Company Profile

Andreas Beierer
International Sales Director

Dirk Herppich
Executive Manager International Sales

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MICROSENS GmbH & Co. KG

- Over 10 years in the business
- R&D, Production and HQ in Hamm, Germany
- Leader in Fiber Optical solutions for Industrial and FTTO as well as Conversion and Transmission Applications
- Over 1 million ports sold
- Private hold and profitable

Global player

Headquarters
MICROSENS GmbH & Co. KG
Hamm / Germany

Eastern Europe
MICROSENS Poland
Wroclaw

Asia
MICROSENS Singapore

Western Europe
MICROSENS France
Paris

Events 2005

MICROSENS

Visit us at …

Intertelecom
01.-03. March, Lodz, Poland

CeBIT
10.-16. March
Hannover, Germany

Sviaz/Expo Comm
10.-14. May, Moscow, Russia

CommunicAsia,
14.-17. June, Singapore

20.-22. October
Paris, France

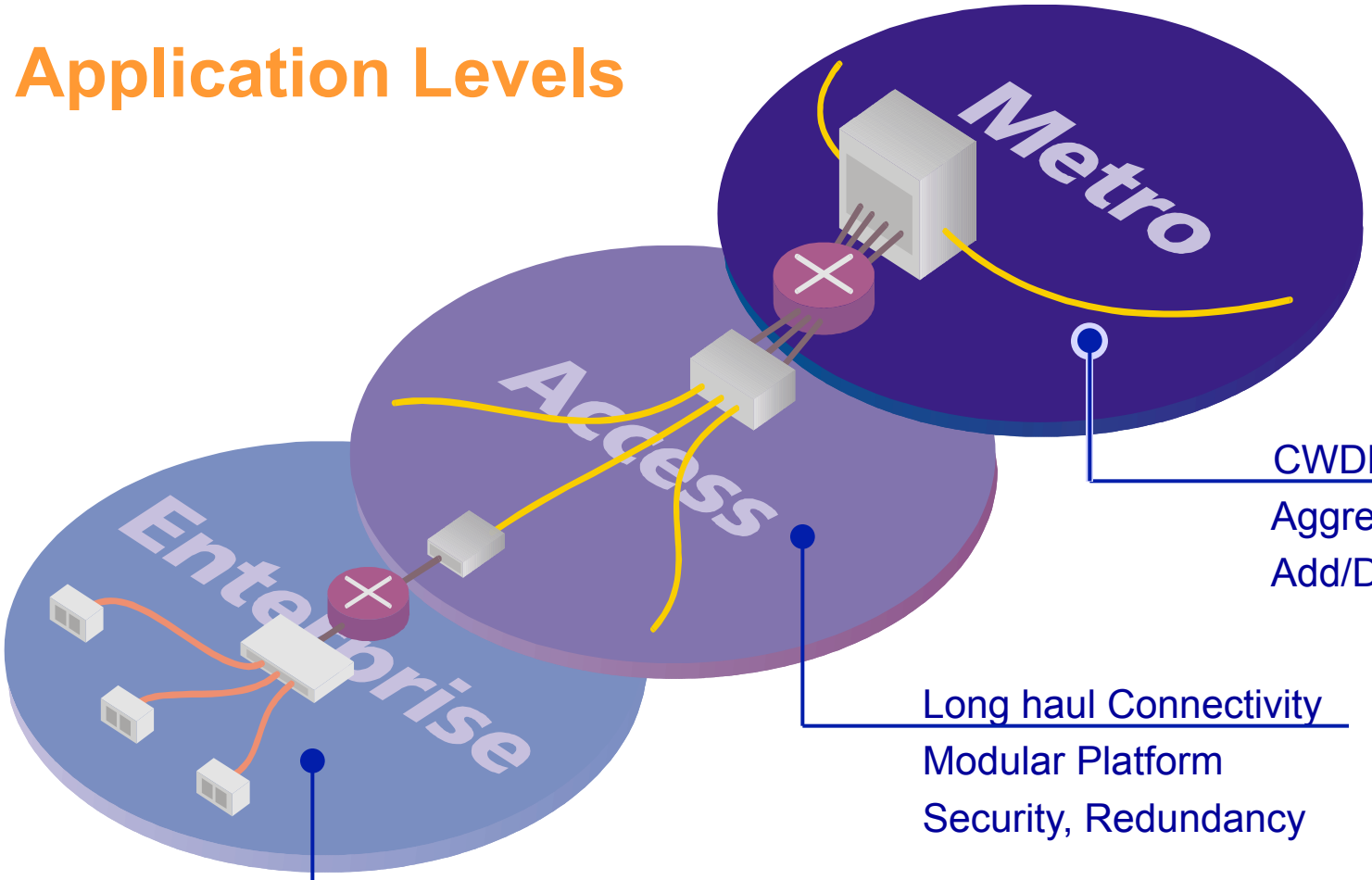
November
Paris, France

exponet
15.-17. November
Cologne, Germany

Company Facts

MICROSENS

Application Levels



CWDM / DWDM
Aggregation
Add/Drop, Ring

Long haul Connectivity
Modular Platform
Security, Redundancy

Fiber to the Office
Industrial Solutions
Media Conversion

Company Profile

MICROSENS

Strategic Projects Germany

5.000 optical ports
in SAP Headquarters

Ministry of research 4.000
optical ports

POLIZEI NRW.

25.000 optical ports

DAIMLERBENZ
AKTIENGESELLSCHAFT

1.200 optical ports

Haspa
Hamburger Sparkasse

Hamburg Savingsbank
20.000 optical ports

ruhrgas

4.000 optical ports with
12-port Conv.

Financial ministries bavaria
17.000 optical ports

Hamburg Electricity 2.000
optical ports

Company Profile

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Strategic Projects International

Singapore Changi Airport
fiber backbone
SM/MM Converter

National Bank Austria
5.000 optical ports

France Telecom

Modular Converter
Systems

Autoroutes du Sud de la France

Modular Converters
Systems

LEGO

LEGO Denmark
2.000 optical ports

Volkswagen AG
2.000 optical ports

Societe Generale Paris
fiber backbone SM/MM
Converter

Company Profile

MICROSENS

Automobile Industry

PSA PEUGEOT CITROËN

PEUGEOT CITROËN

PCI Media Converter Cards

DAIMLERBENZ AKTIENGESELLSCHAFT

Factory Bremen
Installation transceiver
1.200 optical ports

MAN Nutzfahrzeuge

KARMANN

VOLVO

Volvo Belgium

VW Mexiko
Serial Interface
Media Converters
2.000 optical ports

GM

General Motors - Opel Austria
Production Line
Installation Hubs/Switches

DAIMLERCHRYSLER

Werk Raststatt
Multiportmedia-Converter
Installation switches - 700 Ports

Strategic projects Military

Ministry of Defense

Germany

3.000 optical ports

Armée de Terre

French Army

Marine nationale

Marine Nationale, France

Singapore Immigration Department , 250 optical ports

Armée de l'Air - French Airforce

100 optical ports

BGS

BUNDESGRENZSCHUTZ

– Polizei des Bundes –

Bundesgrenzschutz Ost

400 optical ports

Bundeswehr

Deutsche Bundeswehr
Pilotproject ‚Fiber to the Office ‘
200 optical ports

Company Profile

MICROSENS

Strategic xWDM Projects

Broadband TV

ascom

Point-to point links in
France

bayernoil
Gemeinsam erfolgreich

Gas / petrol industry
In Bavaria / Germany

Sparkassen Informatik

Computer center of Bank-central
Backbone connectivity

ALCATEL

Backbone link between
central locations

AdvaCom

PIONER: Polish Optical Internet

XS4ALL

(KPN Group) first ISP in NL,
OC-48+GBE with line protection

HEIN GAS

Gas Provider (EON-group)
CWDM-connectivity to 5 locations with Gigabit Ethernet, Fibre
Channel and G.703

GVT

Carrier in Brasil using
CWDM-Systems

Strategic Projects Industrial

DSK

German Coal Mining AG
Underground mining
140 industrial switches

BARTEC

VW in Wolfsburg
RS232 / FO
industrial conversion

SIEMENS

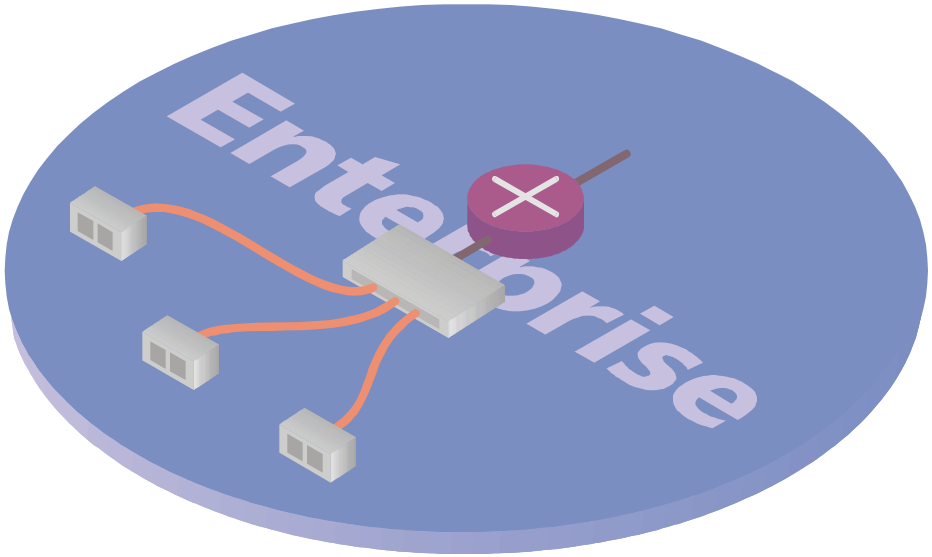
BONUS Energy A/S

30 industrial switches for
Windmill datacom (SMF)

