Fundamentals of Fiber To The Office (FTTO)

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Microsens, Germany
Agenda

• Introduction of FTTO
• Design Guidelines
• Installation Practices – Hardware & Configuration
• Management of FTTO’s
• Q&A
Introduction

• History

FTTO Technology emerged in Germany at the start of the 1980s when fiber based connectivity was extensively explored and meet the following,

- Ethernet based
- Long Life Cycle
- Redundancy
- Security
- Improved energy efficiency
- Low maintenance
- Less network hierarchy
Introduction

- FTTO (Fiber To The Office) is a future-proof networking infrastructure for modern office environments
- A cost effective cabling infrastructure for modern office environments
- FTTO is a standards compliant and decentralized cabling concept
Introduction

• Highly efficient fiber optic technology with the flexibility of twisted pair cabling
• Networking infrastructure that offers flexibility, protects investments and reduces life cycle costs.
Basic Schematic

Wall Mounted Splice Enclosure

Fiber Optic Splice Box

Fiber Optic Cable, MM or SM, 2 core

FTTO Switch

CAT 6A Patch Cord

Computer

IP Telephone

IP Camera

IP Video

IP Camera

FTTO Switch

IP Telephone

Equipment Room
With 19" cabinets
Fiber Optic Technology

- Fiber optic technology being the most future-proof cabling technology currently available, its economic benefits are widely accepted, and used particularly in generic office environments, such as commercially-used buildings.
Current Scenario

- In Local Area Networks (LANs), optical fiber is normally used for backbone cabling.
- Multi-fiber multimode (OM3/OM4) or single-mode fiber cables are used in backbone.
- For horizontal cabling for the individual floors, fiber optic cabling is quite rare, only copper cabling is used.
- Following a short boom at the end of the 90s, things have become very quiet again around Fiber to the Office (FTTO) and Fiber to the Desk (FTTD) solutions.
Advantages of Fiber Optics

- Long distances possible > 100 km
- Almost unlimited bandwidth
- Low space requirements
- Longer Life time
- No EMC issues and grounding problems
- Higher Security (tapping)
- Fiber optic cable less expensive than copper
- Environmental friendly (green building)
Physical Conditions Demand Fiber

For a large number of applications copper cabling cannot be used

– Physical restrictions
  • airports with extremely long cable routes
  • historically protected buildings need thinner cables and smaller pathways

– Electro-magnetic considerations
  • e.g. industrial, hospitals
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.
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 micro-switches support “Eco-Mode” and Energy Efficient Ethernet (IEEE 802.3az)
Copper Structured Cabling Network

- Strict length limitation (max. 90 m)
- Floor distribution required
- Additional energy consumption for air conditioning / UPS
- For each end device one central switch port is required
- Huge bundles of cabling (fire load / EMC)
- Technology change requires complete change of horizontal cabling
Fiber To The Office

- No length limitation
- Gain more usable space – no floor distribution required
- 4 end devices share one central switch port
- Up to 75% reduced cabling volume
- At technology change the cabling can remain unchanged
- Technical advantages of fibre
“Cost comparison of the FTTO-concept with a standard structured cabling with floor distribution”

• WIK = Wissenschaftliches Institut für Kommunikationsdienste

• Founded by the ministry of economy and technology (BMWi)

• Analyses and evaluates the concept in terms of business and political economical aspects

• Main competence is the development of detailed cost models for different network architectures.

The comparison shows clearly the advantages of the FTTO concept. Both, technology and economical wise fiber networks are the better choice. WIK-Consults proves this with an expertise and recommends clearly the use of fiber networks.
Cost Effectiveness

Sample: Small Building

- 220 workplaces (WPs)
- Upper floors each with 50 WPs
  - 4th floor – 50 WPs
  - 3rd floor – 50 WPs
  - 2nd floor – 50 WPs
  - 1st floor – 50 WPs
- Ground floor – 20 WPs
- Basement

Representation floor on the ground floor with 20 WPs (reception, conference rooms, showrooms, social room).

