MICROSENS
fiber optic solutions
www.microsens.com
news 4
No.4, April 2003

Dear Readers, dear Partners,

The market is more sensitive and the room for maneuver is becoming smaller. Successful sales work is now more important than ever. MICROSENS is consciously acting against the cycle and is actively expanding its sales activities.

More than one third of MICROSENS' staff in Germany and abroad are working in sales and marketing. Customer support is now more effective by our newly formed sales teams.

We want to support you better in order to create the conditions for developing better and more tailored solutions for customers on the basis of our technical competence.

The CeBIT gave us many new impulses on how to achieve market success together with you. The following pages will surely convince you.

Yours Marko Richter
Executive Sales Manager

Contents

CeBIT 2003 – a great success

CeBIT HANNOVER 12. – 19. 3. 2003

The CeBIT 2003 has closed its doors and, as expected, with 560,000 there was a considerable decrease in visitor numbers of 17% compared to the previous year. However, MICROSENS is very satisfied with the way the trade fair went.

The concept of the strategic direction of the company towards powerful, fiber based access and metro solutions and the related move to the telecommunications hall 27 was very successfull.

Particular attention was paid to our CWDM/DWDM and "long haul" media access solutions.

MICROSENS booth at the CeBIT.

Continue reading on page 12.

Spring product highlights

The new generation of installation switches has just been introduced. Electricity can be supplied to devices connected over the Ethernet port through the integrated **Power-over-LAN** function. This feature enables the complete integration of the telecommunications and data infrastructure into a homogenous fiber network.

All of today's demands on multimedia applications and security-related applications are met with the full support of port-based VLANs and data prioritisation according to IEEE 802.1p.

Continue reading on page 4.

Another CeBIT magnet was the new launch of industrial switches with **ring function**. This permits fault-tolerant ring structures to be set up in Ethernet networks.

The switches launched can be connected to a fiber ring. Failures are recognised extremely fast and the ring is reconfigured using a patent pending procedure.

The switches can be integrated in all common network management systems (NMS) using the integrated SNMP agent.

Continue reading on page 10.

IT company of the year 2002

On 16th January 2003 during the Gala of LUPUS publishing house, in Sabat Theatre in Warsaw/Poland, MICROSENS was given the title "IT company of the year 2002".

Once again the IT magazines: TelenetForum, Computer Reseller News, Enter and PCKurier awarded prizes and distinctions

in their areas. TelenetForum, leading telecom and networking magazine in Poland, distributed the Platinum Network Prize for the IT Company of the Year.

Continue reading on page 2.

Partnership with Anixter increases the availability of MICROSENS components

Just in time for the CeBIT, Anixter Deutschland GmbH and MICROSENS GmbH & Co. KG announced a strategic partnership. Anixter Deutschland GmbH will start distributing the complete MICROSENS product range from 1st March 2003.

MICROSENS is extending the existing sales channels and expects a substantial increase in global product availability from the strategic cooperation with Anixter.

"Apart from our direct cooperation with certified VAR partners we did not have a partnership with a distributor that is active worldwide. With the current partnership we fill the final gap in our sales concept" comments Thomas Kwaterski, Sales & Marketing Director.

Anixter International is a global leader in distributing network infrastructure products used by companies today to connect to digital networks. The company works with a value-added distribution process by offering its customers access to the largest sales team in the industry. Anixter sells over 80,000 products with a global inventory of approx. US$ 450 million.

Anixter has locations with over 100 warehouses and a storage area of over 340,000 m² in 175 towns in 40 countries.

Redefining distribution℠

ANIXTER

WIRE • CABLE • CONNECTORS • LOGISTICS

Strategic partnership with IT Co. in Russia

IT Co. introduced the Optibox IT-SCS system to the press at the Moscow Marriot Hotel for the first time. The joint solution is based on active MICROSENS fiber components.

IT Co. is a leading Russian integrator, distributor and software developer. The company has many years of experience in planning and integrating LAN and WAN networks.

Optibox IT-SCS is an innovative product that was developed to offer end users a complete information service. The system for up to four terminals with RJ-45 connectors is used for central connections via a multimode or single mode fiber. It supports such standard services as Fast Ethernet for data exchange and IP telephony. Time-critical applications such as video transfer, security and similar applications can also be used.

Mr. Tomasz Niewolik (Managing Director MICROSENS Eastern Europe, left side) and Mr. Andrey Semenov (Deputy Director from IT Co.) are presenting a Optibox IT-SCS.

Russia's first project with this system was in a power plant in the town of Sayanogorsk in the Krasnoyarsky Kray region of southern Siberia.

Platinum Network Award for the IT company of the year 2002

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The following companies received nominations in the category 'IT Company of the Year': MICROSENS, APC, ComArch, Novell, Veracomp. The contest jury made up of journalists, representatives of science and IT branch awarded in this category MICROSENS for its modern and diversified offer of professional fiber solutions for LAN and WAN networks as well as good financial results in difficult times.

"We are really happy with the fact that TelenetForum and the contest jury appreciated our achievements on the Polish market. However, our success wouldn't be possible without the trust that our customers put in us as well as without good cooperation with our partners. In the name of MICROSENS I would like to thank them all for the support and wish continued successes in the future" – said Tomasz Niewolik during the awarding ceremony.

Tomasz Niewolik (Managing Director MICROSENS Eastern Europe) took in Warsaw the prize "Platinum Network Award" and the diploma from the hands of Mr. Andrzej Janikowski, TelenetForum Chief Editor.

100Base-FX NIC with powerful Intel-Chipset

The MICROSENS Fast Ethernet adapter card for the direct connection of terminals via fiber in a Fast Ethernet network in line with the IEEE 802.3u standard is now immediately available with the new Intel chipset.

The series 21143 chipset offers improved performance and lower CPU utilisation. The adapter is equipped with familiar features such as Wake-on-LAN and Boot ROM.

All the important operating systems support the chipset natively. The standard equipment supplied also includes a comprehensive driver package for all Windows derivatives, Unix, Linux, Novell etc.

In addition this Intel chipset is certified for operation under Windows XP.

