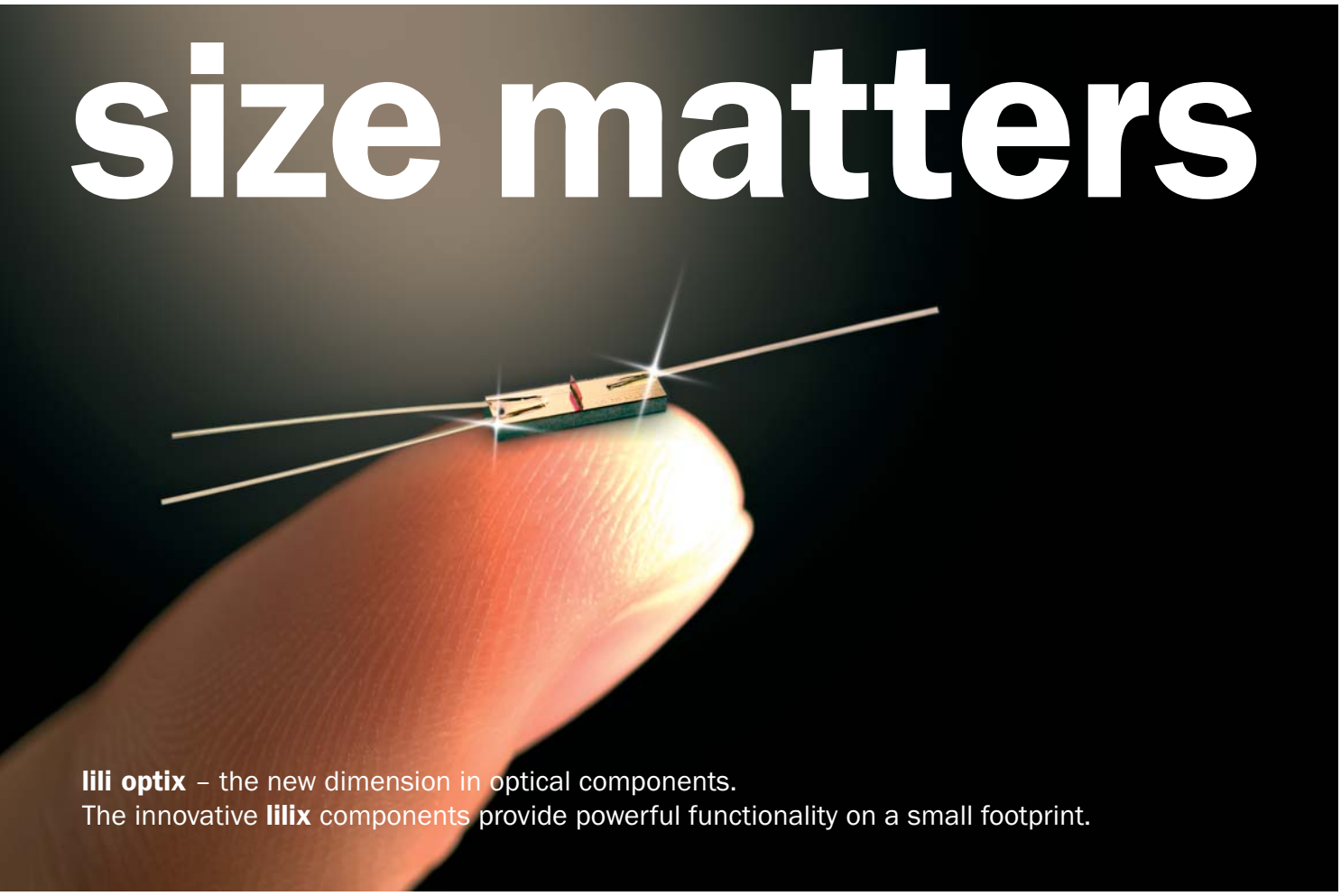
fibre optical components GmbH

At the speed of light into the future.

size matters



lili optix – the new dimension in optical components.
The innovative **lilix** components provide powerful functionality on a small footprint.

foc flash-light

March 2010

foc flash-light

Contents

Editorial

foto: Stephanie Eißrig

The more bandwidth is required by the application in the wireless area, the shorter the distance between the mobile terminal and the antenna station. If you really want to be ‘broadband’, you cannot do without optical fibres.” This simple physical relationship precisely formulated by Klaus Petermann, professor for radio frequency technology at Berlin Technical University, clearly indicates the sustainable means to overcome the ‘blank spots on the map’ of broadband supply in Germany. The 2009 Broadband Atlas of the German Federal Ministry of Economics shows where we are today. Here the FTTH/ FTTx connections are listed under the section of “Other connections”. What a potential! In particular in the rural areas, which seemingly are uneconomical to develop, there is much demand from the customer side and there are lots of ideas available. New solutions provided by SMEs stand a good chance of implementation. An innovative circle of new network components, installation technologies, training and further qualification, energy efficiency and new ways for medical support seems to start moving. We appreciate the new development for eliminating the ‘blank spots’. In our new issue we would like to inform you on some steps taken in this direction.

Christian Kutza, General Manager

Measuring and monitoring *in optical networks*

The expansion of optical fibres into the local loop requires new concepts for the design of the fiber-optical termination at the customer. Here also the question of new measuring and monitoring possibilities arises to ensure a certain Quality of Service (QoS), on the one hand, and on the other hand to meet the requirements of a high cost pressure for network expansion (Capex) and network operation (Opex). In the following we would like to present a new concept for monitoring the optical links independent of the network topology used. This new concept allows the implementation of at least the "testing cabinet" functionalities known from copper technology up to the optical network termination socket.

1. Network topologies of passive optical networks

From the perspective of different network operators the FTTx development scenarios show some basic common features. All of them assume that only so-called triple play service providers or full-service providers stand a chance of surviving on the market in the long run. This is why over the past five years classic telephony and data transmission providers have expanded their lines of business to include CATV or IPTV, while former cable network operators play an important role also on the telephony and data transmission markets today.

With regard to triple play services, there are two network topologies which need to be taken into consideration independent of the implemented protocol (EPON or GPON). Both point-to-point (PTP) (Figure 1) and point-to-multipoint (PTMP, PON) (Figure 2) structures are used for connecting the customer.

