# CONNECTIONS 46




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CELEBRATING 50 YEARS OF CABLING SOLUTIONS SINCE 1964

R&M
Convincing cabling solutions

050.5841

# Fifty Years of "convincing cabling solutions"




**Dear Business Partners**

2014 is a very special year for R&M! Fifty years ago, Hans Reichle and Renato De-Massari laid the foundation for our company with the development of a telephone socket that at the time was revolutionary. Today, around 750 employees work for R&M in more than 30 countries and, with true professionalism, are highly committed to maintaining and also extending our market position.

The ICT market is continuing to grow dynamically. New end devices are becoming ever more powerful and require the corresponding infrastructure. Top-quality cabling is still the basis for optimal performance in data transmission. At the same time, R&M is changing from what was once a component manufacturer to a supplier of system solutions in the areas Office Cabling, Public Networks and Data Center.

Networks for data centers are complex systems for individual requirements. From the design through product selection to commissioning, there are countless details that have to be taken into consideration and coordinated. In the Focus article of this latest issue of CONNECTIONS, we demonstrate how important a trusted advisor such as R&M is for successful projects in this area. A true partner advises customers with strategic plans, provides recommendations and tailors advice to suit the particular business case whenever it is a question of keeping the balance in terms of necessary investments, high competitive capacity and the appropriate profitability.

With successful projects in all kinds of sectors such as health care, education, industry, sport, tourism, energy, transport and telecommunications etc., we once again show R&M's great expertise when it comes to providing solutions. As a company keen on sports, we are especially proud to have provided cabling solutions for the Museu Benfica Cosme Damião in Portugal and the Zillertaler Arena. But other solutions, such as those for the global player Bühler as well as the state-of-the-art Danish university hospital in Aarhus – along with all our other valuable customer contracts – also fill us with pride and joy.

Recent surveys show that our well-grounded "Trends" articles are extremely popular. For this issue, we have prepared four background articles that in a concise and comprehensible fashion show how important the technical groundwork is for R&M and its business partners. This results in a range of new products which are developed to suit requirements thanks to an early involvement of our esteemed customers. An excellent example of this is the new Cat. $6_A$ Module (see article on page 15).

We are looking forward to a memorable anniversary year 2014 and would like to take this opportunity of thanking you for your long-standing loyalty that has made a fifty-year success story possible.

Yours



**Michel Riva** | CEO

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Cover picture:
R&M provides top-of-the-class solutions for high-performance network connectivity (HPNC). © Jürg Neff


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# Cabling is a Matter of Trust

You are hardly going to stop off at your local discounter to buy a network for your data center. From design through product selection to commissioning, there are so many details that have to be taken into consideration and then coordinated. After all, these are complex systems we are talking about. And what data centers need on their way to the perfect network are reliable and experienced advisors, known in the business as "trusted advisors".

So what exactly is a trusted advisor for a data center? What solutions and skills do trusted advisors have to have at their fingertips to be able to share responsibility for the network and its cabling? First of all, advisors have to have a background. Because only then can they claim to have experience.

R&M can draw on a very sound background. The company was born from an innovation. In 1964, Hans Reichle and Renato De-Massari, the founders of R&M, launched their first product: a five-pin loop-through telecommunications outlet. It featured a functional design and reduced the time of installation by 40 percent. A two-fold benefit as it were. Since then, R&M has launched thousands of products that help users to create the very best networks. The benefits grow with every innovation.

Furthermore, the telecommunications outlet was the starting point for a trusting collaboration with telecommunications companies that has now lasted for 50 years. With the same attitude to sustainability and the company's soft spot for value added, R&M has been pushing for progress, operating reliability and efficiency in data centers for years now.

**Long-term horizon**

What exactly is a trusted advisor? First of all, it is a reliable partner the customer has known for a long time, an expert that is aware of where its responsibilities lie. The advisor is committed to the customer, providing all-round, far-sighted support. The typical requirements of data center business require collaboration with manufacturers who are also committed to long-term, sustainable business and who do not merely focus on quick sales.

Today, investing in a network infrastructure is a long-term affair. The infrastructure of a data center usually has to fulfill its purpose for at least ten years and be able to cope with several changes of generation on the part of the active devices. The manufacturer must be able

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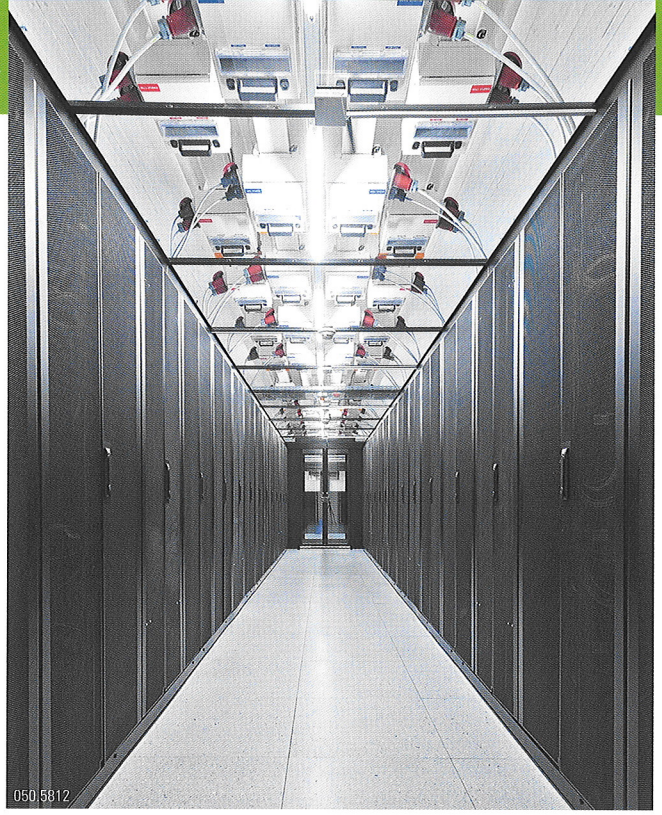






to offer a holistic solution, optimized for the long term, that comes with the relevant system warranty.

But the task involves much more than just the technical solution. It also has an organizational aspect. As a trusted advisor, the manufacturer determines the direction for years. It guides the customer in terms of strategic plans and recommendations. Trusted advisors will establish and then nurture long-term relationships to be able to deploy their expertise and their strategic concepts in the best possible way.

**Understanding customers and markets**

R&M believes that the trusted advisor should also be familiar with the business case. The advisor must be seen to be helping the customer reach defined operative and financial goals or alternatively must help improve business processes, productivity and value added.

Over and over again, a balance has to be found between necessary investments, competitive capacity and profitability. The fact that networks in data centers are constantly changing does not make the task any easier.

Keeping abreast of the overall picture and being able to see future developments at an early stage requires sound expert knowledge and extensive practical experience. R&M has spent decades gaining expertise of precisely this kind. The company's experience shows that IT strategies are more successful when network design anticipates future growth and when greater attention is paid to the demand for increasing bandwidth.

Furthermore you have to understand the challenges customers are facing on their relevant markets. A trusted advisor has to know and understand the environment the customer is working in to be able to conscientiously suggest the right solutions.

**The data center program**

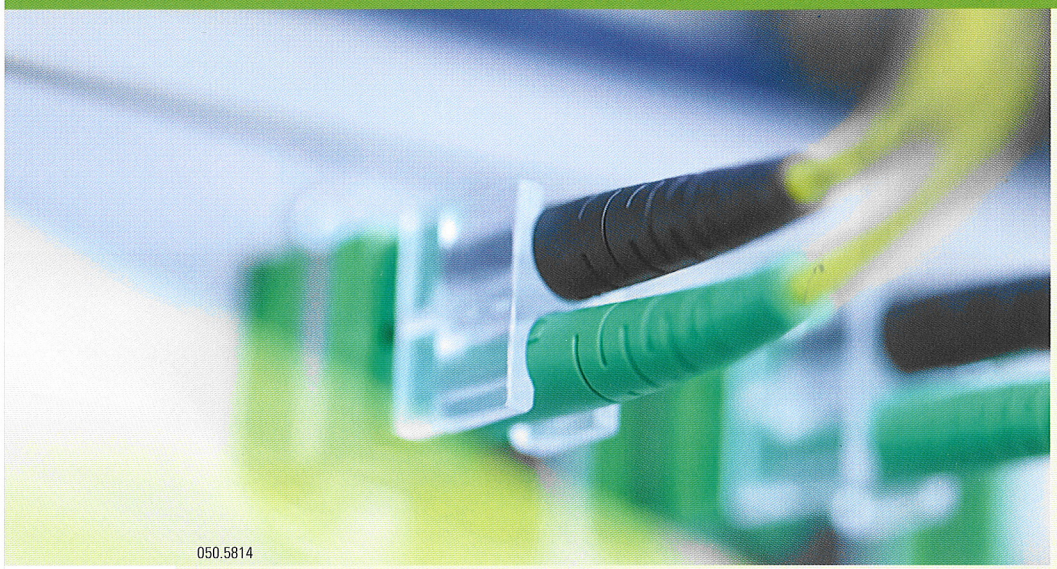
Taking all this into consideration, R&M developed top-of-the-class solutions for high-performance network connectivity (HPNC): pioneering, application-friendly, flexible and modular connection and distribution technology. The HPNC solutions from R&M consist of a technological package with both FO and copper cabling that is specially tailored to the bandwidth requirements of data center applications.