Further information at:
www.microsens.com/uk/produkty/karty_3.html

Features Adapter Card

- Intel-Chipset 21143
- higher performance with low CPU utilization
- PCI Plug-n-Play compatible
- Windows XP certified
- optional Boot ROM for diskless workstations
- Wake-On-LAN
- ST/SC connectors, optional VF-45 and MT-RJ

Fast Ethernet bridge with power supply via USB

Two new features – USB and link through – have been added to the already well-known Fast Ethernet bridge for coupling copper and fiber networks.

From now on power can be supplied either by an external power supply unit or via the terminal's USB port.

The bridge simply gets its power supply from the USB port. Data continues to flow over the 10/100Base-TX Ethernet connection.

This type of power supply is especially advantageous for mobile and UPS secured terminals. The power network remains independent.

Because the bridge is supplied both with a plugged mains unit and a USB connection cable the user is free to choose the type of power supply that is finally used.

Further information at:
www.microsens.com/uk/produkty/mnbr.htm

Features Mini-Bridge

- compact desktop chassis
- cost effective design
- external power supply unit or via USB port
- Auto-Negotiation 10/100Base-TX
- Link Through functionality
- ST/SC connectors, optional LC, VF-45 and MT-RJ

PCMCIA 100Base-FX Fast Ethernet adapter

Using the new PCMCIA network card with fiber connection, you can integrate all the terminals directly into fiber networks (FTTD) with a PCMCIA 2.x compatible slot.

The card, integrated as a Real Port, is characterized by its extremely compact design. There are no problems with lost or broken cable adapters because of the fixed, integrated fiber connection. It is quick and easy to connect to the network.

Network connection is made using duplex fibers with either SC or ST connectors. When using multimode fibers, you can cover distances of up to 2 km in the full duplex mode. There are also other versions of this card available for single mode fibers for ranges of up to 60 km. The adapter is fully compatible to IEEE 802.3u (100Base-FX).

Drivers for all standard operating systems are supplied.

Further information at:
www.microsens.com/uk/produkty/PCMCIA.htm

Features PCMCIA-Adapter

- compact design, dongle-less
- IEEE 802.3u, PCMCIA Rel. 2.x, JEIDA 4.x conform
- multimode versions with SC or ST connectors
- single mode versions with 20/40/60 km, SC connector
- drivers for all standard operating systems
- LEDs displays Link/Activity, Full Duplex and Collision

Installation Switch with VLAN and Power-over-LAN

The MICROSENS installation components enable an intelligent combination of fiber and twisted pair cabling and, especially due to the new upgradeable Power-over-LAN function, represent a long-term, secure investment.

By converting the fiber connection coming from the central distribution to copper connections, it is no longer necessary for terminals as PCs, laptops, printers, IP telephones etc. to have direct fiber connections. These are linked directly to the installation switch using twisted pair patch cables.

Power supply via LAN cable

What is new is that in addition to data exchange smaller terminals such as IP telephones, access points, web cameras etc. connected using twisted pair cables can now also be supplied with power. A separate mains unit is no longer necessary and this creates the conditions required for implementing a common emergency power concept for an IP communication infrastructure (VoIP).

The new IEEE 802.3af standard dealing with power supply via data cabling is due to be passed by an Institute of Electrical and Electronics Engineers (IEEE) working group in the summer of this year. Substantial elements of the standard are already completed and define the interaction between the power sourcing equipment (PSE) and the powered device (PD).

Upgrade to 6x 10/100Base-TX

The installation switch is connected to an additional module so that it supports the Power-over-LAN function. This additional module provides both the 48 V DC operating voltage for Power-over-LAN and two additional 10/100Base-TX connections.

Therefore, the familiar 4 port Fast Ethernet switch is expanded into a 6 port 10/100Base-TX switch. The arrangement of a typical 2 person office via one switch is retained, whereby the 4 data connections and the two new connections with Power-over-LAN are available. The link to the central network distributor occurs as before via the 100Base-FX fiber uplink.

