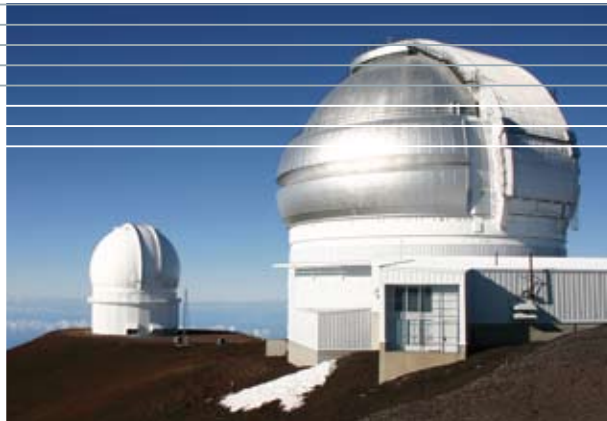


MICROSENS

Efficient
transmission solutions
for research & education



MICROSENS fiber optic solutions -
intelligent, reliable, high-performance



FIBER TO THE OFFICE (FTTO)



COPPER-BASED NETWORKS



OPTICAL TRANSMISSION NETWORKS



CENTRAL POWER SUPPLY CONCEPT



Dear reader,

Excellence in research and education requires a modern technical foundation. Every year, the volume of data transmitted over research networks increases by around 40 percent. These growing amounts of data are the result of more frequent interinstitutional cooperation and of virtualisation's progressively larger role in research and education.

Together, optical transmission networks and efficient building IT-infrastructure provide the foundations research and educational institutions need to ensure continued peak performance in the future. Investments in high-quality technology also pay for themselves by reducing operational and maintenance costs over the long term — costs which the institutes themselves often have to cover.

As a long-term partner to ZKI (center for communication and data processing in education and research), MICROSENS is committed to promoting active cooperation between industry and higher education. Maintaining a bilateral exchange of experiences with German universities is an integral part of MICROSENS' corporate philosophy and history.

As a German developer and manufacturer of high-performance fiber optic devices, MICROSENS offers regional proximity, innovative products and professional consultation. They work in close cooperation with a wide variety of educational institutions to implement all manner of comprehensive solutions. These projects range from future-proof in-house Fiber To The Office networks — which are especially suited to sensitive laboratory areas — to high-performance intercampus networks with CWDM/DWDM technology for research networks and universities.

On the following pages, you will learn more about how you as a decision-maker can use MICROSENS' fiber optic solutions to realise future-proof network structures.

Enjoy reading this brochure!

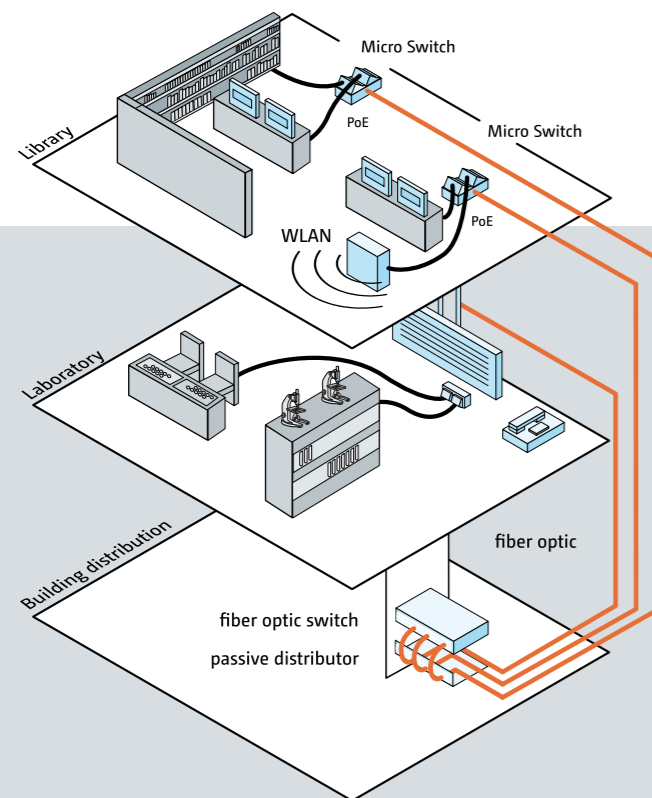
Dipl.-Ing. Hannes Bauer

Technical Director and Founder of MICROSENS GmbH & Co. KG

MICROSENS

FIBER TO THE OFFICE (FTTO)

Future-proof in-house cabling for educational and research institutions' growing bandwidth needs



The MICROSENS FTTO concept combines the advantages of high-performance fiber optic networking with the flexibility of copper-based twisted pair connection technology. With FTTO, colleges and institutions gain a future-proof network topology with low operating costs and high transmission capacities.