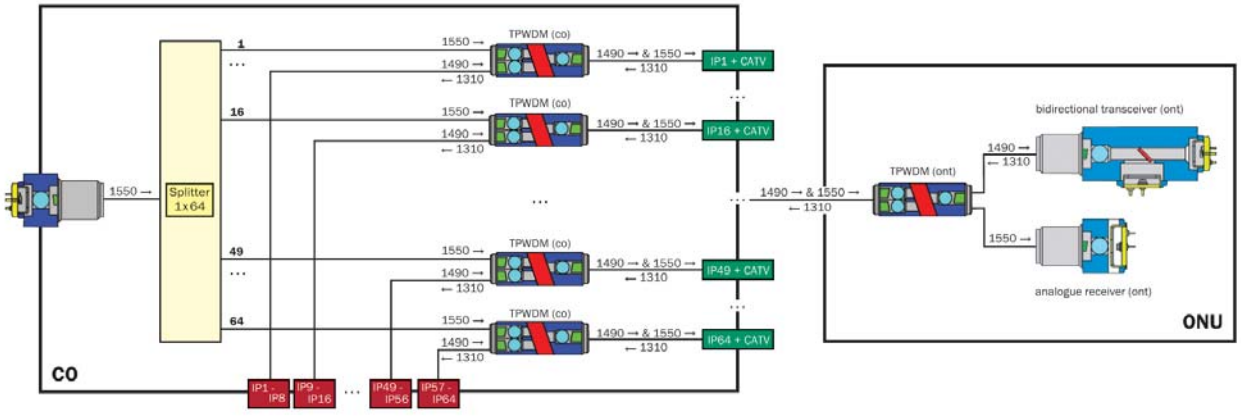


Figure 1 Triple play home run system (PTP) for up to 64 customer ports

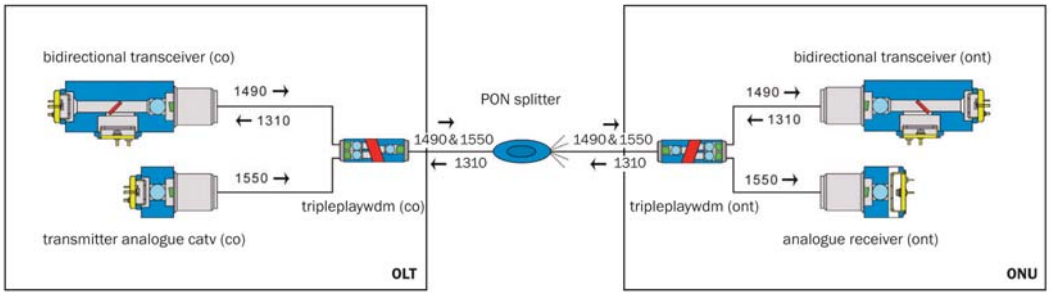


Figure 2 Triple play PON system (PTMP) for up to 64 customer ports

The components required for the optical function, such as splitters and WDM, are essentially identical.

With a view to their measuring and monitoring features both topologies have some common characteristics, but also differences, which will be explained when introducing the respective measuring and monitoring solutions.

2. Classic measuring and monitoring features in optical networks

So far different approaches to measuring and monitoring optical networks have been used:

- Simple monitoring couplers for checking the system signal
- Attenuation measurements for wavelengths outside the transmission range
- OTDR standard measurements
- Use of an SFP-integrated OTDR

the SFP without length reduction is insufficient for the double run.

- Each of these solutions requires at least one physical access to the link.

3. New solutions for monitoring optical networks

However, some of the approaches presented above are based on interesting and future-proof partial solutions.

OTDR-based measurements have the advantage that a physical access is required on one side of the network only. If this Opex advantage is combined with the measurement outside the operating wavelength range, the use of a reflector and the step-by-step initial measurement of the network already during the commissioning phase, this solution is completely sufficient for most network operators.

In the PTP network in Figure 3 this solution fulfils all requirements with regard to the measurement and monitoring of the network's operability. All lines are equipped with a reflector

Passive fiber-optic testing terminations – a stunning reality

However, a summary of the essential drawbacks of these solutions shows clearly that they are suitable for FTTx to a limited extent only.

- All solutions based on attenuation measurements require an access on the customer's side.
- Solutions based on an analysis of the payload signals limit the loss budget and represent a potential security risk.
- Due to the overlay of signals returning from different links, OTDR solutions employed from the Central Office can be used in PTMP networks to a limited extent only.
- OTDRs integrated in SFPs have the drawbacks of discrete OTDR solutions and in addition mean reduced link lengths and/or limited customer numbers, since the dynamic range of

matching the OTDR's measurement wavelength; the OTDR itself is switched onto the optical links in the Central Office via the measurement WDMs using e. g. an optical switch. Then the OTDR measurement results can be compared with the initial measurement taken during the commissioning of the network allowing breaks in the link and increases in attenuation to be detected and located in a simple way.

This approach can also be used in a PTMP network (Figure 4). If you ensure already during the construction of the network that the differences in line lengths from the CO to the individual reflectors are big enough to be resolved by an OTDR, connectivity testing to the customer is quite simple. Only in case of failure, if the customer cannot be reached, an additional OTDR measurement from the customer's side will be required.