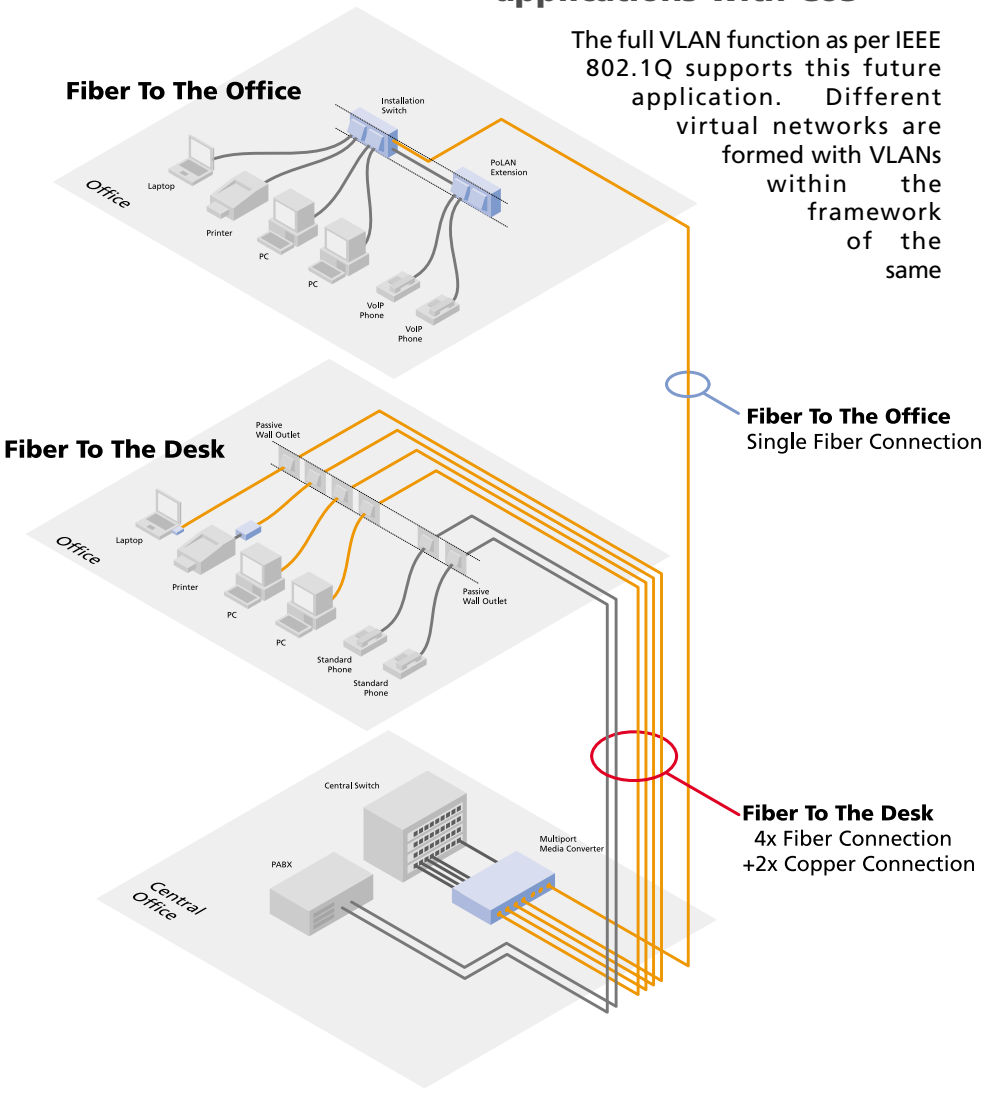
Fully compatible with 10/100Base-TX

For reasons of compatibility however the standardised 10/100Base-TX connections may not generally supply power via the Ethernet cable. Terminals that do not support this Power-over-LAN standard or do not even need power supply via Ethernet may be damaged or even destroyed.

In order for power to be fed into the cable the installation switch (here the PSE) checks the powered device (PD) to which power is to be supplied with a precisely defined control voltage. Here the terminal's identifier signals whether it can be supplied with power at all and if so the power class to which it belongs. The supply is only activated when the power classes of the PSE and PD match. The standard differentiates between five power classes.

VLANs support VoIP applications with CoS

The full VLAN function as per IEEE 802.1Q supports this future application. Different virtual networks are formed with VLANs within the framework of the same



Fiber to the Office

physical infrastructure. This facilitates such items as ensuring the required quality of service, by reserving a certain part of the data network in advance for voice transmission.

Therefore, telephone conversations can be processed in a separate VLAN that is assigned a higher priority than the one for data communication. So even if the data network is highly utilised can still make calls at the usual quality.

The actual advantage of VoIP, however, is not in the telephony via the data network but rather in the value-added services that accompany implementing VoIP:

- Multimedia applications and communication solutions via IP
- Convergence of voice, data, fax and video
- Integrating address databases for computer-supported telephony
- Integration of unified messaging
- Integration of web and real-time applications
- Database and workflow integration

Class of Service (CoS)

The additional, integrated prioritisation mechanisms can regulate data packets and data flows for time-critical applications in a targeted manner. The MICROSENS installation switch supports various methods of prioritisation on the basis of the OSI layers one to three. If the connected terminals are not able to use this function, the individual connections are either prioritised in general (layer 1) or combined with the VLAN tagging function (layer 2). For this the inserted VLAN tag is assigned a priority at the same time.

Network management

The installation switches can be configured either by SNMP or a PC-based management tool (Device Manager). In addition to the Device Manager all statuses can be displayed via an internet browser using an integrated HTTP server. The integrated agent has its own IP address that is either configured manually or assigned by DHCP.

An additional security aspect is the assignment of a single VLAN for internal switch port management. Then only the administrator of the relevant VLAN can configure the switch.

IP-Telephony with the new MICROSENS switches.

Simple assembly and operation

By the implemented auto-negotiation and crossover functions the switch automatically adapts to the speed and pin-assignment of the connected port. Compared to pure fiber cabling (Fiber-to-the-Desk) the number of central active optical ports is dramatically reduced. In addition the solution offers highest flexibility because terminals with different electrical interfaces can be connected directly.

Because the twisted pair module can be rotated it is possible to assemble the installation switch in both horizontal and vertical operating installation systems. The switch is powered via an integrated switch mains unit with direct 230 V input. The maximum power consumption is below 5 VA. The fiber port for connecting to the central distribution works at 100 Mbit/s and can be operated in full or half duplex mode (200 Mbit/s) depending on requirements.

Further information at:
www.microsens.com/uk/produkty/inst_switchBJ_M.htm

Features

- Power over LAN according IEEE 802.3af (optionally by add-on module)
- implementation of the full VLAN functionality in accordance with IEEE 802.1Q
- data prioritisation (CoS) for VoIP applications
- compact design, installation in cable trunks and sub floor tanks
- horizontal/vertical mounting
- integrated management agent, SNMP/web based
- manual/automatic configuration of all ports
- Auto MDI/MDI-X of the TP ports, configurable
- ALM function (Fiber-Port) configurable

Modular access platform

MICROSENS supplies modular converter systems with a multitude of functionality modules for LAN and WAN applications as well as for the conversion of telecommunications and industrial interfaces.

The modular concept of this platform allows the selection of the optimized solution for current and future applications regarding bandwidth, fiber optic parameter and connectivity demands.

This guarantees a maximum flexibility and protects the existing investment. Depending on the model, the converter modules can do media conversion, speed adaption, distance extension and wavelength conversion.

Further information at:
www.microsens.com/access/index_en.htm

Multifunctional bridge with optional redundancy and bandwidth limitation

Fast Ethernet bridge

The bridge enables connection of copper and fiber segments to Ethernet and Fast Ethernet whilst at the same time altering the speed. The new twin bridge achieves a higher port density in the distribution equipment by integrating two bridges per card.

Redundancy

When the card is configured correctly, the two bridges can be switched to one bridge for redundant connections. This means that important connections can be secured using this module without the need for such costly features as spanning trees. Two routes are possible via both, fiber and copper. Switching occurs physically by recognizing links.

4 port switch

The card function has a further setting that permits the connections to be grouped into a 4-port switch with two fiber ports (100Base-FX) and two copper ports (10/100Base-TX). This switch makes it extremely easy to implement service networks, e.g. for coupling management agents or rack monitoring systems in existing connections.

Bandwidth limitation

An additional operating mode allows the card to be configured as a fiber/ fiber bridge with the option of limiting bandwidth. Service providers can use this to release data rates to customers in a targeted way. If the customer is not prepared to pay for the maximum bandwidth or if a lower performance is sufficient they can make a targeted reduction. If migrations are completed later the required bandwidth of up to 100 Mbit/s is released by reconfiguration, it is not necessary to swap out the hardware. The copper connections can also be used as mirroring interfaces at the same time, e.g. for sniffer analyses.