Informational diversity as a basis for modern didactics

Modern “blended learning” educational concepts are closely linked to the availability of substantial media and new communication methods. As they expand their medial infrastructure, more and more university and school libraries are turning into media centers with comprehensive access to digitalised content. The increasing data volumes quickly push ordinary copper-based infrastructure concepts to their limits — in terms of both data transmission capacities and cost efficiency.

Reducing IT operating costs with Fiber To The Office

IT operating costs are of particular relevance in the fields of education and research, as they cannot be covered by external funding. FTTO reduces expenditures on electricity, climate control and maintenance. The horizontal fiber optic cabling's wide range makes additional sub-distributors on each storey unnecessary, and the building distribution system requires fewer active network components. By eliminating the need for technical rooms on each storey, this so-called “collapsed backbone” network architecture also frees up additional building space. Furthermore, FTTO gives universities and institutes greater long-term planning security, as the horizontal fiber optic cabling can remain in place even through multiple technology upgrades.

- Significant reduction of power, climate control and maintenance costs
- Long-lasting thanks to horizontal fiber optic cabling's long-term usability
- Especially suited to laboratory and research areas thanks to high EMR resistance and galvanic separation

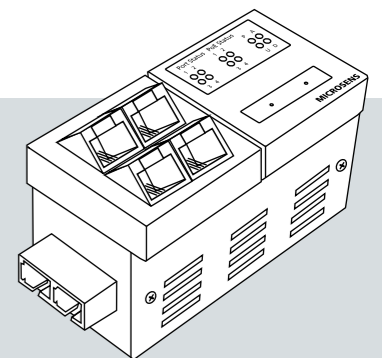
Flexible wireless network access to educational content and information systems

Comprehensive wireless network coverage is an integral aspect of a modern IT concept for today's universities and other educational institutions. Power-over-Ethernet technology is one of the keys to cost-efficient implementation of wireless networking.

This technology makes it possible to power wireless solutions or VoIP telephones cost-effectively using twisted pair cabling, meaning no installation costs for separate electrical cabling are incurred. MICROSENS' intelligently-designed FTTO switches enable the use of PoE (Power over Ethernet) throughout the institution. The devices are also fully compatible with all important administrative and security protocols, and thanks to IPv6, they are well-prepared for future developments.