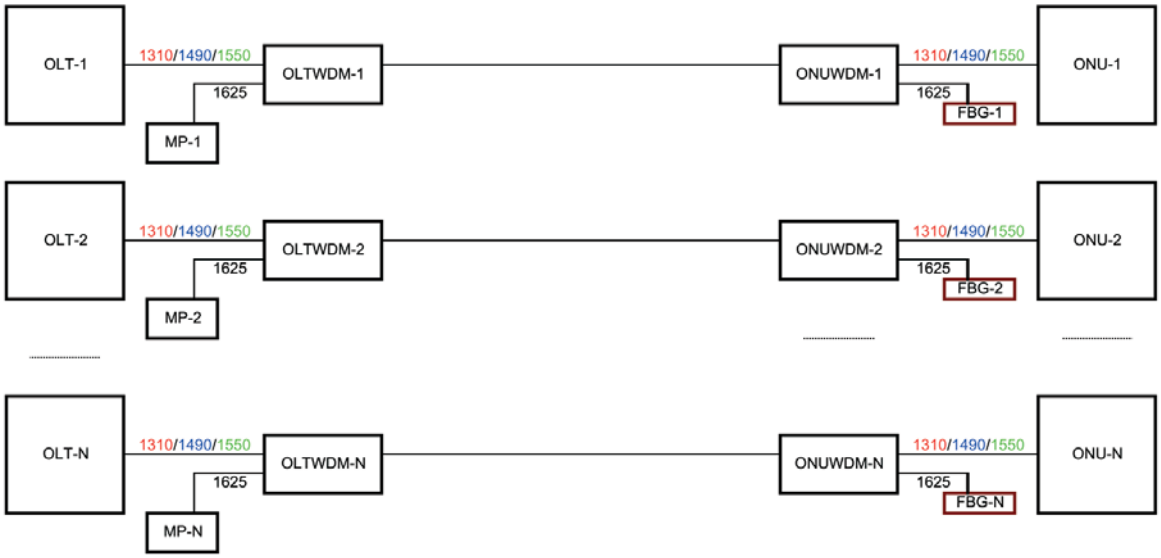


Figure 3 Monitoring solution with OTDR and reflector in a PTP network

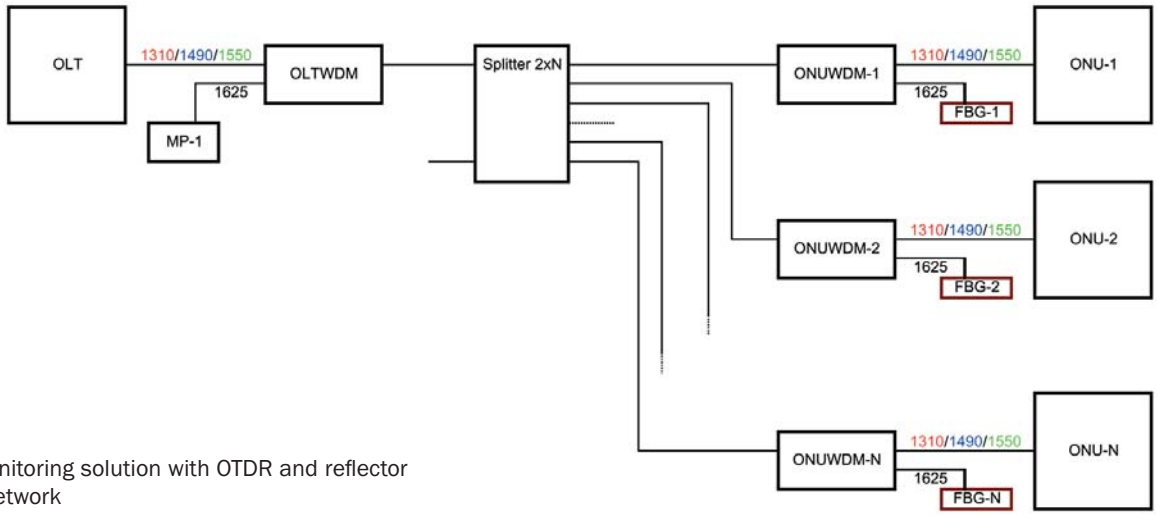


Figure 4 Monitoring solution with OTDR and reflector in a PTMP network

The illustrated reflector solutions with discrete WDMs and FBGs on the customer's side represent different approaches. Alternatively the FBGs can be integrated into the WDMs or WDMs in combination with reflectors based on mirrored fiber ends can be used. Additionally there are integrated solutions available, as developed by FOC in cooperation with partners (Figures 5, 6). In particular with a view to their integratability and the pure Capex costs, from our perspective, the solution in Figure 6 presents the only practicable way for a passive monitoring solution for FTTx networks.

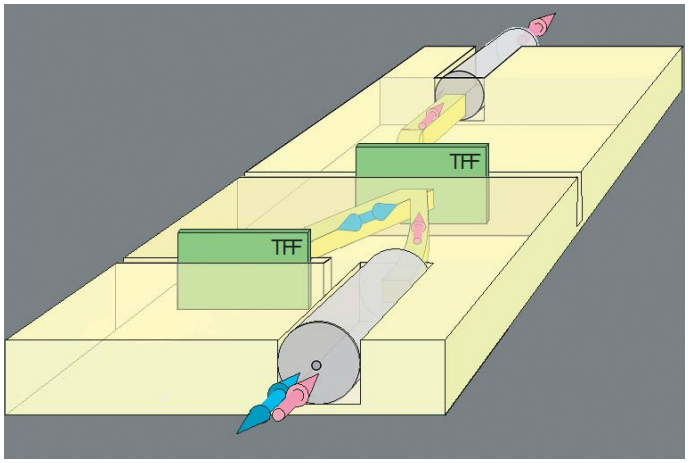


Figure 5 Polyboard-based FTTx WDM reflector module

Unlike other solutions the presented approaches can be used without any restriction both for active lines and for lines not yet terminated with active equipment.

4. Summary

The presented solution enables the network operator to determine at any time whether the passive link is operable with a potential access port and whether the operator can send the customer, who wishes to have a subscriber access, the required terminal unit (ONU).

So far the implementation of such a simple package as illustrated in Figure 6 was doomed to fail for reason of costs. Only with today's possibilities of miniaturization and integration there is a chance of cost-efficiently implementing such a package.

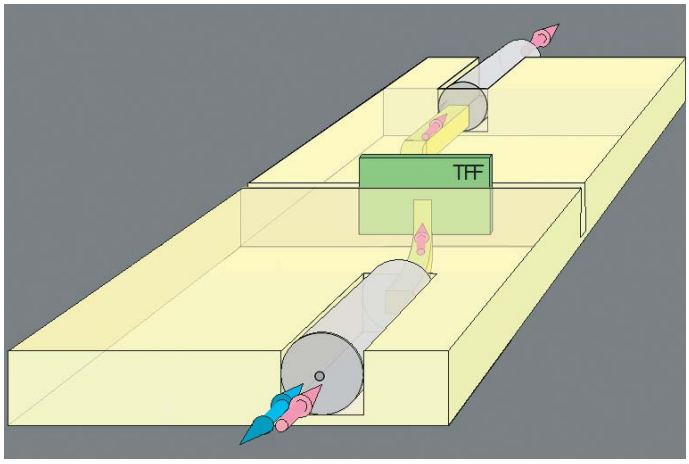


Figure 6 Polyboard-based FTTx reflector module

Using the opportunities provided by current optical technologies and considering the aspect of monitoring optical networks already at the beginning of the network expansion, the OTDR measurement with reflectors presents the most cost-efficient passive solution for monitoring FTTx networks independent of the implemented network infrastructure.

Dipl. Ing. Axel Thiel
Head of Development Department
FOC GmbH

Efficient deployment of fiber-optic networks through innovative technologies

New business segment for municipal utility companies and regional energy suppliers

The availability of broadband communication and fast Internet connections has become an important locational advantage for towns and communities. New innovative telecommunication services and multimedia contents make high demands on the telecommunication networks. The direct connection of buildings and flats to a fiber-optic network is particularly future-proof with a view to the network infrastructure. This approach to broadband development is represented by the abbreviation of FTTH ("Fiber To The Home"). FTTH networks enable the network operator to deliver very high transmission rates of up to 100 Mbit/s to the customer.

In most cases considerable civil engineering works are indispensable in order to provide the required infrastructure. In this context the municipal utility companies and many regional energy suppliers are in a particularly good position:

- Their core competencies include – especially in their own service areas – the construction and operation of cabled infrastructures.
- Wherever possible and practicable the FTTH network expansion can be implemented cost-efficiently by simultaneously laying other new supply and disposal lines; but also the disturbance for the residents is significantly reduced by not having to open the pavement multiple times.
- Within the course of infrastructure rehabilitation successive empty conduit systems for FTTH networks can be laid.
- The companies have skilled employees on their staff who are familiar with the place both for the construction and the operation of such networks.

These are some decisive advantages against competitors on the telecommunication market. Not only with a view to the deployment, but also in relation to the marketing of the FTTH network infrastructure, municipal utility companies and regional energy suppliers can exploit their locational advantages. The proximity to the customer and the existing sales structures allow them to offer their telecommunication products in a direct and simple way. Moreover it is possible to operate "only" the passive FTTH network and to lease the use of the network to telecommunication companies ("non-discriminatory access").