Figure: MICROSENS Ethernet/Fast Ethernet 2 port bridge module

FTTH applications

In addition to multimode versions, MICROSENS also offers single mode bridges with altered optical parameters, which enable long-range segment links of up to 125 km. These single mode designs are used in particular for Fiber To The Home (FTTH) projects. The end user can obtain internet services, video on demand and VoIP applications using the familiar 10/100Base-TX copper connection.

Configuring the connections can either be completed automatically via the auto-negotiation protocol (10/100Base-TX) or manually via integrated configuration switches. It is not necessary to differentiate the patch cables used (1:x or 1:1) because of the auto crossover function on the twisted pair side. The bridge recognizes the configuration automatically and sets itself as required.

Security features

This new addition to the range also includes such familiar MICROSENS security features as link through and advanced link monitor (ALM). Link through ensures the link transparency of the whole connection and not just of individual segments. Using ALM (link

MICROSENS connecting the backbones of NOOS, the largest french cable provider

In the early 80's, the French government started an initiative for equipping towns with cutting-edge cable TV technology, which is evolving into digital broadband technology as we speak.

The Noos networks focus on broadband services and represent the most efficient and fastest data communications solutions today. And in the future, they will provide digital TV and broadband Internet services on the same line.

With 3.2 million connected households, Noos is the leading broadband cable provider in France at this point. The company supplies more than 140 towns throughout the country using more than 30 regional networks.

Noos has developed from a traditional network operator in France into a digital service provider. Part of the company's success is owed to their wide range of services such as the "Noos TV Pass" providing access to over 35 channels and interactive services, or "Noos net" allowing different types of Internet access.

As the owner/operator of its networks, Noos has set itself ambitious goals and is working on the expansion and updating of its network infrastructure.

To give just one example, the company has converted the different backbones in the Greater Paris area to fiber optics to handle the distances of up to 80 km between the cities of Palaiseau, Evry, Courbevoie, Bellevue, Suresnes, Mantes, and Bella Bartok.

Since these cities represent highly critical nodes within the network, their connection had to be reliable and expandable. That is why the modular converter system from MICROSENS with its high degree of flexibility and availability and its network management was chosen for implementing this project.

From the wide range of access solutions from MICROSENS, Noos is using copper/fiber as well as fiber/fiber converters for Fast and Gigabit Ethernet. These long-haul components allow bridging distances of up to 80 km.

Mr. Pascal Brugier, NOOS project manager

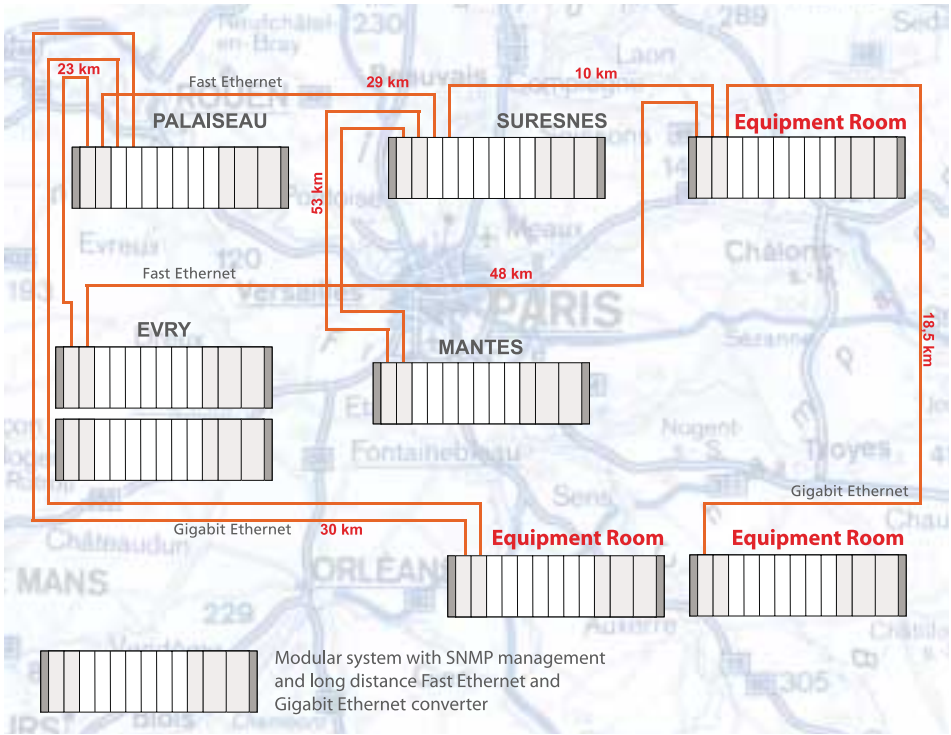
The option of combining different services through appropriate modules slot-mounted in one rack, as well as their hot-swappability proved themselves to be a highly efficient and expandable basis for future development of the network. Steady bandwidth expansion and the implementation of future FTTx designs are thus guaranteed.

In addition, the MICROSENS solution can be integrated into a network management environment, which fulfils another important requirement.

Noos is extremely happy with the MICROSENS solutions, and they are already planning additional conversions. Besides the products presently in use, implementation of the new xWDM platform, as well as of the FTTO solutions, is of increasing interest.

mirroring), the customer also has the option of subsequently increasing the security of existing networks without the need to make large-scale changes to the whole system.

