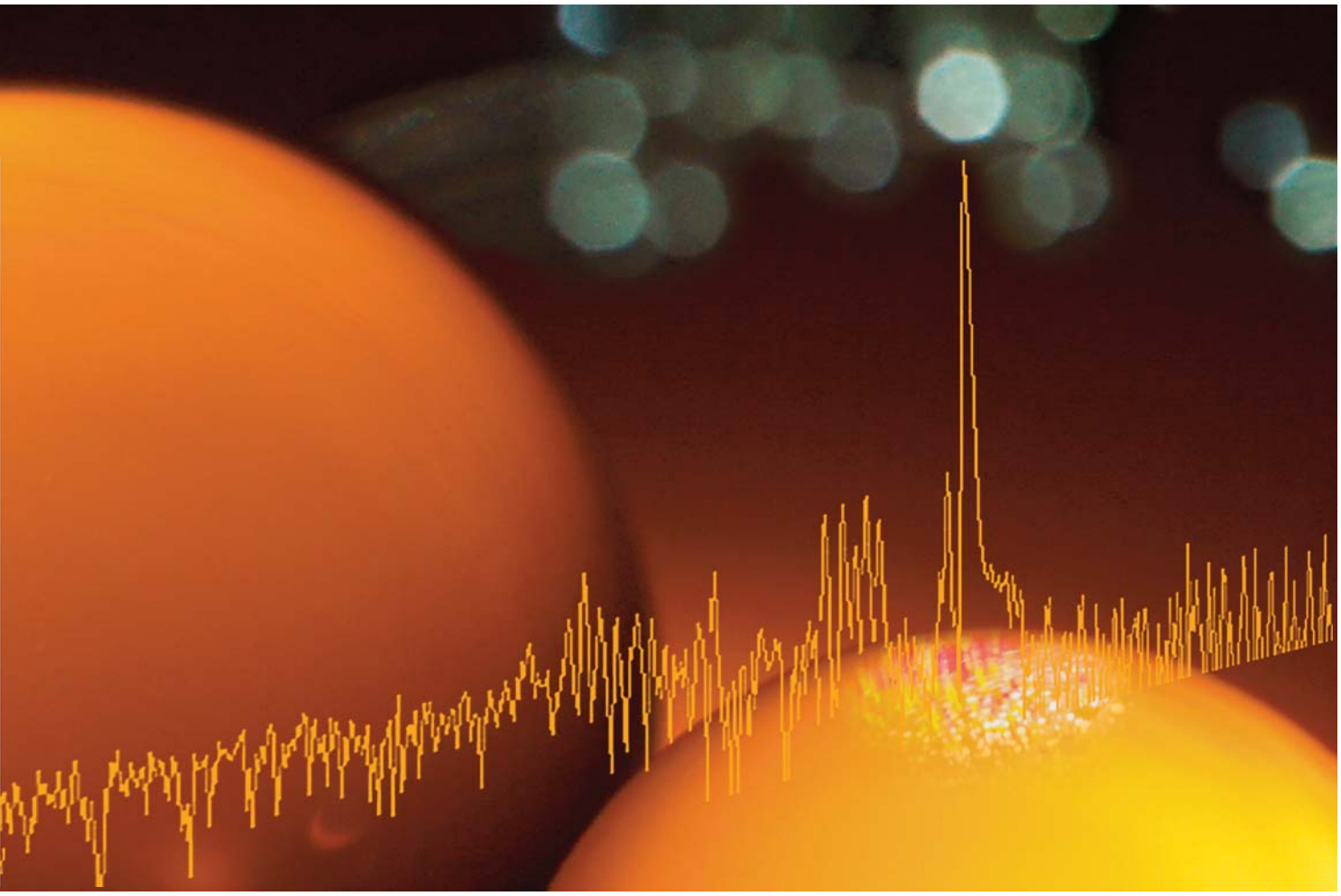
fibre optical components GmbH

At the speed of light into the future.



foc flash-light

September 2013

foc flash-light

Contents

Editorial

Photo: Rico Prauss

The year 2013 promises to have an interesting second half. Big changes are about to happen on the German telecommunications market. Recently we could hear from Deutsche Telekom AG that broadband expansion was of dominating priority for the future and would be set up on a secure technical basis. Also Vodafone now speaks of planning to heavily invest in the expansion of its own network. Looking at E Plus and O2 we can expect for the near future that they want to have a front-row seat, too. We also certainly are anxious to see how the political framework conditions for the expansion of broadband networks will develop after the elections to the German Bundestag. The elections offer Germany the chance to improve on its rather weak international position in terms of the expansion of a sustainable fibre-optical infrastructure.

We are also very excited and expect, of course, both technical stimuli and the possibility to participate in tenders. Since the last issue of our magazine we have invested much in the further development our *lilix*© kit. We have the clear aim of fitting existing network components with additional and new features. Thus optical connectors of any standard, in-line applications and pluggable attenuators can additionally be employed as filters and reflectors through the use of *lilix*© elements. Also with existing structures this development results in completely new applications or known procedures are greatly simplified for installation and measurement. We will talk about these results in the current issue.

ECOC 2013 will trigger a number of new ideas on how to increase the performance and also the operational efficiency of networks. We understand the requirements of the future for the manufacture of low-loss components, because ”green“ IT commences with the prevention of transmission losses over the passive network. Today we are pleased that we have – with our Class A connectors – a popular product, which has clearly proven its capability and integratability in existing networks.

On the occasion of our 20th company anniversary I, on my own behalf, would like to thank our customers, suppliers and service providers for the very successful cooperation. Also in future our company would like to be a reliable partner on the market by providing pioneering products and innovations.

Christian Kutza, Managing Director

20 years of FOC

On our own part: Life really starts at the age of 20!

This holds particularly true for companies, because at the age of 20 you are no start-up any longer but a well established organisation. At that age companies have proven over the period of their existence that they understand the market, where they are active on and offer their goods and services. They are known among their customers. All the customers, who in the course of time have taken the opportunity to join the regular clientele, provide good references. During this time the company has overcome the "teething troubles" and experienced other ups and downs.

But companies are entities consisting of machines and, above all, human beings, who are generating an added value for themselves and consequently for the company day by day. The foundation of a company always starts with a good idea and a vision, which can be born in one or in several heads.

In our particular case the story briefly reads like that:
During his studies a young fellow with the name of Christian Kutza dealt with a worldwide new and unique technology, which did not any longer transmit information from point A to point B via metal conductors but via glass fibres using light. At some points on the link the fibres must be branched and the light consequently divided up. In order to manufacture such a type of "light branching device" or coupler for glass fibres, the necessary technologies had to be developed. Thus the FBT – Fused Biconical Taper – process was born. Christian Kutza was directly involved in the development of the process at the then Department of Electronics at Humboldt University in Berlin, Germany.

After the reunification of Germany, he – with his know-how, a splash of insanity and much enthusiasm – then founded and built FOC GmbH.

Today he still is Managing Director and 100% shareholder employing a staff of 45. The company still produces couplers and filters in line with the FBT process. However, meanwhile the biggest part of the sales income is generated from the manufacture of complete optical network products and systems for the telecommunications industry.

Being 20 years on this planet always is a good occasion to appropriately celebrate this jubilee. So it is quite natural when the master of the FOC freighter invites the crew for a cruise on the waters of Berlin, as was done on 27 June this year. Employees and close companions spent five enjoyable hours on the Spree and Havel rivers.

The author of this article would like to wish for himself, the master and all other colleagues, "fair winds and following seas" (for the master this also and particularly applies to his hobby) and a healthy growth for the FOC ship. Full speed ahead…

Tilo Kuehnel, Sales FOC

BROADBAND over

An ounce of practice is worth a pound of theory in the

FTTx fiberLAB

The energy turnaround has been politically proclaimed. Its implementation is the task of the utility companies in the different German regions and of the national electricity transmission companies. For this purpose we will also need new energy networks. This is a fine occasion not only to plan and build new gas pipelines and electricity routes, but also to deploy optical fibres at the same time.