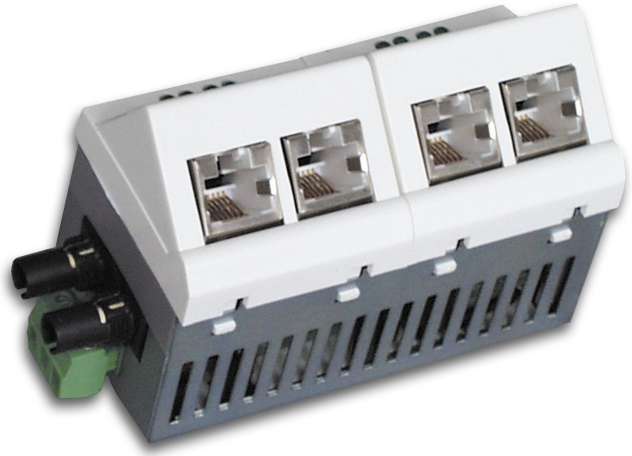
becker

Becker Mining Systems
Switches for underground
mining

SNCB, Belgium Railways
industrial switches, SMF



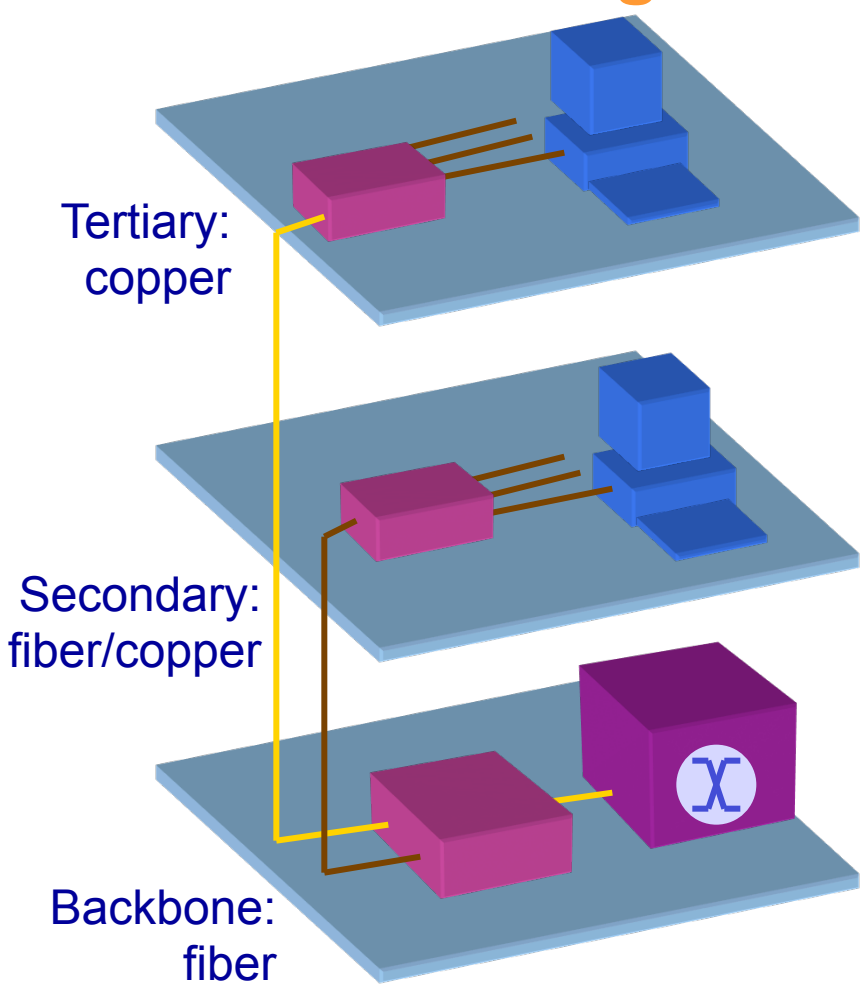
Fiber to the Office (FTTO) Solutions



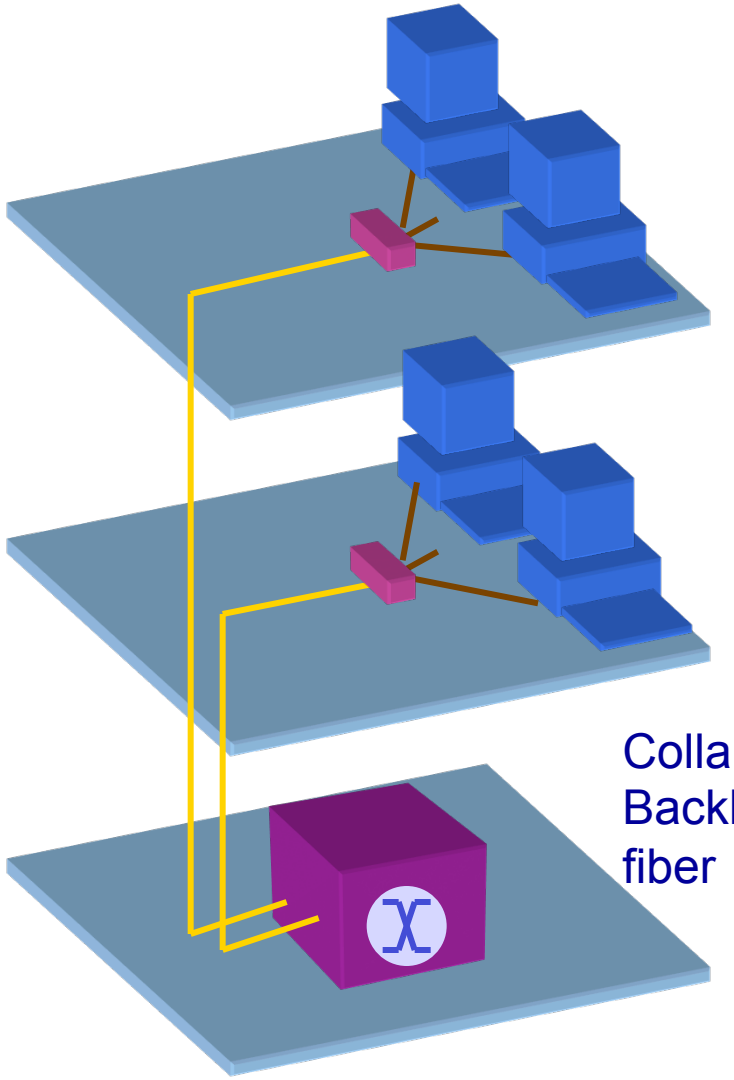
Enterprise Networks

MICROSENS

Structured cabling

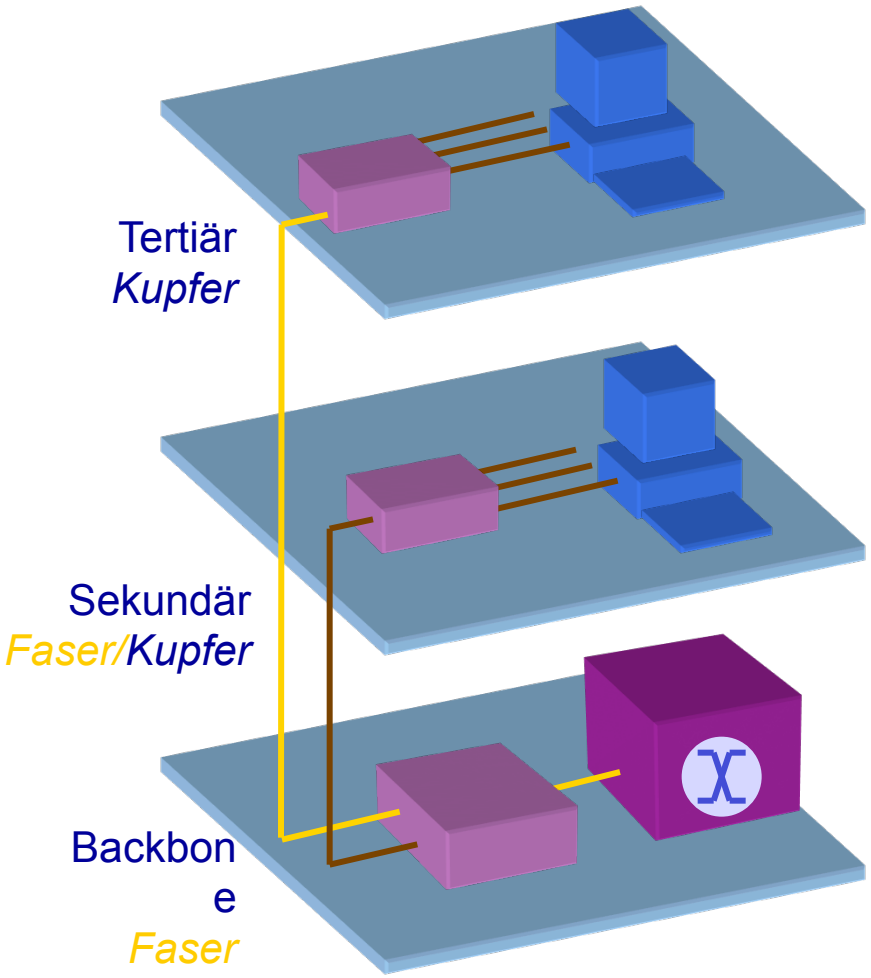


Fiber to the Office

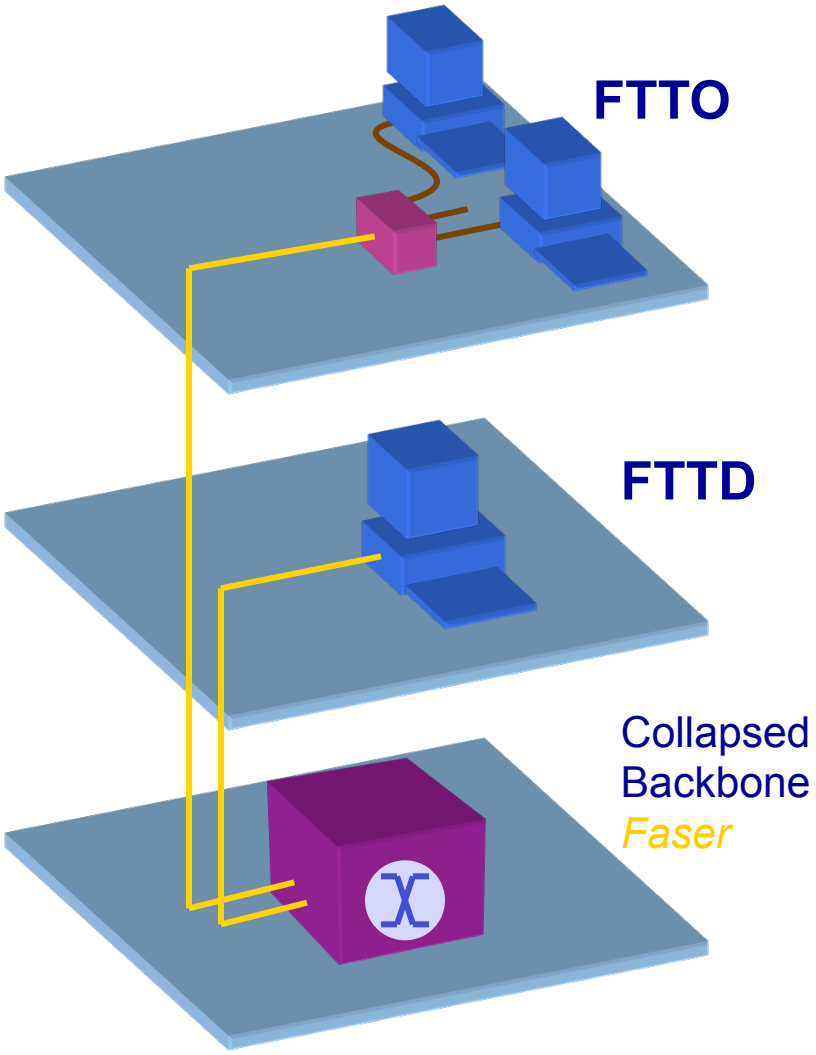


Konzepte

Strukturierte Verkabelung



Fiber to the Desk/Office



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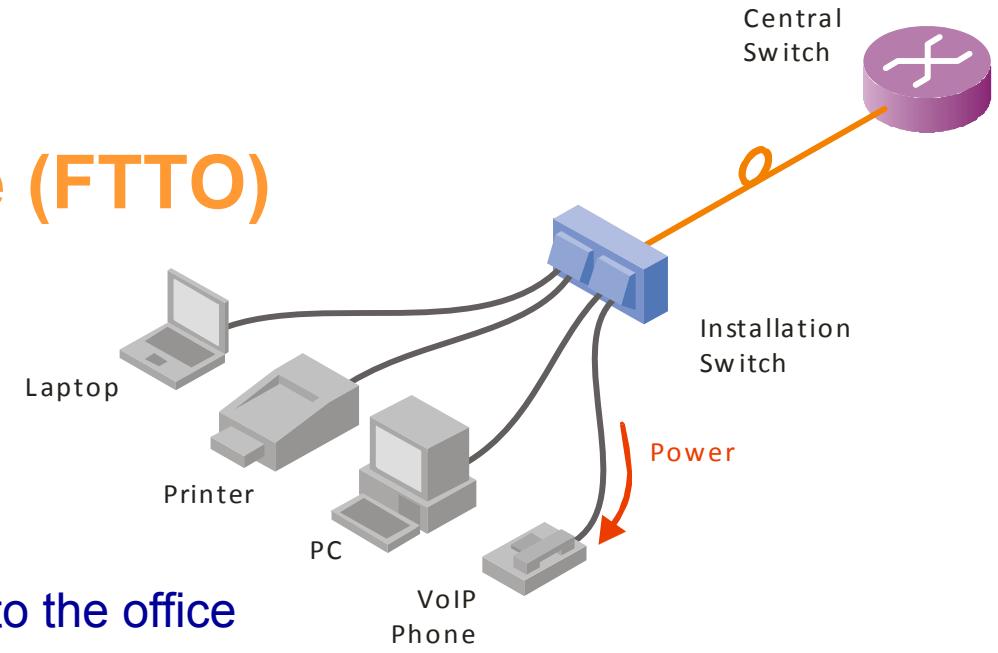
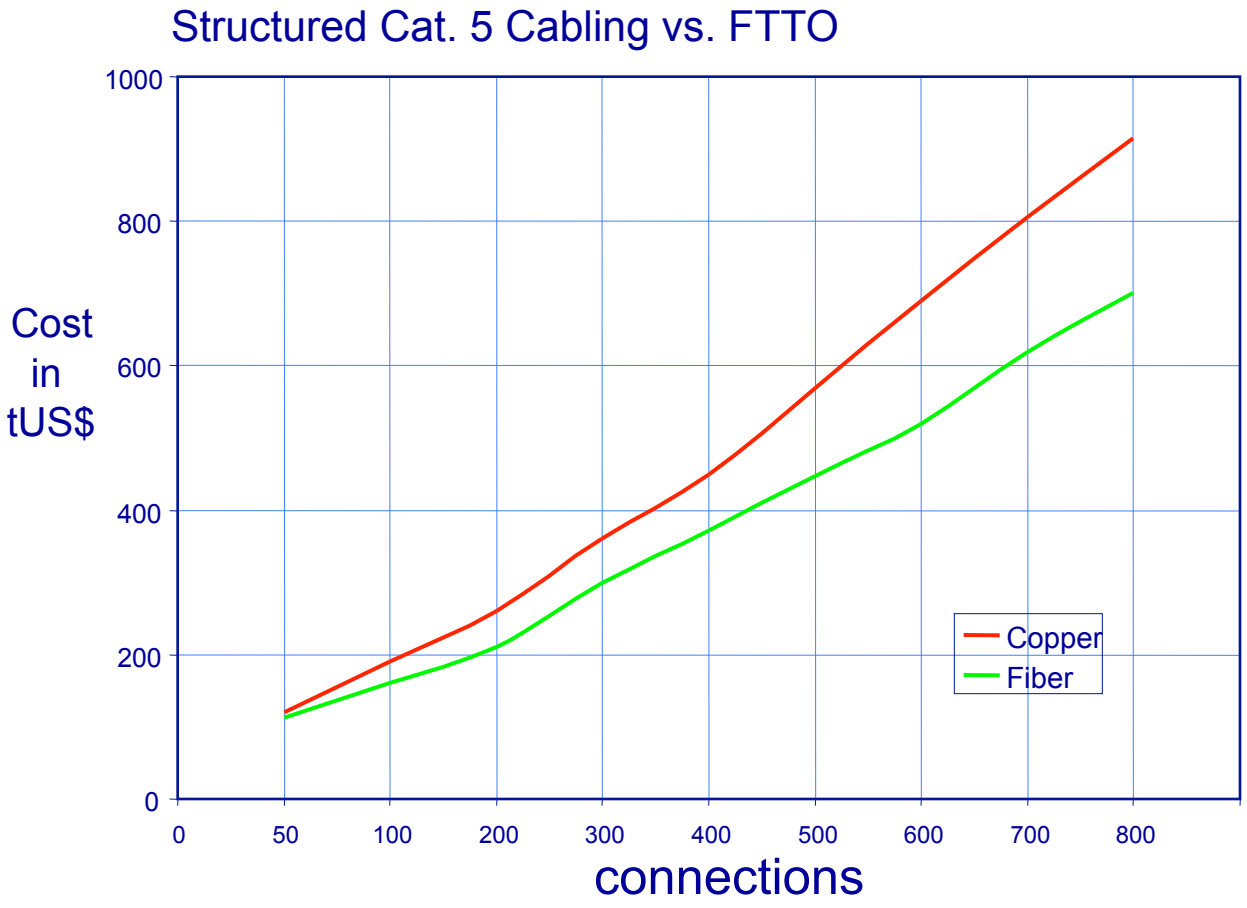
Fiber To The Office (FTTO)



- Fibre Optic connectivity into the office
- End-to-end passive fibre infrastructure
- High capacaties – future proof
- Flexivbility and easy to expand
- Compatible to all standard end-user devices
- PoLAN integration

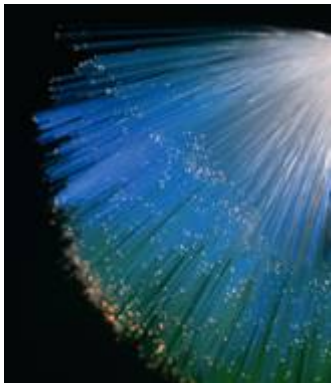
Economic advantage



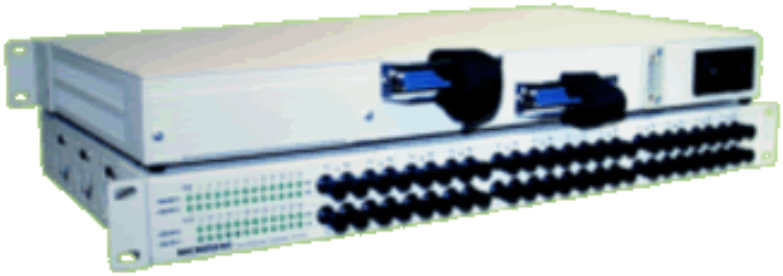
Why is the new FTTO Concept so promising?

- Secure infrastructure concept within the cable duct
- VoIP success makes extra telephone wires unnecessary
- More end devices to be connected per working place
- PoLAN / Ethernet use demands a decentral switching concept
- Investment Protection becomes most important
- Lots of references – a large installed base

Benefits of Fiber Optic in the Horizontal



- No distance limitation with the SM option
- Central installation in one Telco Room
- Reduced installation and troubleshooting costs
- Investment Protection/Future proof up to 10Gbps
- EMI/RFI immunity
- Galvanic separation



Typical FTTO Customers

- Hospitals
  - Connection of the patient rooms
- Finance / Banks
- Insurances
- Municipalities
- Utilities
- Police
- Universities
- Listed buildings

International FTTO - References

- General Motors Austria
- Olympus Prague
- Raiffeisen Bank Zurich
- Schools in Northeast France
- State Prison Vienna
- BaFIN in Bonn

References

Strategic Projects
Installation Switches

Bundesministerium für Bildung und Forschung

Location Berlin:
215x central optical ports
200x 45x45-switches
with management

Schweiz

ERNST & YOUNG
FROM THOUGHT TO FINISH™

1.100 optical ports
550 x 10/100TX switches
100BaseFX-Uplink

OLYMPUS C&S

276x central optical ports
230x Installations-switches
with Management

Deutsche Forschungsgemeinschaft DFG

Installation - switches
350 x 10/100BaseTX, FX

DER LANDTAG SCHLESWIG-HOLSTEIN

500 optical ports
285 x 10/100TX switches
100BaseFX-uplink

RWE

45x45-switches Monomode
central converter 100TX/FX

degussa.