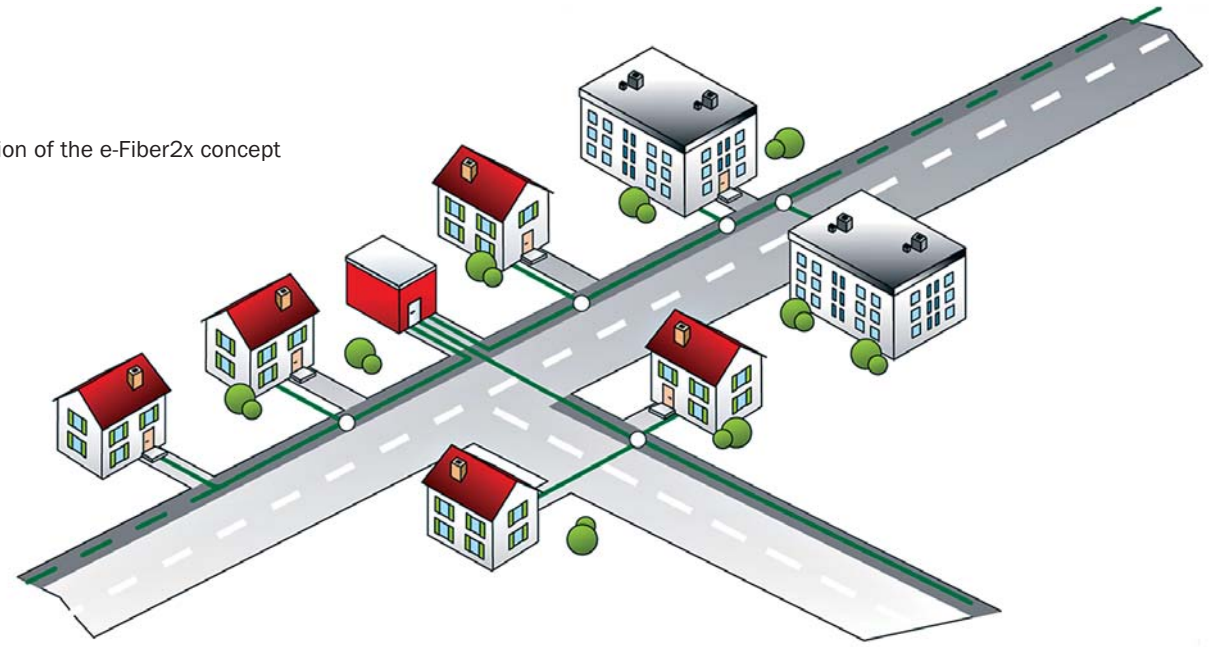


Figure 1
Implementation of the e-Fiber2x concept

FTTH and energy – symbiosis of the future?!

The EWE energy and telecommunications company from Oldenburg, Germany, uses these advantages and is currently massively investing in the expansion of FTTH networks. Since the consistent expansion of networks requires the employment of cost-efficient methods and materials, employees of EWE NETZ GmbH, an EWE daughter, have developed an innovative, patented infrastructure concept for deploying FTTH telecommunication networks in towns and communities. We call it "e-Fiber2x". This concept allows us to increase network expansion flexibility and to reduce capital expenditure (Capex). It enables the extremely space-saving and cost-efficient laying of the cables.

A house junction box is set up (see the white spots in Figure 1) for connection to the FTTH distribution cable. One junction box can be used to connect up to four buildings. The provision of additional cable lengths for setting up the house junction box is not necessary. The infrastructural development method used by EWE NETZ complies with the tried and tested approach to setting up electricity and gas distribution networks. It is possible to install the house junction box and cables after placement of the order by the customer, independent of the laying of the FTTH distribution cable. The house drop cable can be buried in the ground or pulled through a pre-installed empty conduit to the building. Distribution stations with active equipment (red, flat-roof building in the figure) are used to split the bundled data flows from the wide-area network. From the station to the customer a point-to-point connection is set up. One distribution station can serve several thousand subscribers.
It is possible to branch off fiber bundles or even systematically individual fibers. In the junction box the fibers of the distribution cable are spliced to the fibers from the drop cable of the house (cf. splice enclosure in Figure 2).

The EWE NETZ splice closures are not installed by external specialists but by trained engineers, who are also responsible for installing the electricity and gas house connections. This creates synergetic effects and reduces costs. In order to train the employees for the installation work, EWE NETZ cooperates with an institute of further education.

The maintenance costs for the operation of the network are relatively low, because durable and proven material, e. g. commercially available empty conduits, junction boxes with shrink technology, is used, and maintenance-intensive elements such as cable manholes or cable cabinets are not required for network expansion. Moreover, compared with other systems, e. g. microtube systems, the network infrastructure has the advantage that in case of damage through excavators not all fibers are pulled out of the customer's building and the distribution station. This is a great advantage, because the customer's buildings need not be accessed in order to repair the damage.
The district town of Westerstede is one example of the use of the e-Fiber2x network infrastructure. Westerstede lies in the northwest of Lower Saxony, Germany, has about 22,000 inhabitants and a population density of 124 inhabitants per square kilometre. In the town about 100 km of fiber-optic cables were laid on a route of 70 kilometres. Frequently the laying of the cable accompanied other laying works. Four distribution stations can serve approximately 6,000 houses via a star-shaped distribution network. In addition, within the course of the joint laying with other supply lines, it was possible to lay empty conduits for 400 fiber-optic house connections, so that later connection will be quite easy for these buildings.

Besides FTTH development in Westerstede, EWE NETZ is active in other towns such as Oldenburg, Cuxhaven, Lohne and Haseluenne. Some urban districts are already marketed by the group's daughter EWE TEL GmbH. Moreover, due to the successive laying of empty conduit systems within the course of rehabilitation works, the infrastructures in the towns of Bremervoerde, Bad Bederkesa and Scheessel have mostly been developed, already.

Figure 2
e-Fiber2x splice closure

This is why it will be possible to deploy an FTTH network there in the near future, too. EWE TEL offers residential customers a complete package including broadband Internet, TV/radio as well as telephony. All three services are provided via the fiber-optic link. These connections are much faster and more performing than the DSL lines commonly used today.

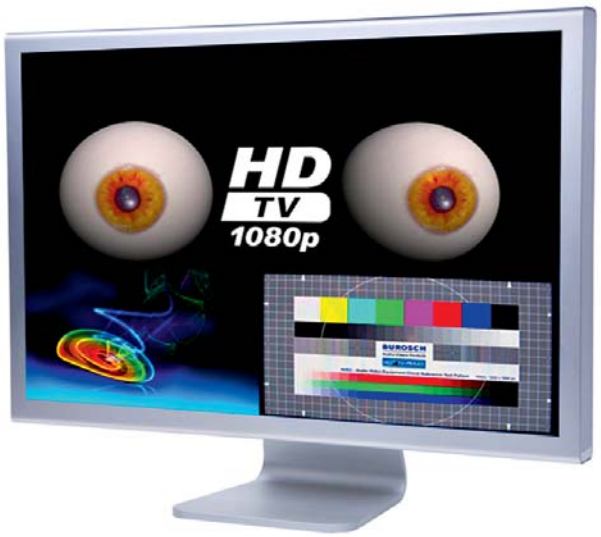
The consistent use of existing civil engineering competences, and advantages resulting from the joint laying of different lines allows the energy suppliers and municipal utility companies to cost-efficiently deploy an FTTH infrastructure and thus to create a new, future-proof business segment. This does not only hold true for urban, but also for suburban and rural areas. Here the technology and construction used by EWE NETZ prove to be particularly advantageous.

Alexander Grote, EWE Netz GmbH

High Definition Television

FOC is in the game!

HDTV stands for "High Definition Television" and by definition describes a TV system which at a viewing distance of three times the height of the TV picture conveys to the viewer the same or almost the same visual impression of a scene which this viewer would experience at the original location. You've got it?



A bit simplified and, above all, more practical, we can say that HDTV is a TV system with up to five times more pixels than our current SDTV (digital) or PAL (analogue) TV system. This results in a much better image sharpness and the possibility of enjoying TV scenes also on very large TV screens in a very good quality.
TV sets are getting bigger and bigger, anyway. While the classic cathode-ray tube (CRT) TV sets had a maximum screen diagonal of about 80 cm (31"), the new flat screen displays do (almost) not have such limits. The new plasma and LCD technologies facilitate even screen sizes of several meters. Already today (in spring 2009) the average size of the newly sold flat display units with about 37" (94cm) clearly exceeds the former maximum size of CRT TV sets (approx. 80cm) – with an upward tendency.