Moreover, the program takes a coherent, logical path through the changes in technology. The change of generation to 10 and later to 40/100 Gigabit Ethernet is surprisingly easy to plan and implement with R&M's connection technology. This underscores the pragmatic approach that requires an in-depth understanding of both everyday and strategic requirements of data centers.

Over and over again, a balance has to be found between necessary investments, competitive capacity and profitability.
The fact that networks in data centers are constantly changing does not make the task any easier.

Further key factors that make R&M outstanding in this respect:

- Swiss quality
- Technology leadership
- Far-sighted, comprehensive cabling solutions
- The performance and innovative strength of a big player coupled with the flexibility of a medium-sized company that can deliver customer-specific adaptations at any time



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**Data center operators receive support from R&M from the very first draft of their network through evaluation, installation and commissioning of the systems to migrations and long-term development plans – or in other words: over the entire lifetime.**

## New challenges

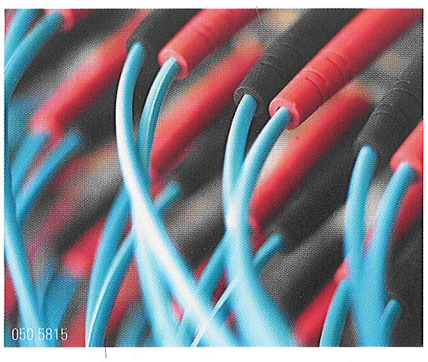
But first of all, we should take a closer look at the situation in data centers. Data centers have become the indispensable basis for communication and information processes. They are the nerve centers of the economy with their databases, storage systems and applications. The amount of digital data being produced worldwide is growing enormously. Global ERP systems, social networks, online storage, file sharing, software as a service etc. are already applications that are being used daily. Data center operators have to be able to react ever more quickly to such offers and adapt the performance of their infrastructure accordingly.

And that is not all. The digitization of the world is continuing. In the current phase, there is a strong and irreversible desire for virtualization (refer to the article on page 24). Ongoing virtualization can already be seen in the server and storage system sector. This trend also makes it necessary to further optimize the performance and the costs of infrastructures. Networks also have to become more flexible. The coming challenges are therefore likely to become even more complex.

The original goal of virtualization was to make more extensive use of existing server capacities. At the same time, it was hoped that a rein could be put on investment costs. The cost advantage seems obvious if a few physical servers can provide a greater number of virtual servers. However, it must be remembered that every virtual machine requires just as much bandwidth as the physical server before did. And that has serious consequences in terms of the passive infrastructure.

A further challenge is today's trend toward using clouds. Cloud computing promises users the constant use of services on demand as well as virtually unlimited scaling of resources. A large number of conventional data centers are being transformed into cloud data centers. Data Center Transformation (DCT) is the name of this new management task. These developments also have considerable consequences for the infrastructure.

The significance of cabling is naturally increasing constantly too. This is quite easy to demonstrate: If a link to a physical server does not deliver the required performance in terms of latency, packet loss and data throughput or if it actually fails, all the virtual machines and applications hosted on the server are affected. The risks are multiplying as we speak.



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The technical requirements of the next few years can really only be mastered with high-density, parallel optical connection technology. This involves coupling large numbers of fibers in a very restricted space with as little attenuation loss as possible to achieve the desired performance. This is a case of precision work in the nanometer range.

**Objective situation analysis**

A conclusion from the trends and challenges presented: Data centers should analyze their situation objectively and in a matter-of-fact way. R&M supports them with research, innovations and experience gathered in network technology. Data center operators receive support from R&M from the very first draft of their network through evaluation, installation and commissioning of the systems to migrations and long-term development plans – or in other words: over the entire lifetime.

Anyone who sees an opportunity in virtualization and clouds and who wants to tap the full potential of these markets has to examine the infrastructure requirements exactly. This includes cabling. In practice, it is a question of planning the use of Ethernet, fiber channel and convergent networks appropriately. Data centers that get in on physical networks now, will avoid obstacles later. They will be able to fully use the advantages of a cloud environment in their companies.

**The role of HPNC**

R&M took the appropriate steps at an early stage: High-performance network connectivity (HPNC) is the basic standard that R&M advocates as a trusted advisor for data centers. Passive connection and distribution technology may appear to be a trivial detail to some market participants. For R&M, high-end solutions on the basis of FO and copper cabling are the cornerstone for competitive data centers. Because high availability and performance start at layer 1, with passive infrastructure – with the tiniest details such as contacting in the connection modules and connectors. This is where you see whether a cabling system can provide the necessary signal quality and sufficient resources long term.

Taking the road to virtualization and clouds together with R&M means high-performance network connectivity that will fulfill the coming requirements and offer added value. It means superior quality that exceeds relevant standards. This quality is based on progressive manufacturing processes, the very best in terms of material and perfect results in product tests.

As has been proved, HPNC solutions from R&M significantly improve data throughput. They ensure low latency, the very best availability and minimal packet loss. R&M is committed to providing connectivity solutions that exceed industrial standards. With cabling systems from R&M, users can face market challenges, trends and future technologies without any worries. ■




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**With cabling systems from R&M, users can face market challenges, trends and future technologies without any worries.**



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**Dr. Thomas Wellinger**
Market Manager Data Center
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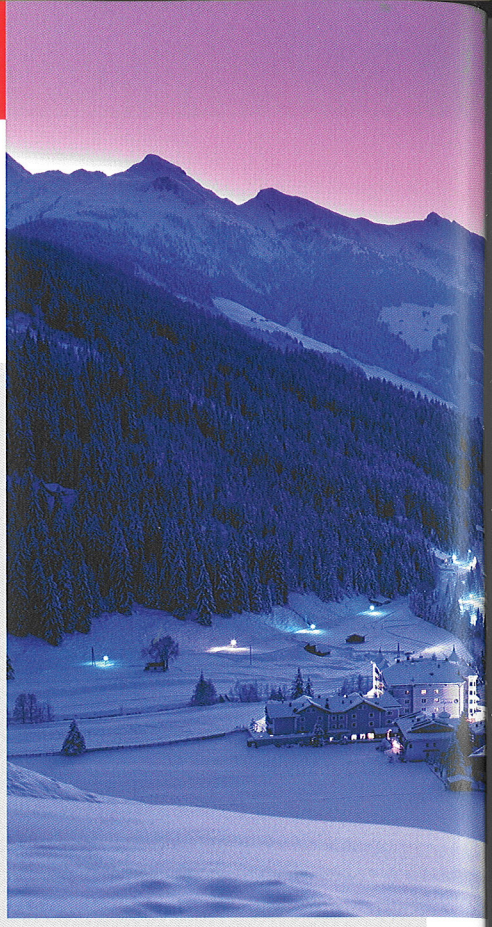


# High Speed in a Skiing Paradise

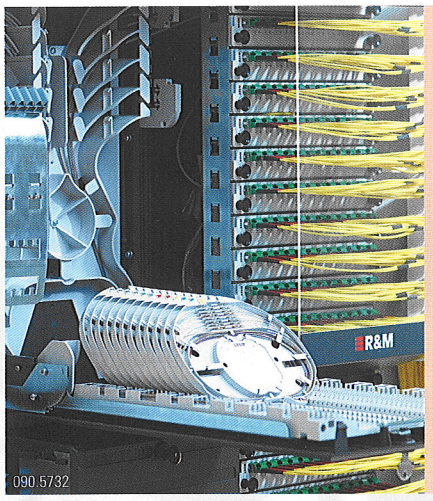
**In Gerlos, in Tyrol's Zillertal valley, R&M components are giving their all to ensure universally fast data communication – from the hotel to the pistes.**

Winter tourism has a long tradition in Gerlos. As far back as the beginning of the twentieth century, guests came from abroad, mainly from Great Britain, to experience the magic of the Tyrolean mountain scenery. The inhabitants of Gerlos thus already had considerable experience under their belts when they started to promote skiing as a commercial sport, shortly after World War II. It was the starting point of a continuing success story: Today, Gerlos is the center of one of Austria's largest skiing areas – the Zillertal Arena. Ongoing investments ensure the number of visitors is always on the increase. Currently the figures show around 1.5 million "skier days" per season (1 person/lift pass/day = 1 skier day). In addition to approximately 140 kilometers of pistes, the region offers the best conditions for the ever-more-popular ski tours with over 40 mountains on the ski tour trail.

Gerlos is the center of one of Austria's largest skiing areas – the Zillertal Arena. Ongoing investments ensure the number of visitors is always on the increase.