Compact switches for professional use

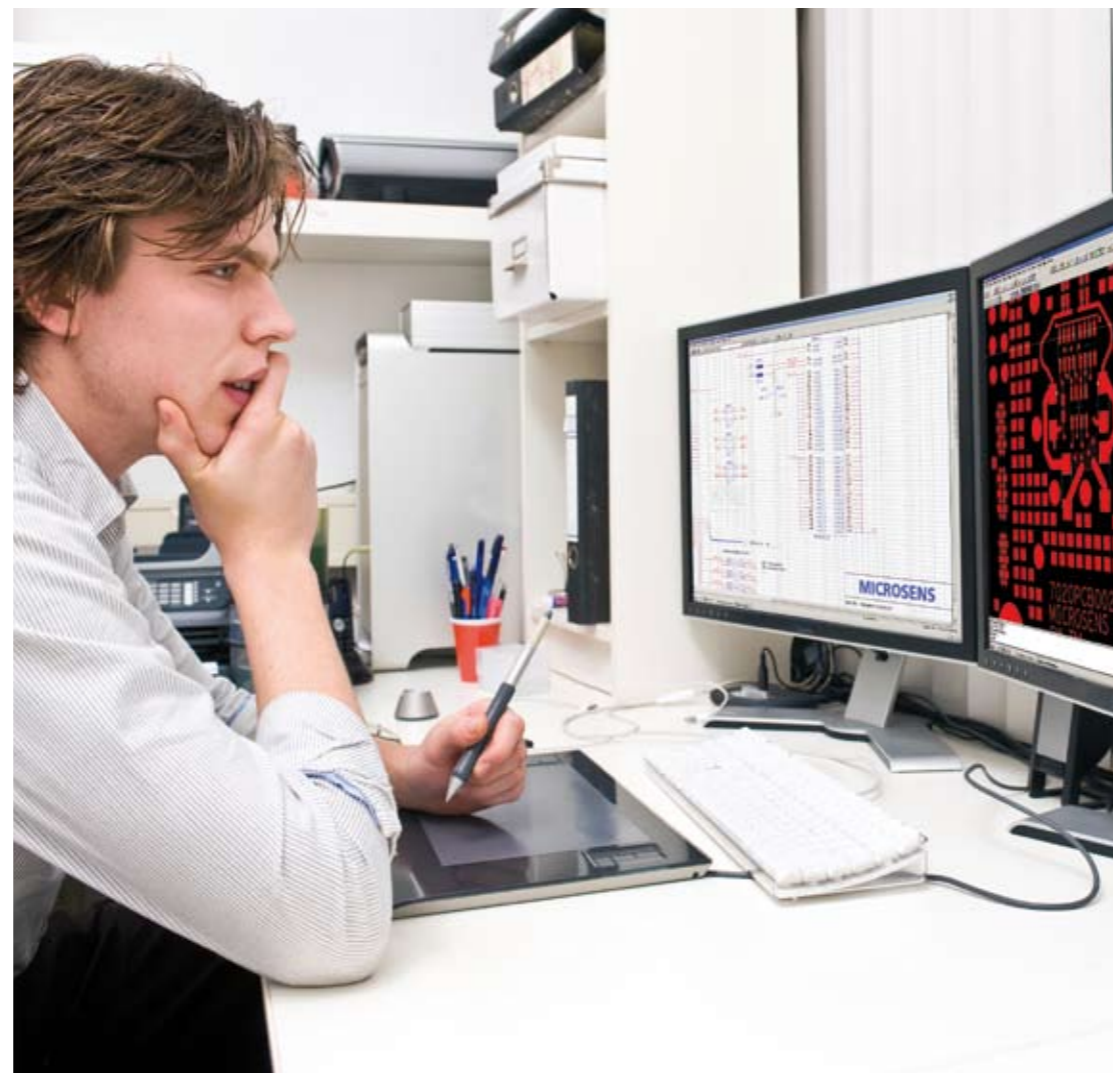
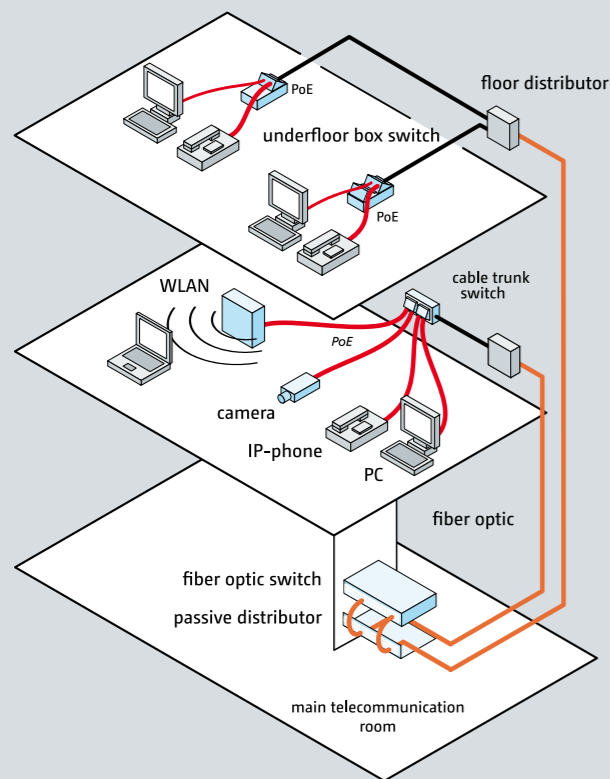
- Integrated powering of wireless equipment and VoIP telephones via Power-over-Ethernet
- Usable with all important security protocols (authentication in accordance with BSI 802.1X, RADIUS)
- Future-proof thanks to IPv6 support



Cost-efficient expansion of copper-based networks

Professional network expansion without relaying cable or interrupting normal business operations

Even before the comprehensive restructuring of college and university funding, institution heads were under serious budget pressures which were far removed from any excellence initiatives or higher education pacts. This pressure often directly affects an institution's ability to provide the additional Ethernet connectivity which is so vital to modern educational environments. It does not help that building IT infrastructures (some of which are showing their age) often are not set up to accommodate modern requirements like Power-over-Ethernet.



