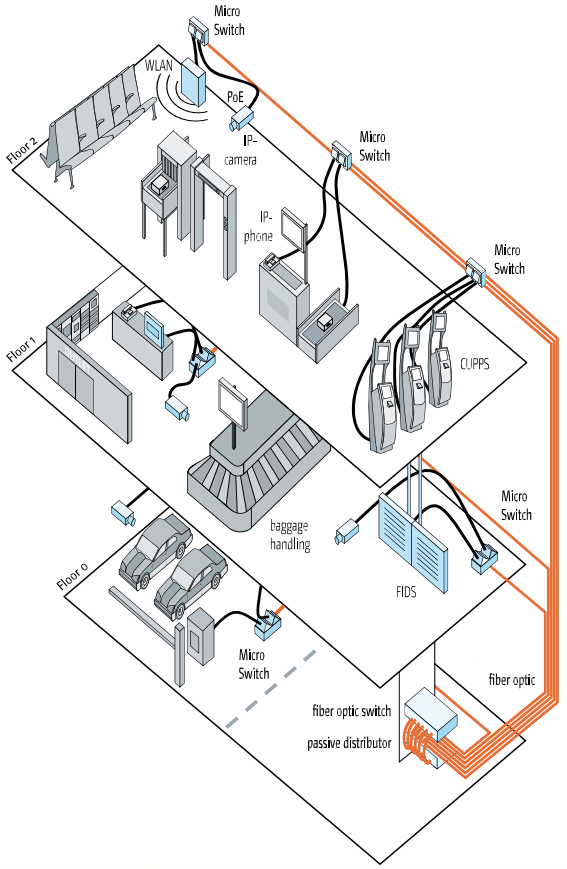
- Future proof hardware
- Reduced energy consumption
- Flexible configuration management
- Tamper proof housing
- Innovative installation concept



FTTO for Airports

Reliable in-house networking architecture for airports

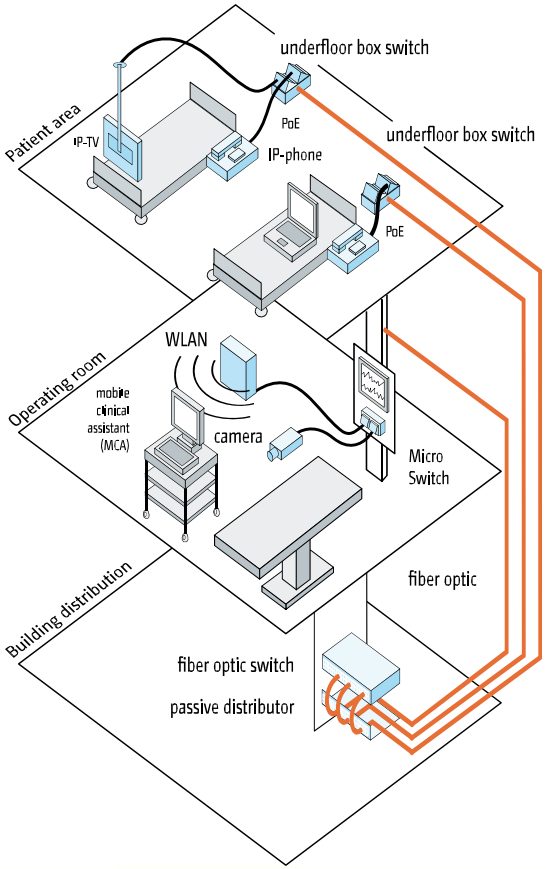
- Almost no length limitations
- Minimal wiring cabinets needed
- No EMI susceptibility and very high network reliability
- Easily expandable by using downlink port
- High bandwidth per user



FTTO for Healthcare

Flexible applications for triple play throughout the entire clinical environment

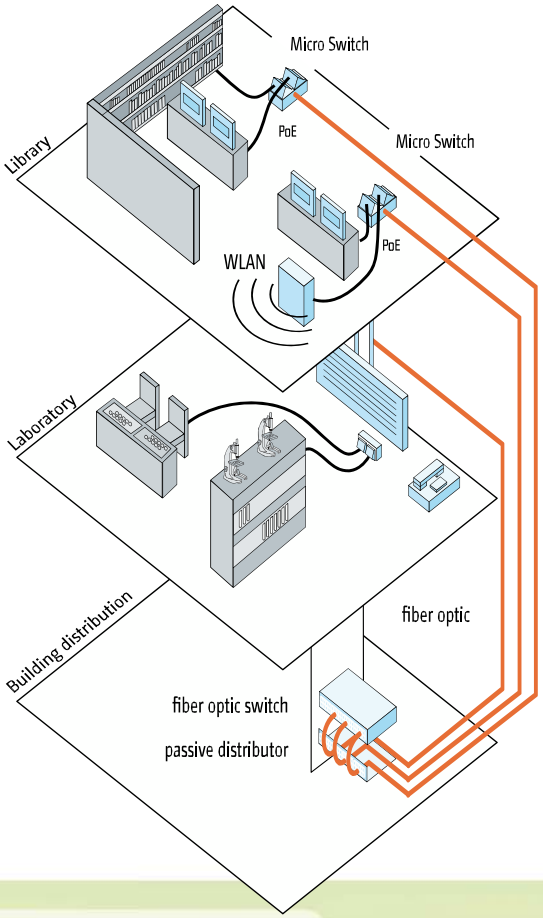
- Applications in patient care, operating theatre and administrative areas
- Direct integration into ceiling-mounted units
- Integration of IP-based call systems
- Suitable for IP-based patient monitoring systems



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

FTTO Installations

Leipzig Medical University, Germany

Cannes Hospital, France

FTTO Installations

Munich University, Germany

Copernicus Airport, Wroclaw, Poland

Copernicus
AIRPORTWROCLAW

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

FTTO Newest Project

Bahrain Airport

Bahrain awards $1.1bn contracts for new airport terminal

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

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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.

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- Bahrain awards $26m contract for airport expansion
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Companies

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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