1200 optical ports
700 x 10/100TX switches
100BaseFX-uplink

Features of the FTTO Switches

- Smallest compact Design (45mmx45mm)
  - Easy installation because of “snap-in” mounting
  - Mechanical adapters for nearly all Installation material vendors
- Integrated Management Agent
  - GUI Tool, Telnet, SNMP, Syslog and Web
- Integrated Power Supply with lowest consumption
- Full VLAN Support and CoS

FTTO Switches- Competitive Strengths

- Most compact design and easy installation
  - Standardized dimensions (45x45mm)
  - Snap/In-installation (tool less)
- Without Fan and lowest power consumption
  - Lower heat in the cable duct and noise in the office environm
- Enhanced Management Functions
  - CoS (4) and VLAN's (16)
  - Authentication (IEEE802.1x) and statistics
  - Management controlled Power over Ethernet option

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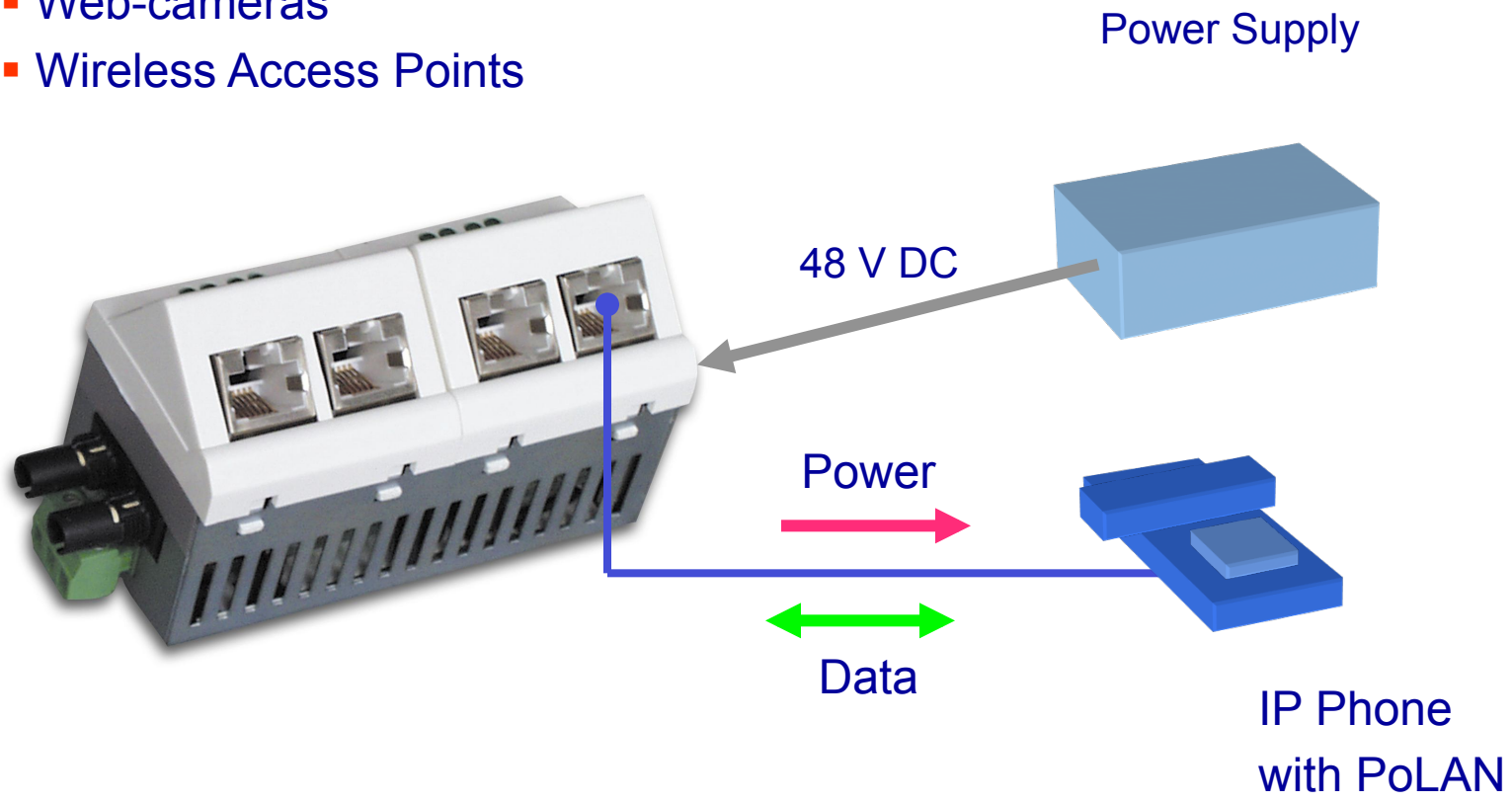
Power over LAN

- **Applications**
  - IP telephony
  - Web-cameras
  - Wireless Access Points



Power-over-LAN

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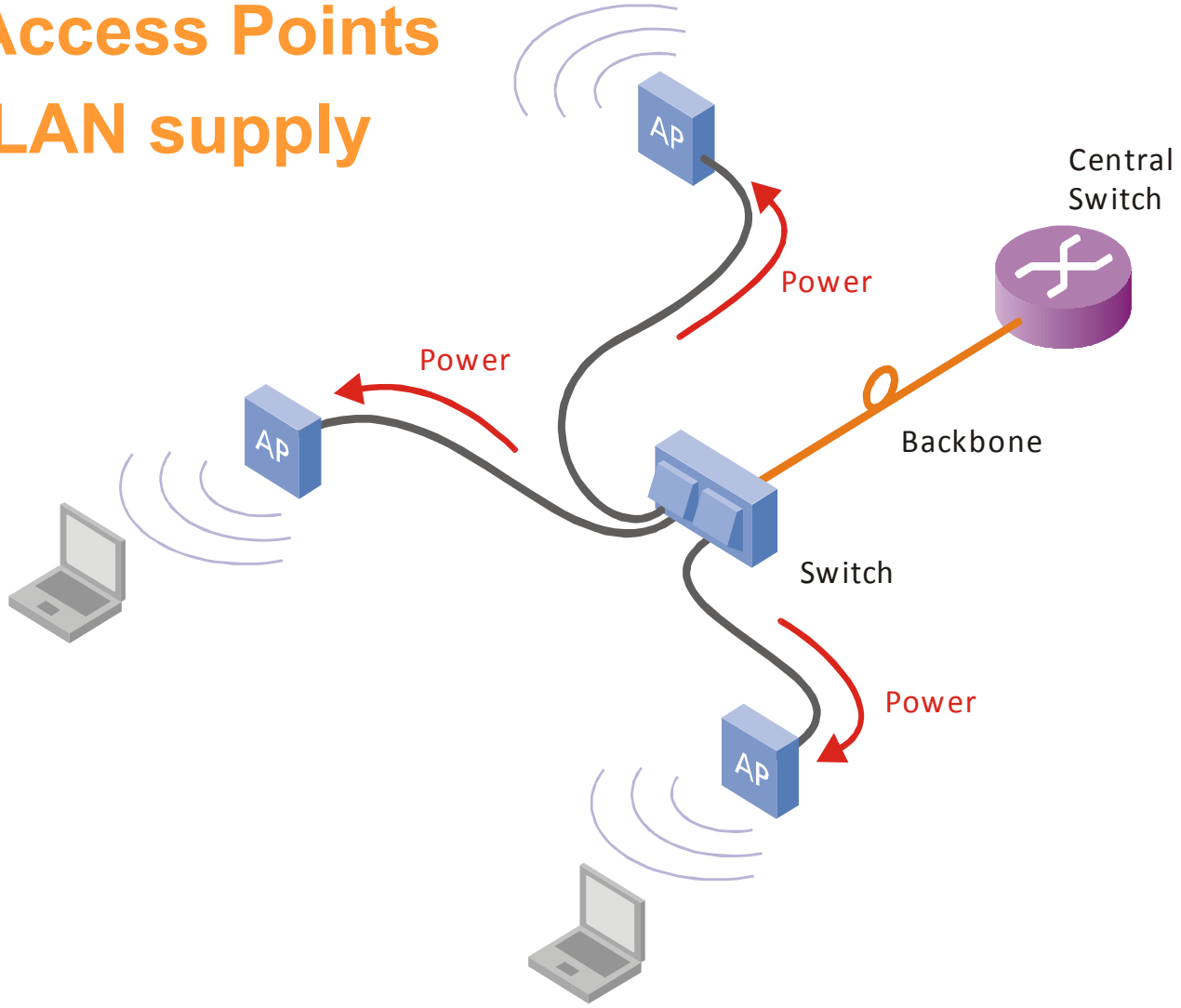
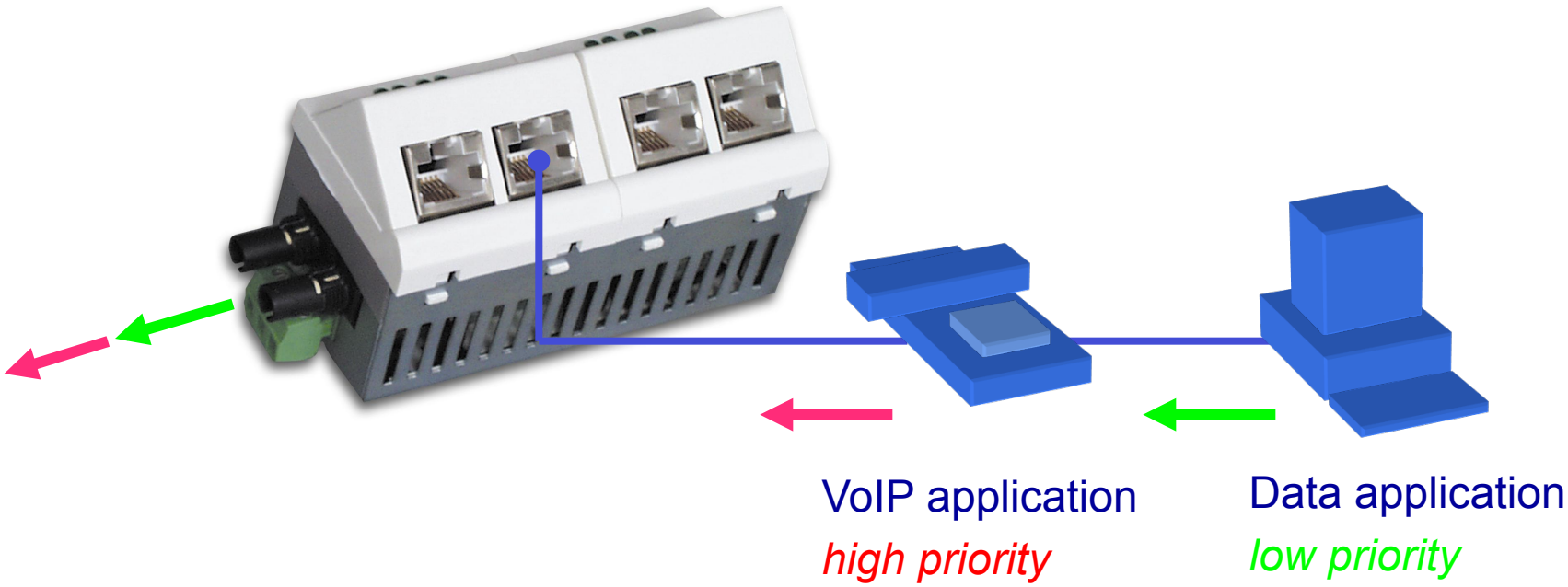
WLAN Access Points with PoLAN supply



Quality of Service

Protocol based Prioritisation

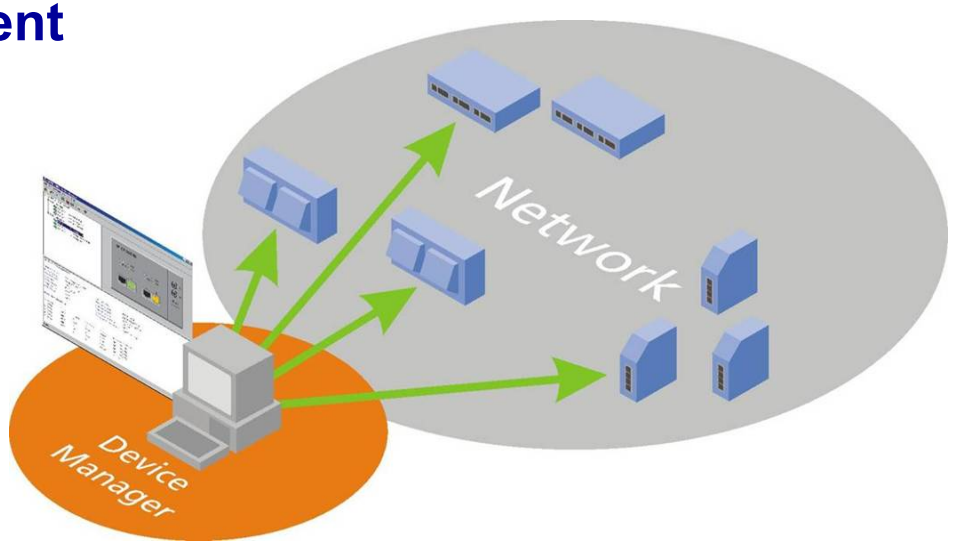
- Layer 2: IEEE 802.1p/Q (VLAN Tag)
- Layer 3: DiffServ Codepoint (IP Header)



Installation Switch

Software Features

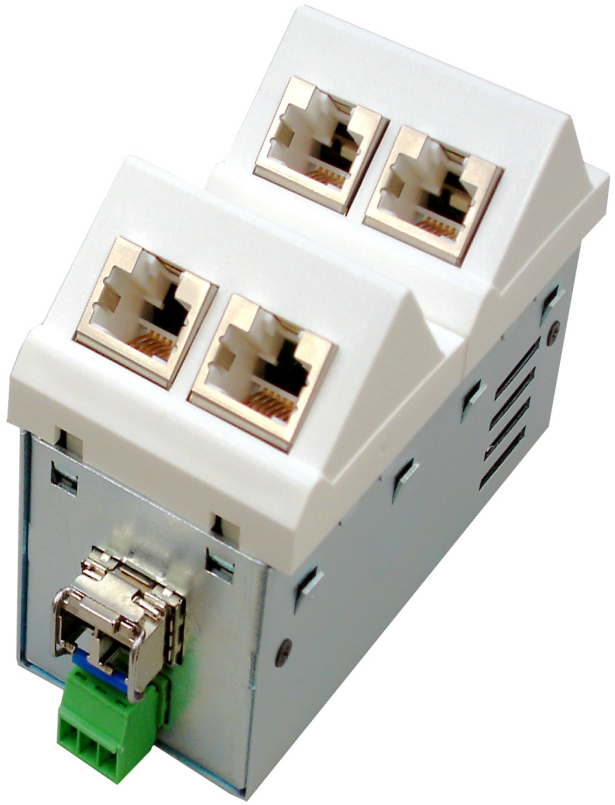
- **Integrated Management Agent**
- **Firmware Update**
- Device Manager
  - TFTP upload
- **Supported Protocols:**
  - Telnet
  - SNMP/Traps
  - Syslog
  - Device Manager (GUI software)
  - Web based (optional)
- **IEEE 802.1x transparent** (authentication)
- **RADIUS Authentication** (optional)