Basement with central telecommunication room (für both architectures with identical costs).
Cost Effectiveness

Sample: Tall Building

10th floor – 50 WPs
.
.
5th floor – 50 WPs
4th floor – 50 WPs
3rd floor – 50 WPs
2nd floor – 50 WPs
1st floor – 50 WPs
Ground floor – 20 WPs
Basement
### Cost Effectiveness

<table>
<thead>
<tr>
<th>Number of workplaces</th>
<th>220</th>
<th>220</th>
<th>1040</th>
<th>1040</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>New building</td>
<td>Old building</td>
<td>New building</td>
<td>Old building</td>
</tr>
<tr>
<td>Costs of installation and operation after 10 years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td>429,860 €</td>
<td>437,294 €</td>
<td>1,668,005 €</td>
<td>1,731,980 €</td>
</tr>
<tr>
<td>FTTO</td>
<td>309,129 €</td>
<td>309,129 €</td>
<td>1,106,685 €</td>
<td>1,106,685 €</td>
</tr>
<tr>
<td>Related difference</td>
<td>28%</td>
<td>29%</td>
<td>34%</td>
<td>36%</td>
</tr>
<tr>
<td>Yearly costs per work place</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Copper</td>
<td>265 €</td>
<td>270 €</td>
<td>218 €</td>
<td>226 €</td>
</tr>
<tr>
<td>FTTO</td>
<td>191 €</td>
<td>191 €</td>
<td>145 €</td>
<td>145 €</td>
</tr>
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<td>28%</td>
<td>29%</td>
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<td>36%</td>
</tr>
</tbody>
</table>

The total costs (first installation, operation, planned replacements) of the copper architecture are in all scenarios higher than the FTTO solution and the cost advantage increases if you increase the distances, the number of floors or the number of workspaces.
Design Guidelines
FTTO Concept

- Standards-compliant, decentralized networking concept
- Combination of the advantages of fiber optics and copper cabling in an intelligent way
- Standard interfaces (TP) at the workplace
- One central building wiring closet for better scalability, migration, and redundancy
- Investment protection and reliable planning due to long-term periods of use
- Low cable volume, no floor distribution units, reduction of investment and operational costs
Copper Structured Cabling System

- In classic structured cabling system, the horizontal cabling on each floor consists of copper cables linking the data ports in the offices to decentralised Ethernet switches located on each floor.
FTTO Concept

• The FTTO Concept implements fiber optic cables for the horizontal floor cabling, allowing the end users to connect their equipment directly up to copper Ethernet ports via 4-port fiber micro switches / installation switches (Fast Ethernet or 1 Gb) located in the work areas.
FTTO Concept

Central Switch

FTTO Switch

- Fiber Media Interface
- Fiber
- Power Supply 48 V
- 230 V
- Data
- Data + Power
- WLAN Access Point
- IP Camera
- VoIP Phone
- PC

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FTTO Versus Copper SCS
Work Area

- The horizontal cable can be terminated with a splice on connector or field connectors
Horizontal Cables

- For the horizontal links either Single Mode or Multi Mode cables can be used.
- Preferably 2 core
FTTO Sub Systems

Backbone Cables

- For the backbone links, use higher count tight buffered cables
- Strands depends on the number of FTTO switches
Backbone Hardware

Wall mount splice enclosures are used to join the backbone and horizontal cables.
Micro Switch / Installation 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 Switch

- Optimised compact and fanless design
- Full Gigabit Ethernet Performance on all ports
  - 1x 1000Base-X fiber uplink
  - 4x 10/100/1000Base-T Twisted Pair RJ-45 ports
  - 1x 10/100/1000Base-T Twisted Pair RJ-45 downlink (optional)
- Power-over-Ethernet functionality on all RJ-45 ports
- Integrated network management
Power Supply

- AC power supply (decentral)
  - Local AC/DC power supply
  - 230V AC to 54V DC, 65W
Power Supply

DC Power Supply (central)
- Central AC/DC power supply
- Protection with UPS possible
- Voltage drop to be considered
# Power Supply

## Power Design Tool

- Calculating cable length and diameter

### Power Design Tool

<table>
<thead>
<tr>
<th>Project</th>
<th>Title</th>
<th>Customer</th>
<th>Date</th>
<th>Prepared by</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

### Configuration

- No. of Segments: 3
- Conductor Diameter: 2.5 mm²
- Warning Range: 37 V
- Voltage Level: 48 V
- Specific Resistance: 0.01780 Q/km/mm²

### Power Supply

- Voltage: 110 V
- Max. Power: 240 W

### System Availability with Accumulator

<table>
<thead>
<tr>
<th>Status</th>
<th>Capacity</th>
<th>Time remaining</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>13 Ah</td>
<td>10 min</td>
</tr>
</tbody>
</table>

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FTTO Structure

Application Servers

Central Network + Management + Access Control (NAC)