Because for energy networks and for telecommunication networks the same rule applies: If the load increases, NEW ones must be provided.

The message of the campaign for energy networks launched by the German Federal Government (picture on the left) holds true for telecommunication networks, too.

This means that framework conditions must be created ensuring that our economy continues to function properly. The modern infrastructures, such as energy, traffic and telecommunications, are the lifelines of our national economy. And free market economy needs guide boards and guidance systems. Otherwise the traffic of services and goods comes to a halt resulting in congestion. Just this is currently the case on the telecommunications market, where too much liberalization and market supervision will blow the chance of sustainable investment in durable infrastructures.

An irrefutable sign is the dispute about the topic of vectoring on the VDSL market, which again will result in missing the chance for a sustainable infrastructure competition in the German republic. We do not only need the energy turnaround, but also the telecommunications turnaround.

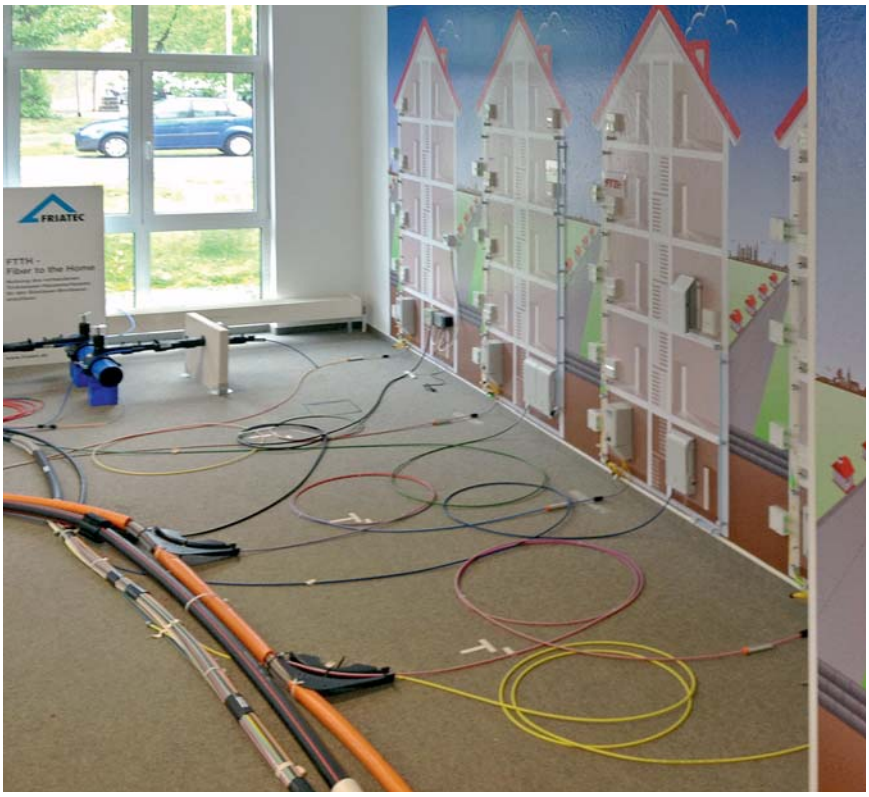
Over the past years, since the liberalization of the telecommunication and energy markets, many of these utility companies have become active also on the telecommunication market. Today they are an integral and also necessary part of the telecommunication market for ensuring a broadband connection of industrial parks, big industries and also residential subscribers – mostly where established telecommunications companies (have to) fail for economic reasons.

Because, when we talk about a new telecommunication infrastructure, we do not mean copper or wireless networks – which are required as supplements – but "true", investment-proof optical fibres to the end-customer.

In particular municipal utility companies and other municipal enterprises up to special-purpose associations for water and waste water are – apart from their core business – interested in supplying their customers with new, broadband telecommunication services. What they lack is the required know-how. This know-how ranges from the necessary installation of the infrastructure right to the operation of the networks.

Just here the telecommunication industry companies get involved and offer their advice and support in addition to their longstanding technology and market expertise. The newcomer is confronted with the critical problem of making the right choice. Because in Germany consolidation effects have reduced a broad technological basis consisting of many telecommunication equipment manufacturers down to a modest number of vendors. This development was particularly to the benefit of companies from China.

GLASS



This year FOC GmbH celebrates its 20th company anniversary. With this jubilee FOC has impressively demonstrated how excellently the know-how and the potential available on the telecommunication market has been utilized over the past 20 years and implemented on the market.

FOC does not only stand for Fibre Optical Components but also and in particular for Further development, Optimization and Competence in particular in the design and equipment of glass fibre-based optical access networks.

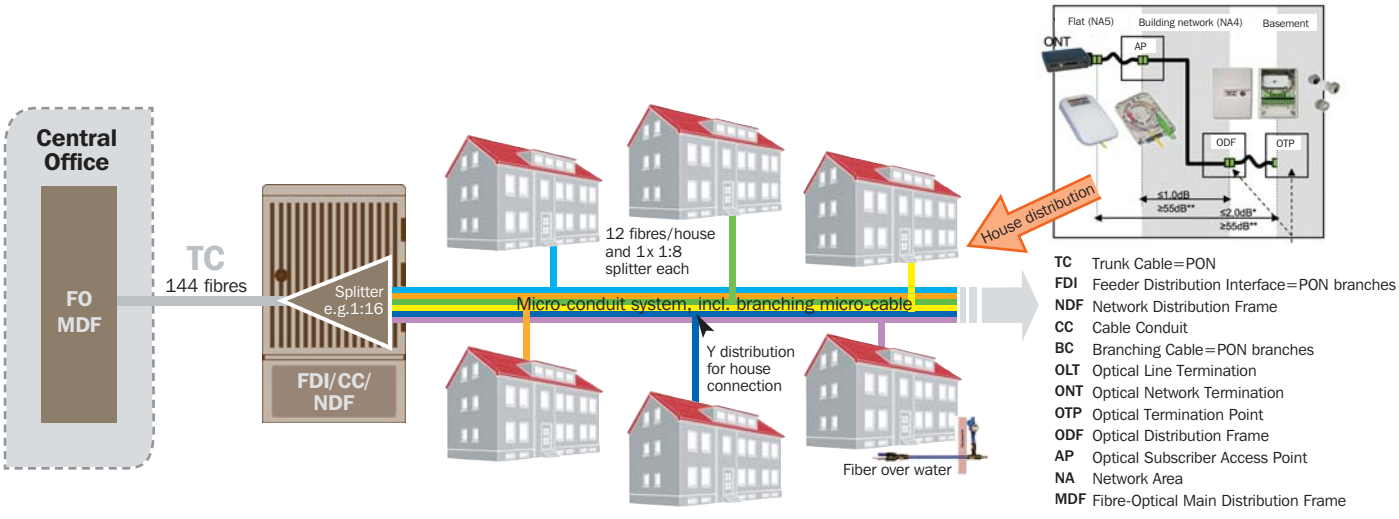
This message finds its expression in the FTTx fiberLAB in Berlin-Adlershof, currently the only one in Germany. The laboratory was opened during the BEL··2· trade fair at the end of April for the interested professional audience.

Subject matter of the FTTx fiberLAB – Building various infrastructures and network elements for providing future-proof services for end-customers on the basis of optical fibres.

Objective of the FTTx fiberLAB – Meaningful presentation of the actually required optical components for installing optical access networks within several exemplified networks and their operation.