MICROSENS

Gigabit Installation Switch

- **Layer 2+ Gigabit Switch**
  - 2 Ports 10/100/1000Base-T
  - 2 Ports 10/100Base-T + PoLAN
  - 1 Port 100/1000Base-X (SFP module)
- **Power-over-LAN IEEE 802.3af**
  - Direct supply of 48 VDC
  - 2 Twisted-Pair Ports with 15 W each
- **Quality of Service**
  - 4 Priority levels (Queues)
  - Hardware, VLAN 802.1p, IP DiffServ
- **VLAN support IEEE 802.1p/Q**



New Products

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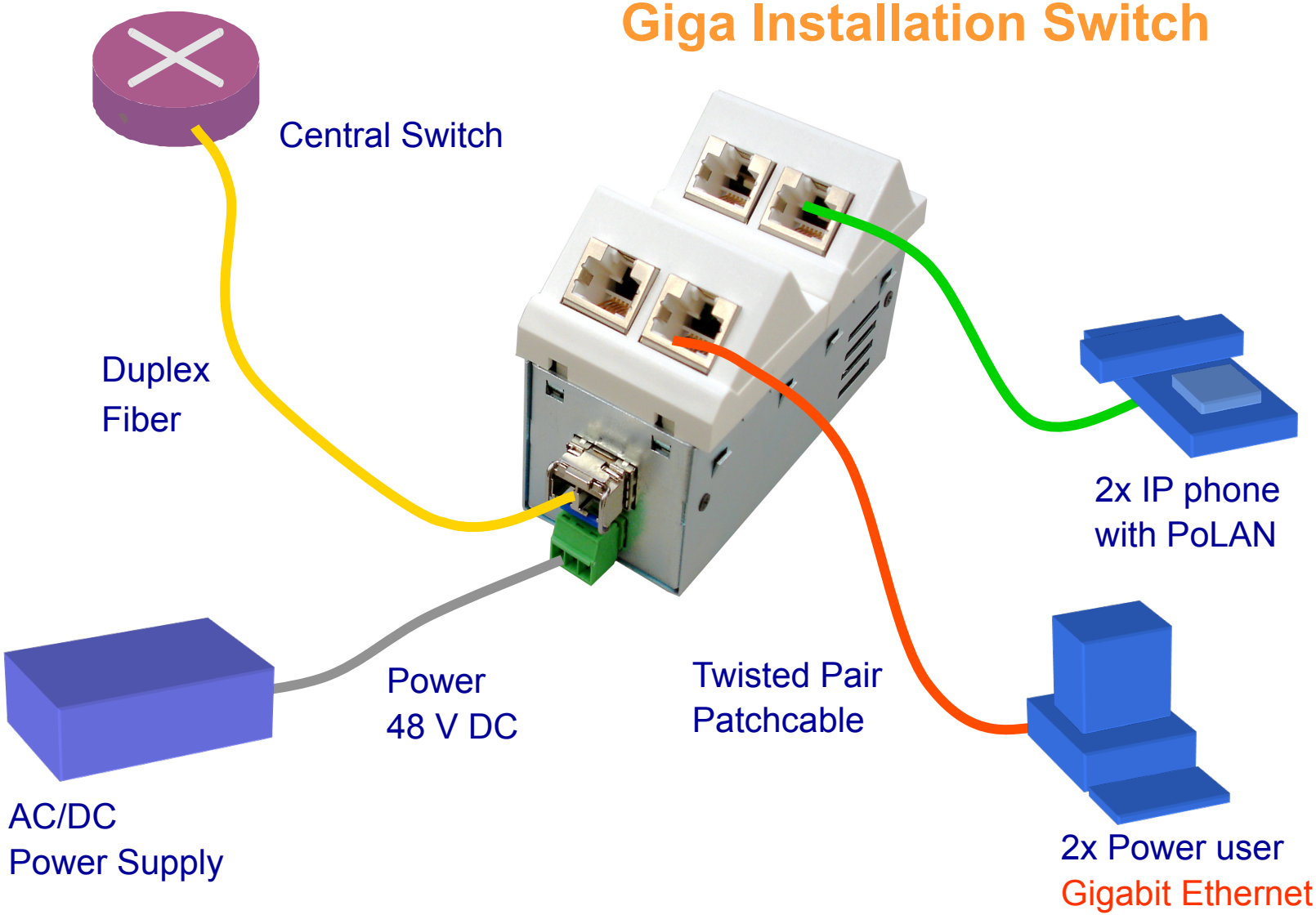
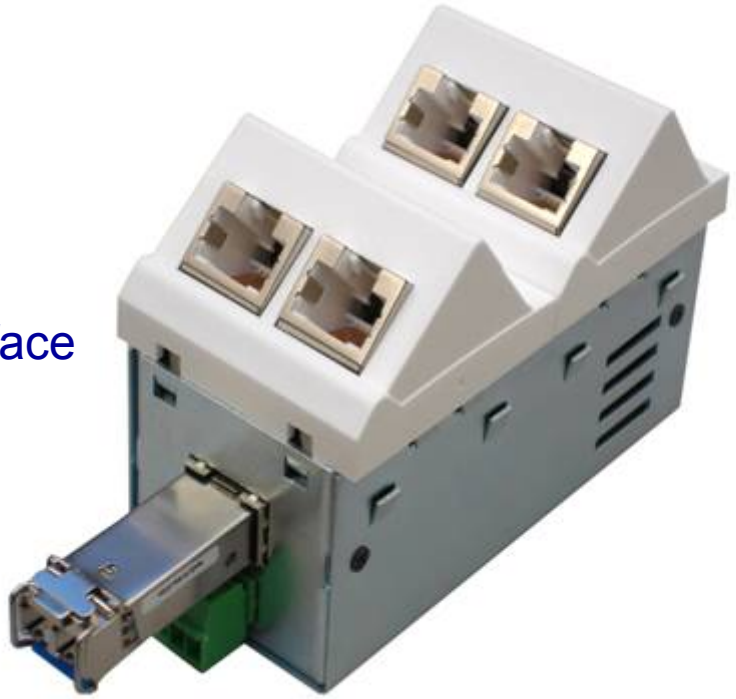
Giga Installation Switch



New Products

Dual Speed Optical Port

- **Optical uplink port**
  - 100 Mbps (Fast Ethernet)
  - 1000 Mbps (Gigabit Ethernet)
  - configurable by management
- **SFP transceiver module**
  - Quick upgrade of optical Interface



SFP transceiver

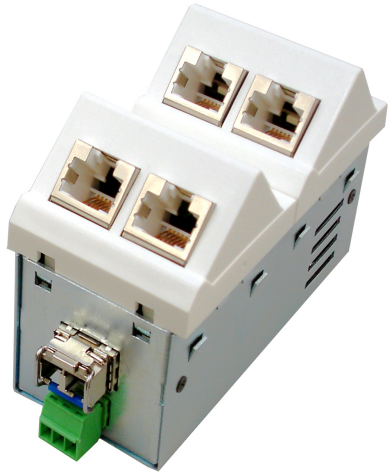
New Products

MICROSENS

Device Variations

- **Fixed 1x9 transceiver**
  - Cost effectice solution
  - Standard SC duplex interface
  - Multimode & Single Mode versions
  - Fixed to Gigabit speed

- **Modular optical port**
  - SFP transceiver slot
  - Industry standard
  - Simple upgrade of optical interface
  - Dual speed (100/1G) migration
  - LC or MT-RJ Interface



Mechanical Versions

- **45 mm Design**
  - Easy and tool-less installation
- **Verticale and horizontal mounting**

Horizontal

Vertical / Sub Floor Box

Installation Switch

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1-2-3 Mounting in the cable trunk

1. Mount adapter plate

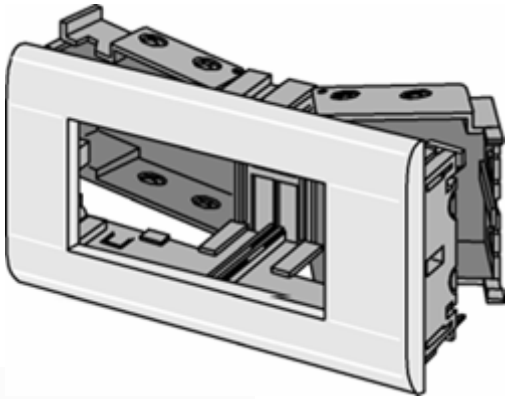
2. Insert Switch

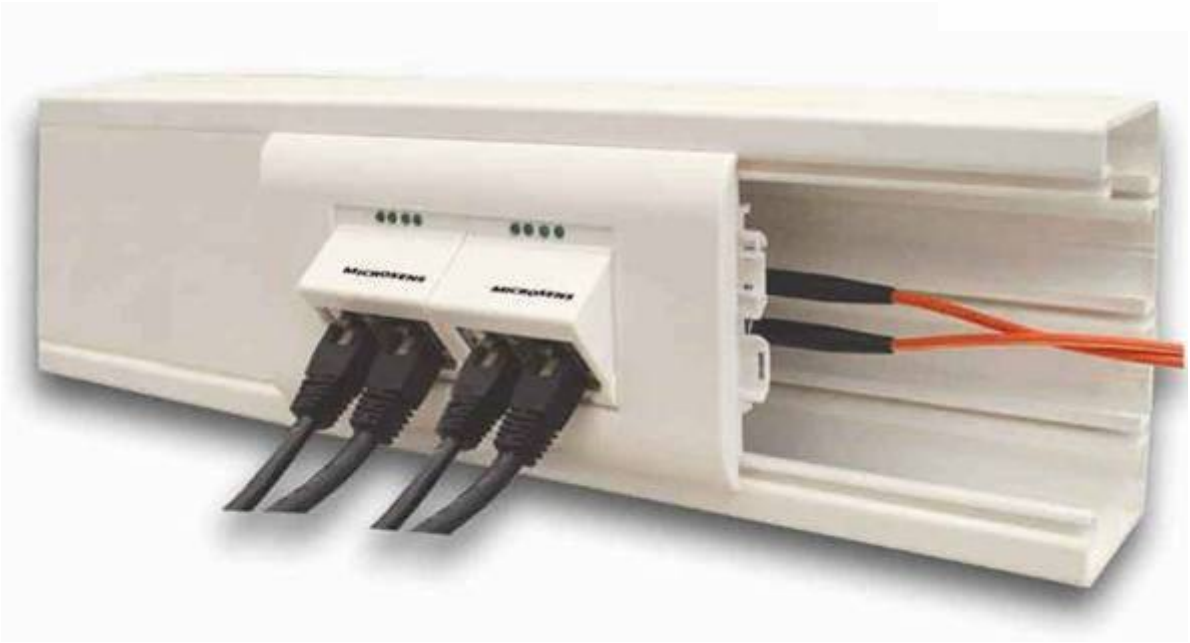
3. Put on cover

→ **Ready!**

Installation into cable channels

- for 45x45 design with installation box and cover frame (e.g. Ackermann 71GD5)





Installation into sub floor systems

Direct support of the 45x45 design from:

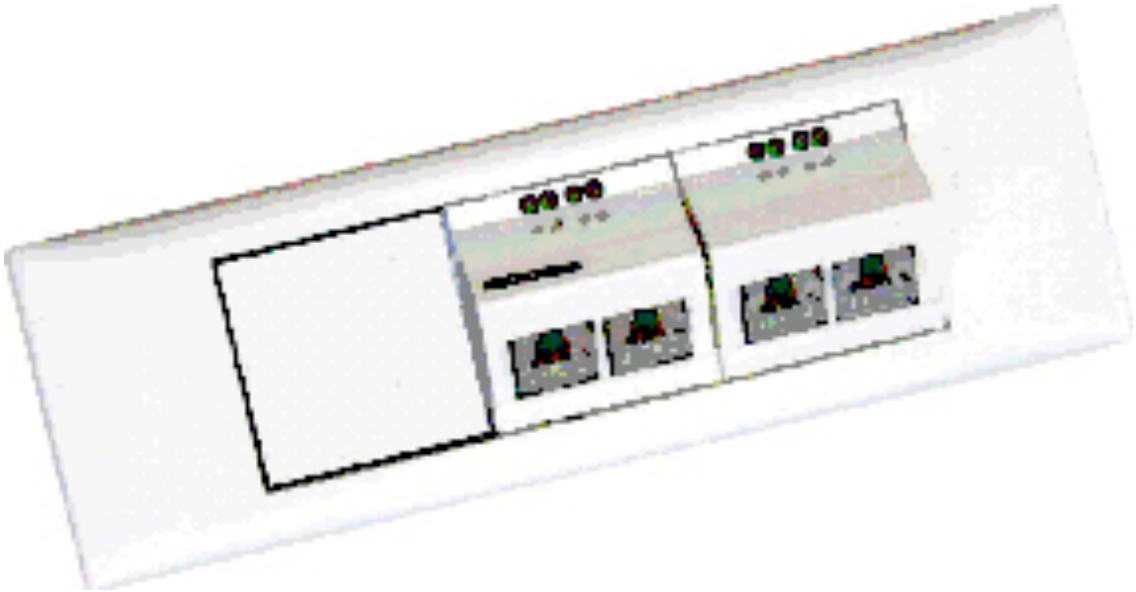
- Ackermann
- Rehau
- Electraplan (Niedax)