### WLAN on the pistes

In 1999 work started on an FO network to connect all mountain railway opera-

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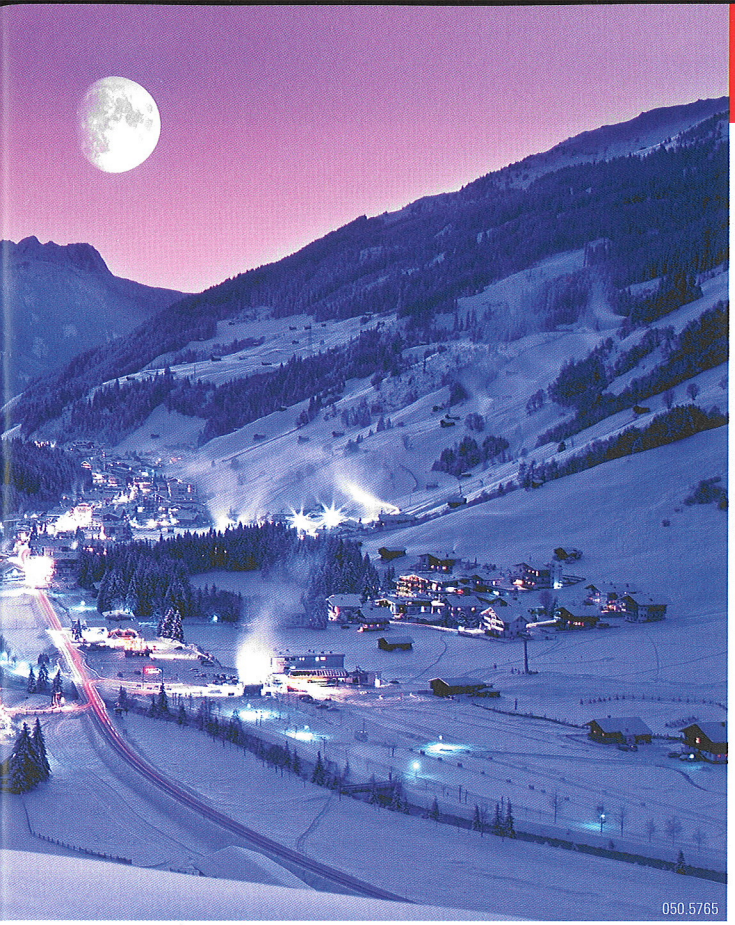
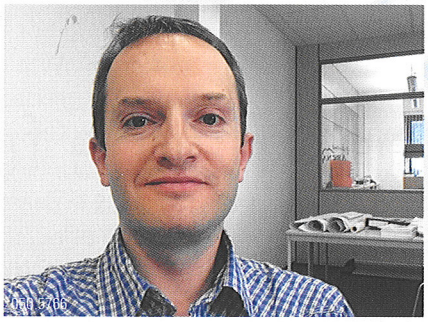
**THE R&M SOLUTION**

- **E-2000™* in Grade B1 quality in accordance with Austrian regulations concerning electrotechnology ÖVE/Ö standard EN 61753 and EN 61755**
- **SCM ODF (Single Circuit Management Optical Distribution Frame)**
- **Raceway routing system**
- **Venus box FML and FXXL**
- **Splice closure SCM**
- **UniRacks with E-2000™***
- **FO patch cables**



"We knew our decision was the right one back in the installation phase. The interaction of the individual components was perfect. That enabled simple and time-saving installation. The products are perfectly tailored to each other."

David Kammerlander, Managing Director of Schilift-Zentrum-Gerlos GmbH

tors, lifts and POS systems as well as for operating webcams. In addition, the Zillertal Arena has boasted a virtually universally available free WLAN with, currently, 160 access points since 2012. When it became necessary to purchase new connectors and other passive components able to withstand the particularly harsh conditions, R&M products were the obvious choice.

The Zillertal Arena has boasted a virtually universally available free WLAN with, currently, 160 access points since 2012.

**Fiber optics in town**

Once the skiing area had been so successfully equipped with an FO infrastructure, residents and entrepreneurs from the town area also wanted powerful data connections. The numerous hotels were keen to give their guests the best possible service and that also means fast Internet. An opportunity arose when new district heating pipes had to be laid. The opportunity was seized to install a complete system of empty tubes for a universal FO network. In this project, R&M is also supplying the entire range of passive connecting components. Particular attention is being paid to the quality of the passive FO infrastructure. Exclusive use is being made of E-2000™* components in Grade B1 quality in accordance with two Austrian regulations concerning electrotechnology ÖVE/Ö standard EN 61753 and ÖVE/Ö standard EN 61755. Over the next one to two years, every building in the community of Gerlos will have its own FO connection – and that means that, in the middle of the Alps, a high-tech standard will be realized which some ultra-modern megacities are still dreaming about. ■

** E-2000™ manufactured under license from Diamond SA, Losone.*




**Herbert Tisch** | R&M Austria
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# Venus: End-to-End Range for Public Networks

**They are all-rounders for the access network and are now a full-fledged family: the Venus boxes from R&M. Six basic housings and a whole range of variants of the compact distribution cabinet help network operators in the fast setup of FTTx projects.**

R&M recently completed the family of Venus boxes and presented it as an end-to-end range for public networks. The Venus boxes are part of the cabling range R&Mfoxs for fiber optic networks and are mostly used on telecommunication company customers' premises.

The most important function of the Venus boxes is the precision distribution of fibers in FITH and FTTH projects. They are also used for subscriber management and for scaling fiber bundles with the Single Circuit Management (SCM) system from R&M. Hybrid solutions for the transition from FO to copper infrastructures can also be installed in Venus boxes.

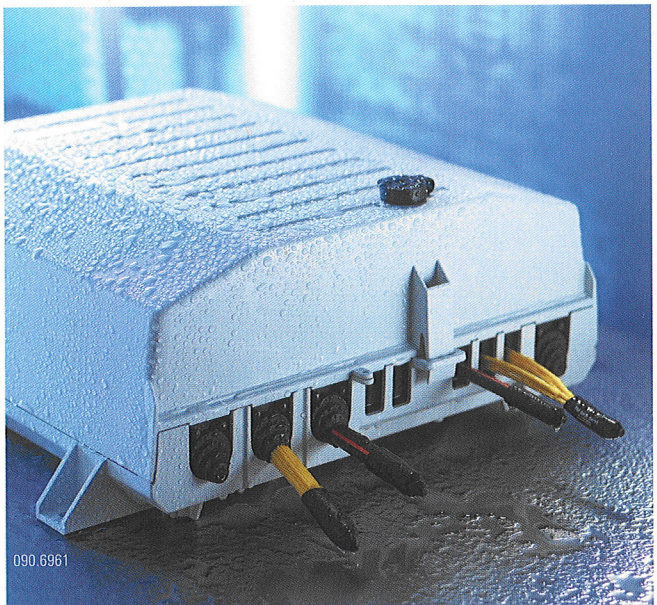
Due to the modular assembly possibilities, the Venus boxes are suitable for all typical FTTH scenarios and network topologies. The configuration possibilities support point to point, point to multipoint as well as future PON generations such as WDM-PON. The scalable configurations support splice, patch, splitter and WDM applications. This ensures network operators remain independent and flexible.

The packing volume ranges from 4 to 864 splice or 2 to 192 patch connections. This means extension plans can be implemented with an eye to cost containment according to requirements and also to the market situation. And there is considerable flexibility when it comes to assembly too. The sturdy and climate-stable Venus boxes can be positioned anywhere: on pylons or facades, in street cabinets, cellars, on staircases or on the individual floors of a building right into individual apartments. The clever fast assembly technology from R&M simplifies installation and maintenance even with the smallest housing.

With the Venus FML (overall dimensions 194.8 x 178 x 94.6 mm), ultra-compact distributors can be positioned close to the end customer discreetly. The FML can accommodate up to six fibers or four adapters. It has an integrated R40 splice tray and is designed for standard connectors from the R&M range. It is also suitable as an affordable termination for FTTB cabling and even for industrial applications.

The Venus FLA SCM with Single Circuit Management is the ideal solution for smaller residential units. Up to 12 subscribers can be separated using SC trays. The FLA SCM is characterized by an increased level of flexibility: The box can accommodate 144 FO connections, divided between six SE trays each of 24 splices. Or SE splitter trays, suitable for integrating splitters with a split ratio of up to 2:32.

The standard Venus FLA is equipped with conventional splice trays and can accommodate up to 96 splice connections and 24 connectors of the types E-2000™*, SC or LC-D. For the Venus FLA housing, R&M provides individually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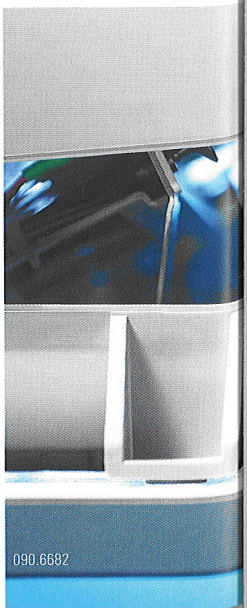
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modifiable holders – also for active components such as DSLAM, converters, switches and antennae. The Venus HLA is the hybrid variant for up to 12 fibers and 50 copper pairs on VS strips.