Target audience

- Administrations (mayors, district administrators, persons in charge of broadband development on federal and state levels)
- Municipal enterprises (managing directors and network operation heads from electrical and gas utility companies, special-purpose associations).



Gemeinschafts SEMINAR

BEL··2·

BEL··2·

SPECIAL

In April there were too little time and space available. That is why there will be a BEL··2· Special in Berlin-Adlershof on Thursday, **14 November 2013**, on the following topics:

- **Security in the network**
  (security of data, information, infrastructures)
- **Copper meets glass**
  (latest developments in network technology)
- **Planning optical networks**
- **Optical measuring instruments workshop**
  (including real-life acceptances tests)

Please note the date and/or register today at:
www.bel2.net/spezial/anmeldung

The lectures held in 2012 and 2013 at BEL··2· can be viewed online at ***www.lwlportal.de***

By the way, within the framework of *BEL··2· Special* (www.bel2.net) all interested parties can visit the FTTx fiberLAB on 14 November 2013.

The Contractor's Meeting Point organised at the FTTx fiberLAB also offers the chance to learn more about various acceptance test procedures in optical networks. Entrance is free of charge for all visitors.

But there is more to it: All interested participants can also take a splicing test for a small fee and, if successfully passed, receive the BEL··2· Splicing Certificate.

A lack of occupational training to become a communications engineer or for similar trades makes it difficult for the companies and associations from the above-mentioned target audience to enter the market of broadband telecommunication. Many "consultants" give wrong advice due to ignorance and a lack of experience. This is the reason why even in the telecommunications industry, which was deemed trustworthy over many years, quite a lot of "charlatanism" and foolish action can be seen.

The FTTx fiberLAB has been designed to give newcomers from the communal environment a reliable orientation. Anyone who would like to or has to familiarize himself with the topic of optical access networks is warmly invited to do so at the FTTx fiberLAB in Berlin-Adlershof.

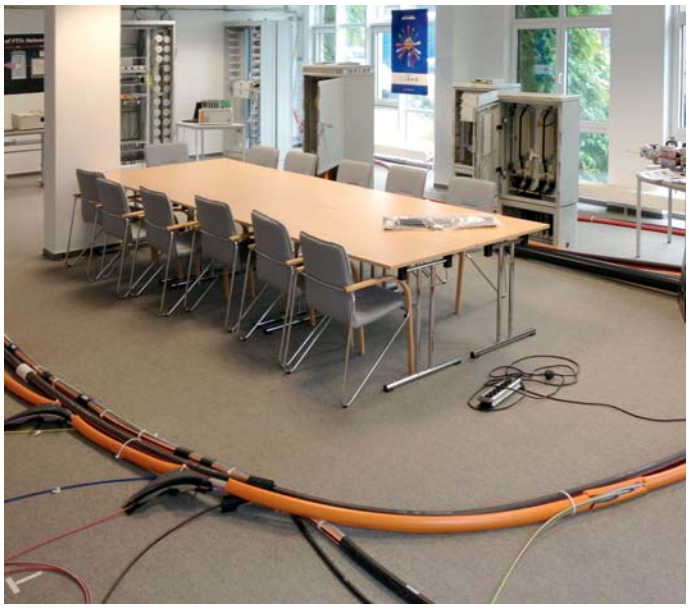
Network equipment manufacturers interested in participating in sustainably equipping the FTTx fiberLAB are equally welcome any time. The only precondition is not to be afraid of competitors, which might already be demonstrating their own technologies at the FTTx fiberLAB.

The FTTx fiberLAB is meant to always reflect the current market situation and to give an outlook on emerging technologies.

In this context and at this point we would like to say thank you to the initial equipment suppliers of the FTTx fiberLAB. Without their fast and straight-forward provision of the required network elements such a smooth and quick installation (3 months) of the FTTx fiberLAB would not have been possible.

Tilo Kuehnel, Sales FOC

Hands-on fibre technology demonstration

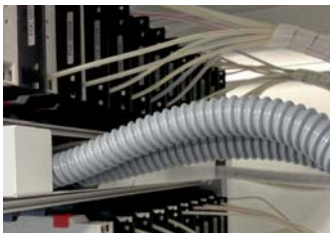


Thanks to the companies

- Schöngen-Kunststoffsysteme (conduit system)
- Dätwyler (cable distributors)
- Gabocom (mciro-conduit system)
- DELTA Electronics (Fibernode)
- FRIATEC (Fiber over Water)
- Egeplast Procable (mciro-conduit system)
- TE – Tyco Electronics (FO MDF)
- VETTER (cable laying / blowing equipment)
- ROMOLD (cable manhole system)
- EWE Netz GmbH (house junction box)
- Genexis (FTTH router)
- Teleste (TV head-end)
- Huber+Suhner (FO MDF, oAP)

Slow FTTx expansion in Brandenburg

Communal enterprises in the German state of Brandenburg recognise their chance to supply the inhabitants with broadband telecommunications services



Also the labour market profits from a stimulation of the market through the installation of future-proof fixed telecommunication networks by communal enterprises. In particular in the Brandenburg province, such as in the town of Finsterwalde, this issue still is a very hot topic. Currently in this town, which is situated between Berlin and Dresden, the municipal utilities company is installing a state-of-the-art fibre-optical network.

The Central Office as the heart of the FTTx project in Finsterwalde was already completed at the end of 2012 and is currently fitted and connected with the fibre-optical termination equipment.

The required technology is delivered by FOC GmbH in Berlin. An important argument in the decision in favour of FOC was that their technology allowed us to implement very high packing densities on the patch front, the so-called compact modules with-

Regional service providers set up infrastructure

By 2014 up to 5,000 dwelling units of the municipal and cooperative housing companies in the town area will have the possibility of connecting to this optical network. For the housing companies this step will result in an increased value of their dwellings and in a better occupancy rate of their housing stock. A desired side-effect is that also the owners of owner-occupied houses can largely profit from this development. Currently all parties involved within the municipal utilities company and their external service providers are intensively working to install the distribution points at the streets and within the residential houses. Underground engineering in the streets and on the pavements is another main area of work. Here several kilometres of micro-conduits still need to be laid, in which the micro-cables will be blown.

One of the service-providers mentioned above is TEKOM Service GmbH from Finsterwalde, which for some years already has concentrated the technological know-how for installing fibre-optical cables and distributors in its organisation.

The related activities do not only extend to the field of telecommunications but also to the industrial companies, which have been using fibre-optical technologies for years already. As an example, Wacker Chemie in Nuenchritz near Dresden is another fibre-optical customer.

in the subracks. High packing densities were difficult to realize because in view of the space restrictions in a 19“ rack the fibre bundle excess lengths had to be arranged and routed in such a way that during splicing a straight-forward handling of the fibres was guaranteed. In the run-up to the installation there was a very tight and fruitful cooperation between FOC and TEKOM Service. Employees from both companies were active on-site both in Finsterwalde and in the FTTx-fiber LAB of FOC GmbH in order to explore and test different possibilities. Both sides profited from this approach.