- Ackermann-Sets
  MS140026 -> for 2-times box

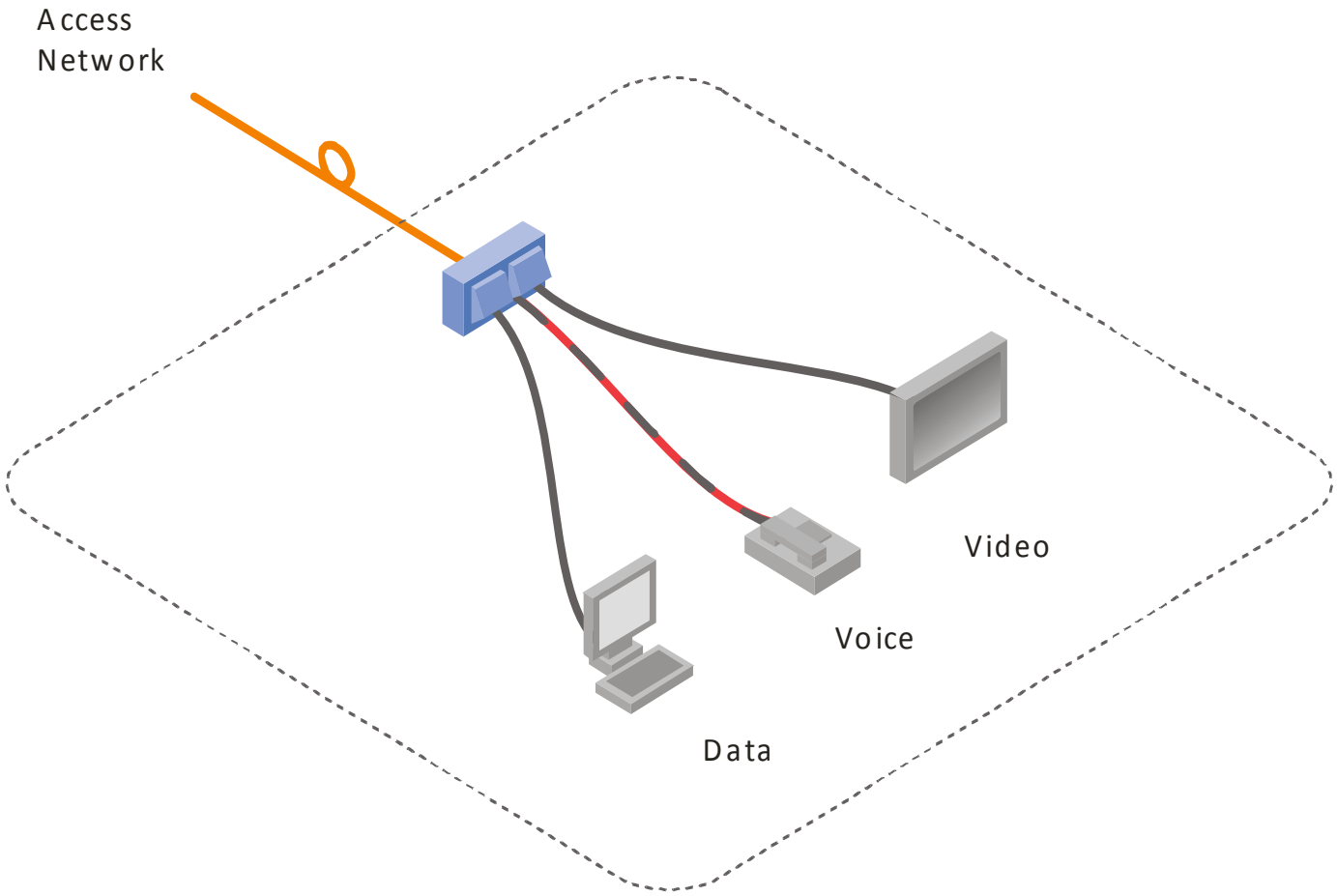
MS140027 -> for 3-times box

Installation on walls

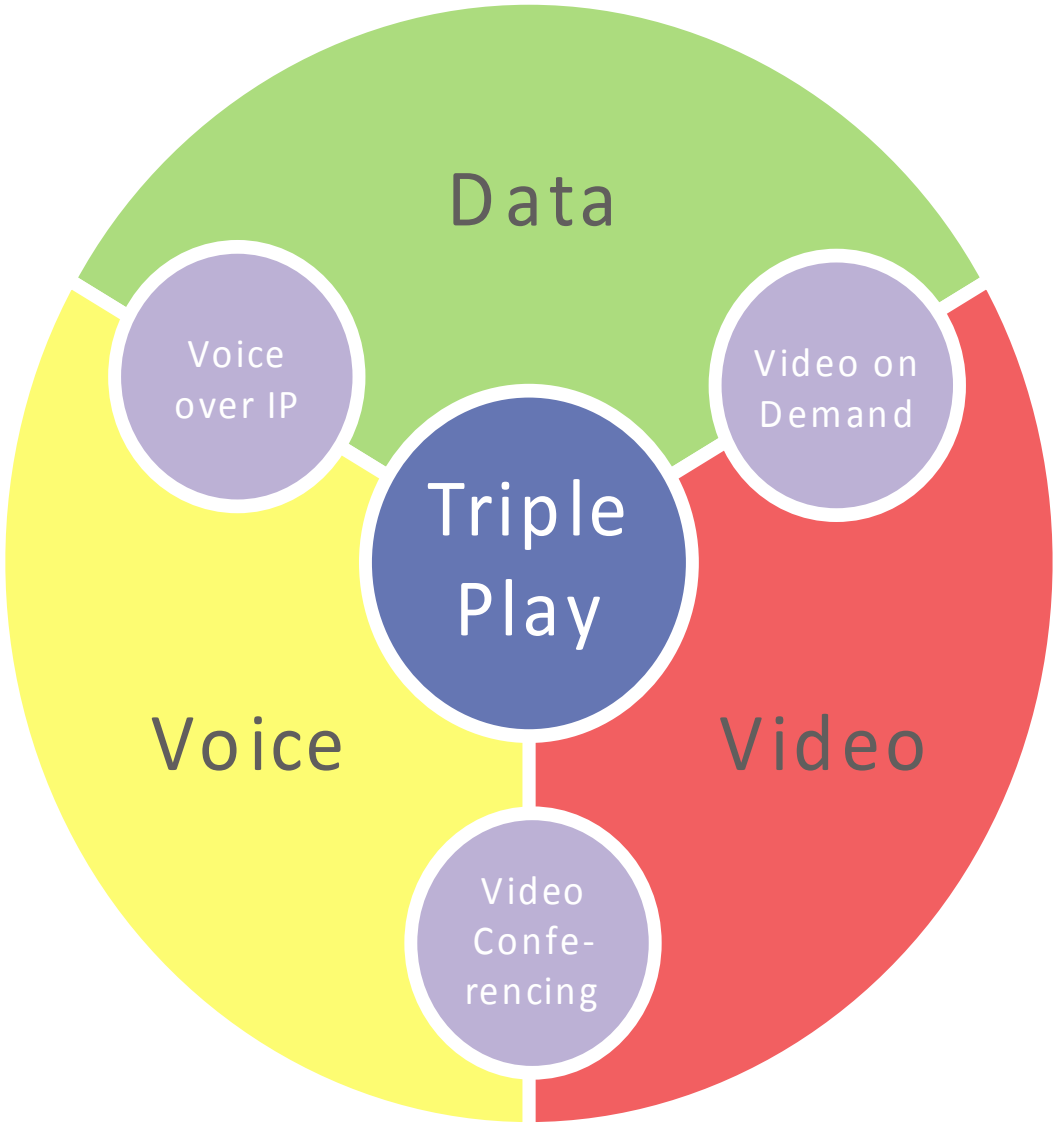
- Wall mount set, 2pcs.
  MS140010



End User Access

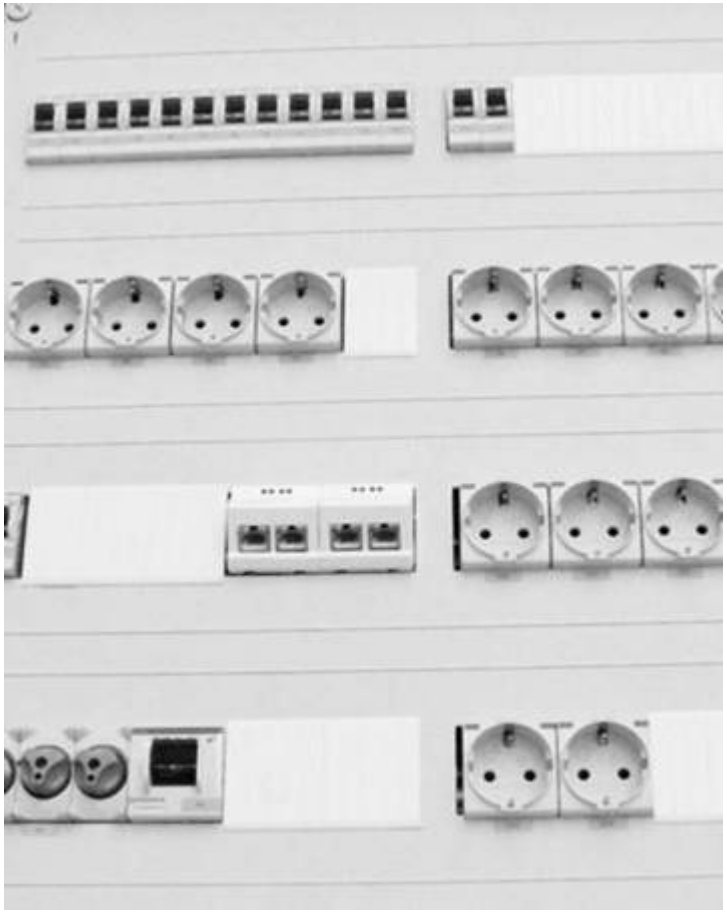


Triple Play


Data
Voice over IP
Video on Demand
Triple Play
Voice
Video
Video Confe-rencing

Installation into current distribution boxes

- Special for FTTH applications
- Mounting on DIN-rail

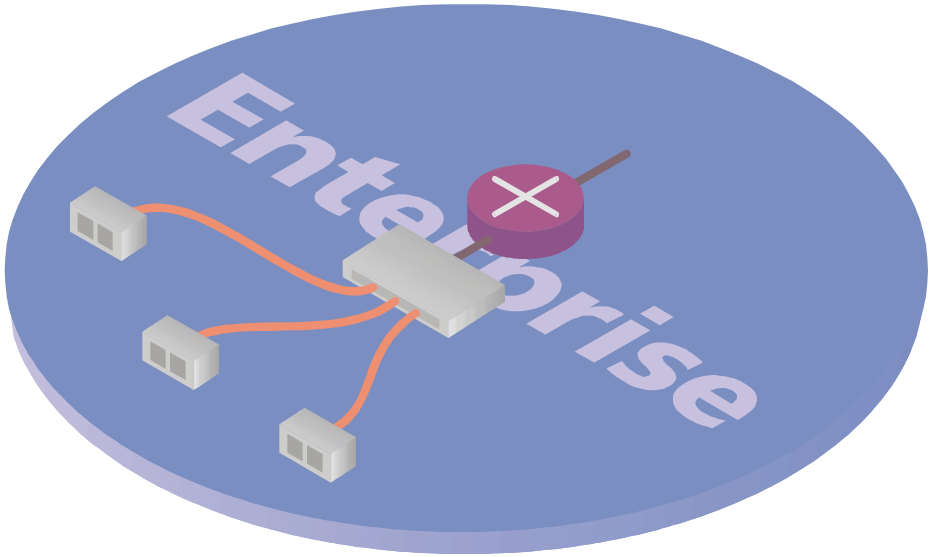


Multiport-media converter

- 6 / 12 / 24 ports
- Ethernet / Fast Ethernet
- SNMP + web based management
- Redundant power supply
- Gigabit version with SFP on roadmap

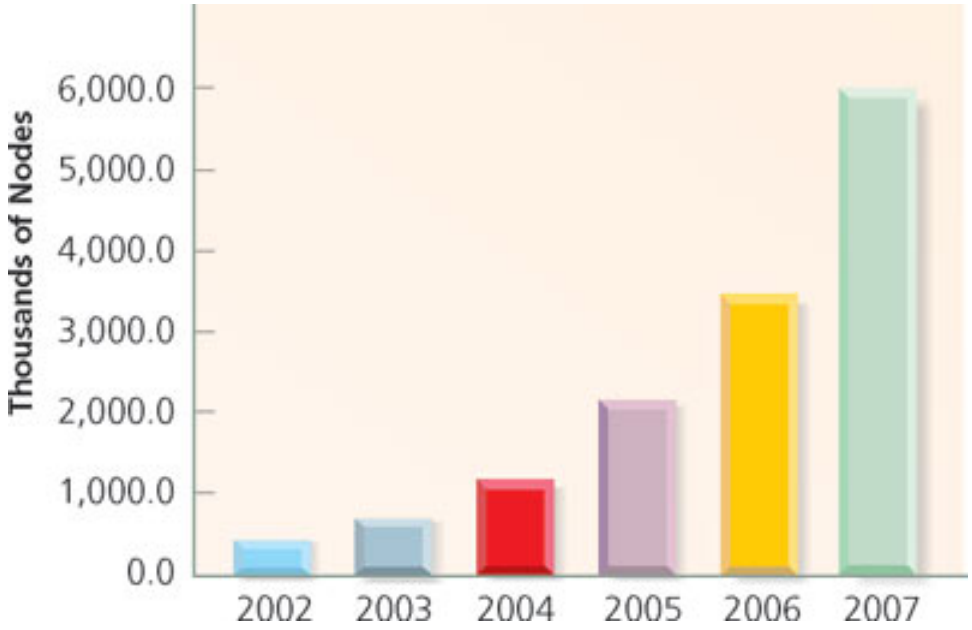
Advantages

- Minimum costs per port
- High port density (1 HU)
- Easy installation (TELCO)



Industrial Solutions

Industrial Market Fcast



Source: ARC Advisory Group

- 50% growth rate within the last 3 years
- Fcasted average growth rate of 84,1 % per year
- Fcast for 2007: 6 Million ports

Strengths of Industrial Converters and Switches?