In that case even a digital broadcast frequently does not provide a clear and sharp picture. Here only a high-definition HDTV signal can help. Due to the up to five times higher resolution the recommended viewing distance can be cut by 50% down to three times the picture height, which is equivalent to about 1.80 m for a 50" TV set. So the field of view of the viewer is almost completely filled and integrates him/her completely into the story presented on the screen. HDTV thus allows you to have a quality of experience comparable to that enjoyed in a cinema.

TV of the future only with and via optical fibers

On international level (in particular in Japan and in the USA, but also in Korea, Australia and China) HDTV has been playing a big role for many years already, both in TV production and in broadcast operation. In Europe the HDTV development started to accelerate slowly in 2006. In particular the UK and our French neighbour meanwhile have installed quite a considerable number of HDTV stations.

This is why for German TV channel providers HDTV is not only of great interest for the domestic market but in particular for international co-productions. In this context HDTV has (partly) been an absolute must for some years.

With HDTV the consumer is confronted again and again with two different formats – 720p and 1080i. At first sight you could think that a bigger number also means a better picture quality. In reality, however, both formats principally can deliver pictures in HD quality to the TV viewer. However, this is only possible, if the source material was recorded in these formats.

For your reassurance you should know the following: All displays available on the European market labelled with "HD ready" or "HD ready 1080p" support both HDTV formats. With these logos the European industry association (former EICTA, now DIGITALEUROPE) has specified minimum requirements for HDTV displays, so that TV programmes from all providers can be shown on the displays – even if the commercially available screens differ considerably with a view to their sizes, number of pixels, and number of video frames per seconds.
The 720p format (p=progressively scanned) uses the complete time resolution and delivers 50 video frames per second (with 720 lines) to the screen. De-interlacing is not required and moving artefacts, as possible with the interlaced format, do not exist with the progressive format.

Tests performed by the German Institute for Broadcasting Technology (IRT in Munich), by the European Broadcasting Union (EBU in Geneva) and the second German TV channel ZDF independently from one another, show clearly that, with

the same distribution data rate, the TV viewers prefer the pictures presented in the 720p format. This format offers a much better resolution of movements and moving scenes appear sharper. Thus, for the moving picture of the TV set, the 720p format delivers a better picture quality than 1080i. But there is no need to get nervous – the HDTV1080p logo on your screen means that your TV set can display both formats.

The Sony HDC series ranks among the most successful camera series for HD live production. TopVision, a Berlin TV production company and specialist for live coverage of large national and international events, has complemented its comprehensive camera pool by three more HDC-1000.
During the 2009 World Championships in Athletics in Berlin the new HDC-1000s from TopVision were present in all competitions. Further examples of the successful work of TopVision GmbH & Co. KG in Berlin can be found under:
http://www.top-vision.tv/event.
These cameras process huge amounts of data per second, which need to be transported and transmitted. Today, also the control of the camera is performed via fiber-optic cable only. This is why couplers providing 18 useable wavelengths are used here.

The biggest OB-van on Europe's streets

does not only stand out for its dimensions. It is rather the unconventional solutions which make TopVisions's new HD OB-van 5 a real eye-catcher. Including a compact, light-weight and flexible detail: the stringent fiber-optic cabling.

Two picture control stations, one big multi-functional video equipment room with two VTR stations and one separate slow-

motion station, one additional editing suite with NLE cutting and one 7.1 audio control station: What reads like the description of a well-equipped production building, in reality is on board of a new HD/SD outside broadcast (OB) van. However, in roadworthy condition this space miracle of TopVision, a Berlin provider of TV outside broadcasts, must not be longer than 16.5 m

HDC-1000 camera in use during the 2009 Word Championships in Athletics

and wider than 2.5m in order to be allowed to roll on Europe's streets. This is why the trailer has two big extractable extensions on the sides and one shorter extension which can be extended to the rear. With all extensions extracted the van thus provides a gross area of about 70 m².

Completely equipped

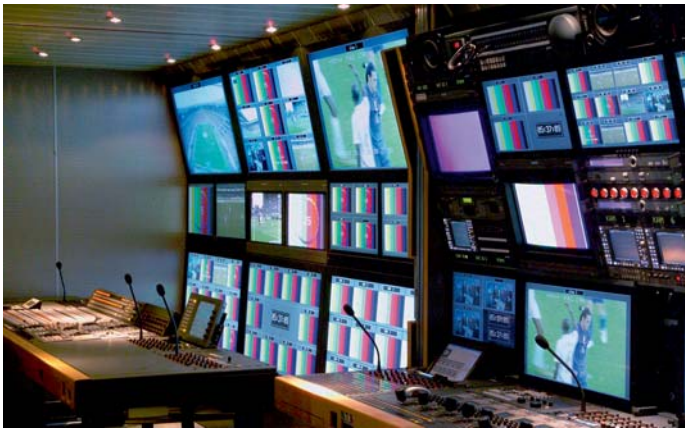
One thing is sure: The new TopVision HD OB van has been designed for covering large events. These will be sports events such as the football world cup, which specified the time frame for building this van. A second field of applications is concert recordings. Both applications require the best sound and picture quality; for HDTV formats, of course, with multi-channel sound, which is almost the standard for pay TV sports coverage.

Colourful

For years TopVision has gained experience with the reliability of STAGETEC products. Already its OB van 4 has been equipped with fiber-optic cabled I/O units. This is almost a must for such a comprehensive system.
Just imagine the cabling necessary for connecting such an OB van with all its external equipment prior to a production operation in the conventional way! Up to 28 camera cables, seven fiber-optic cables for the external sound equipment, possibly intercom cabling and other additional links – all this would have to be laid individually, partly into remote corners.
It is much easier, if the signals are combined on fiber-optic links. Now the intercom signals could be passed on transparently, so that they would not need their own physical cable links. However, with the HD OB van 5 they have embarked on a different path.
One group of signals, consisting of HD/SDI, NEXUS FOC, intercom, RS422 and Ethernet, is each combined and transmitted via one single fiber-optic cable. This approach results in an enormous reduction in cable, weight and space requirement.
For combining the signals the so-called Coarse Wavelength Division Multiplexing (CWDM) technology is used, facilitating the multiple use of an optical fiber. Casually speaking, several carrier wavelengths, i. e. light of different colours, are used on the same fiber. This method is frequently used for the optimized utilization of urban computer networks and in some modern stadiums even employed as an internal audio/video infrastructure. A similar method has already been used for outside broadcasts elsewhere, e. g. as mountain cabling at the 2003 World Ski Championships in St. Moritz. But in the world of OB van cabling, where each gram of reduced weight and each bit of reduced on-site workload counts, it surprises to hear that this method is a complete novelty.

For both directions

All in all, the HD OB van 5 has eight of these fiber-optic multiplexers which each can bundle 16 transmission channels. This allows for much flexibility in the cabling – up to eight external equipment locations can thus be supplied with links for video, sound and auxiliary signals.
And there is more to it: The special hybrid cables, a combination of optical fiber and additional power supply cable, also supply the required mains voltage for operating the intercom terminal, basic unit, computer, and other equipment.
Apart from the combined cabling, CWDM offers still another advantage: During a sports event in a stadium with permanently installed fiber-optic cabling it is frequently possible to connect the OB van via CWDM to the stadium's internal infrastructure, thus saving again cabling.
In order to ensure the versatile use of the multiplexed links, two frequencies have been defined for each of the services, one frequency for each direction. For the sound, two wavelengths between 1,500 and 1,600 nm have been specified. This eliminates the need for an expensive external transponder, which otherwise would convert the colour of the light at the multiplexer input correspondingly.