**Multifunctional platform**

The new Venus SCM family consists of three further distributor housings: Venus FLA2, FXL for medium-sized and FXXL for larger terminating units. These housings offer considerable space for splice and plug connections as well as passive network components.

The largest model is the Venus FXXL SCM (overall dimensions 600 x 500 x 150 mm). It provides network operators with a multifunctional distribution platform for delivery points both indoors and out. It offers space for 432 fibers – when users opt for the splice and patch solution. In a pure splice solution, there is space for 864 FO terminations. Depending on what is required, you equip the box with SE, SC and splitter trays from the SCM system family. This means, for example, that up to 72 fibers or subscribers can be separated using SC trays. Patch inserts, loop storage and other components can be retrofitted whenever required.

When combined with an SCM tray holder and up to four patch inserts, there is enough space for 24 to 96 LC, SC or E-2000™* connections. With high-density LC Duplex, the packing volume is even greater at 48 to 192 patch connections. Two pre-terminated splitter inserts up to a splitter ratio of 2:32 (LC) or CWDM inserts for up to 16 channels can also be accommodated in the FXXL. Network expansion is thus simply a matter of Plug & Play. ■

** E-2000™ manufactured under license from Diamond SA, Losone.*



*The Venus family, from top to bottom:*
*Venus-FML*
*Venus-FLA*
*Venus-FLA-SCM*
*Venus-FLA2-SCM*
*Venus-FXL-SCM*
*Venus-FXXL-SCM*

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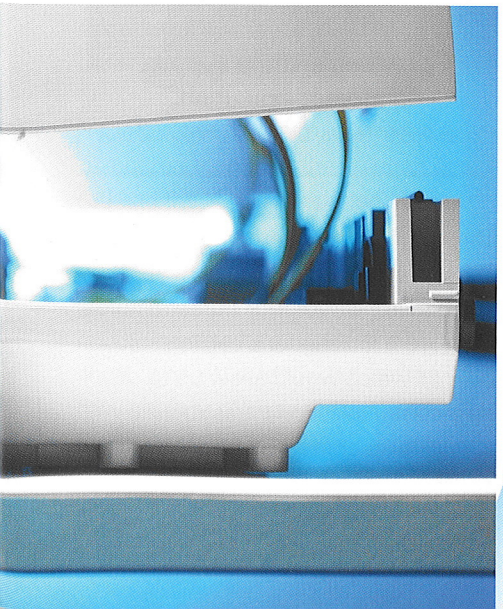

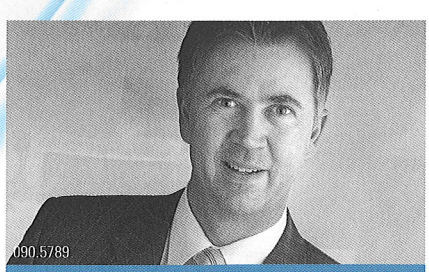

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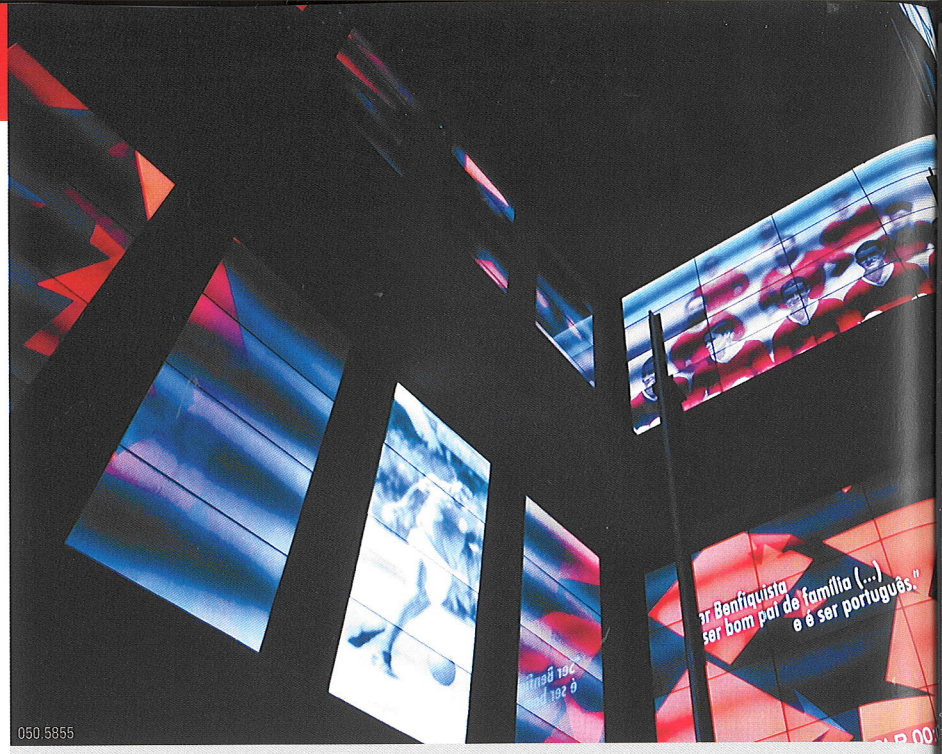






# R&M Solutions Support Benfica Museum to Revive Great Memories

**Sport Lisboa e Benfica Club is the most important sporting association in Portugal and one of the most famous clubs worldwide.**

In particular Benfica has won virtually every major trophy there is in international club soccer.

The commercial relationship between R&M and Sport Lisboa e Benfica began in 2011 with a golf event: "Golf Tournament Sport Lisboa e Benfica". Since then, the relationship has been intensified and R&M has supported the club, for example by introducing cabling products into the club's different enclosures.

For the modernization of the Museu Benfica Cosme Damião museum, R&M engaged one of its certified installers, Fieldeon, to take care of services such as infrastructure, IT, communication, security and energy. Fieldeon has worked together with R&M to provide the best results in every single project fulfilled with the club. The installer, which has been working with R&M since 2011 in Portugal, is a high-quality partner and has also been instrumental in achieving the best possible implementation.

The main goal of this project, as far as telecomunications was concerned, was the implementation of an infrastructure that could support LAN itself, CCTV and video.

When investment protection was declared one of the "must-haves", a product had to be chosen that would guarantee quality.

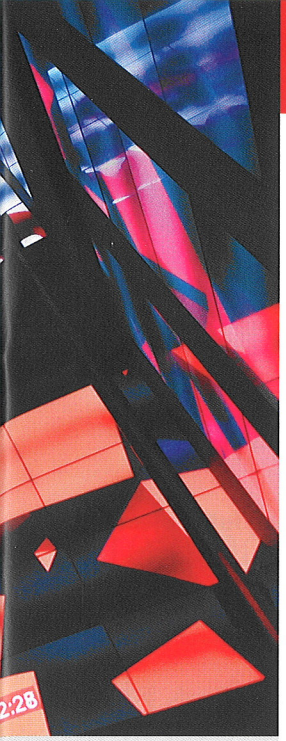
**Quality solution**

Cat. $6_A$ shielded soon became the obvious choice for horizontal distribution. The connection to the main technical pole was ensured with OS2 fiber optic cable.

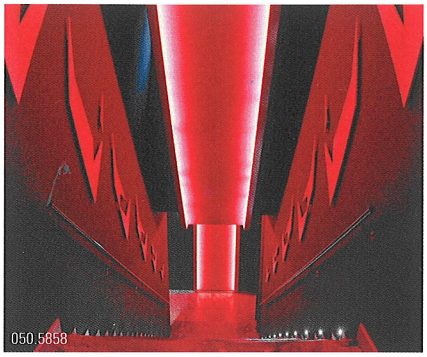
This type of solution has been extended to other parts of the sports complex, including CCTV solution, for fan control, as well as the facilities of Benfica TV.

> "After just a few months, the museum is working as we expected thanks to the solution provided and the support in project execution."
>
> José Pedro Ribeiro, Director of Infrastructures

The technical requirements of the project were defined by Benfica's José Pedro Ribeiro, Director of Infrastructures: "We were looking for a cabling solution partner which would allow us to develop a communication infrastructure with a quality guarantee. After just a few





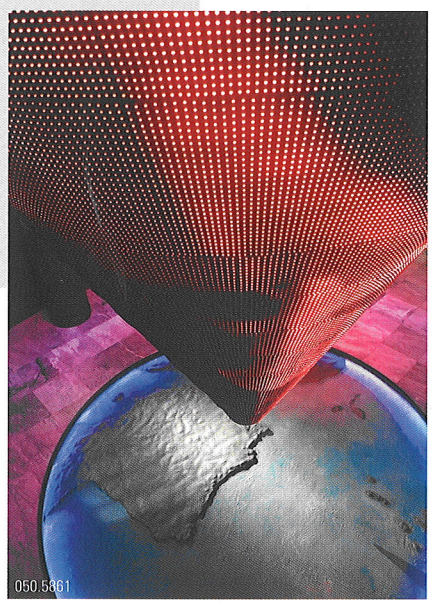







**WHY R&M?**

- **Investment guarantee**
- **Quality solutions**
- **Cat.$6_A$ shielded**
- **Good relations between Sport Lisboa e Benfica and installers**







months, the museum is working as we expected thanks to the solution provided and the support in project execution".