”Looking back, a successful project, which will be going on for some time,“ says T. Kuehnel, FOC GmbH. ”TEKOM Service GmbH, in particular their managing director Manfred Loesche, but also the employees, have done an excellent job in fitting and connecting the FOC products. The quality and the look of the technical equipment speak for themselves. You won't find that too often in this industry today.“

Manfred Loesche
Managing Director, TEKOM Service GmbH

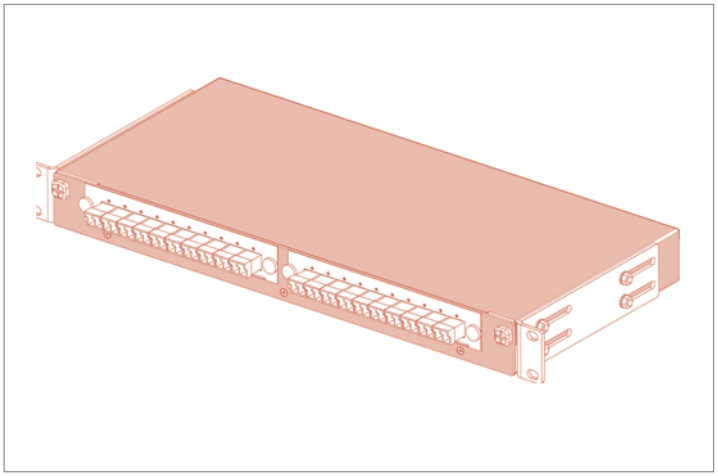


Fig. 1
Modular 19" 1HU system containing two 18-channel CWDM modules

Flexible modular 19" system

for smooth integration in distribution systems

Fig. 2
Modular 19" 1HU system fitted with two cable termination modules

Over the past years the 19" distribution systems made by FOC have become a standard equipment with many customers. FOC offers its customers a complete product portfolio ranging from simple 19" splicing and patching modules to sophisticated main distribution systems. With its products FOC particularly fulfils the request of many customers who demand a low-cost and frequently customized alternative to the systems provided by the competitors, without compromising on essential functionalities.

Customized product development – …

Over the past months both complex fibre-optical functional modules and factory-assembled complete modular solutions have played an increasingly important role on the fibre-optical market. At the same time a trend to a higher packing density can be seen for splicing and patching solutions. With its new modular system FOC addresses these developments.

The new modular system has been designed on the basis of the 19" Lightbox system which has proved itself for many years now. On the one hand the new product will offer access to a broad portfolio of accessories, ranging from mounting brackets, e. g. for 23" systems, to solutions protecting against rodents; on the other hand FOC will stick to a design line its customers have become familiar with.

Fig. 1 shows – as an example of an application with functional optical modules – a solution for an 18-channel CWDM system using the LSH-HRL connector system. Here the 19" 1HU chassis is fitted with two 18-channel CWDM modules.

It is possible to similarly integrate other functional modules, starting with simple splitter modules for FTTx up to complex functional units for NGPON applications.

Another application consists in employing the modular system as part of a factory-assembled, ready-to-install cabling solution. In this case the modules will be configured as end points for the tried and tested FOC breakout cable solutions. Fig. 2 shows such a solution with which FOC managed to come out on top over many competitors as a standard for the next years in a request for proposal by a well-known European network operator.

Apart from the example shown in Fig. 2 with 12 LSH-HRL ports per module there are solutions available offering up to 24 ports per module taking the trend towards a higher packing density into account.

The modular system launched by FOC early in 2013 will allow the customer to easily integrate functional optical modules in existing distribution systems. In combination with the tried and tested breakout cable solutions made by FOC it can also reduce the installation time and effort for the customer.

Axel Thiel, FOC Head of Development and Manufacture

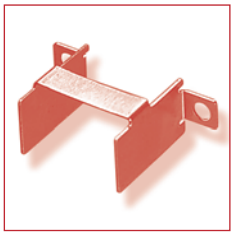
FOC expands mounting clip portfolio for the new type of LSH adapters

Fig. 1
LSH-HRL adapter with mounting clip for screw fastening with thread

Fig. 2
LSH-HRL adapter with mounting clip for screw fastening w/o thread

Fig. 3
LSH-HRL adapter with mounting clip for quick fastening

Fig. 4
LSH-HRL adapter with mounting clip for screw fastening w/o thread for asymmetric assembly



Already in 2012 Huber+Suhner developed together with FOC GmbH a new modular adapter system for the LSH connector family. Through combining universal basic bodies using the appropriate mounting clips it is possible to take the various assembly requests of the customers into consideration.

solution from the beginning, further mounting versions can be implemented at short notice by manufacturing customized mounting clips.

Axel Thiel, FOC Head of Development and Manufacture

… one of the strengths of FOC GmbH

While the designs shown in Fig. 1, 2 and 3 have replaced already known adapter types in the FOC portfolio, the version in Fig. 4 is the first of a new type developed on the specific request of a customer.

The LSH connector system is frequently used in transmission systems which were originally designed for the SC connector system. However, due to the longer overall length of the LSH connector system, this may cause problems with the bending radius of the patch cords used.

For this reason FOC GmbH in cooperation with Huber+Suhner has designed a mounting clip enabling the asymmetric installation of the adapters. This clip can be used to fix the adapter in such a way in a front panel that the adaptor can be shifted back by about 7… 9mm from the centre in relation to the standard mounting clip (Fig. 6). The first version of this asymmetric mounting clip available is the one that is typically used for installing adapters which can be removed to the front of the casing in order to be able to clean the interior connector.

Since the new adapter system has been designed as a modular

Fig. 5 19"/1HU front panel fitted with LSH-HRL adapters with standard mounting clips

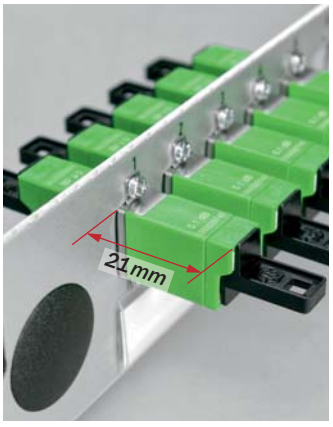
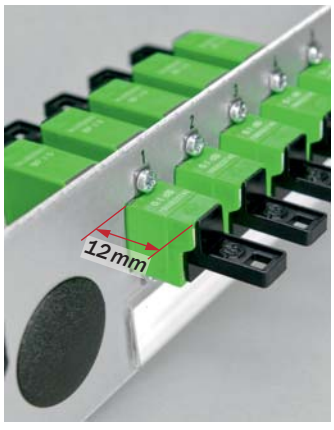


Fig. 6 19"/1HU front panel fitted with LSH-HRL adapters with asymmetric mounting clips



The new *lilix* OTDR reflector made by FOC

The lilix reflector product line, which meanwhile has considerably grown, has a new family member: The new lilix OTDR reflector will be available from September 2013. It almost completely reflects (>99%) over the whole wavelength range of 1260…1700 nm which is relevant for optical signal transmissions. The new OTDR reflector is available in the form of a terminating connector.

The *lilix* OTDR reflector has been designed as a measuring aid for different applications relating to OTDR measurements. In contrast to the wavelength-selective FTTx reflector, which has also been designed for permanent installation in the network and which thus is transparent in the operating wavelengths range, the *lilix* OTDR reflector reflects the complete spectrum of wavelengths from 1260…1700 nm at >98 % reflectance on filter chip level. In the product a reflectance of up to 90 % can be implemented. Frequently it is imperative to know the reflectance value as a factor of the wavelength (see Fig. 1), which can be provided on request.

lilix® OTDR reflector reduces measurement effort

As a rule the *lilix* OTDR reflector will be attached to the last connector at the end of a fibre link and used there as a marker for OTDR measurements at any OTDR test wavelength. It should not be permanently installed in the network because it would block the operating wavelengths. Thus it needs to be removed after the measurement. The *lilix* OTDR reflector can be used in all applications where a measurement signal refection in the range of 1260…1700 nm is temporarily desired. In the following some typical fields of application are discussed.