Stepwise expansion of connection capacities

MICROSENS offers an expansion concept that, unlike laying additional cable or even completely replacing the cabling network, allows for step-by-step ("pay-as-you-grow") expansion of connectivity. MICROSENS FTTO switches can help institutes of higher education plan their capital expenditures with greater flexibility. Selective capacity expansion for individual building sections or storeys can be divided up among several different budgets. This stepwise expansion method also keeps disruptions of daily operations to a minimum.

Using low-security workarounds to avoid budgetary issues

In times where school and university authorities are frequently confronted with tight budgets, doing a comprehensive restructuring of building IT infrastructure is often not financially feasible. At a loss for adequate solutions, many institutions often end up turning to cheap desktop switches with limited management functions in order to provide additional computer workspaces with some kind of connectivity. More and more IT managers thus find themselves confronted with local network structures that cannot be managed efficiently and do not meet the necessary security standards.

Professional solutions for professional network expansion

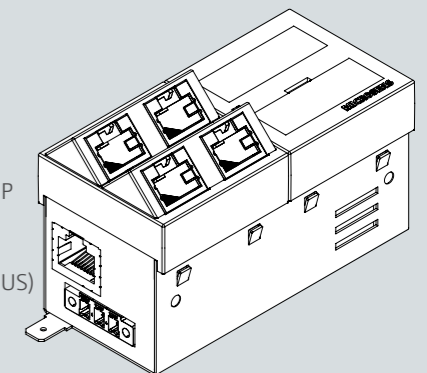
MICROSENS offers a professional method of supplying additional network connections. Using up- and down-links with copper connection technology, the Micro Switch makes it possible to create additional network connections without the cost-intensive dismantling and rewiring processes.

- Toolless snap-in mounting into cable channels, under-floor tanks and control cabinets
- Power supply also possible via central 24-port PoE injector
- Ordered cable routing rather than "flying cables"

Power-over-Ethernet, modern security functions, central management

With their copper uplinks, MICROSENS' FTTO switches are suited to a wide variety of installation scenarios; they support all standard security protocols and allow prioritisation of VoIP services.

- Integrated powering of wireless equipment and VoIP telephones via Power-over-Ethernet
- Usable with all important security protocols (authentication in accordance with BSI 802.1X, RADIUS)
- Central management over standard interfaces, IPv6 compatibility



Optical transmission networks as the basis for efficient research work

With the MICROSENS optical transmission system, research and educational institutions can lay crucial groundwork for the successful establishment of virtual research teams. High-performance CWDM/DWDM transmission networks allow users quick access to their joint database regardless of their location — creating a solid basis for scientific success.



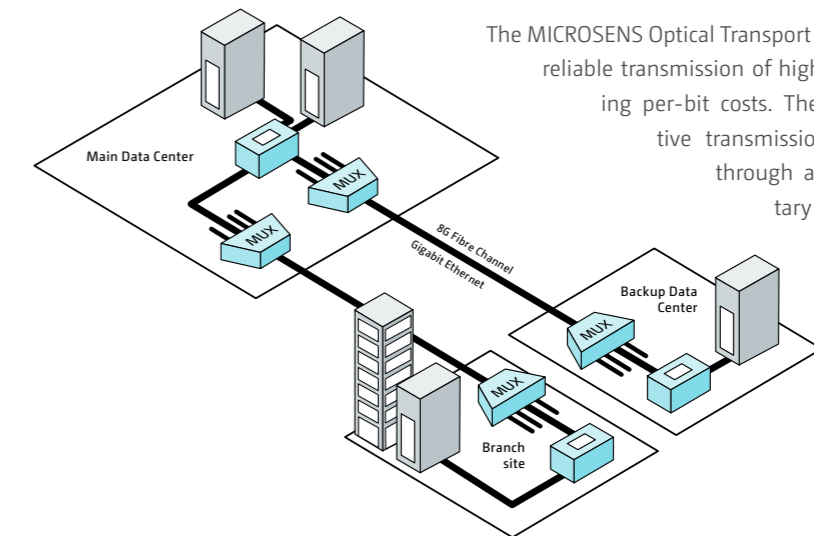
Needs-oriented expansion of transmission capacities

Thanks to its modular setup, the MICROSENS Optical Transport Platform allows users to adjust the capacities of their network to their present needs, using fiber optic lines with up to 100 Gbps per transmission channel. Research institutions and facilities can balance their bandwidth needs with their investment levels while retaining flexibility in terms of their future transmission capacities.