Another important feature needs to be noted: In fact, this is not a mere radio transmission van but the currently biggest HD van. Apart from all the sound equipment, we should not forget to mention the 28 digital HD cameras!

This is exactly what FOC GmbH, by the way just 2km away from the TopVision location, contributes to the equipment of the OB van trailer. CWDM couplers for the control and transmission of the HD production studio on 10 wheels, which is fully equipped with fiber-optic cabling.

With kind support of
TopVision GmbH & Co.KG
Stage Tec-Entwicklungsgesellschaft für professionelle Audiotechnik mbH

Licenses for future fiber-optic access networks *or:* communal self-commitment?

The availability of fiber-optic networks is a decisive factor for the future of broadband communication. Only fiber-optical network access offers future-proof infrastructures for the high-tech sector in Germany and forms the basis for the multitude of existing and emerging digital services.

FTTH – communal project of the future?!

This article underlines the necessity of having more competition in the communications sector and of decoupling the access network from the services for 'Open Access' as a business model and the future broadband network access provided by the communities.

Broadband – what is it?

Partly a network access is still called 'broadband' if it provides more than 128 kbit/s. The DSL input bandwidth is 2 Mbit/s in download direction. This is completely sufficient for many applications (while the upload as the smaller but ever more important part is simply ignored). In the course of the last years the application habits, e.g. of the younger generation, in the Web have drastically expanded. VoIP (Web telephony), as an example, has almost become a standard application. And new applications are added. For instance, video telephony allows science and business to easily implement international video conferences using high-speed network access connections. And the German public TV stations ARD and ZDF declare that in future they want to offer their complete programme in high quality on the Web for time-delayed use.

For the near future it has become a matter of fact that triple play services will bring telephony, data communication/Internet and TV to the home or business via a single fiber-optic cable.

This infrastructure forms the basis for the design of innovative services in many areas, such as education and research, the health sector, the security branch etc., and for the creation of the related jobs at home, at the computer, near your children and household.

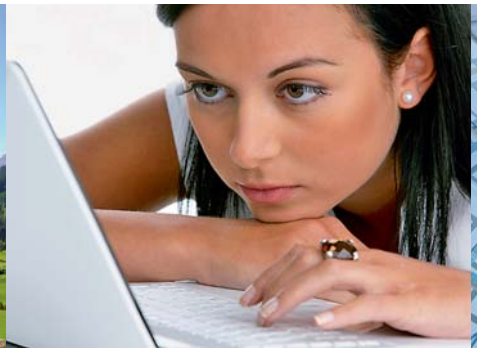
In order to implement triple play services, a rate of at least 25 Mbit/s is required. For a transitional period connections providing 100 Mbit/s would be sufficient, if they provided this data rate symmetrically, i. e. in download and upload direction. But as the development over the past years has shown, the demand is increasing rapidly.

In future the data rates for the provision and transmission of innovative TV services in HD/SD (High Definition/Super High Definition) quality and 3D presentation will have to be doubled every three years. Already today for one single HDTV programme four analogue channels are required instead of the one analogue TV channel needed so far.

This is beyond the capacities of classic copper networks.

Thus a ground-breaking new access network is necessary which will entail comprehensive construction work and high costs.

Towns and communities could clearly improve their attraction and revenues by deploying future-proof access networks for commercial and residential customers.



"Historic" mistakes of privatisation

With a market share of approximately 75% in the field of local lines to the consumer, today Deutsche Telekom AG is in a market-dominating position covering all transmission and switching equipment. Apart from a few providers with their own infrastructures (e. g. city and regional carriers, QSC), the vast majority of the providers (such as 1 & 1) acts as resellers of Deutsche Telekom.

In 2009 DSL (Digital Subscriber Line) has reached its technological limit due to the number of access ports. Cross talk at the near and far ends and the related disturbances affecting the individual DSL technologies of the competitors among one another, operated simultaneously and in parallel on one cable with several twisted-pair copper lines, make any further marketing beyond the year 2010 almost an impossibility.

Practical separation of business models

Reflecting on separations in the vertical value-added chain, it makes sense to consider the depreciation periods and/or re-investment cycles. In this case we will find the following, distinctly different levels:

· Outside plant and access network: 30 – 40 years
· Switching and transmission equipment: 10 – 15 years
· Development of services: 2 – 5 years

The implementation of all three levels in one company has consequences for the design of the business model. For this reason, with the deployment of new optical access networks under official communal supervision, care has to be taken to implement so-called "open service access interfaces" for all interested service providers (TV, telephony, Internet, bandwidth).

This does not necessarily require the vertical integration of all functions in one company. In case of a strict separation of the value-added levels, cooperation can be performed on the basis of the agreed service levels and key-account conditions. The communal network operator is thus able to establish direct final customer relations, e. g. with businesses, tenants and owners, and to charge these services in one invoice together with electricity, water and gas.

Alternative access methods

Talking about the next generation of broadband access with up to 100 Mbit/s, the traditional twisted-pair copper line is no longer sufficient for that. An infrastructure based on fiber-optic cables is indispensable for deploying such a new network. Of course, there should not be only one single company deploying and operating the access network. Just as with radio frequencies, which are not available to an unlimited extent either, the access network operator could be granted a license by the German Federal Network Agency following a tender procedure. If this license is simultaneously combined with certain requirements and mile stones relating to the degree of infrastructure development, later availability could be ensured.
The granting of a long-term license for operating a broadband access network to the consumer provides the potential operator with some security with a view to the enormous investments made. Investors need planning reliability in order to control their own risks. This quite naturally and particularly applies to situations where the ROI periods are comparable with those in the real estate business!

Potential operators of fiber-optic access networks

The longer amortisation periods for a broadband fiber-optic access network limit the range of potential investors. Principally it makes sense, in particular with a view to the national economy, if this access network of the future is deployed and operated by public bodies like the road network – even if the financial situation of the public authorities seems to speak against this obvious solution. This is why is it necessary to look for complementing investors. On the one hand, this could be e.g. a communal company, i. e. the city-owned companies operating the gas and waste water networks and thus already today managing the business with the final customer. On the other hand, private investors could join in, which already today e. g. as Public-Private-Partnerships (PPP) finance real estate projects or industrial infrastructures with similar investment volumes and periods. Thus completely new types of providers might emerge stimulating the weak competitive structure in the infrastructure sector in Germany. In particular, such an approach might accelerate the construction of the fiber-optic access network and create new business opportunities.

Separation of value-added levels and licences for access networks

The separation of the access network from the other value-added levels will remove the existing barriers for the development of an intensified competition with innovative services.
Higher planning reliability for all stakeholders is the precondition for the provision of more financial resources. The increasing competition will result in faster market penetration. However, such an approach must be realized soon with the introduction of a licensing procedure. The first companies and communities are already beginning to deploy their own fiber-optic networks.

Christoph Pauselius, Business Development
With kind support and use of the article by:
Dr. rer. nat. Juergen Kaack,
STZl-Consulting Group

Schwedt municipal utility company

invests one million Euro in the supply of "blank spots" with broadband technology

In Germany there is still quite a number of so-called "blank spots" on the map with no supply with real broadband services faster than 2 Mbit/s. This means that from about 40 million copper-based telephone connections, approx. 24.6 million can be used for broadband transmissions at 1 Mbit/s or more. About 15 million residential and business customers have to live or work in such "blank spots".