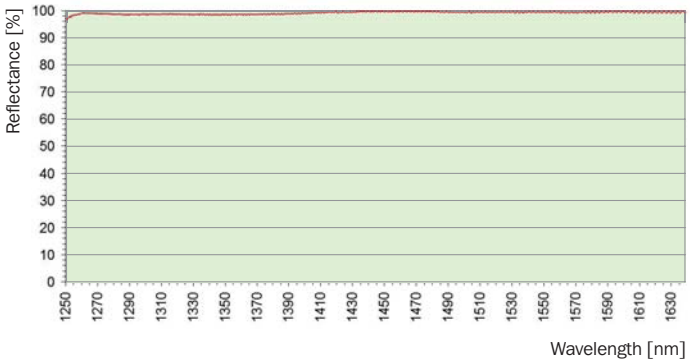


Fig. 1 Reflectance value of the *lilix* OTDR reflector

Using the *lilix* OTDR reflector at the end of a long-distance fibre link enables the bidirectional measurement of a link to be replaced by a unidirectional test[1]. This will considerably reduce the time and effort required for the measurement, without losing any information.

In the installation phase of a PON the *lilix* OTDR reflectors can be temporarily attached to a permanently installed wavelength-selective *lilix* FTTx reflector. This setup will allow you to perform – in addition to the measurement in the monitoring channel (1625/1650 nm) – an additional centralised OTDR measurement from the Central Office, e. g. as an acceptance test, also at 1310 nm or 1550 nm.

If the reflectance value is known, the link loss can be determined by analysing the reflex height the reflector generates at the end of a backscatter trace. Using the *lilix* OTDR reflector thus makes it possible to determine the respective link loss within the framework of a centralised OTDR measurement at 1310 nm or 1550 nm. Consequently optical level measurements at the operating wavelengths, as previously required, will no longer be needed.

Using the combination of permanently installed and temporarily attached reflectors described above it might be possible to completely perform the acceptance tests required for the provision of access networks completely from one central point in the future. This setup could increase the measurement efficiency, because the centralised arrangement of the measurement devices in the Central Office would enable an automation of the measurement procedure as well as the automatic analysis and archiving of the measurement data to be made. The installer is responsible for correctly installing/attaching the reflectors, remotely triggering the central OTDR measurement after installation and interpreting the result. (See also "Efficient acceptance and commissioning using OTDR reflectors" on the next page.)

Further areas of application for the *lilix* OTDR reflector are all conventional uses of gold-plated connectors, such as for calibrating measuring instruments or as a reference in optical setups for research and development.

For more information on our new product please write to info@foc-fo.de.

Martina Vitt, Product Manager lilix Product Line

1 See also: M. Vitt: "What information can be gathered from a single-ended backscatter measurement?", foc flash-light September 2010, p. 14-15.

Efficient acceptance and commissioning using OTDR reflectors

The acceptance and commissioning not only of FTTx links is a considerable cost factor in the overall calculation of a network operator. In addition to the pure installation effort, performing the baseline tests in the network and verifying the measurement results will involve much labour and costs. However this process can be simplified and even automated by the intelligent use of lilix OTDR reflectors during the commissioning phase. Please find below a description of the procedure.

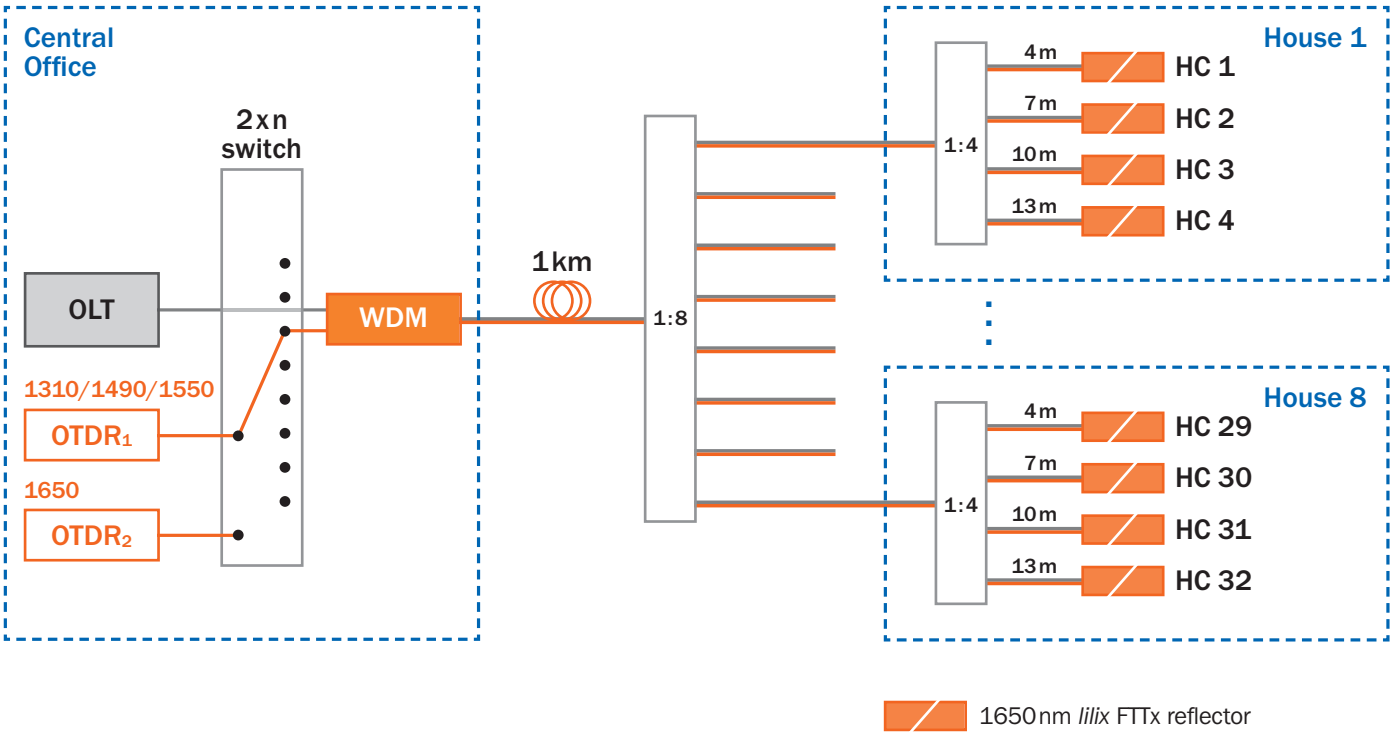


Fig. 1 1x32 PON network infrastructure

The 1x32 PON in Fig. 1 is the starting point. It supplies eight houses with four dwelling units each. In the basic configuration each link was terminated with an FTTx reflector, which reflects at 1650 nm and which is transparent to the traffic wavelengths. On each PON branch a *lilix* FTTx reflector was integrated in the last connector, which thus is immediately positioned at the interface to the end-customer.

The *lilix* FTTx reflectors have been integrated in the network in order to implement an FTTx monitoring system. This setup allows you to check the individual PON branches from the Central Office (CO) independently for their proper functioning during later network operation[1] (so-called FTTx link monitoring). If the end-customer reports a defect, you will thus be able to determine very fast and without much cost, whether the affected link really is faulty or whether the cause is to be found outside the network operator's responsibility. This information expertise allows you to reduce the number of truck rolls, since in real life the reported defects are rarely caused by problems on the fibre link[2].