**Quality visitors**

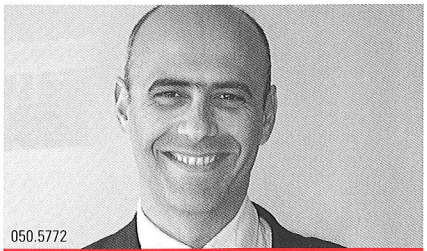
Since the opening, at the end of 2013, 20 000 people have visted the museum. And during the festivities for the tenth anniversary of the stadium, more than 1400 persons visited the museum.

The museum proudly reflects the long and rich history of Sport Lisboa e Benfica and will include a multipurpose room to house temporary exhibitions. The new Museum Benfica is a place of pure interactivity between the past and present history of the club and all "Benfiquistas".

There are 900 exhibits in the museum representing the club's achievements in soccer as well as in other sports.

Benfica Soccer Club is one of the most famous in the world and its stadium too plays a major international role. This year's final of the Champions League is to be held at the Estádio da Luz on May 24. The security, reliability and quality solutions will without doubt ensure one of the greatest soccer festivals of the year.

R&M is very proud to have provided the club with the very best technology solutions. ■

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# Full Fiber Ring around London City Airport

**Reichle & De-Massari successfully takes on full project, including design and costing.**

NATS Services Ltd provides air traffic control at airports in the UK and overseas, as well as a number of related engineering, technical and education services. Recently, R&M UK supported NATS in a unique airfield fiber rollout.

R&M worked closely with NATS to design and cost a new fiber ring around London City Airport, primarily to service vital radar equipment. There are numbers of drop-off points around the six-kilometer perimeter that required resilient connectivity. Due to the particular distances involved, singlemode cable and high-quality E-2000™ * connectivity were proposed. In this case, R&M did business directly with the client, instead of being approached by an installation company first.

It was clear that the project would be challenging due to its high profile nature, the hours of work involved and the level of risk. However, there was sufficient experience in design and project delivery within R&M and ample support from the Qualified Installation partner.

**THE R&M SOLUTION**

- **Singlemode (OS2) stranded loose tube FO cable**
- **High-performance E-2000™ * APC connectivity**
- **Robust 24-way E-2000™ * APC patch panels**
- **Building entry cross connect wall box**
- **Modular 12-way E-2000™ * APC splice module**

## Creative approach

For this project, all work had to be done outside airport hours. There were some health and safety issues, as the airport is on an island and the ducts run around its edges, very close to the water. Also, a creative approach to logistics was required, as there was no on-site storage to speak of.

R&M has been working with NATS for three years now, and had already performed smaller projects with them in Southampton and Belfast. This new project was a complete success and shows this business really works. For the customer, the benefits are clear: significant savings and direct communications. Also, a manufacturer offers the greatest possible expertise regarding its own materials, as well as longevity and stability.

## Competitive edge

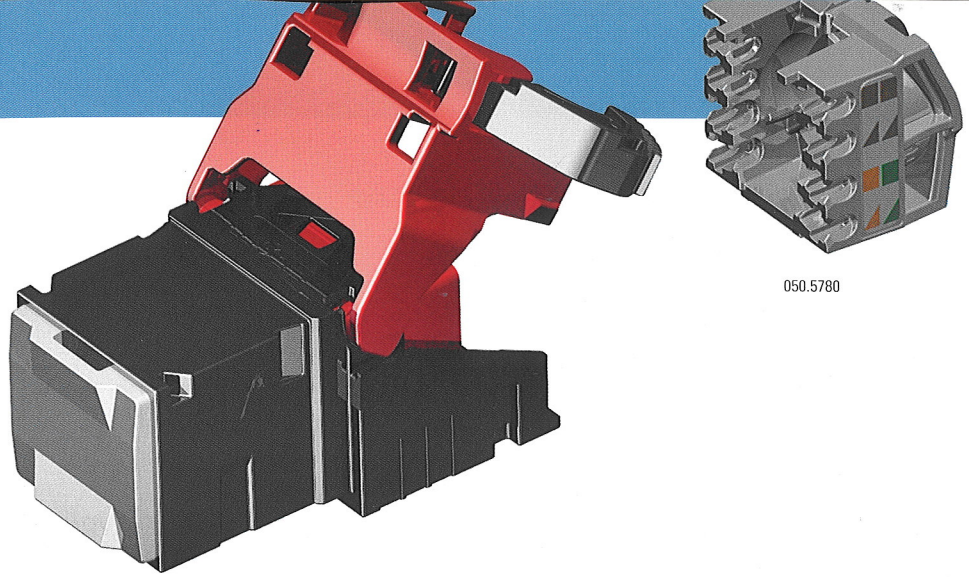
Understanding the client's needs has enabled all parties to engage in depth ensuring all aspects were met with a quality solutions deployment. The installer was enthusiastic and is keen to participate in future projects. For R&M, it is important not just to offer the right products and services, but to think along with the client and provide services that make a difference. Working directly on large projects with clients gives more scope for developing a relationship and sets us apart from the competition.

"NATS has many suppliers and manufacturers, helping us provide solutions for the aviation service provider industry," concludes Paul Hatia-Black, Senior Systems Engineer Nav/Met. "In our line of work, safety, service delivery and reputation are key factors. The products we supply must not only be fit for their intended purpose but also innovative, in order to drive safety and costs whilst planning and servicing the future needs of our customers and flying public. This is best served with close working relationships with innovative, forward-looking suppliers and manufacturers, such as R&M." ■

** E-2000™ manufactured under license from Diamond SA, Losone.*



**Geoff Dear** | R&M UK
geoff.dear@rdm.com



*The new Cat. $6_A$ module from R&M incorporates an ingenious fast installation technology.*

050.5780

Preannouncement

# The New Cat. $6_A$ Module: Optimized for the Installers

**Join just two installation parts on the end of the cable and your wired module is all set. You need neither special tools nor cable ties. That is the new Cat. $6_A$ module from R&M, built according to the strict ISO/IEC 11801 requirements for guaranteed Class $E_A$ permanent link performance.**

In the second half of 2014, R&M is launching a second generation of the Cat. $6_A$ module on the market. The first generation of the modules has the best performing copper connection technology of all times in RJ45 format plus ample reserves to accommodate future developments. The new module can be mounted even more easily and quickly and has a transmission technology that reliably enables 10GBase-T. Installers will appreciate the new module. After all, time is money and quality is the basis of lasting success. The new Cat. $6_A$ module with its compact body is particularly suitable for office cabling and structured cabling systems.

The module consists of three parts: wiring cover, wiring block and jack housing. Another new feature of the R&M modules is the integrated strain relief on the wiring cover, which works reliably without cable ties.

The wiring of the module requires neither special tools nor specially trained personnel. Thanks to simple termination and assembly steps, any experienced fitter can install these modules in next to no time.

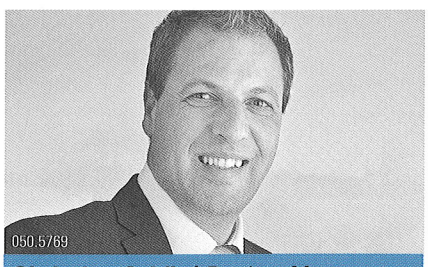
**Compatible with the future**

The housing of the shielded version is die-cast so it is especially robust. The unshielded version has the same design but is made out of plastic. The module will be compatible with most existing and future platforms, adapters, the new DCIM/AIM system R&M*inteliPhy* and the R&M Security System.

**No quality compromises**

The excellent value for money was not achieved at the cost of quality compromises. The new module is a genuine Swiss quality product from R&M, fully tested for return loss (RL) and near-end crosstalk (NEXT), high voltage and short circuit. Certification from independent labs is ensured as is participation in the extensive R&M warranty program.

Ultimately, what you get is this: a compact Cat. $6_A$ module with a small number of components and excellent installation features plus favorable acquisition and installation costs for reliable 10-GBit transmissions. ■



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**Christian Schär** | Product Manager
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# Outside Plant from One Source

**It does not matter whether it is greenfield or brownfield: Setting up modern networks outside brings with it a number of challenges whatever the terrain. But if the cabling components fit together seamlessly, things become much easier. With the Outside Plant (OSP) range from R&M, users have a consistent universal solution at their disposal.**

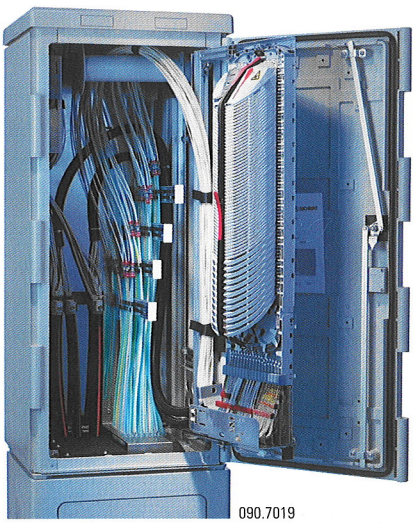
"One-stop shopping!" Now a possibility for OSP cabling between the central office or main distributor frame and the building entry point. That means extra efficiency for FTTH projects and for the construction of tunnel networks, traffic management systems and campus cabling. R&M has set up the OSP range for network operators of all sizes and description correspondingly systematically: Durable street cabinets, indestructible splice closures and multifunctional housings for precision distribution form a universal, modular and unique full package.