Passive Fiber Infrastructure

Micro Switches

Enduser Application

VoIP Phone

WLAN Access Point

PC Workstation

PC Mobile User
Redundancy

Dual SFP Uplink

• Provides 2 slots for fiber uplink
• Downlink is removed
• Former Downlink port is used as Expansion Port (Terminal)
FTTO – Dual SFP

Dual SFP Uplink - Redundant Data Center

- Service is more critical than individual user
- Maximum network service availability
- Minimized downtime
Dual SFP Uplink – Redundant Ring Structure

- Simplified network topology
- Easy to install, easy to expand
- Ring provides failure tolerance
FTTO – Dual SFP

Dual SFP Uplink – Ring structure with star topology

- Star cabling topology, patched for ring structure
- Utilization of existing cabling
- Ring provides failure tolerance
FTTO – Ring Cabling

FTTO Topology
Ring Structure

• Ring structure for horizontal cabling
• Ring structure for vertical cabling
• Combination of PLM and Micro Switches
• Simplified installation and expansion
• Minimized cabling efforts
FTTO Expansion

**Downlink Port**

- For cascading up to 3 FTTO switches
- For locations where more than 4 ports are required

*DownlinkPorts
Energy Efficient Ethernet PoE+ (max. 30 W)*
Typical Commercial Building
Cabling Requirement

- Usable space / floor: 1,200 m²
- Number of floors: 6
- Total usable space: 7,200 m²
- Number of work areas: 720
- Work areas / floor: 120
- I/O per floor: 120 dual
Copper Structured Cabling
## Copper Structured Cabling

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information Outlets</td>
<td>1,440</td>
</tr>
<tr>
<td>Cat6 Patch Cords - I/O</td>
<td>1,440</td>
</tr>
<tr>
<td>Cat6 Horizontal Cable (m)</td>
<td>72,000</td>
</tr>
<tr>
<td>Cat6 Patch Panel (24 port)</td>
<td>60</td>
</tr>
<tr>
<td>Cat6 Patch Cords - TR</td>
<td>1,440</td>
</tr>
<tr>
<td>24-port access switch</td>
<td>60</td>
</tr>
<tr>
<td>FO Patch Panel (6-fiber)</td>
<td>5</td>
</tr>
<tr>
<td>FO Patch Panel (48-fiber)</td>
<td>1</td>
</tr>
<tr>
<td>FO Patch Cords</td>
<td>12</td>
</tr>
<tr>
<td>6-core FO cable (m)</td>
<td>150</td>
</tr>
<tr>
<td>42U Racks for Telecom Rooms</td>
<td>5</td>
</tr>
<tr>
<td>42U Racks for Equipment Room</td>
<td>4</td>
</tr>
<tr>
<td>Telecom Rooms</td>
<td>5</td>
</tr>
<tr>
<td>Equipment Room</td>
<td>1</td>
</tr>
<tr>
<td>Core Switch ports</td>
<td>60</td>
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FTTO and Fiber Optic Cabling
FTTO and Fiber Optic Cabling
## FTTO Bill of Material

<table>
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<td>360</td>
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<td>1,440</td>
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<tr>
<td>2-core FO cable Horizontal (m)</td>
<td>18,000</td>
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<tr>
<td>FO termination box</td>
<td>360</td>
</tr>
<tr>
<td>FO Patch Cords (FTTO)</td>
<td>360</td>
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<tr>
<td>Splice enclosures</td>
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<td></td>
<td>60</td>
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Design Advantages of FTTO Solution
Saving Space on Telecom Rooms

- Saving on premium space
- Reduced operations cost
  (Cooling, Power, maintenance, access control, fire safety)
Cable Trunking and Laying

**FTTO**

2 core FO cable is only 4 mm dia and one cable for 4 users

**COPPER**

Cat6A or Cat7 cable is 7 – 8 mm dia and 4 cables for 4 users

- Saving on cable trunking
- Reduced installation cost
Core and Access Switches

FTTO

Only 3 core switches

- Saving on hardware, space, power and cooling
- Reduced maintenance and troubleshooting
- Higher reliability and availability

COPPER

60 nos. 24-port Gigabit switches with PoE and 1 Core switch
Bandwidth per User

**FTTO**
- 1 Gb/s
- 4 users share 1 GbE link

**COPPER**
- 1 Gb/s
- 24 users share 1 GbE link

**FTTO offers higher bandwidth per user**
Future Proof

FTTO

1
10
40
100 ++

> 1 THz
All present and future data transfer speeds will be supported

COPPER

1
10
??