Georedundant archival of scientific data

Short latency periods and complete protocol transparency combine to form a perfect basis for connecting secondary data centers or linking partners in intercampus scientific networks. By connecting DRCs (Disaster Recovery Centers), users can archive important scientific data georedundantly, ensuring that scientific work can be resumed quickly following an emergency. In addition, the combination of in-house transmission equipment with cost-effective dark fiber lowers the operating costs associated with data transmission while simultaneously helping institutions retain autonomy from external service providers.

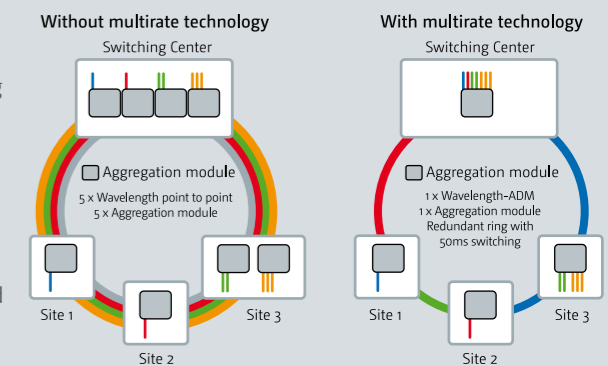
Increased cost efficiency through intelligent technologies



The MICROSENS Optical Transport Platform is designed to provide reliable transmission of high data volumes while optimizing per-bit costs. The system maintains this positive transmission capacity-to-total cost ratio through a combination of complementary technologies that help significantly reduce operating and capital costs.

Innovative advantages of the Optical Transport Platform

- **Green IT technology** — the system's particularly energy-efficient single-chip technology helps reduce operating costs by up to 25 percent compared to conventional multi-chip solutions.
- **Multi-rate technology** — parallel transmission of different protocols (Ethernet, SDH, Fibre Channel) and data rates (100 Mbps to 40 Gbps) along a single wavelength reduces infrastructure-related aggregation and operating costs by up to 60 percent without network expansion.
- **Integrated hardware encryption** — an optional FIPS-based hardware encryption system protects important research data from industry spies and unauthorised access.
- **Next-generation FEC (Forward Error Connection)** — provides a signal gain of 10–12 dB instead of the standard 6 dB. The system largely operates without dispersion fibers improving latency periods and eliminating costs associated with dispersion compensation.



Central power supply concept for Power-over-Ethernet applications

The ability to power network terminal devices via Power-over-Ethernet also provides educational institutions with important advantages. With PoE, access points to area-wide wireless networking and VoIP telephony can be supplied with power effectively and cost-efficiently. MICROSENS offers a central power-supply concept for this application, a concept that uses redundant construction to raise total availability while also allowing exact dimensioning of the necessary capacity.

High energy efficiency

Central 48 VDC power supplies provide numerous advantages over the use of separate power cords. Above all, they are more economical, as precise dimensioning makes it possible to operate power supplies at optimum levels, thus reducing electricity usage and lowering operating costs.

Easy scalability

The entry-level solution is comprised of up to three compact 500 W rectifier modules in a 1 HU-sized housing, for a total capacity of up to 1,500 W. The next stage of expansion results in a 2-HU solution with a total capacity of 4,500 W; this system includes up to three 1,500-W rectifier modules plus a carrier chassis and an electrical distribution chassis.

Redundant construction in UPS operations

Central power-supply systems can be constructed with some redundancy and also buffered with battery power (UPS). MICROSENS offers especially compact solutions with high power density. Its broad operating temperature range — from -20 to +50°C — also eliminates the need for a complex climate control system.

Capacity overload protection

MICROSENS FTTO Switches' power management systems work together with the central power supply system perfectly. The overall load is monitored continuously, which prevents incorrect or defective end devices from overloading the electrical system.

- Cost-efficient thanks to high effectivity — even in areas of partial-load operation
- Compact construction — little space required
- Variants from 500 W (1 HU) to 4,500 W (4 HU) for precise dimensioning
- No temperature control necessary within broad range of operating temperatures (-20 to +50°C)
- Easy installation and commissioning
- Modular construction provides flexibility in expansion

MICROSENS fiber optic solutions - intelligent, reliable, high-performance



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