■ **Street cabinets:** the base stations in the outside plant area. Different types of compact splitter support Single Circuit Management (SCM) or 19-inch systems as well as classic copper and hybrid cabling. The SCM solution comes in three housing and distributor sizes to accommodate 144 to 1440 splice connections. With such resources at their disposal, carriers are well equipped for decades to come.

■ **Splice closures:** the all-rounders for distribution points in cable ducts, channels, trenches, tunnels and on pylons. The four housing types (SCM, RM, FL and FTTx) for 48 to 1152 splice connections consist of sturdy HD-PE plastic, are climate-resistant, pressure- and water-proof. Tool-free fast assembly technology shortens the time installation teams need to complete their work. Cabling and closure assembly will be even more efficient with the innovative mechanical seal that R&M will be launching in 2014.

■ **Venus Boxes:** small distributors that can be used flexibly for assembly on pylons and facades. They connect the fibers in the access area with the buildings. The R&M range offers different types for 4 to 864 splice connections and/or 96 plug connections. Hybrid solutions are also feasible (FME, FML, FLA, HLA, FLA-SCM, FLA2-SCM, FXL-SCM and FXXL-SCM). ■




*All OSP components are universally tailored to each other: a basic requirement to ensure the smooth setup of modern networks.*




**Axel Homburger** | Product Manager
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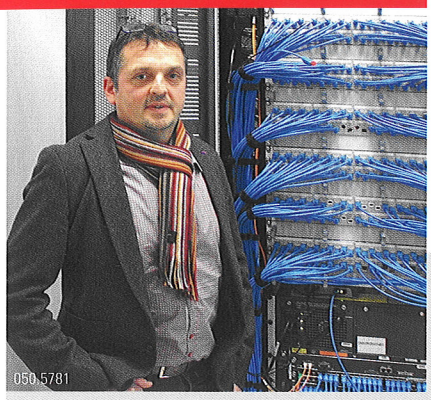
# Eneco Belgium Implements Cat. $6_A$ Network




**Eneco is a utility company based in the Netherlands and Belgium which has implemented an R&M Cat. $6_A$ network in its new office in Mechelen, Belgium. Because this network is used in both ICT and security applications, Eneco decided to opt for a top-quality solution, installed by DNCS.**

### Green energy

With headquarters in Rotterdam, Eneco produces and delivers energy in Belgium, France, Germany, the Netherlands and the United Kingdom. The group as a whole employs some 7000 employees and achieves an annual revenue of over five billion euros. Eneco has a strong focus on producing green energy using solar, wind and biomass power. As the company needed a new network infrastructure for its Mechelen office in Belgium, Didier Dereere, Head of HSSE Eneco Belgium, approached DNCS for the most suitable solution. Apart from the usual data and voice applications, Eneco also wanted to use the network for security systems. Gust Dierckx, owner of DNCS, suggested a high-quality R&M Cat. $6_A$ solution.

### Warranty certification

"Because of the integrated use in data, voice and security applications, we were looking for a future-proof solution with a systems warranty certification", says Didier Dereere. "Although we had no previous experience with R&M, DNCS managed to convince us of R&M's track record in delivering top-quality solutions. An additional advantage lies in the modularity of the portfolio, as we expect to grow substantially in the years to come. After reviewing the available Cat. $6_A$ cabling systems, we concluded that although R&M may not be the cheapest solution, it would offer us the best return on investment thanks to its proven quality and modularity".

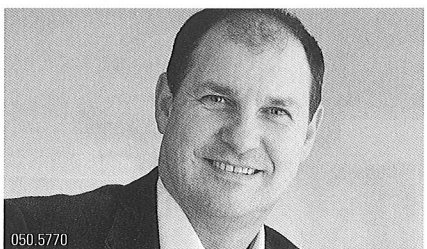
### Implementation facts

Within three months, R&M's certified installer DNCS installed over 560 network connections at Eneco's new Mechelen office. The company also delivered and installed security cameras, as well as an access control solution which uses the same cabling. The servers and storage for ICT applications are centralized in Eneco's Dutch data center. "We're very satisfied with the R&M network as it operates faultlessly. Our trust in DNCS's experience and advice has been rewarded with professionally installed connections that fully pass the required certification test. After fine-tuning the initial installation and implemented systems, we are now discussing additional applications for 2014." ■

"Although we had no previous experience with R&M, DNCS managed to convince us of R&M's track record in delivering top-quality solutions. An additional advantage lies in the modularity of the portfolio, as we expect to grow substantially in the years to come."

Didier Dereere, Head of HSSE Eneco Belgium

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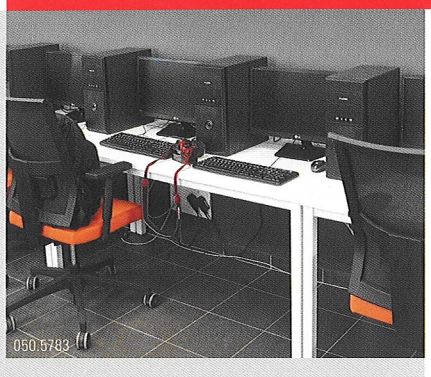
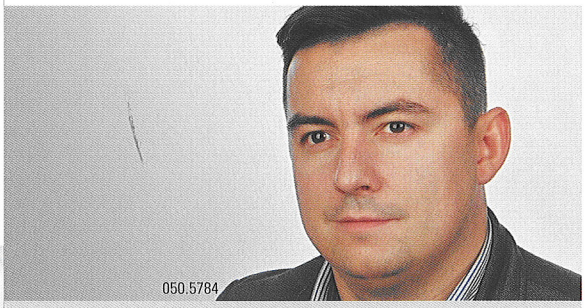



# Premium Solution at Polish Center of Excellence

**The Silesian University of Technology not only has a good reputation for training engineers both in their subject and in management, but is also an institution with great scientific research potential with its state-of-the-art laboratories and highly qualified teaching staff.**

The institution offers excellent conditions for commercializing research. The school meets the expectations of the business sector as it offers a wide range of research, expertise and services using the equipment and specialist knowledge of university personnel. Some Silesian University of Technology scientific research projects can actually be implemented directly in industry.




"R&M was able to offer us everything we required in all respects."

Jaroslaw Homa, Administrative Director, Silesian University of Technology




The Silesian University of Technology is an important academic institution which takes an active part in building a knowledge-based society and economy, thus contributing to an increase in the competitiveness of both the region and the country. This is in fact why it became necessary to modernize the IT network to ensure that it will be able to handle all the tasks mentioned above. IT specialists at the university paid particular attention to the performance and reliability of solutions offered for the project. As passive infrastructure is often to blame for the loss of data, this part of the project was declared to be of top priority. The requirements were simple: A reliable, flexible and future-oriented system was what was needed.

"The Silesian University of Technology is one of the largest educational centers in the region. The most important features of the cabling system for us are the density, the flexibility of the solution, and a possible future implementation of Automatic Intelligent Management (AIM) without patch cords and patch panels having to be changed. R&M was able to offer us everything we required in all respects," says Jaroslaw Homa, Administrative Director, Silesian University of Technology.

R&M came up with an excellent offer: best-performance cabling able to handle the most demanding applications, an unshielded solution to solve the previous bonding problems of the network and optimal use of existing space thanks to high density panels. The customer greatly appreciated the flexibility of the system enabling potential future Moves, Adds & Changes (MACs) in every direction, both copper and FO. A very important issue for the university was the possibility for easy and cost-effective deployment of AIM in the future.