500 MHz
Copper can not support more than today’s 10 Gb/s

FTTO is future proofed
Life Cycle Cost

Fiber networks have a longer useable lifetime because fiber networks can be upgraded without pulling new cable: increased data rates are implemented by changing the electronics.

In a copper cabling network, increased data rates have historically required that users change cables, connectors and electronics [Cat5e, Cat6, Cat6A].

FTTO offers lowest TCO
## Costs

<table>
<thead>
<tr>
<th>FTTO</th>
<th>COPPER</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Initial cost slightly less than copper</td>
<td>• High initial cost for huge cabling, trunking and large quantity of hardware</td>
</tr>
<tr>
<td>• Much less cost of space for only a few TRs</td>
<td>• Huge cost for large number of TRs</td>
</tr>
<tr>
<td>• Low operation cost</td>
<td>• High operation cost</td>
</tr>
<tr>
<td>• Low maintenance cost</td>
<td>• High maintenance cost</td>
</tr>
</tbody>
</table>

**FTTO offers the least total cost of ownership**
Availability

When an SFP or fiber uplink fails only 4 users will be affected

When an SFP or fiber uplink fails all 24 users will be affected

FTTO offers high availability

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Reliability

**FTTO**

FTTO is inherently more reliable because of its resistance to electromagnetic interference (EMI), radio frequency interference (RFI) and crosstalk.

**COPPER**

Copper cabling is highly susceptible to EMI, RFI, crosstalk and return loss failures.

**FTTO is highly reliable, provides error-free transfer**
Weight and Pulling Tension

**FTTO**

- Weighs only 21 kg/km
- Max pulling loading 660 N

**COPPER**

- Weighs 75 kg/km
- Max pulling loading 100 N

Fiber is lighter and stronger
Cable Testing

FTTO vs COPPER

Simplified testing, only a few parameters to be tested:
- attenuation, polarity, length and OTDR trace,
On a much less number of links
→ 75% less than copper

Many parameters have to be tested:
- length, wire map, return loss, Insertion loss, NEXT, PSELFEXT, delay skew.
Even if one of them fails, the link will not work

FTTO is simpler to test and troubleshoot
Fiber is dielectric (non-metallic), so completely safe and presents no spark or fire hazard.

Copper conducts electricity, can cause damages to equipment if carries unwanted currents.

Fiber provides maximum safety
Fiber does not radiate any energy, so it is extremely difficult to tap into it.

Copper cable can be tapped since it radiates EMI.

**FTTO provides maximum security**
Due to its size and weight, fiber optic cable uses **less than one fifth** of jacket material used by copper cables.

Large volume of copper cables used have large amount of jacket and Insulation material, which poses an environmental hazard.

**FTTO is environmental friendly**
FTTO is Standard Compliant

• TIA/EIA 568C
  – Standardised as Fiber-to-the-Enclosure (FTTE)
  – Centralized cabling
  – Singlemode cable can now be used in horizontal

• EN 50173
  – Recognized as collapsed backbone cabling

• ISO 11801
  – Recognized as FTTO and centralized optical architecture (COA)
Association for FTTO

- A non-profit organization
- Composed of ICT professionals, consultants, manufacturers, distributors, systems integrators, and users of ICT infrastructure who are actively involved in applications of fiber optic for ICT network infrastructure
- To support the growth and education of FTTO for its use in the industry
- Members are focussed on promoting the adoption of FTTO for modern data network infrastructure in premise applications

www.ftto.us, www.ftto.me, www.ftto.in
Why FTTO?

• Fiber optic technology is the most future-proof cabling technology currently available
  – maximum achievable bandwidth
  – a range of other obvious advantages.

• Copper cabling is much less future-proof from a long-term perspective.

• Copper performance has its physical limitations and is clearly inferior to fiber optic networks.
Why FTTO?

- FTTO concept offers cost benefits for large projects, such as airports or hospitals.
- FTTO can also achieve obvious cost savings for smaller projects.
- For some buildings, FTTO may be the only solution.
Installation Options

- Floor Tank
- Cable Trunk
- In Wall
- Desktop Box
- Wall Box
- Distribution Rack
- TeLi-Tank
Installation Accessories

Micro Switch in cable duct with 45 mm track

Adapter plate + E2 Socket in OBO BETTERMANN GEK BR-Duct
Insert switch

Apply cover frame
Installation Accessories

Power supply installed with C-rail

Power supply installed with front-locking mounting in duct
Installation Accessories