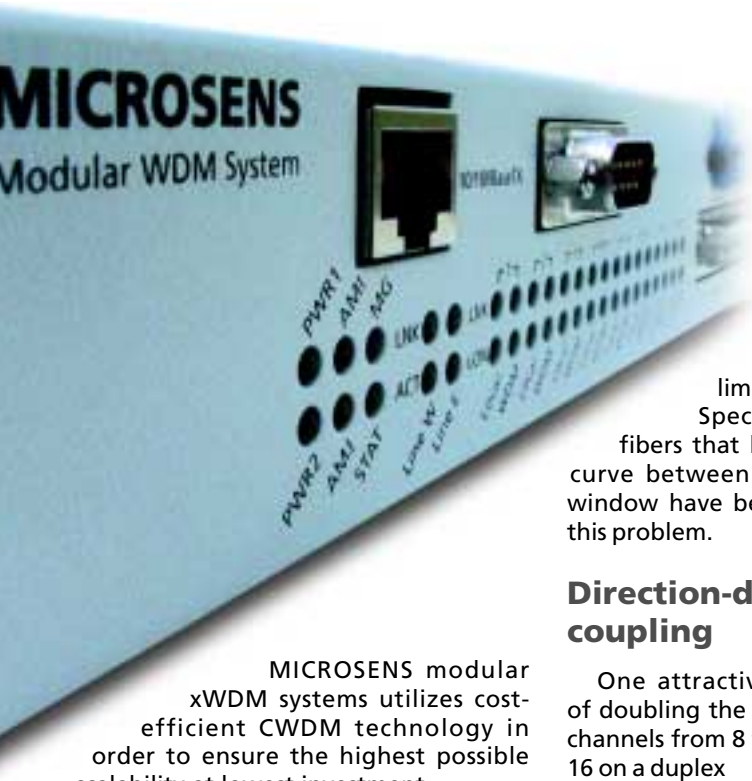
The new twin bridge is one element in a wide range of function module products for installation in the MICROSENS modular card systems. In addition to desktop packages, the user can choose a 19" chassis that accepts up to 12 cards. When using the multi-slot chassis, the converter can be combined with all of the Enterprise Access Family cards as required. There is also the option of integrating it into the existing SNMP/web based management.



Further information about "Enterprise Access" can be found at:
www.microsens.com/access/index_en.htm

Further information about the described product can be found at:
www.microsens.com/uk/presse/art_m_bridge.htm

Modular CWDM system with 16 channels



MICROSENS modular xWDM systems utilizes cost-efficient CWDM technology in order to ensure the highest possible scalability at lowest investment.

Up to eight independent high speed services can be transmitted via a single fiber using the basic system. To transfer more than eight channels there are new approaches based on CWDM technology. For highest channel count it is also possible to migrate softly from CWDM to DWDM

Use of the second optical window

Standard CWDM 8 channel systems utilize the wavelengths between 1470 to 1610 nm in the third optical window. To extend the number of channels the wavelengths from 1310 to 1450 nm in the second optical window can be used, but physical restrictions have to be taken into account, as the fiber attenuation is considerably higher than in the third optical window. This reduces the usable optical budget for all channels.

Furthermore, the standard single mode fibers used in many applications show a considerable higher attenuation between the second and third window, the so-called "water peak".

The use of the lower CWDM wavelengths is restricted substantially by these limitations.

Special "zero water peak" fibers that have a flat attenuation curve between the second and third window have been developed to solve this problem.

Direction-dependent coupling

One attractive method of doubling the usable channels from 8 to 16 on a duplex fiber is to use a special direction-dependent optical coupler. In a standard system each fiber is only used to transfer data in a single direction.

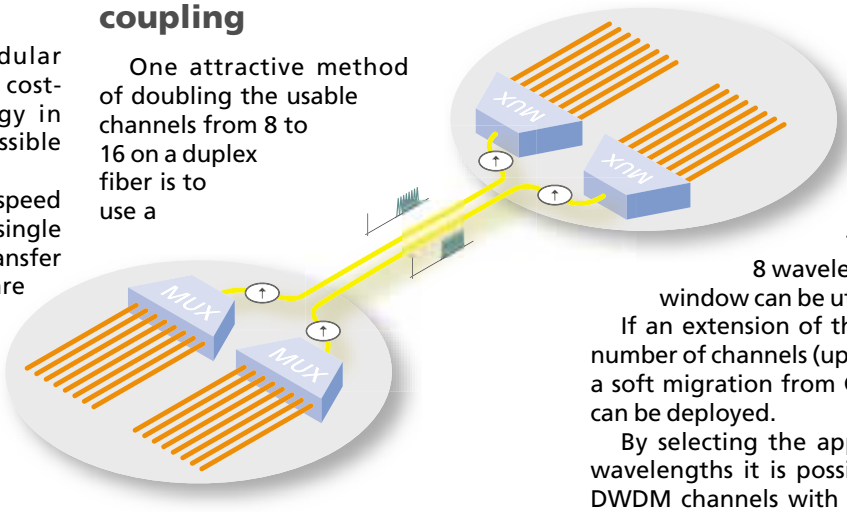


Figure 2: 16 channel CWDM system built up by two parallel 8 channel simplex systems.

By using a special coupler it is possible to transmit data in both directions without interference on the same fiber. The same wavelength is used in transmit and receive direction.

The advantage of this solution is that only the upper 8 CWDM wavelengths in the third optical window are used. So maximum distances can be achieved because of the minimal attenuation. In addition the wavelengths are outside the "water peak" area, so no special fibers need to be used. The direction-dependent couplers reduce the usable optical budget on each side by less than 1 dB.

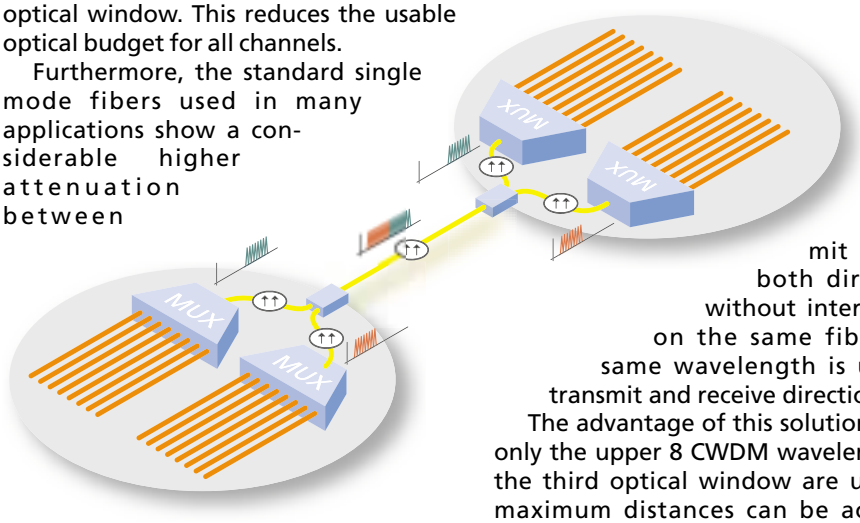


Figure 1: 16 chanal CWDM system by use of the second optical window

Migration from CWDM to DWDM

When extending the number of channels on CWDM systems the attenuation profile of the fiber is the limiting factor. Because of the large spacing of CWDM channels the use of more than 16 channels is not technically appropriate. For long distance applications (80 km) using standard fibers only the 8 wavelengths in the third window can be utilized.