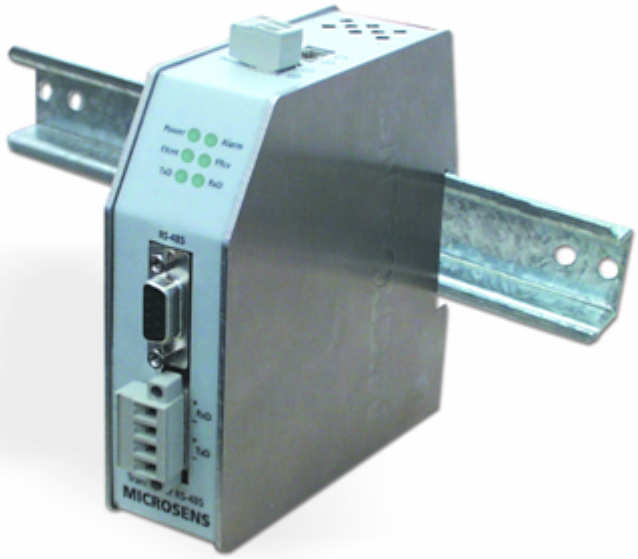
- Designed for DIN Rail mounting
- Higher temperature range (-20 to +60 degrees C)
- Higher electromagnetic immunity
- 24VDC Power Supply
- Robust and compact metallic housing
- Available with MM and SM and with WDM

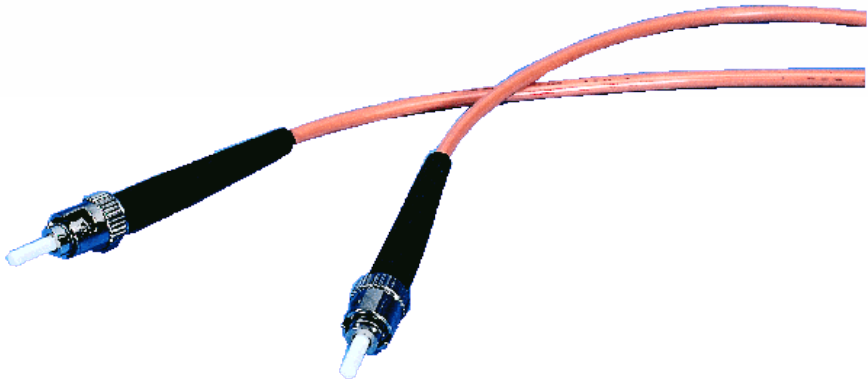
Typical Customers for Industrial Converters and Switches

- Manufacturing Plants
- Traffic Control Centers
- Railways and Airports
- Wind Mill Parks/Manufacturers
- Mining Companies
- Security Companies (CCTV)
- Military
- FTTB & FTTC

Media converter for serial interfaces

- RS-232/V.24 / Fiber
- RS-422/V.11 / Fiber
- RS-485 / Fiber
- 24 Volt DC input
  optional redundant



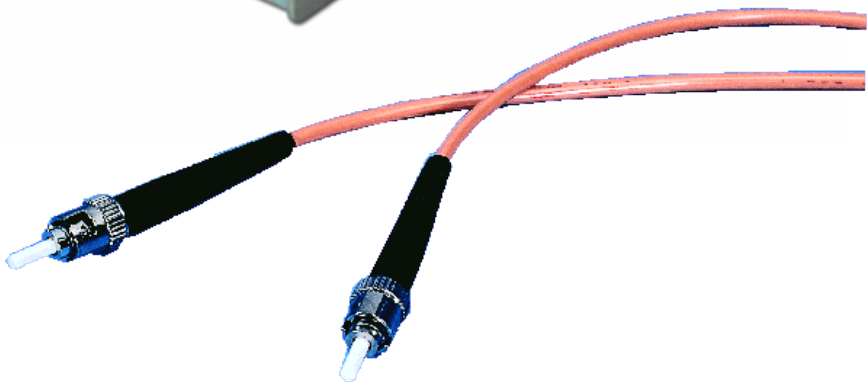


Ethernet Media converter

- 10Base-T/10Base-FL
- 24 V DC input
  optional redundant

Fast Ethernet Media converter

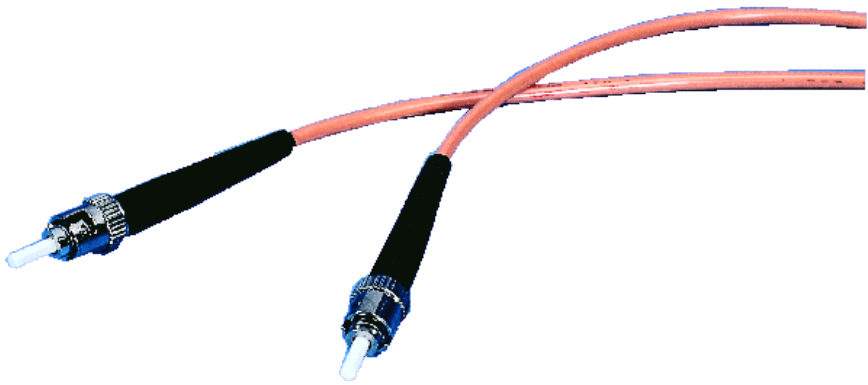
- 100Base-TX/FX



MICROSENS

6 Port Fast Ethernet Switch

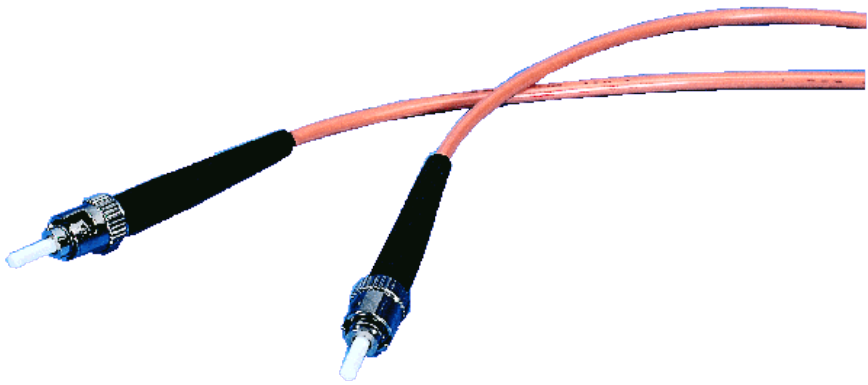
- 4x 10/100Base-TX
- 2x 100Base-FX uplink
- Management integrated
- 24 V DC input
  optional redundant
- NEW: redundant rings for
  fault tolerant networks



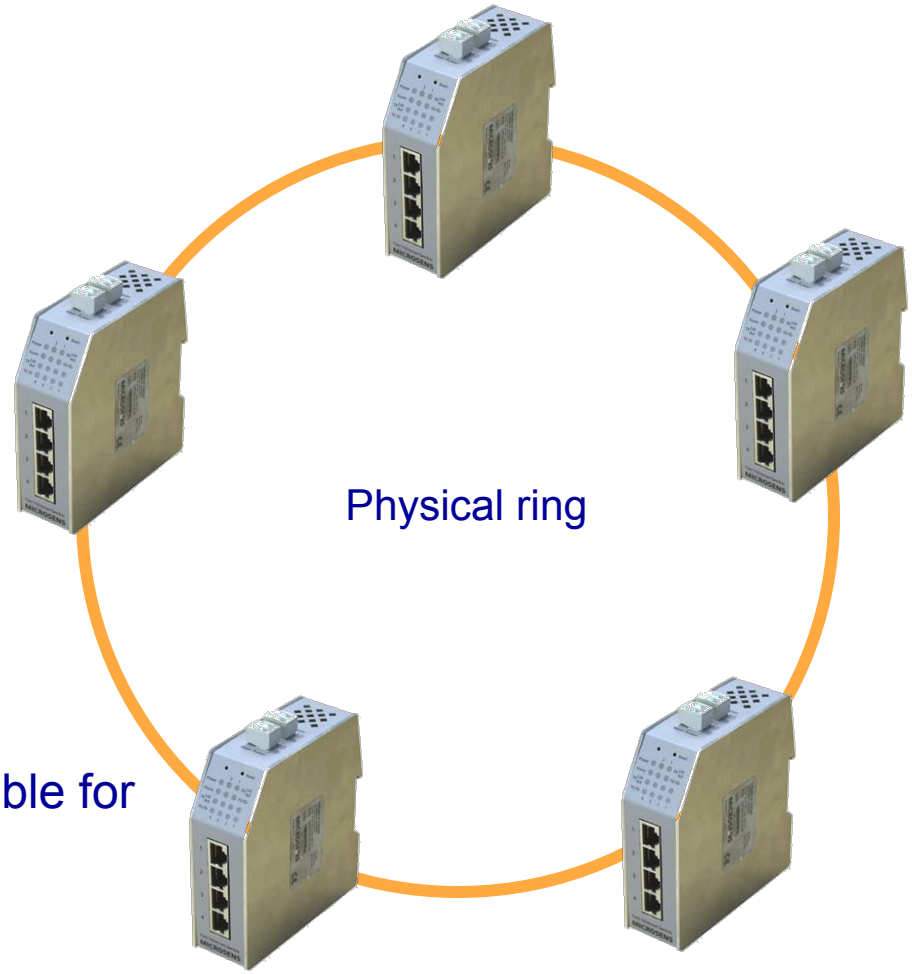
MICROSENS

10 Port Gigabit Ethernet Switch

- 1x 10/100/1000Base-T
- 7x 10/100Base-TX
- 2x 1000Base-SX/LX uplink
- Management integrated
- 24 V DC input
  optional redundant
- PoL optional
  (with 48 V DC input)

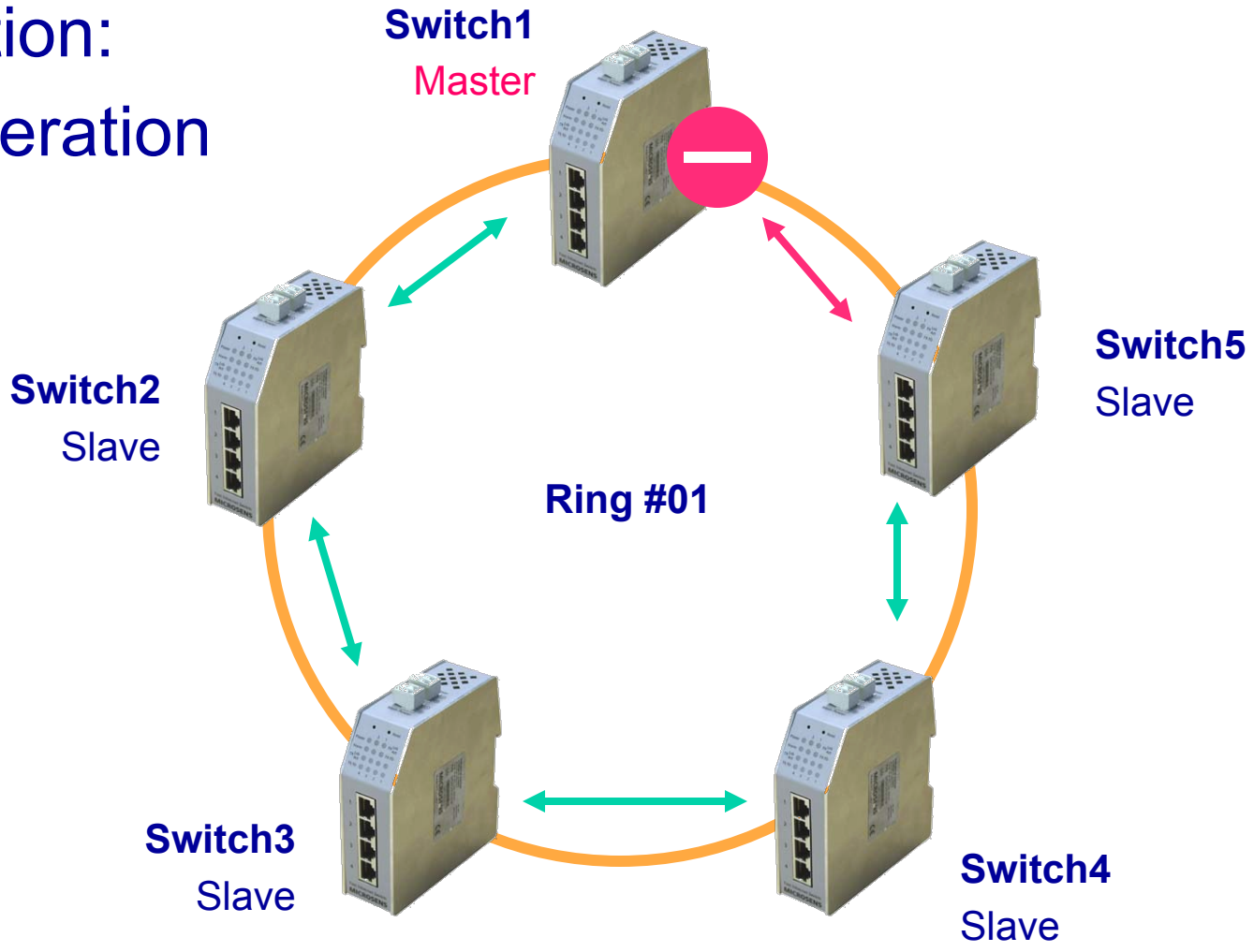


Redundant Ethernet Ring Structure

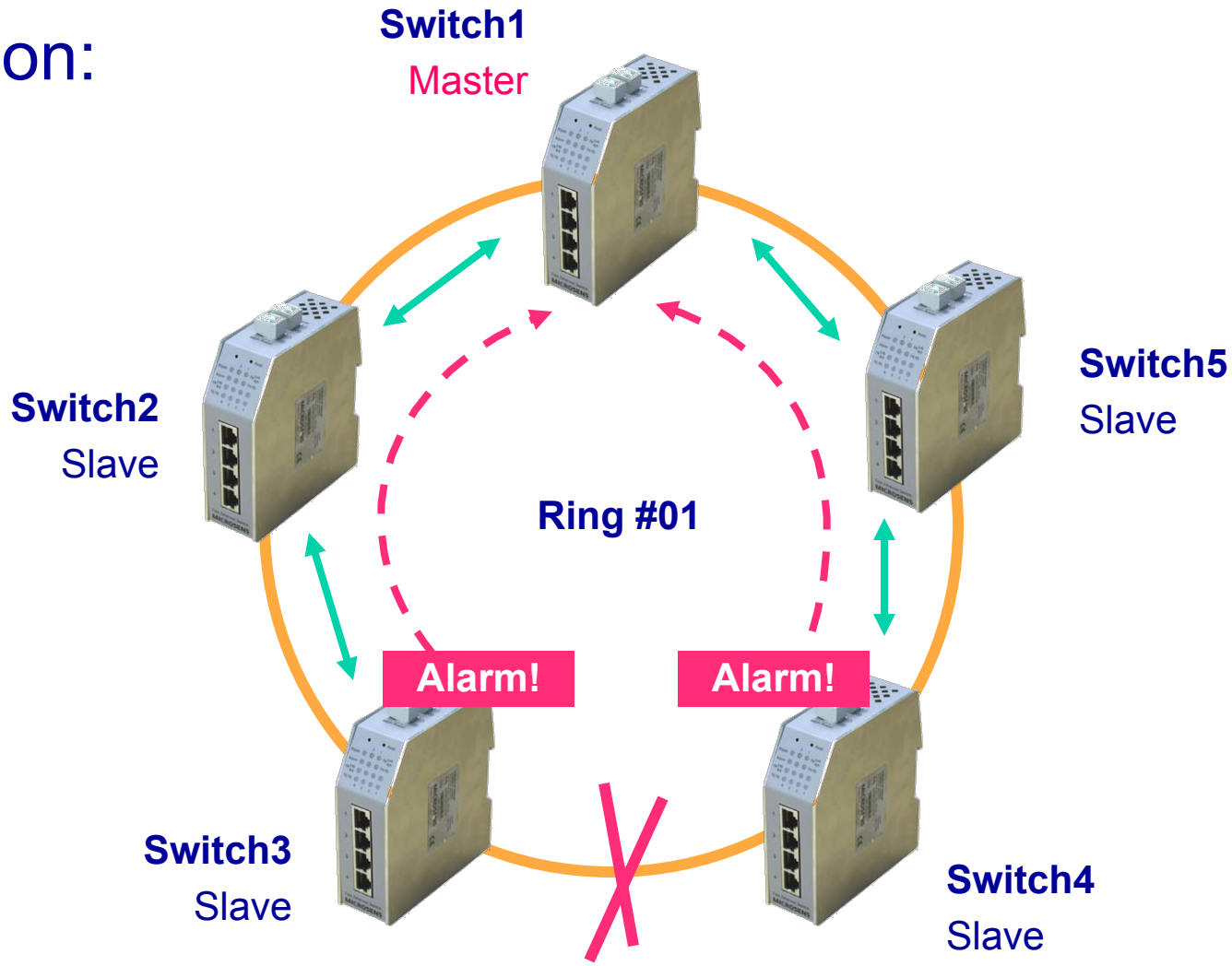


- High system availability
- No ‚Single Point of Failure ‘
- Fast Reconfiguration time (typ. <100 ms)
- 100 % of the bandwidth is available for the data traffic
- Optimized cabling effort