Power supply installed in a standard socket
Installation Accessories

- Floor service box installation
Installation Accessories

- Floor service box installation
Installation Accessories

- Switch with cover installed in an hollow wall socket
References

AIRPORTS

Dubai International Airport, UAE
Concourse A

Dubai International Airport, UAE
Concourse D
References

UNIVERSITIES

Munich University, Germany

College de l'oise, France
References

HOSPITALS

Det Nye Universitetshospital, Denmark

Cannes Hospital, France
Installation Practices
Hardware and Configuration
FTTO Switch
Hardware Platform

- Latest Ethernet switch technology
  - Energy Efficient Ethernet (energy savings for copper ports)
  - QoS – 4 Hardware Queues pro Port
  - 256 VLANs
- Power-over-Ethernet Plus (802.3at) on all copper ports (max. 30W per end device)
- Memory card for firmware and configuration (optional)
- Solid, shielded metal housing, clear structure of ports and displays
- Mounting in standard 45mm double frame
- Horizontal and vertical versions for cable ducts, columns and sub-floor boxes
Switch Features

- **Uplink Port**: SFP/Fixed/RJ-45 (PD)
- **Power**: 54VDC/230VAC
- **Labelling Field**: Integrated
- **Reset Button**: Reset/Factory Default
- **LED Display**: Switch/Port/PoE Status
- **Local Ports**: Energy Efficient Ethernet PoE+ (max. 30 W)
- **Expansion Port Terminal**
Switch Features (Contd.)

- Downlink Ports
  - Energy Efficient Ethernet
  - PoE+ (max. 30 W)

- Memory Card
  - Configuration Storage
    (optional with G6+)

- Chamfer Edge
  - Simplified Installation
Versions

Horizontal Mounting
(Reference)
- Cable ducts
- Floor-boxes

Vertical Mounting
- Cable ducts
- Columns
- Floor-boxes
Intelligent Office

• From Product to Application
Quality of Service

Prioritization

4 Priority levels
4 queues per port

2 Weightings
Strict = Higher priority first
Weighted = queues weighted 8:4:2:1
Quality of Service

Port based prioritization

Layer 1: Hardware

Port 2:
Normal data
low priority
Quality of Service

Protocol based prioritization

Layer 2: IEEE 802.1p/Q (VLAN Tag)
Layer 3: DiffServ Codepoint (IP Header)
Port Based Access Control
IEEE 802.1x

Central Switch

RADIUS
User1: ok
User2: no access

Installation Switch

User1

User2

Bicsi
Authentication

Port Based Access Control IEEE 802.1x
Port Based Access Control IEEE 802.1x

- User1: Access Accepted
- User2: No Access

Central Switch

RADIUS
User1: ok
User2: no access
Authentication

Port Based Access Control IEEE 802.1x

Central Switch

Access Request

RADIUS
User1: ok
User2: no access

Installation Switch

Request

User1

User2

Bicsi
Port Based Access Control IEEE 802.1x

Central Switch

Access Reject

RADIUS
User1: ok
User2: no access

Installation Switch

User1

User2
VLAN Filtering (IEEE 802.1p/Q)
VLAN Modes

Access
Outgoing frames are sent untagged. Incoming frames receive the port’s default VLAN ID (PVID). This port mode is normally used for connecting end devices.

Hybrid
Outgoing frames are sent tagged, except the frames of the default VLAN port. Incoming frames from the default port VLAN are expected to be untagged, frames from other VLANs are always expected to be tagged. This mode is normally used to connect a VoIP phone and a PC to share one port. In this setup the phone communicates tagged and the PC untagged.

Trunk
Outgoing frames are always sent tagged. Incoming frames are expected to be received tagged. Incoming frames without a VLAN tag are processed using the port’s default VLAN ID (PVID). This mode is normally used as an inter-switch connection.
Enterprise Networks

Port VLANs
Insert/removal of port VLAN ID/priority
Processing of tagged/untagged packets (hybrid ports)

Egress packets
VLAN Tag is removed

Ingress packets without tag
Port VLAN tag is inserted

Ingress packets with tag
VLAN tag remains unchanged

Trunk port
VLAN tag remains unchanged
Enabling the Internet of Things
Smart Lighting

- Light
- GUI
- Light switch

Smart Office

- Public address
- Intercom
- Window blinds
- Heating control
- Wall thermostat
- Air conditioning
Smart Sensor

Presence

Intensity

Temperature

°C

7/27/2017
1 Controller for each light

- Powered via PoE+
- Input RJ-45 (Ethernet)
- Sensor input RJ-45
- Output to light Phoenix contacts on the device back side
- Power output approx. 25 W
Extension Module
for the Micro Switch G6