R&M achieved its most important goal, i.e. satisfying its end users. Once again Swiss quality, supported by the knowledge and expertise provided by R&M, has proved to be the best strategy for the future. ■

**THE R&M SOLUTION**

- **Class system $E_A$ U/UTP**
- **Copper cable: 100 km Cat. $6_A$ U/UTP**
- **2014 copper ports Cat. $6_A$ U/UTP**
- **42 x HD 48p 1U patch panels**




**Bogdan Bogdal** | R&M Poland
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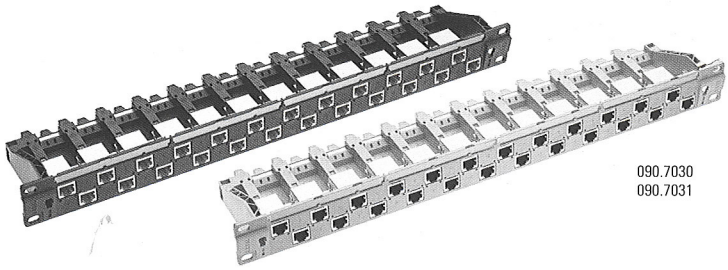
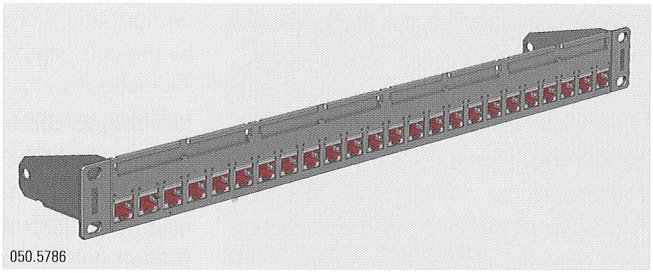



# Faster, Lighter, Smaller

**Change of generation in the rack. R&M has developed a new patch panel family for the 1U/24-port segment. Your value added: compact and lightweight construction, snap-in technology for fast installation, greater functionality. The modules are accommodated horizontally in a single row.**

What is striking about the new generation?
The modules are now arranged in a single row instead of being on two levels.
The contact sets are now horizontal and are positioned at the top.
The result: more contact security.




The basic R&M patch panels for copper connection technology have been given a uniform, modern design. The new 1U/24-port family is the first result of the range update to be launched. The platform is suitable for Cat. 5, Cat. 6 and Cat. $6_A$. What is striking about the new generation? The modules are now arranged in a single row instead of being on two levels. The contact sets are now horizontal (instead of vertical as was the case to date) and are positioned at the top. The load is thus spread evenly over the contact socket and dust cannot collect. The result: more contact security.

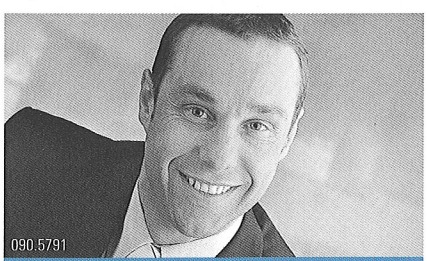
**Simple snap-in technology**

The connection modules can simply be snapped directly into the frame. You no longer need an adapter plate. The pre-terminated installation cables can be snapped in directly just as easily on the back. An integral cable manager is responsible for strain relief of the modules.

Installation depth is between 80 and 100 mm. This represents a space saving of up to 50 % in comparison to earlier constructions. The weight of an unequipped panel is thus around 60 % less. Nevertheless, the high-tech plastic used by R&M still ensures extreme stability. In the variant for Cat. $6_A$, the plastic front panel is combined with a steel body.

Visual coding is possible thanks to integrated numbers and labels. Color clips from the R&M security system can also be accommodated. The variant for Cat. $6_A$ can be retrofitted with the infrastructure management system R&M-*inteliPhy*.

This progress has had a positive effect on the investment costs. The connection capacity in the rack has increased by 20 % – taking three height units (U) into consideration. The costs per port are reduced by 16 to 35 % – depending on the configuration. ■




**Rolf Zollinger** | Product Manager
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# Secure Cabling for Perfect Pasta Machines

**Pasta, rice, flour, chocolate and muesli... wherever foodstuffs are produced, you will find machines and systems from the Bühler Group. Fiber optic solutions from R&M help the company supply its sites, employees and customers around the world with interruption-free IT services.**

The new Bühler data center in Uzwil near St. Gallen has immense strategic importance for the Swiss family company. This is where information from more than 70 sites worldwide comes together. Around 500 servers guarantee secure operations.

### IT services for more than 10 000 employees

The data center provides the more than 10 000 employees of the Bühler Group with comprehensive IT services – including a large SAP landscape, a proprietary mobile cloud, desktop virtualization and 380 terabytes of storage volume. Customers and machines are increasingly being incorporated into the Bühler cloud and expect reliable connections. Innovations, lab values, research and development results constantly have to be reflected and communicated in the data network.

These are just some of the key data and general conditions that had to be taken into consideration when the data center was being planned at the start of 2013. It was to replace an older center that simply could not cater to the current requirements after 45 successful years in operation. And it was to be designed to operate for 15 to 20 years. That was the minimum length of time that it should work without interruption and without any faults – a stipulation made by the company's risk prevention policy.

### Looking to the future

"It is quite difficult to estimate what requirements data centers are going to have to fulfill in ten years," says Bruno Bedin, Project Manager for IT Infrastructures. It was therefore essential to choose as far-sighted a solution as possible that would still be able to be used in more than ten years. "We want to be and remain future-proof at all costs," says the project manager. He listened to the arguments and came to the conclusion that FO cabling was the only option for the passive infrastructure. "It is future-proof, even beyond the age of 10 Gigabit Ethernet – in other words going toward 40 and even 100 Gigabit Ethernet. Fiber optics offer large capacity reserves as well as top transmission speeds and do not need much space."




"Fiber optics offer large capacity reserves as well as top transmission speeds and do not need much space."

Bruno Bedin, Project Manager for IT Infrastructures

A further challenge was the dynamic scheduling. The teams in IT organization and facility management at Bühler wanted to set up and commission the

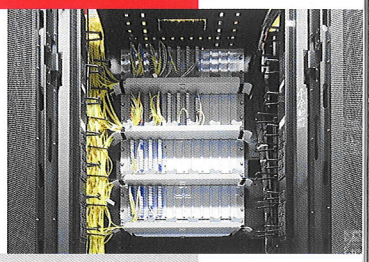


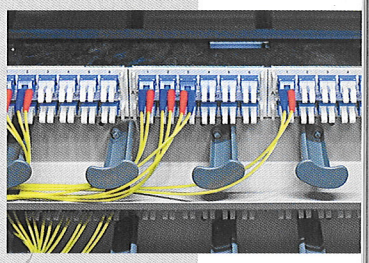

## Bühler Group

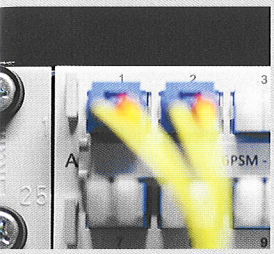
Bühler is a specialist and technology partner for machines, systems and services for processing staple foods as well as producing top-quality materials. Worldwide, the company has a leading market position for production systems used in the making of flour, the processing of animal feed, but also in the making of pasta and chocolate as well as in aluminum die casting. The company's core technologies are mechanical and thermal process engineering. With its expertise and its 150-year experience, Bühler develops unique and innovative machines that focus on the solution behind the solution. The Bühler Group is active in more than 140 countries, has a workforce worldwide of more than 10 000 employees and recorded sales of CHF 2322 million in the fiscal year 2013.

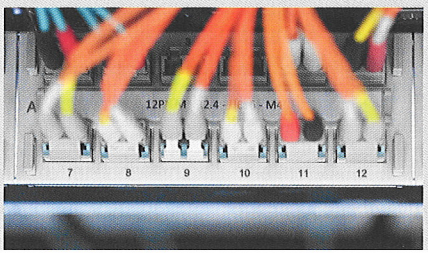
*Bühler HQ in Uzwil, Photo: Bühler Group*











*Photos: R&M*
050.5789 to 050.5794

data center in just four months – a timeframe that included moving the active devices from their earlier location. They had cleared and converted a cellar in Uzwil for exactly that purpose. It offered space for around 30 server cabinets over 145 square meters. "The project had to be mastered with limited resources alongside the normal daily business," stresses the project manager. That made precise planning, coordinated schedules and efficient, fast and simple installation all the more important.

### Convincing MPO solution

The sophisticated and user-friendly FO connection technology from R&M was a decisive factor in awarding the contract. The precision and quality of the MPO connectors and modules, the packing density of the HD platforms and the fast assembly technology in particular were compelling. "The MPO solution from R&M corresponds to our goals one-hundred-percent: It can be used flexibly, is easy to handle and can be extended any time without any great effort. I had never really come across anything like that before," sums up Bruno Bedin. Bühler has been impressed by the quality of R&M products for quite some time, however. For years now, R&M has been equipping Bühler sites all over the world with cabling systems.

Within three months, it was possible to coordinate and prepare the installation down to the very last detail. The data center specialists from planners ADC-TEC successfully directed operations. R&M supported planning by providing, for example, cabling overviews and a concept for positioning the distribution and server cabinets. The cabling components were perfectly installed by R&M QPP partner Etavis Grossenbacher, under the watchful eye of Max Morach.

And the project demonstrated once again that complex installations can only yield the optimal result with the perfect cooperation of end customer, planner, installer, and system supplier.