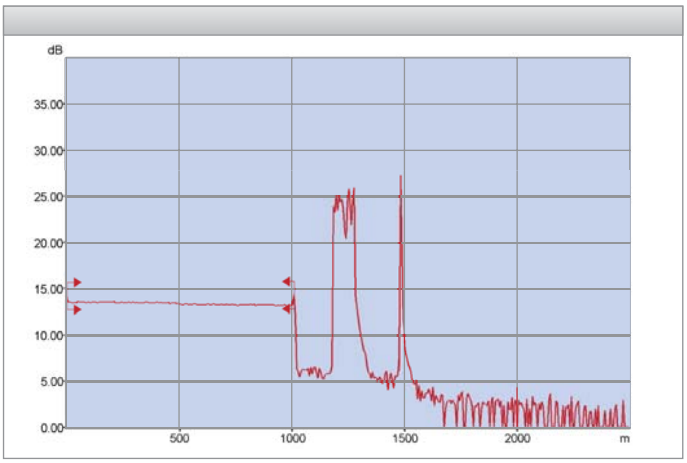


Fig. 2 Network infrastructure OTDR measurement from Fig. 1 at 1650 nm

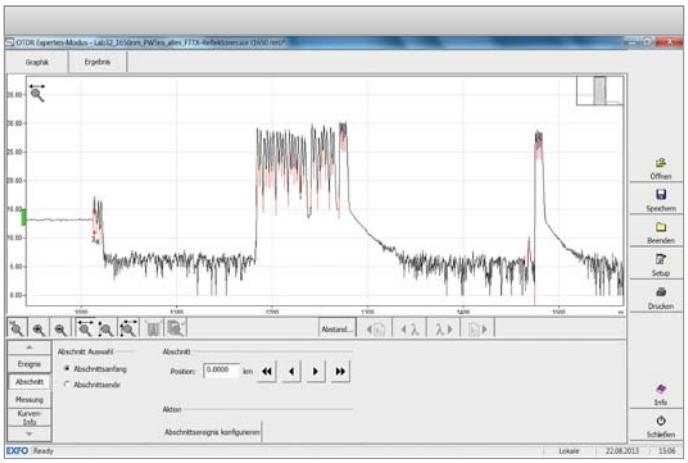


Fig. 2a Detailed view from Fig. 2

The backscatter trace shown in Fig. 2 was acquired at 1650 nm from the CO. The feeding line, the 1 x 8 splitter as well as the individual FTTx reflectors, which distinctly project from the noise level and mark the end of a subscriber line, can clearly be seen. The OTDR trace, containing the reflector peaks with their typical structure for this PON and their assignment to the individual house connections, forms the so-called PON reference. It will be used as a benchmark for later link monitoring.

In the following this network will be used as an example to illustrate how the acceptance and commissioning of links can be performed quite elegantly using a *lilix* OTDR reflector[3].

In this context we proceed from the assumption that the link loss is the parameter which is relevant for accepting the link. With a view to the link loss certain standards must be observed in order to ensure the framework conditions required for operating the active transmission equipment. The acceptable link loss must

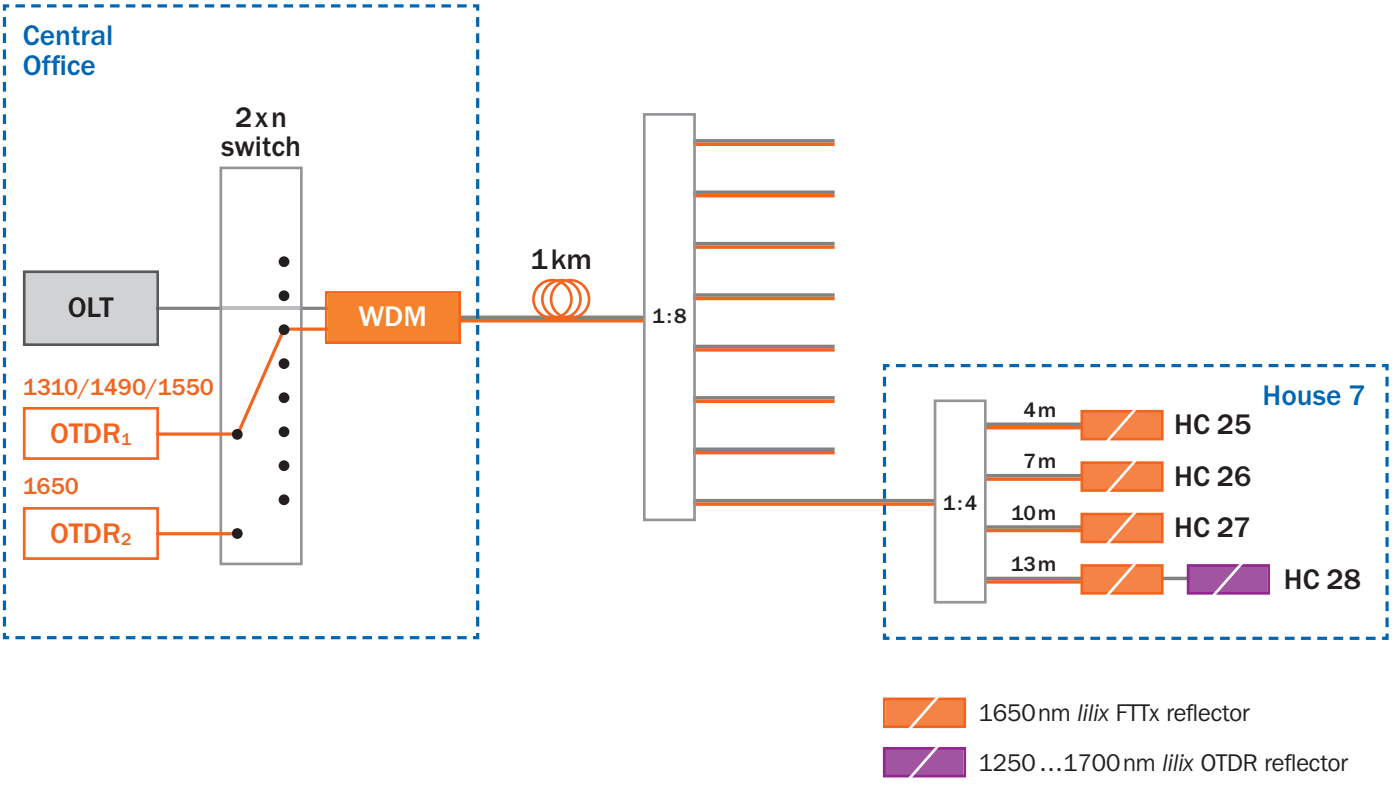


Fig. 3 Network configuration for measuring link loss

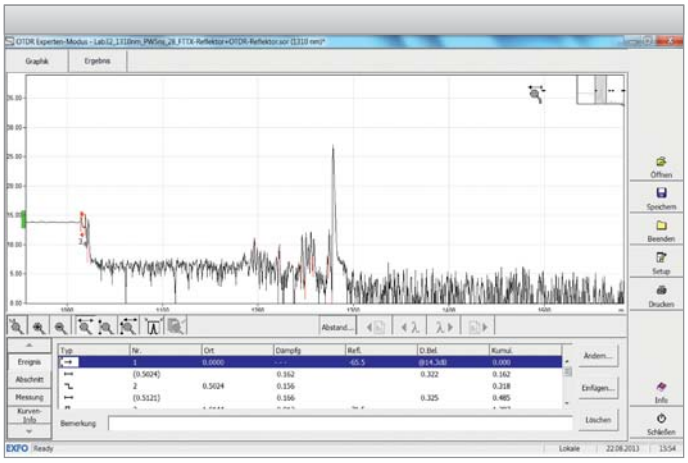


Fig. 4 OTDR measurement at 1310 nm using the setup shown in Fig. 3

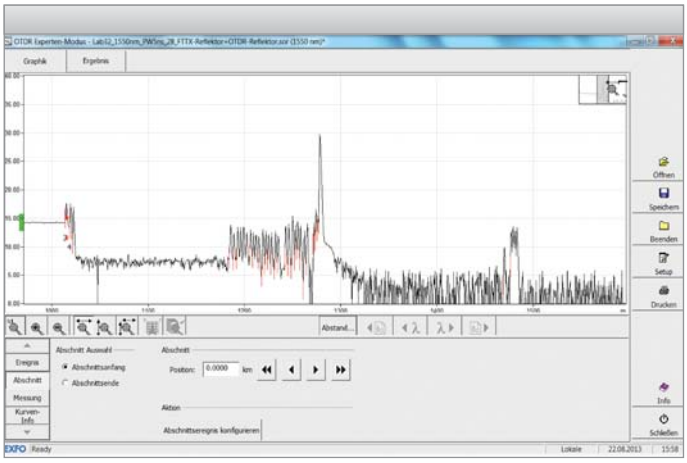


Fig. 5 OTDR measurement at 1550 nm using the setup shown in Fig. 3

be explicitly verified by measurements for each of the operating wavelengths of 1310 nm, 1490 nm and 1550 nm, since the different network elements (WDM, splitters, connectors, splices, etc.) may exhibit very different spectral attenuation behaviours.