VDSL2 in Germany

Since spring 2006 Deutsche Telekom AG (DTAG) has been building a VDSL2-based distribution network based on the Infineon Vinax VDSL2 chipset. The progress made and the experience gained with such a large-scale network is followed by many network operators at home and abroad with great interest, since they also plan to deploy VDSL2-based networks. The VDSL2 data transmission rate is sufficient for the provision of triple-play services allowing the transmission of both Internet data with VoIP and IPTV in HDTV quality using VDSL2 technology.

Within their fixed network line of business DTAG has offered VDSL2 connections in the twelve biggest German metropolitan areas since 17 October 2006. Originally about 35 German cities were to follow by the end of 2007. In addition, meanwhile VDSL2-based products can be used in many smaller towns and communities. However, in these areas there will be no cost-intensive FTTC expansion with outdoor DSLAMs for the time being. Only the locations of main distribution frames (MDF) will be equipped with indoor VDSL2 DSLAMs and connected to the IPTV concentration network, so that, due to the higher line attenuations of the longer local lines, a considerable portion of the subscribers currently cannot use the VDSL2 and ADSL2+ profiles currently marketed by DTAG, and the related triple-play offers. Within the framework of the new T-Home strategy to offer IPTV services also in urban areas without outdoor DSLAM expansion, currently in many other cities the main distributors (local exchanges) are fitted with IPTV DSLAM linecards and connected to the IPTV concentration network ("Indoor VDSL2 DSLAM Expansion"). Within a radius of up to 1 km around the main distributors the subscribers in these cities can book VDSL2-based IPTV packages from T-Home; within a radius of a bit more than 1.5 km around the main distributors connected to the IPTV network, ADSL2+-based IPTV packages are marketed. A large-scale VDSL2 area expansion over the whole city area using outdoor DSLAMs is currently not planned.

Since March 2008 EWETEL has offered VDSL2 connections in the local networks of Westerstede and Klausheide. Other telecommunication providers will follow, quite a number of them being municipal utility companies or the communities themselves.

In spite of an offered flat rate publicly promising Surfing around the clock, the DTAG specification says that when the transmitted data volume exceeds 100 GB (V-DSL 25) or 200 GB (V-DSL 50) per month the speed of the VDSL connection will be reduced to DSL 6000 level (6,016 kbit/s in download and 576 kbit/s in upload direction) for the rest of the month.

Eliminating broadband ‚blank spots' – FOC at the front line

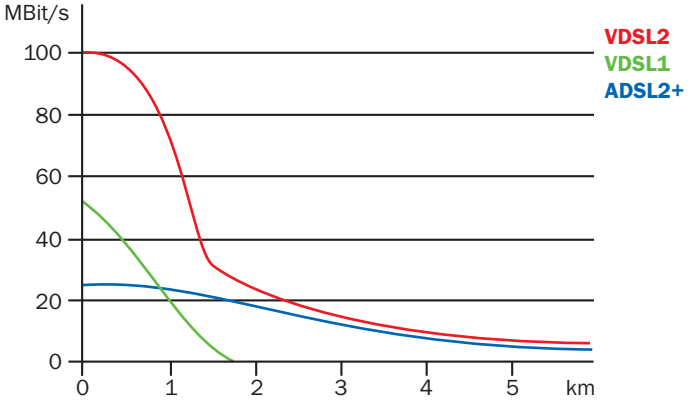


Figure 1

This supply gap will become bigger in future, since in particular in rural regions the available maximum bandwidths will be at 1 Mbit/s due to the long line lengths (Figure 1). This means: Active DSL technologies need to be deployed and operated in localities next to the DTAG cable distributors. The connection of this active equipment via fibre-optic cables is indispensable.

This is the chance of local telecommunication service providers such as municipal utility companies or communities to close this gap on their own and to make it future-proof by laying the fibre-optic cable in their localities. Thus the later expansion

(migration) of the network to Fibre-to-the-Building/Home (FTTB/FTTH) will only be the last step towards the future provision of unlimited bandwidths – a realisation causing many municipal utility companies to expand their telecommunication networks, just as done by the Schwedt municipal utility company in the Northeast of Germany.

DSL now also in Berkholz-Meyenburg and Heinersdorf. Electricity and telecommunication services from the same provider...

After the launch of the project in May 2009 in the village of Criewen, today the DSL connection of Berkholz-Meyenburg as well as in the Schwedt borough of Heinersdorf has been completed. At the end of 2008 already, the DSL connection of Vierraden was implemented. In less than 6 months the Schwedt boroughs of Gatow and Blumenhagen as well as Criewen and Zuetzen followed suit. Simultaneously the involved companies were commissioned to perform the civil engineering works and the subsequent laying of the empty conduits in Berkholz-Meyenburg and Heinersdorf. The interconnection with the DTAG network on the last mile has been completed and the required hardware commissioned. In order to reach the last mile the network of the municipal utility company was expanded. All in all more than 20 km empty conduits were laid and later fiber-optic cables were pulled in. Thus all preconditions for fast Internet access in three more localities have been created and from now on customers can register for the attractive DSL packages "SDT FAMILY 2,000, 6,000 and 16,000".

Figure 2

DSL access in the 6 Schwedt boroughs and in Berkholz-Meyenburg was made possible by an investment of 1 million Euro provided by the Schwedt municipal utility company.

The technical foundation is the fibre-optic cable-based telecommunication network of SD Telekom in Schwedt which will successively be expanded in the direction of the outer districts of Schwedt and the neighbouring localities (Figure 2).
As a next step a multifunctional cabinet is installed next to the DTAG cable distributor (Figure 3). This cabinet contains the active hardware in the form of a mini-DSLAM made by Nokia-Siemens Networks (see photos).

Figure 3

Figure 4

DSLAM of the SURPASS type: The IP DSLAMs bring up to 100 Mbit/s to the existing twisted-pair copper line infrastructure (subscriber line). All services are telecommunication carrier grade for ADLS2+ and VDSL2 and support the usual H.248/SIP VoIP protocols. The available VDSL2 technology is the precondition for providing bandwidth-on-demand applications as needed for HDTV transmission and other services.

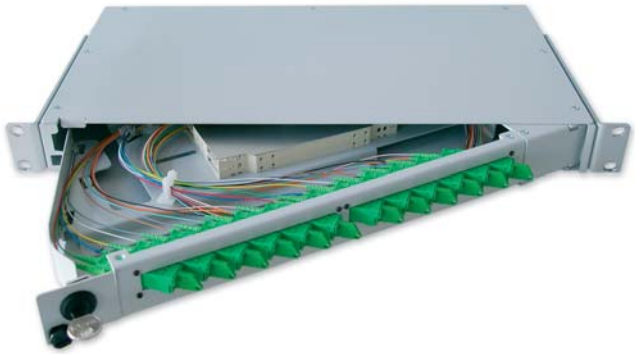


Figure 5

The connection to the fibre-optic ring network of the municipal utility company is implemented using 1 HU swivelling splice boxes made by FOC (Figure 5).

Kindly supported by
the Schwedt municipal utility company
Martin Schmidt

ECOFIS GmbH

One-stop provider of professional and fail-proof IT solutions

Location: Data centre

When does a network outage occur? Always at the most inappropriate moment! – More and more, IT security is becoming a question of life or death for any business. For many companies IT and network security is the precondition for their continued existence and the basis for growth and competitiveness, because IT outages entail enormous costs and impair their operative business. Also the legislative bodies, insurance and financial professional services have recognised the critical importance of IT security.