3 functions in one device:

• WLAN Access Point (802.11b/g/n)
• Smart I/O (2x In Optokop./2x Out 230 VAC)
• Wireless Gateway (868 MHz)

• Own Firmware based on OpenWRT (Linux)
• Integrated FHEM Server as EQ3 Gateway
• PoE power supply via Micro Switch
• Configuration via Micro Switch firmware
Requirements for LED lights:

- max. 54 V DC
- Power consumption approx. 30 W
Construction

MICROSENS Power Supply
240 W
Construction
System Overview

Smart Lighting

- **Smart Engine**
  - Twisted Pair PoE+ (max. 30W)
  - Gigabit Ethernet
  - Fiber Optic

- **Smart Controller**
  - Iconast max. 30W
  - Twisted Pair

- **Smart Sensor**
  - LED Panel

- **Smart Director App**
  - Micro Switch
  - Micro Access Point
  - Control Panel Tablet / Smartphone

**Building Distribution**
- **AC Power Rail**
  - 230 VAC
- **AC/DC**
  - 54 VDC
- **Local Power Supply**

**Office / User Area**
- **LAN**
- **Core Switch**
- **Micro Switch**
- **Light Switch**
Smart Office Showroom

LED ceiling panel
Smart Lighting Sensor
LED Downlight
Smart Audio System
Roller Shutter
Air conditioning
VoIP Telefon
Micro Switch
Micro Access Point
Smart Lighting Director – Decentral Control from the switch

Smart Office Director App

Smart Lighting Sensor

LED ceiling panel
Benefits Smart Lighting

- Open, decentral and IP based system
- Roll-Out office after office
- Integration into a virtual central control system
- Individual control by user
- Apps on the Smart Director
- High security with SNMP v3, etc. (compared to e.g. KNX)

- Simple planning
- Reduced fire load in the building
- Due to less cable more space in cable ducts
- Reduced installation costs (quicker and less qualified persons)

- Energy savings up to 80%
- Monitoring of the real power consumption at each controller
- Extreme reduction of maintenance cycles by use of LEDs > 50000 h
- Possibility for premaintenance
- Detection of faulty lights from central management
Central Management Software

Network Management Platform
Software Overview

Strategic Product Groups

- Network Management Platform
  - FTTO
  - Industrial Ethernet
  - Access Metro
NMP Server

General facts
• Based on Java language
• Available for Windows and Linux
• 32 and 64 Bit versions available
• Three different versions available
  • nmp standard
  • nmp professional
  • nmp server
  • License key required
  • Unlimited number of devices
Overview of Licensing Models

**Unlimited Number of User-Stations per SW-License and Enterprise**

- NMP Standard
  - Single User/Single Station, Non-Shared Database

- NMP Professional
  - Single User/Single Station, Non-Shared Database

- Common Feature Set (Professional, Server)
  - Topology Manager
  - Inventory List Generator
  - Device Search Tool
  - VLAN Change Tool
  - Link monitoring
  - Task Scheduler
  - E-Mail notifications
  - Automatic alarm list generation
  - Switch Password Changer
  - RMA Tool

**1 Redundant Server per License**

- NMP Server
  - Multi User, Shared Database
  - Server Redundancy
  - Northbound Interface for Data Retrieval

**Common Feature Set (Standard, Professional, Server)**

- Auto Discovery, Element Manager, Flexible Device Tree, Backup/Restore of Switch Configuration
Element Manager

Device List Tree

Device/Group/Channel Detailed View

Device Graphical View
Topology Manager

- Graphical view of network topology
Feature Update

Network Management Platform
Server 2010
NMP Standard

- Single User
- All data locally stored
NMP Standard

• Multi User, but
  • Decentralized
  • All data local
• Inconsistency in
  • Data storage
  • Data backup
  • User Management
  • Access Control
NMP Server

- **Central Server**
  - Data consistence
  - SQL Database
  - Central backup

- **User Management**
  - Access control

- **Client Options**
  - Web browser
    - OS independent
    - No local application
  - NMP Client
    - Full functionality
    - Synchronisation to server
NMP Server

Motivation/Benefits

Centralized management platform
  + Single point of administration
• Dedicated user/access management
  + Full control over network access
  + Extended logging functionality
• Central database
  + Simplified data protection/backup
• Access with Client or Browser
  + NMP Client with full function set
  + Web client requires only local browser
Server Architecture
Questions?
Thank you!

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