In the suggested procedure for measuring the link loss the *lilix* OTDR reflector will be used as a measuring aid. After installing the link the engineer attaches the *lilix* OTDR reflector to the last connector already containing the integrated *lilix* FTTx reflector. The result is the setup shown in Fig. 3. The upstream *lilix* FTTx reflector does not interfere with the measurement, because it is transparent in the range of the traffic wavelengths. Thus it is of no importance for measuring the link loss, whether similar PON branches have already been installed and/or fitted with *lilix* FTTx reflectors or not.

The measurement procedure for testing the link loss is very simple. The installer pushes a button and remotely launches OTDR measurements from the CO at each of the wavelengths of 1310 nm, 1490 nm and 1550 nm. Subsequently, the link loss is calculated by numerical analysis on the basis of the reflex height of the OTDR reflector and compared with the acceptable attenuation. Then the installer receives a graphical evaluation allowing him to see at a glance whether the link loss per wavelength is in the "green". After confirmation by the installer the relevant data of the measurement process are automatically archived in the network operator's system. At last the installer removes the OTDR reflector and turns to the next house connection. The whole procedure won't even take 5 minutes.

Fig. 4 and Fig. 5 show by way of example the OTDR traces measured at 1310 nm and 1550 nm. After the splitter a single high reflex can be seen indicating the position of the additional *lilix* OTDR reflector. Due to a residual reflection of less than 0.1% in the range of the traffic wavelengths the lilix FTTx reflectors already installed in the network can partly be detected, too. However, because of the low magnitude of their reflexes they can be distinctly distinguished from the reflection caused by the *lilix* OTDR reflector.

Using the example of FTTx links the described procedure is meant to show the opportunities available to considerable simplify the installation and commissioning of FTTx links. But the method can also be used for the expansion of networks with a point-to-point topology.

In addition to cost savings a high degree of automation for data acquisition provides an advantage because fewer mistakes caused by wrong measurement, a faulty interpretation or confusion of the OTDR traces will occur. This is particular important for the expansion of fibre-optical networks in countries which are short of highly qualified labour. In those regions simple processes are needed for a comprehensive roll-out, ensuring a high quality of data acquisition also with poorly qualified manpower.

lilix® reflectors demonstrate new technologies' potential

Martina Vitt, Product Manager lilix Product Line

1 See also flash-light: "New methods for monitoring FTTx networks"; flash-light March 2011, p. 8-10.

2 Several network operators were unanimous in saying that in access networks the percentage of defects caused by a defective fibre link is only at about 10-15% of all reported faults.

3 "Commissioning and acceptance of FTTx links"; flash-light September 2012, p. 10-13.

For network quality

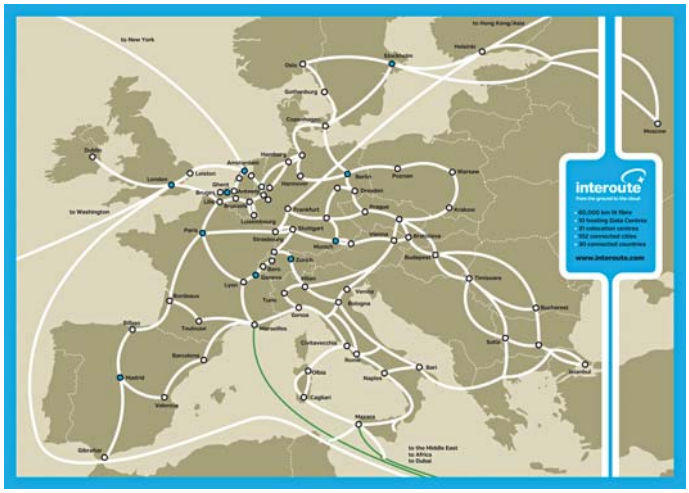


Fig. 1 Interoute in Europe

Interoute relies on FOC

Since its foundation in 2002 the telecommunication network operator has developed to become a leading provider of telecommunications services in Europe and beyond. The pan-European Interoute network largely consists of a company-owned fibre-optical network and the optical transport network set up on it. This structure allows the company to provide a multitude of services from today's worldwide telecommunications portfolio. Interoute's optical network covers more than 60,000 km and connects 102 cities in 30 countries. 2 network operation centres (NOC), 10 data centres, company-owned city networks in several European towns as well as 10 landing stations for submarine cables complete the network with access to globally active telecommunications companies between the continents.

A broad service portfolio

Interoute offers a comprehensive service portfolio via its physical fibre-optical network:

Unified transport (SDH, Ethernet, wavelength services), infrastructure (dark fibre, colocation), Internet transit, unified communication (video conferencing, Interoute one (voice), Hosted Lync, streaming), unified connectivity (IP-VPN, EVPN (VPLS), Internet access) via service gateways at the end-customer, unified computing (managed hosting, storage, cloud computing), outsource services (lit fibre, OPN (Optical Private Network), submarine backhaul services), security services (e. g. DDoS migration, filtering, next generation firewall)

Certified security and availability

Due to the high demand on infrastructure availability and security Interoute regularly applies for certification at the German Federal Office for Information Security (BSI) to be awarded the IT Basic Protection Certificate on the basis of the ISO 27001 standard. Nowadays the security of the network infrastructure is an extremely critical factor both for the network operator and for the customer. In addition to the above-mentioned certificate this security is internally guaranteed by a 7x24 service (7 days per week, 24 hours a day). This service also covers the 10 high-performance data centres operated by Interoute.

High network quality for biggest bandwidths for the customer

On the basis of the network infrastructure consisting of country-specific rings with multiple interconnections points Interoute offers its customers flexible design options such as ring, mesh and point-to-point connections. Since the Interoute network was commissioned in 2002 it exclusively consists of optical fibres whose properties meet the demands of state-of-the-art next-generation optical transmission systems. This enables Interoute to provide bandwidths of 40 Gbps and 100 Gbps for its customers.

Based on the optical infrastructure Interoute has set up different network layers. The service portfolio is based on the all-European Optical Transport Network (OTN) and the IP MPLS network.