If an extension of the fiber to a high number of channels (up to 64) is required, a soft migration from CWDM to DWDM can be deployed.

By selecting the appropriate DWDM wavelengths it is possible to transfer 8 DWDM channels with a 0.8 nm spacing (100 GHz) within a single CWDM channel.

This makes it possible to expand an 8 channel CWDM system to 64 DWDM channels by replacing softly each CWDM channel by up to 8 DWDM channels.

Summary

The number of usable CWDM technology channels is basically restricted by the attenuation characteristics of the fiber. Using the second optical window is problematic because of the low fiber characteristics. Only the 8 channels in the third optical window offer optimal performance. By using directional couplers the capacity of a fiber can be increased from 8 to 16 channels. An intelligent combination of DWDM and CWDM technology offers soft migration to 64 channels.

Further information about "CWDM" can be found at:
www.microsens.com/metro/index_en.htm

Further information about the described product can be found at:
www.microsens.com/uk/produkty/8CWDMmodular.htm

In-band management for optical multiplexers

If several xWDM chassis are switched together in a network, it is desirable for a common interface to address all the devices in the network for management purposes. For this the data channel for the management Ethernet interface must be transferred via the connecting fiber. This can occur in various ways:

Integration into the userdata

The easiest and cheapest way to integrate management is the use of one of the transferred data channels. If this is connected with an external Ethernet switch, the local management port can also be integrated into this connected and therefore transferred network (Figure 1).

This solution can, however, only be used if Ethernet data services are transferred using the xWDM system and the feed is approved by the user of the service.

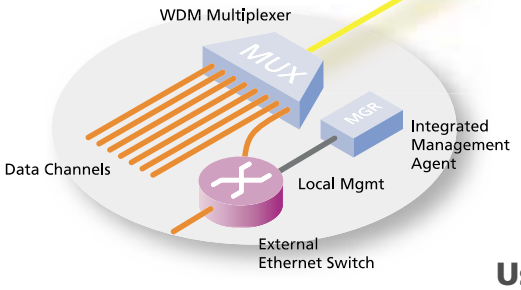


Figure 1: Management integration into userdata

Optical service channel

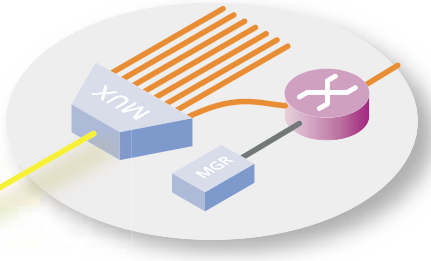
Another method of management integration is the use of one of the optical WDM channels exclusively for transferring the management data.

This solution provides the highest security and performance because the management data is transferred physically separated from the user data and the optical budget remain the same for all of the channels transferred (Figure 2). This solution is, however, the most expensive as far as costs are concerned because it occupies a full WDM channel.

Using the second optical window

An optimal solution from a cost and performance perspective is to use the fiber's second optical window to transfer the management. For this the management is transferred optically in the form of a standard 1310 nm Fast Ethernet channel.

This solution is substantially cheaper than using a real WDM channel because standard 1310 nm range lasers can be used.



Because the transfer occurs in the second optical window the fiber parameters must be taken into account when it is used.

Using an add/drop and ring topology

By using two separate, optical transceivers – one for each of the two line interfaces – it is possible to expand the optical management channel to add/drop structures or even ring networks. All network nodes are brought together in a common network using an integrated Ethernet switch.

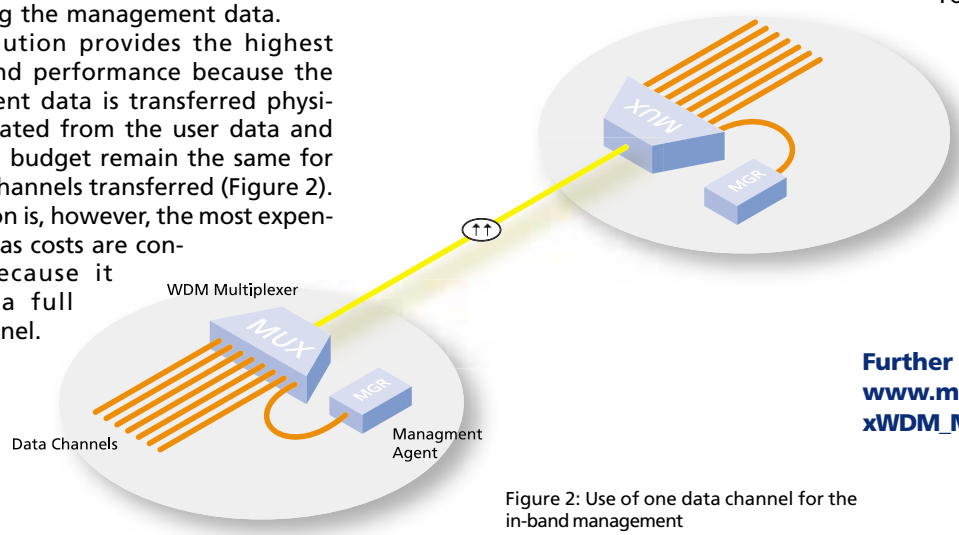


Figure 2: Use of one data channel for the in-band management

Out-band management

All solutions for in-band management have a basic weakness: if the optical connection between the devices fails, e.g. due to a break in a fiber, this also interrupts access to the management. In order to create additional security in this case it is possible to connect an external modem with the chassis management. You can use this to access the management console using standard dial-in telephone lines. This is completely independent of the status of the fiber network and is therefore not substantially affected by the failure of the optical connection.

"Product of the Month" in the USA

The MICROSENS xWDM platform has been awarded "Product of the Month" by "Telecommunications Magazine", one of North America's leading specialist telecoms magazines.