Ring-Function: Normal Operation

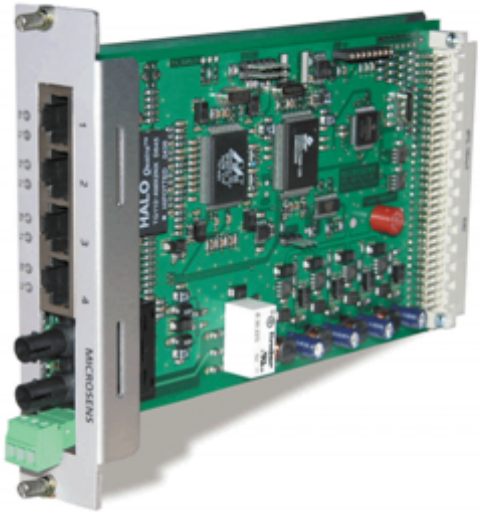


Ring Function: Failure

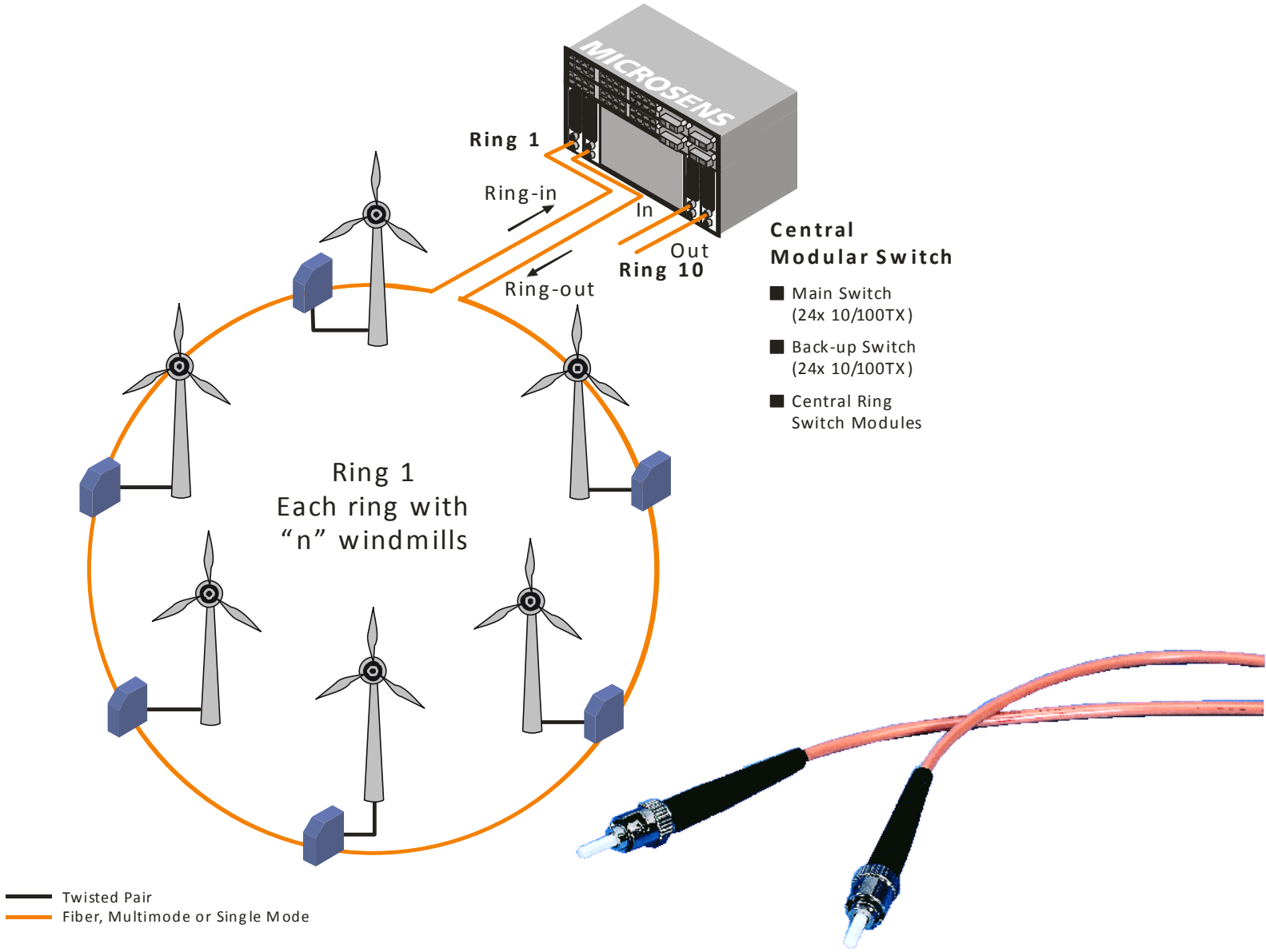


Switch Module with Ring Function

- **5 Port Fast Ethernet Switch**
  - 1x 100Base-FX, 4x 10/100Base-TX
- **Centralized Connection of Fiber Optic Ring**
  - Redundancy via Copper Port
  - Compatible with Industrial Switches
- **Fast reconfiguration time < 100 ms**
- **Integrated Management Agent**
  - QoS, VLANs
  - GUI Tool, Telnet, SNMP/Traps, Syslog, Web
- **Compatibility to Access Platform**



Industrial Solutions



Industrial Ethernet Switches- Competitive strengths

- Highest System availability because of fastest protocol
- Combination of MM and SM in one unit possible
- Compatible with the FTTO switches to build networks
- Same NMS Device Manager for all products
- Compact design
- Very competitive product
- Made in EU for flexibility in support and modifications

Installation Switch

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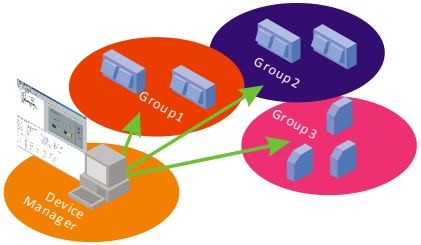
Device Manager

- **GUI Software for Windows platforms**
- **Configuration, Monitoring and Administration of the network**
- **Largely Automatic-features:**
  - All devices of the network are recognized
  - Definition of device groups
  - Configuration of device groups
  - Firmware Update of device groups
- **Integration in Management-Platforms possible**



Company Profile

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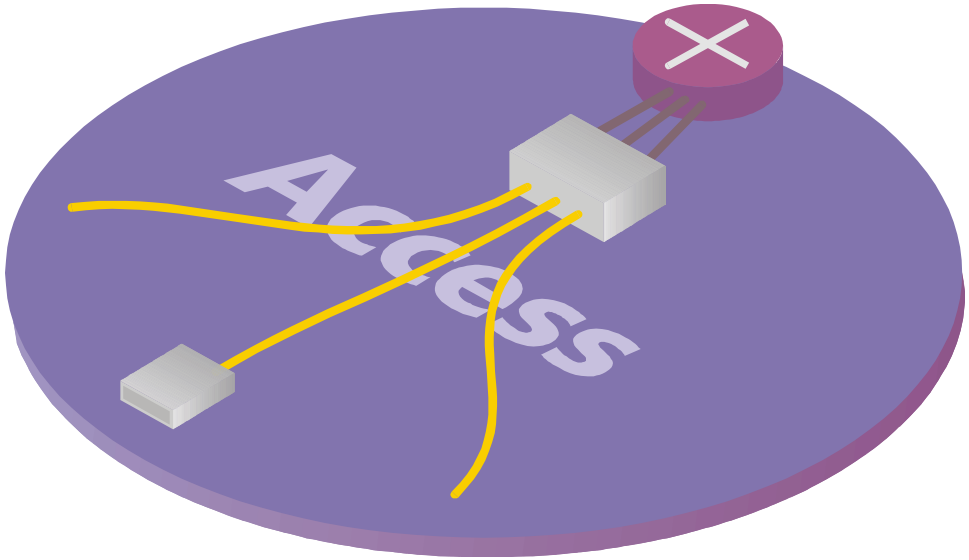

Conversion

- Long haul Connectivity
- Modularity, Flexibility
- Security, Redundancy

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Modular Managed Access Platform

Advantages:

- High flexibility
- Combination of different services
- Redundant power supply
- Hot swap of modules
- Twin modules for high port density
- SNMP management option

Modular Chassis 1 HU

- 3 modular ports
- SNMP Management option
- Floor distribution
- Redundant operation

Desktop chassis 1 slot

- High-class design
- For insertion of 1 x MS416xxx module

Options:

- External power supply (MS417001)
- Internal power supply with 100..230 VAC
- Wall mounting

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Desktop chassis
2 slots

- High-class design
- For insertion of 2x MS416xxx modules
- Application: SNMP management

Options:

- External power supply
- Internal power supply with 100..230 VAC
- Wall mounting

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Access Modules

Ethernet	FL / TP, FL/BNC, TP/BNC
Fast Ethernet	100Base-FX / -TX
Gigabit Eth.	1000Base-TX/1000Base-FX
Bridges	10/100TX-100FX, 10/100/1000TX-1000SX
Token Ring	Copper/fiber converter
Industrial	RS-232, RS-422, serial multiplexer
LAN / WAN	Multimode / Single Mode converter Single Mode / Single Mode converter
	3R retiming systems
	WDM converter

Multifunctional Ethernet Bridge Module

1. **Twin Bridge**
   Two channels 10/100Base-TX / 100Base-FX
2. **Fiber Repeater**
   100Base-FX/FX
   TX-sniffer port for monitoring
3. **4-Port Switch**
   2x 100Base-FX and 2x 10/100Base-TX
4. **Redundant Bridge**
   Recovery time < 50 msec

Multifunctional Ethernet Bridge Module

- „Bandwidth limitation“ function in 32kbps steps for provisioning of services
- High port density with 4 ports per module
- Lower cost per port
- In redundant mode fast recovery time of <50msec

Application example

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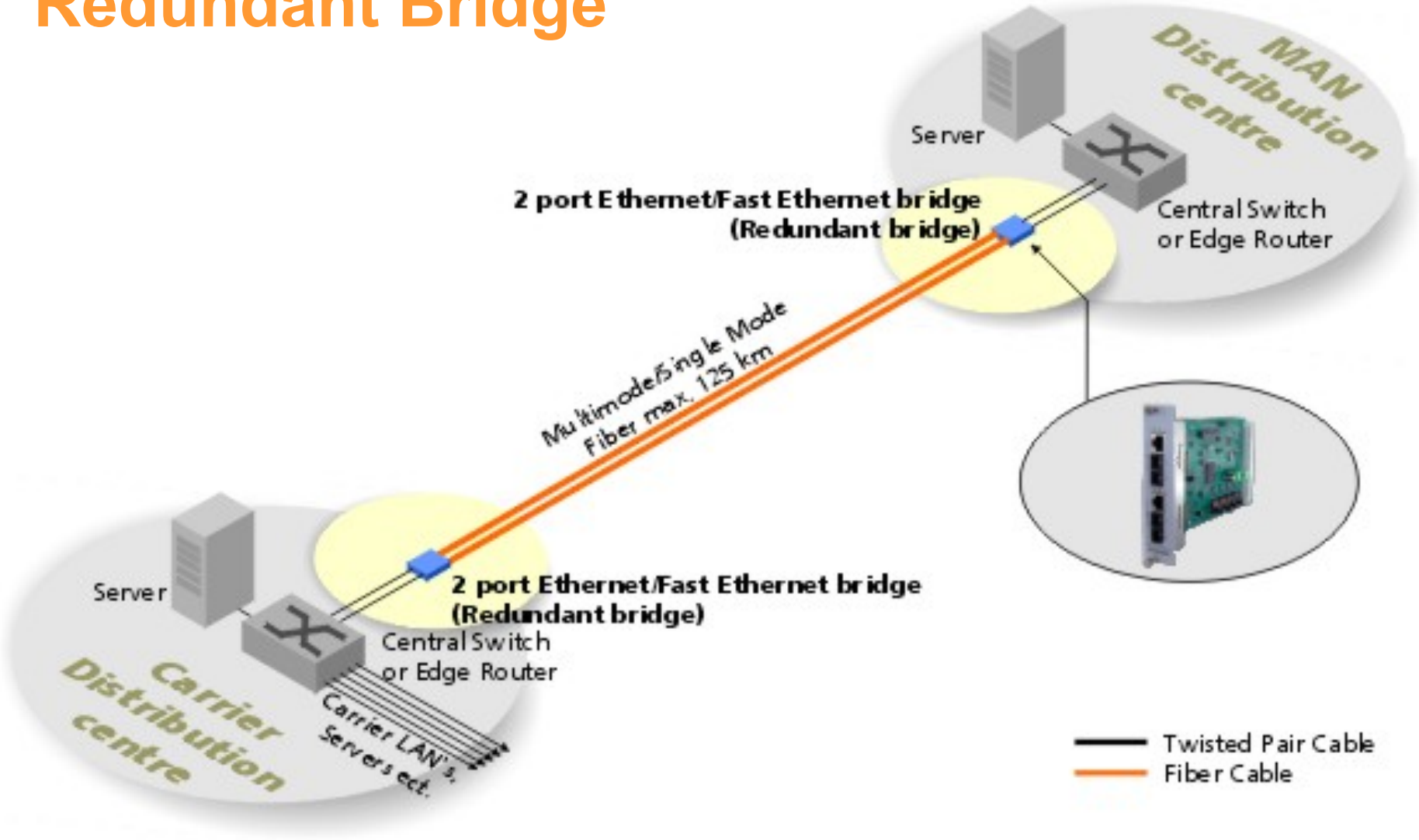
Redundant Bridge

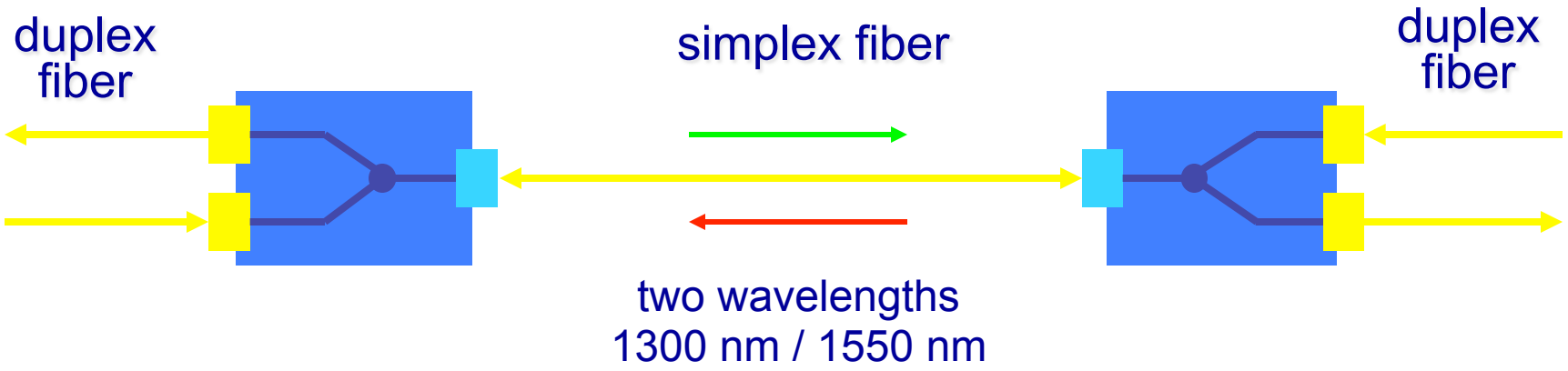


Gigabit Ethernet Multimode Extender

- Distance extension from 275 or 550 m (IEEE standard) to 2 km
- ST- or SC connector
- SNMP-/ Web based management
- Desktop chassis one or two slot version