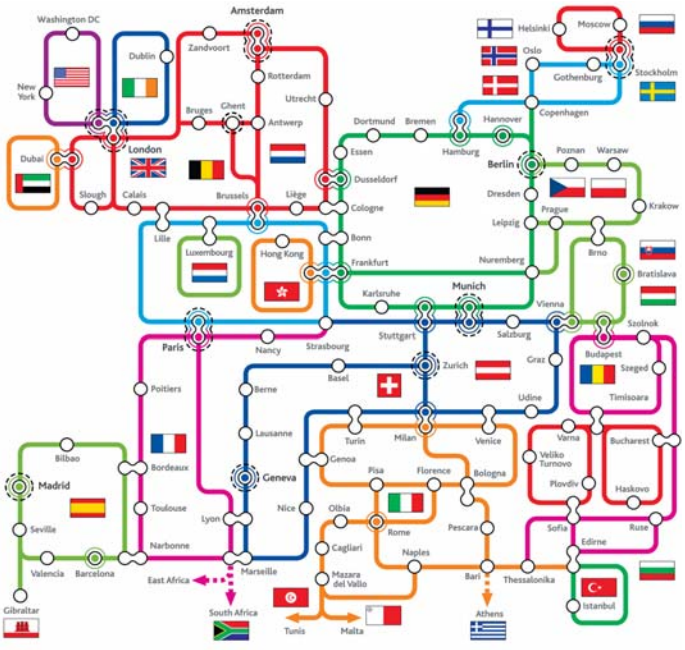


Fig. 2 The Interoute network

Fig. 3 FOC optical connection equipment – Class-A connector

Fig. 4 FOC equipment for optical fibre distribution – 19“ Lightbox

Interoute relies on FOC for optical connection equipment

It goes without saying that the high quality standards in terms of availability and network quality can only be met with high-quality network components. This is one of the reasons why Interoute relies on components made by FOC in the field of optical connecting and distributing equipment.

stable operation of these amplifiers. Even minor optical reflections, which do not negatively impact the usual transmission systems without amplifiers, can affect the secure operation of the amplifier. It is just in this application scenario that the fine properties of the FOC Class-A connector, such as the extremely low optical reflection loss of a maximum of 85 dB, is particularly advantageous.

Class A goes international!

Class-A connector made by FOC in the optical Interoute network

For optical connecting equipment Interoute relies on the Class-A connector made by FOC. In addition to its excellent optical properties such as the very low insertion loss of 0.1 dB (max.) and the high return loss of 85 dB (min.) the Class-A connector also offers very good mechanical properties.

These outstanding properties have positive impacts on the transmission of the extremely high bandwidths of 40 Gbps and 100 Gbps.

Using optical amplifiers in transport networks strictly requires the prevention of optical reflections in order to ensure the

FOC equipment also for optical fibre distribution

Everywhere in the network, where optical fibres need to be distributed, appropriate distribution systems are required. Also in this important network application the equipment made by FOC is used. Here mainly the tried and tested 19“ systems, which Interoute procures from FOC, are employed. The 19“ plug-in units are delivered by FOC complete with adapters, fibre pigtails and the appropriate splicing modules tailored to the customer's requests. Due to this quality, over the past years a mutually beneficial cooperation has developed between both companies.

Interoute Germany GmbH

FOC workshop talks 2013

Topics and dates

This year we will still offer you a Workshop Talk on the following topics:

1. Permanent monitoring of optical subscriber ports in the access network
2. New OTDR features simplify fibre-optical network qualification
3. *lilix* „All-Wave Reflector“ – a useful tool for OTDR measurements (guest contribution by Opternus GmbH)

We would be pleased to welcome you and/or your colleagues in our house. Please register via
fax (+49 30 565507-19) or e-mail (info@foc-fo.de).
Keyword: ”2013 Workshop Talks“
The workshop talk will be held from 11 hrs to 15 hrs on:

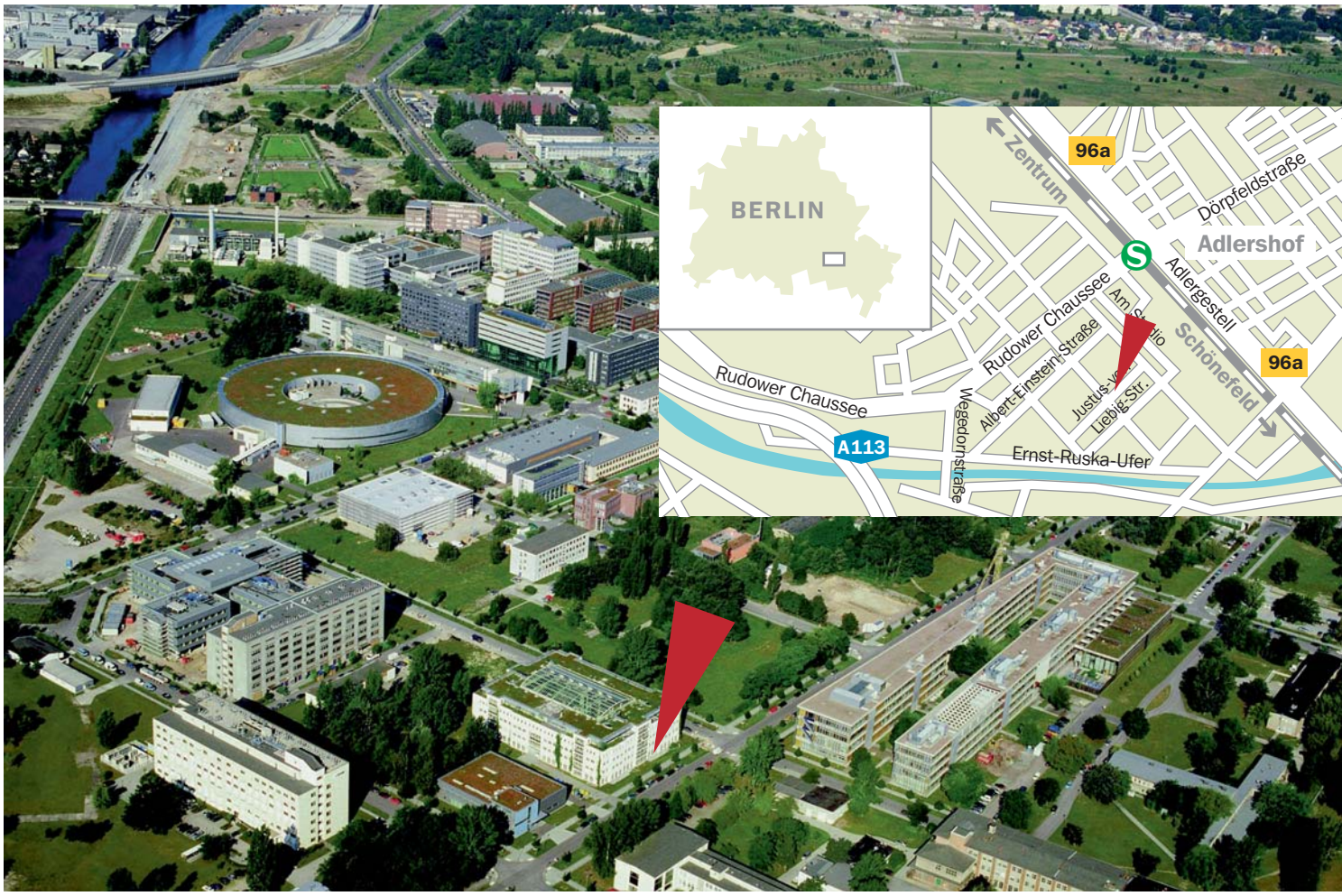
- Thursday, 7. November, in Duesseldorf

We look forward to interesting talks with you.

Yours sincerely,
Christian Kutza, Managing Director

fibre optical components GmbH

In the Berlin-Adlershof Technology Park.



www.foc-fo.com

Contacts

FOC – fibre optical components GmbH

Headquarters
Justus-von-Liebig-Strasse 7
12489 Berlin / Germany
phone: + 49 30 565507- 0
fax: + 49 30 565507-19
e-mail: info@foc-fo.de

Sales region south
Zettachring 10a
70567 Stuttgart / Germany
phone: + 49 711 745191-90
fax: + 49 711 745191-91
e-mail: sued@foc-fo.de

Sales region west
Ansbacher Strasse 19
40597 Düsseldorf / Germany
phone: +49 211 695176-09
fax: + 49 211 59841871
e-mail: west@foc-fo.de

Details on how to contact our staff can be found in the Internet at www.foc-fo.com, Contacts, Direct contacts.

Overall production: Eyck-Media ◆ Berlin, uta.eyck@gmail.com