Each month the magazine's editors nominate a new product that links technology in an innovative and cost-effective way. In February they chose the new MICROSENS CWDM/DWDM platform, which combines high flexibility, the greatest possible cost efficiency and compact design in a way that has not been seen before.

MICROSENS has succeeded in drawing the attention of the specialist press and potential customers, even after just a short period on the North American market and is now able to demonstrate some initial success.

Further information can be found at:
www.microsens.com/uk/presse/xWDM_Management_Options_art1.htm

Fault tolerant Ethernet ring for industrial networks

MICROSENS, the leading supplier of active network components, is extending its product range of industrial fiber switches with the option of a ring function (Figure 1).

Ethernet has been used in the controlling level of industrial applications for many years. Ethernet is continuing to beat the field bus technologies used to date in coupling equipment controls, sensors and actors. Process error-tolerant network components are absolutely essential because the network availability has a direct effect on production.

Rapid reconfiguration on error

If an Ethernet component or even a complete segment fails, it frequently leads to machines stopping and therefore inevitably to production being halted. It is precisely to prevent this that MICROSENS has developed a mechanism for which a patent is pending that enables the Ethernet network to be reconfigured within milliseconds if an error occurs.

The standardised Ethernet only provides inadequate conditions for implementing fault-tolerant industrial networks. Existing mechanisms such as spanning tree are not fast enough for the real-time transfer required by industrial applications. New generation protocols like fast spanning tree only produce the required switching times in the most positive situations. In addition both of these mechanisms are connected with extremely high cabling effort.

Fiber ring structure

The mechanism developed by MICROSENS enables the user to set up a ring. If a component or link fails, all other nodes remain reachable via the intelligent ring topology over the Ethernet (rapid redundancy). The switches are configured as appropriate for this special operation.

In addition to the two 100Base-FX fiber connections for chain linking several industrial switches, the MICROSENS industrial switches also offer four 10/100Base-TX connections for linking

Figure 1: Industrial switch

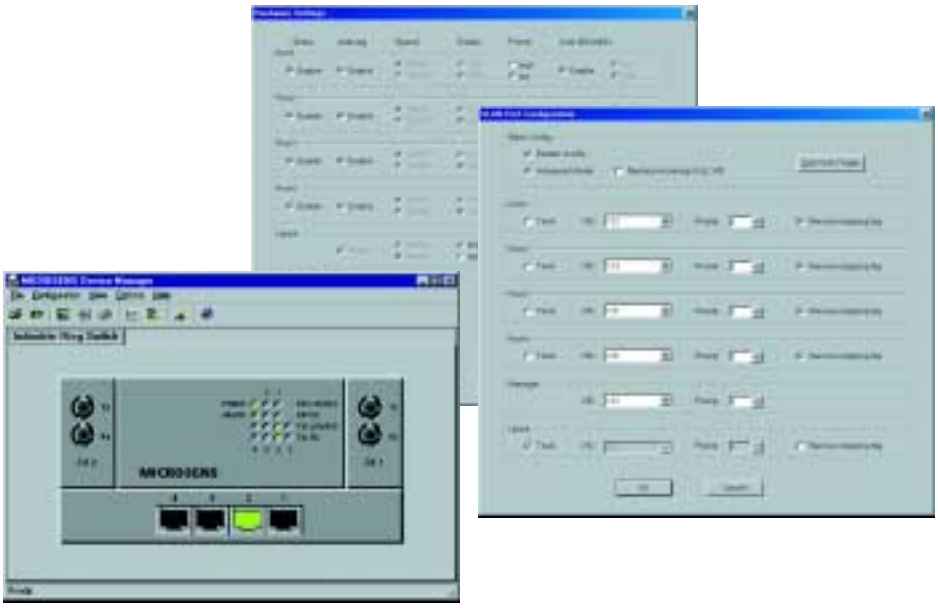


Figure 2: Device Manager

such Ethernet terminals as machine controls, network uplinks, consoles and other network participants. In order to prevent an Ethernet loop being created in a ring configuration, one industrial switch configured for the master mode monitors the operation (Figure 3).

Fast error signalling

The integrated physical link detect mechanism immediately recognises a link or switch failure and signals the master. The master closes the segment logically in the shortest possible time and therefore ensures the ability to reach all the other network nodes (Figure 4). The error status is also signalled by the network management integrated into all the switches.

The system has the enormous advantage that the switch configured for the master mode need not be designed as redundant because if just this switch

fails there is still a local, logical and physical separation. Because all the switches are equipped via the integrated link detect and network management functions, this failure is also recognised and signalled as appropriate.

Full VLAN functionality/ data prioritisation

Support for the full VLAN function as per IEEE_802.1Q is a permanent component of the industrial switch. One switch handles up to 16 VLANS for which each port can be assigned its own VLAN. In addition to the familiar trunking, a VID can be inserted automatically in all the received data packages (tagging).

Additional integrated prioritisation mechanisms can handle preferred data packages and flows in a targeted way for time-critical applications on the basis of the OSI layers one to three.

An additional security aspect is the assignment of its own VLAN for internal switch port management. Then only the administrator of the relevant VLAN can configure the switch.

With the combined use of VLAN tagging and data prioritisation on the layer 2 level, it is not necessary for data prioritisation, for example, to support the connected SPS controls natively. The appropriate marking/prioritisation of the data packets is completed by the industrial switch when the VLAN tag is inserted and is therefore visible to all the other Ethernet nodes.

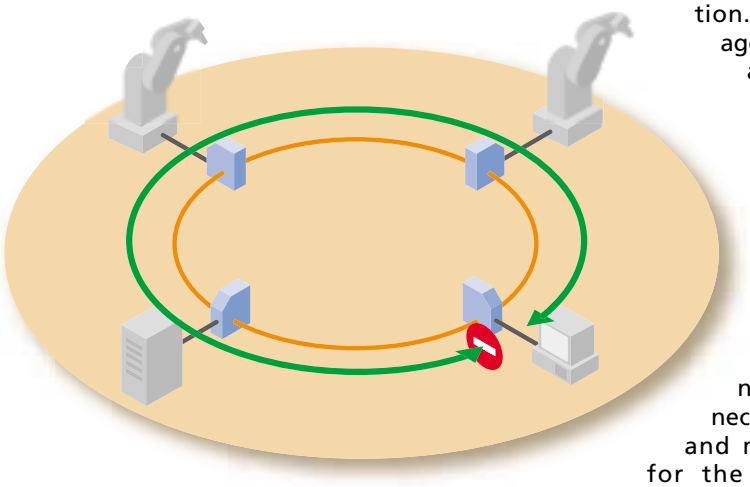


Figure 3: Ring Master controls the data flow in ring configuration

Network Management

The switches can be configured and monitored either by SNMP or a PC-based management tool (Device Manager, Figure 2). In addition to the Device Manager all statuses are displayed web based using an integrated HTTP server.