Quality shows its effect

The passive network infrastructure/cabling with its components such as fibre-optical connectors and boxes is the foundation of all IT. Data centres should pay particular attention to these critical components.

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More information on ECOFIS can be found at www.ecofis.de.

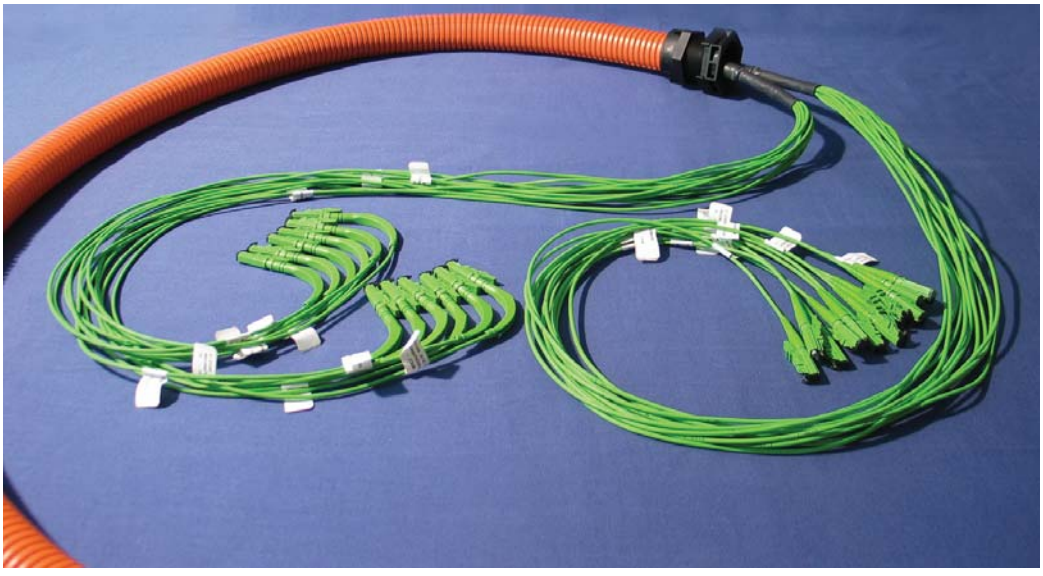
Fail-proof networks – FOC quality joins in

Since FOC has been recognised for its high quality standard among its numerous customers for almost 15 years, ECOFIS did not need much persuasion to become a committed FOC customer. For more than half a year now ECOFIS has been supplied by FOC with components such as splice and patch modules (19“/1 HU jumper box) and fibre-optic jumper cables.

FO Jumper Cables

The multi-jumper cable family has been designed to support alternative cabling concepts in large and small fibre-optic network nodes. Multi-fibre point-to-point links using a jumper cable replace individually installed single- or dual-fibre patch cords in the network nodes. The advantages offered by these jumper cables over conventional patch cords are a low price, big mechanical stability, a greater possible overall length and shorter installation times. Fire-protection compartments in buildings need to be opened and closed only once due to the higher fibre-count of the cables. Conventional, low-cost cable management devices can be used for routing the jumper cables additionally saving cost and time. In the field of industrial cabling the jumper cables provide an extremely flexible, time-saving and low-cost solution in conjunction with the UNI-Alberino concept. This allows you, e.g. to hold a stock of so-called terminated UNI jumper cables in standard lengths and to install the required connector standard (FC, ST, E-2000™, SC) on site.

Jürgen Albrecht,
FOC, Head of Sales South/West



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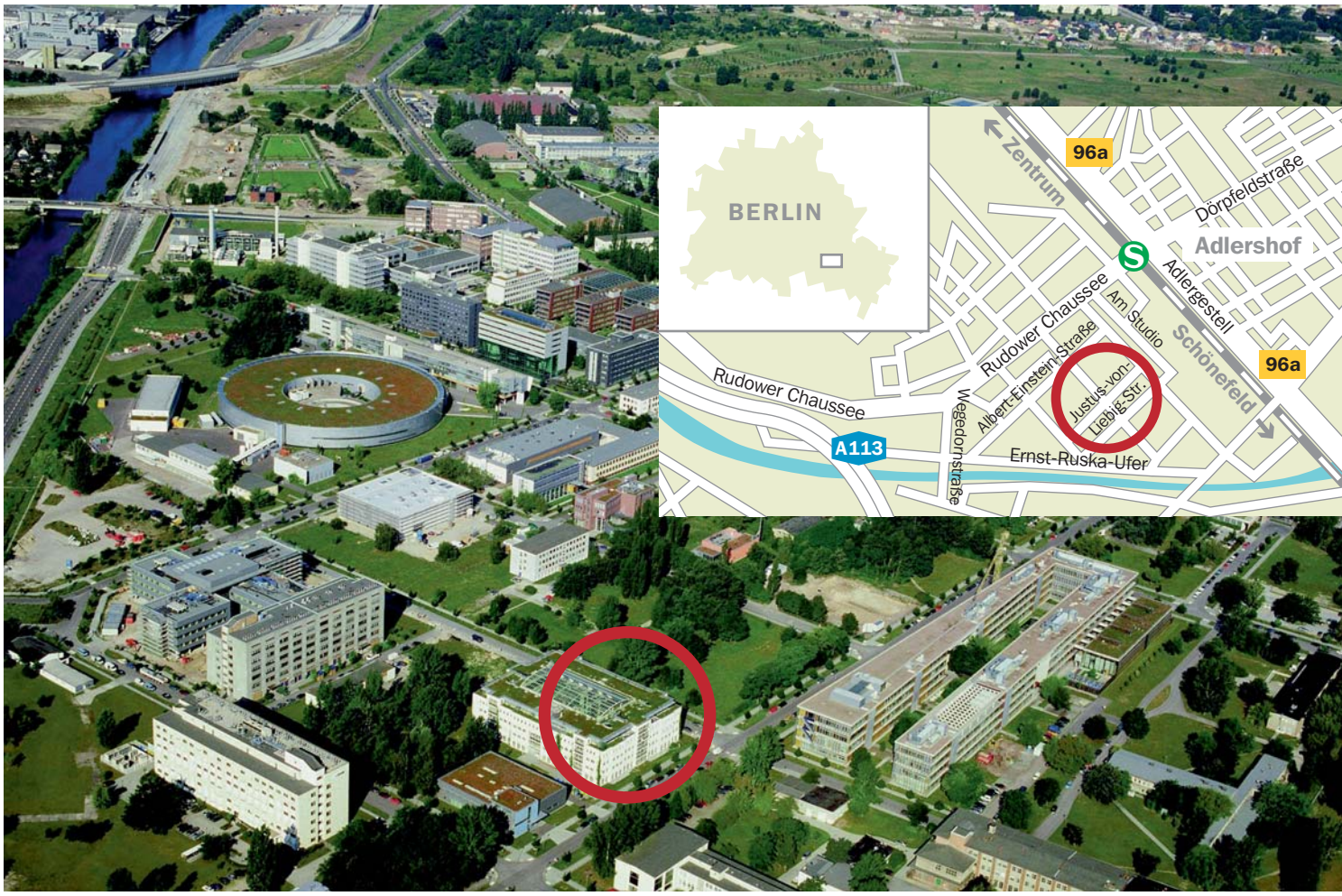

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