Wavelength Multiplexing

WDM 2:1



WDM Converter module

- Multimode / Single Mode
- Transparent up to Gigabit
- Manageable
- Double capacity of existing lin

Application example

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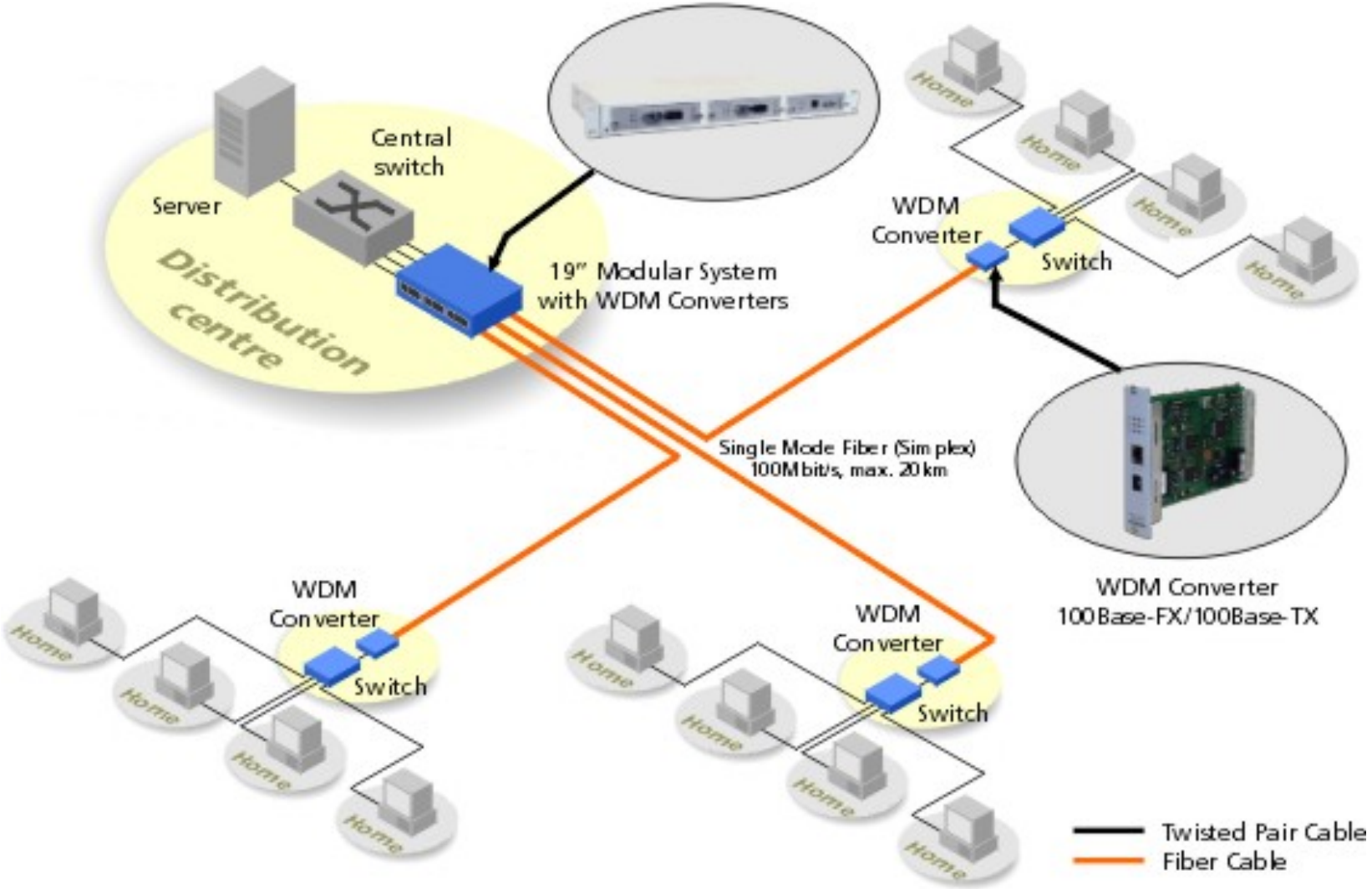
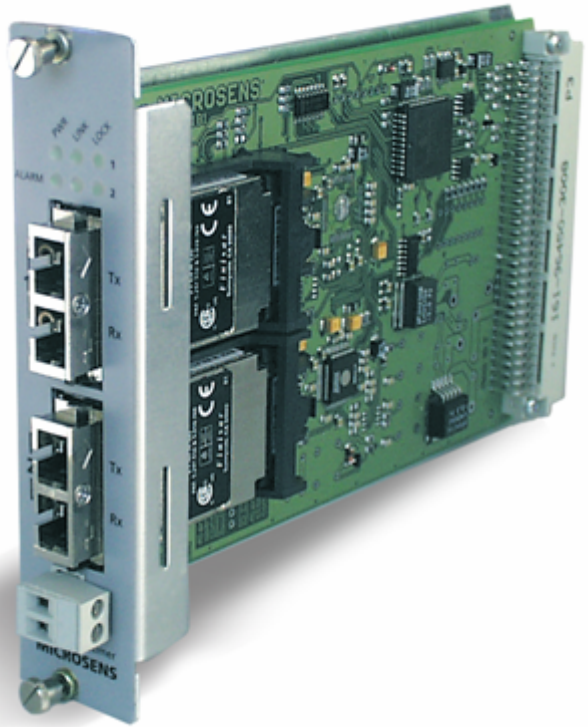
WDM converter 100Base-TX/FX



Multimode / Single Mode converter
Wide Range Retiming

- Maximum flexibility
  due to modular GBIC ports
- ATM OC-3, SONET STM-1
  ATM OC-12, SONET STM-4
  ATM OC-48, SONET STM-16
  Gigabit Ethernet
- Single Mode / Single Mode
  configuration -> repeater
- SFP version available



Application example

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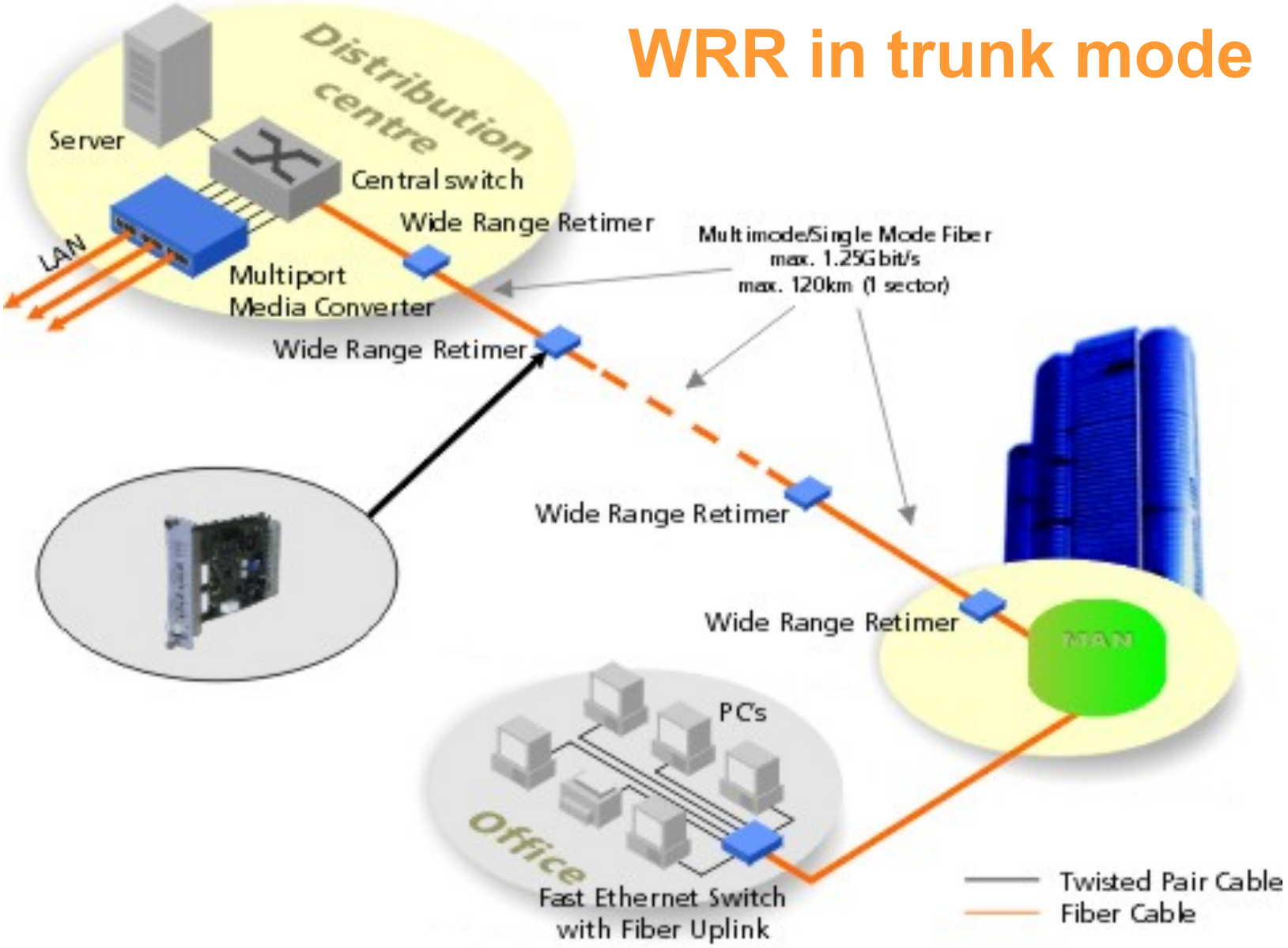
WRR in trunk mode



New Intelligent Gigabit Ethernet Bridge

- 10/100/1000 Mbps autonegotiation
- Flexible due to pluggable transceiver (GBIC/SFP)
- Integrated Management Agent (inband)
- Optional control of optical power budgets
- Migration into CWDM solutions possible (CWDM GBIC)

Twin Retimer with 4 Channel optical Crossbar

- **Point-to-Point connectivity**
- **Double Transponder Module**
- **Free programmable 4 Port Crossbar**
  - Point-to-Multipoint Connection for Broadcast Applications
  - Redundant Mode for Channel Protection
- **Full Retiming (3R) up to 2.7 Gbps**
  - Retiming for any Protocols
  - Optional bypass Mode (transparency)
- **Hardware Protection with two Modules**
- **Compatibility to Access Platform**

Optical Level Monitorting Module

- **Optical Monitoring via Management**
  - Preventing Link Failures
  - Alarm if selected Limit is reached
- **Full transparency (pure optical)**
  - Only 1% of optical Power used for Monitoring
  - Overall max. 1 dB Attentuation
- **Useable for xWDM-Solutions**
- **Bidirectional**
- **Compatibility to Access Platform**

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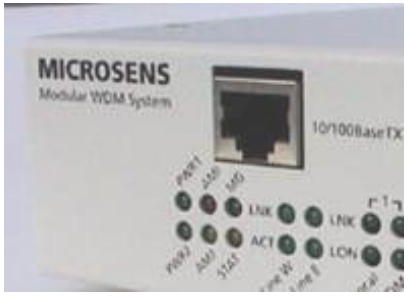
TDM Multiplexer

- **TDM multiplexing**
  - up to 8 x E1/T1 or 1 x E3/DS3 plus one Gigabit Ethernet
  - 4 x 10/100/1000Base-T integrated Ethernet switch (stacked VLANs) support VLAN, QoS and bandwith limitation
- **Optical Ports with plugable SFPs**
  - up to 125 km over SM fiber
- **Management via VT100-CLI, SNMP and Telnet**
- **Redundant power supply 100-240V AC or 48V DC**

CWDM Solution from MICROSENS

- Cost attractive CWDM technology
- Low Initial costs - only required channels are installed
- Expansion to DWDM-technology
- Protocol transparent up to 2.5 Gbit/s
- Point-to-Point, Linear Add-/Drop- and Ring- structures
- Line-, Channel- and System- protection



CWDM System

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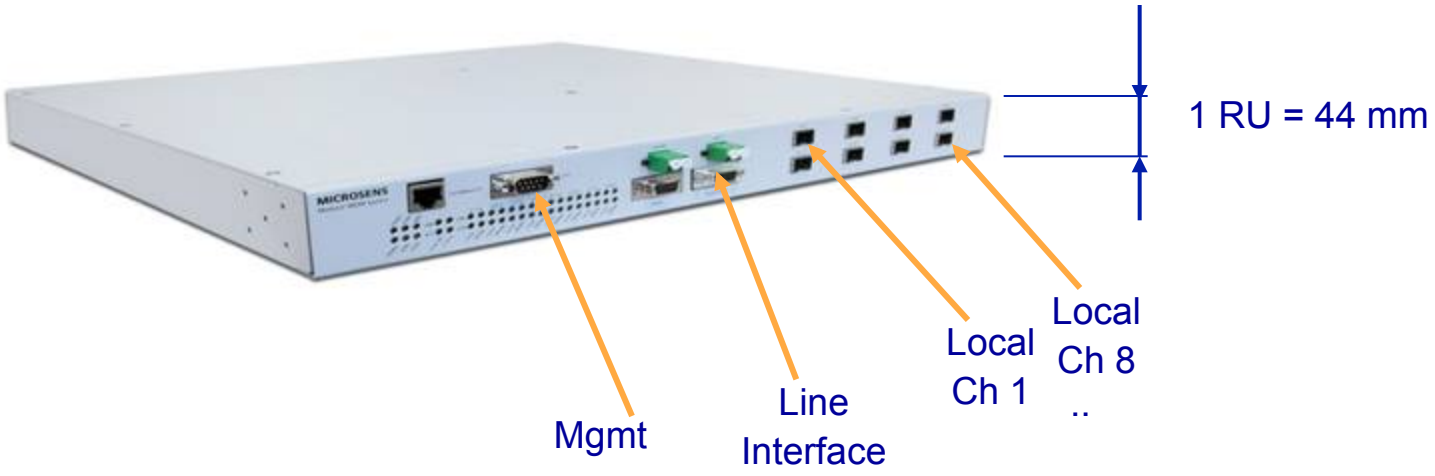

- Extremely compact design
- 1 RU height for minimum space requirement
- Internal modularity
- All data interfaces accessible from the front

xWDM Platform

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New Modular 19“ chassis

Advantages

- Slots at front- and back-side
- Total 28 slots available
- Typ. power supplies on back side
- Hot swap of modules
- Very easy upgrade and maintenance
- SNMP management option
- 8 channel CWDM 3R retiming possible

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fiber optic solutions

Thank You!