Detailed statistics for each port are recorded for monitoring the ongoing operation. The integrated agent has its own IP address. This can be configured manually or assigned by DHCP. The management continues to offer comprehensive configuration options to the network connections. Automatic and manual settings for the switch's auto-negotiation and auto crossover functions right up to deactivating individual ports are possible.

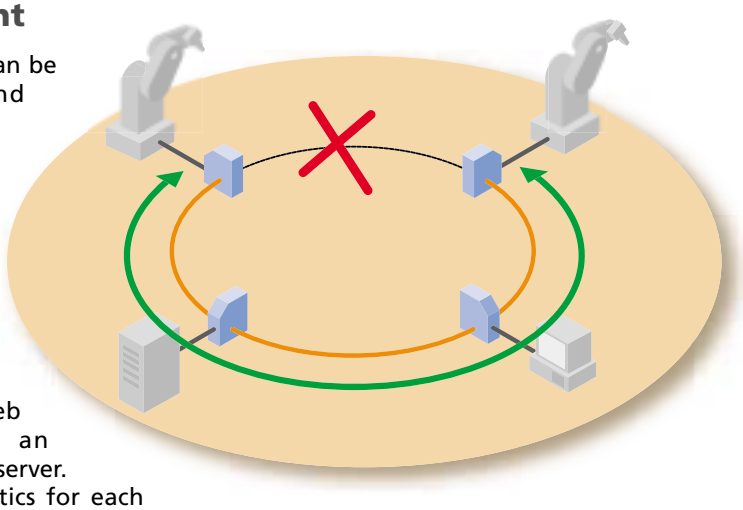


Figure 4: Ring Master secures availability in case of failure

Special construction design

For particularly demanding uses, the industrial switches are designed in a suitably robust construction with an integrated clamping device for direct assembly on 35 mm DIN rails. The devices meet the requirements for protection class 20 and are also designed for a larger temperature range.

Features Industrial Switch

- robust and compact design, mounting on DIN-rail
- Fast Ethernet 6 Port Switch, 4x 10/100Base-TX, 2x 100Base-FX
- fault tolerant fiber ring configurations
- fast reconfiguration time
- integrated management agent, SNMP/web based
- full VLAN functionality and prioritisation (IEEE 802.1p/Q)
- redundant 24 V DC power input, effective overvoltage protection

Further information about "Industrial Solutions" can be found at: www.microsens.com/industry/index_en.htm

Further information about the described product can be found at: www.microsens.com/uk/produkty/ind_switch4TX2FXring.htm

Review of the exhibitions in spring 2003

exponet
11.-13.02.2003 Vienna

We presented our product innovation together with our partner Highspeed Cabling at the first event of the year, the "exponet" in Vienna. As in the previous year our Austrian customers found MICROSENS at our partner's stand.

The trade fair was very successful. The ongoing interest from visitors from Eastern Europe confirmed Vienna as an ideal bridge between East and West before the EU expands eastwards in 2004.

exponet Vienna 2003
Austria Center Wien 11.-13. Februar

Highspeed Cabling publicised the merger with Schrack Energie for whom they have now taken over the whole IT area. The high number of visitors was particularly pleasing. A total of over 40,000 visitors obtained information at the spring IT highlight.

Expo Comm
04.-06.03.2003 Paris

The "Expo Comm" took place for the second time in Paris from 4th to 6th March 2003. The Expo Comm is a key meeting point and serves as an information exchange for experts in all areas of telecommunications and networking.

EXPO COMM FRANCE 2003

Now over 100 exhibitors gather together at the "Expo Comm" which covers 1,600 m². These include hardware manufacturers, technology companies, service providers and consultants.

Mr. Danzel d'Aumont, marketing manager at MICROSENS France, launched the new MICROSENS modular CWDM system as part of his seminar on "Metropolitan Networks".

Intertelecom
04.-06.03.2003 Lodz

MICROSENS exhibited at Intertelecom in the Polish city of Lodz for the third time. This is the largest specialist telecommunications trade fair in Central and Eastern Europe and highlights current trends in the telecommunication market. The Intertelecom is the most interesting and professional telecommunications event in Poland and

INTERTELECOM

was extremely successful with its specialist audience.

One important target group is the new carriers created by deregulating the telecoms monopolies in Eastern Europe. We concentrated specifically on this target group and were able to make numerous, interesting contacts.

CeBIT
12.-19.03.2003 Hannover

The CeBIT 2003 has closed its doors and, as expected, with 560,000 there was a considerable fall in visitor numbers of 17% compared to the previous year. However, MICROSENS was still very satisfied with the way the trade fair went.

CeBIT HANNOVER 12. – 19. 3. 2003

The concept of the strategic direction of the company towards powerful, fiber based access and metro solutions and the related move to the telecommunications hall 27 paid off completely.

Hall 27 presented a modern image and had a large number of high quality exhibitors that attracted a particular specialist audience whose special interest could be felt at our stand. Particular attention was paid to our CWDM/DWDM and "long haul" media access solutions.

These highlights meant that MICROSENS drew an increased stream of visitors to its trade fair stand. We were pleased that even the weekend, especially the Saturday, attracted an audience for more specialist discussions. Because of this more even number of visitors each day and the presence of our strongest sales team, many customers and potential customers took advantage of the opportunity for a longer, more intensive discussion.

MICROSENS logo was engraved into the apple with a laser.

There was overall a high international interest, which MICROSENS assesses as extremely positive. This confirms our assessment not to simply concentrate on national markets but to look towards globalisation and the apparently better growth opportunities there.

The CeBIT opened its gates from the 12th -19th March 2003.

Editorial
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