Thanks to excellent preparation, the data center was able to be completed exactly as required and "just in time". ■

### THE R&M SOLUTION

- **40 MPO modules with multimode OM4 cables, each with 12 LC Duplex**
- **30 MPO modules with singlemode OS2 cables, each with 12 LC Duplex**
- **35 MPO interconnecting cables multimode OM4**
- **25 MPO interconnecting cables singlemode OS2**
- **Platforms: HD Panel and 3U Global Panel**

### WHY R&M?

- **Future-capable, user-friendly connection technology**
- **Compact, modular, easily scalable platforms**
- **Short installation times, simple handling**
- **Acknowledged and tried and tested product quality**
- **Sophisticated consulting services, customer-oriented planning**
- **Fast production, short delivery times**
- **Reliable service, trusting collaboration**



050.5771

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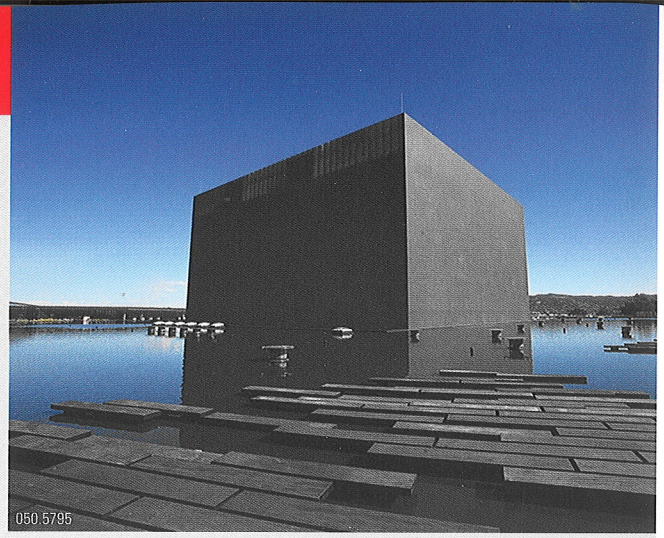
*Located in the city of Covilhã, approximately 280 kilometers from Lisbon, the building is a massive black cube located on 75500 m² of land.*




# Efficiency and Design – Big Infrastructures Need B(igg)est Solutions

**Portugal Telecom Data Center, a brand new infrastructure with the latest technology for impressive technical and safety requirements**




Portugal Telecom (PT) is the main telco operator in the country. PT also has a strong presence in Latin America and Africa. Based on customer orientation, innovation and execution, the company manages its business by focusing on customer segments thus ensuring the customer benefits from optimal service.

## Environmental design

The whole project reflects a clear concept: It is a symbiosis of architecture, environment and technology. That is demonstrated by the sustainable design presented on the outskirts of the complex, featuring a photovoltaic plant which provides 30 % of the energy for the support building, housing the offices of Portugal Telecom, as well as an area of native trees which reinforce the "green" concept.

Portugal Telecom is one of the leading telecom operators in terms of technology and was the first to invest in full deployment of fiber networks for standard individual usage. It now has the most highly developed data center. R&M is proud to have been one of Portugal Telecom suppliers for several years now and is currently enjoying the challenges of this specific project.

This new infrastructure is located in the city of Covilhã and occupies a total area of 75500 square meters. It is a modular infrastructure with four data center blocks and has a capacity of up to 12000 meters of white space. The first block, recently inaugurated, has six IT rooms totaling 520 square meters and a Power Usage Effectiveness (PUE) of 1.25. The operator has also been awarded Platinum LEED Certification for support services buildings and Gold Certification for the data center block.

## Robust infrastructure

The use of high security technology and infrastructures is designed to ensure availability of 99.98 %, complying with Tier III Certification by the Uptime Institute – the Global Data Center Authority. The support building ensures best-in-class backbone performance and availability thanks to the combined OM4/OS2 fiber cable and LC and SC/APC connectivity in a highly modular environment composed of 3U global fiber racks and 7HP fiber modules.

The horizontal infrastructure for the LAN network is composed of the best cost/performance ratio solution, Cat. 6 unshielded, and the CCTV network has been designed with a better EMC protection Real10 shielded system to ensure it protects the building adequately.

R&M participation has been significant from the outset. Given PT requirements, R&M was able to design a solution that actually exceeded expectations in all requirements: technical quality, reliability and safety.

From the technical point of view, the solution has been given a warm welcome as it delivers absolute guarantees that are much longer than expected. ■

**THE R&M SOLUTION**

- **Support services network: Cat. 6 UTP**
- **CCTV network: Cat. 6 blinded (Real10)**
- **Fiber optic backbones OS2 and OM4**
- **Total redundancy of communications**

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# Vectoring and G.fast: R&M Solves the Power Question

**With Vectoring and G.fast, network operators want to bring fast Internet closer to customers. But both technologies only work with active devices that are outside in the field or in remote units on subscribers' premises. How are these devices supplied with electricity?**

The new broadband technologies Vectoring and G.fast (see CONNECTIONS 44 and 45) are based on extended FO cabling. They can shorten the "last mile" of the old copper cabling to just a few hundred meters and thus deliver speeds of 100 to 500 Mbit/s into homes.

This quantum leap in broadband provision brings with it a challenge: Active devices are required at the interfaces in the access network where FO cabling and the remaining copper cabling have to be connected. Vectoring converters are operated at up to 40 W. Future G.fast devices require up to 50 W.

Where is this energy to come from and who is going to pay for it? Is there an interruption-free power supply locally? It is often the case that there is no electric network directly at the distributor sites – e.g. in the last cable duct.

The answer: remote power feeding. Network operators can use the copper cores, previously used for telecommunication, for the power supply.

**New: remote power feeding**

Basing their ideas on the tried and tested VS modular product family, R&M came up with an ingeniously simple solution for putting this idea into practice. We call it remote power feeding. It involves equipping distribution systems with special connection modules which conduct power to the old copper cores of the telephone network and thus supply electricity to the active devices. Even though telecommunication specialists and network planners are aware of the dangers of external voltage and overvoltage, it is imperative to take precautionary measures regarding personal security. The connector strips are orange so that every technician can immediately see where there is live electricity.

If necessary, the outlets of the remote power units on the subscriber's premises can be switched from the distributor frame to the subscriber side. When work is being carried out on the system, the individual devices can be fed separately. This means that all the necessary precautions have been taken to be able to operate remote power feeding safely. ■

| Technologies and Bandwidths | Network Topology | Expansion Options |
|---|---|---|
| **FTTC / copper**<br>Vectoring: 50 – 100 Mbit/s | FO, CU, CU<br>Central Office – Curb – Home | ■ Expansion of FTTC networks in the feeder area<br>■ Copper lines between curb and subscriber < 750 m |
| **FTTS / copper**<br>Vectoring: 100 Mbit/s<br>G.fast: 200 – 500 Mbit/s | FO, CU, CU<br>Central Office – Manhole – Home | ■ Expansion of FTTX using remote units in manholes near the subscriber<br>■ Use of existing copper lines (90% of which < 220 m) |
| **FTTB / copper**<br>Vectoring: > 100 Mbit/s<br>G.fast: > 500 Mbit/s | FO, FO, CU<br>Central Office – Splice duct – Home | ■ Expansion using remote units in buildings<br>■ Use of the existing in-house copper lines |
| **xPON**<br>GEPON: 62 Mbit/s – 1 Gbit/s<br>GPON: Upstream < 2.5 Gbit/s, Downstream < 1.2 Gbit/s<br>10GEPON: < 10 Gbit/s | FO, FO, FO<br>Central Office – Splitter – Home | ■ Expansion of networks using splitter technology<br>■ Adaptation of in-house installation with FO to the end outlet |
| **FTTH P2P**<br>100 Mbps – 1 Gbit/s | FO, FO, FO<br>Central Office – Splice duct – Home | ■ Expansion as FTTH network, as point-to-point connection from the central office to the end outlet |

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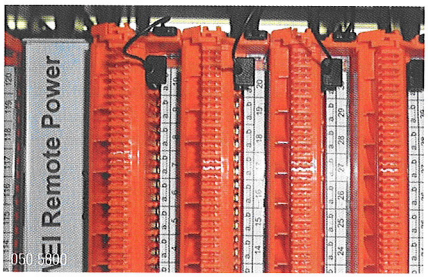


*VS modular for remote power feeding*



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# Trend toward Optical Transmission

**The ECOC Conference 2013 in London presented the latest technological trends in optical communication. The increasing demand for bandwidth is the key driver when it comes to pushing optical transmission technology forward. Virtualization, flat architecture in data centers, 40/100 Gigabit Ethernet and optical interconnects over ever-shorter distances are the important trends in this field.**

The European Conference and Exhibition on Optical Communication (ECOC) takes place every fall. One of the hot topics is to resolve the ever-increasing demand for bandwidth due to the enormous amount of big data and clouds. Experts discussed possibilities and developments for the future.

Innovations in optical technologies and new network architectures are essential. That was the consensus of opinions at ECOC. These innovations will greatly enable data centers to achieve effective resource sharing, advanced scalability, flexible provision and big capability.

### The virtualization

We have observed that virtualization is a mega-trend of data centers. Virtualization improves data center utilization by sharing resources between multiple customers or applications. Most often when people discuss virtualization they mean server virtualization (Fig. 1). But in fact there are three different categories: server, network and storage virtualization. All three have considerable effects on cabling infrastructures.

The following example illustrates the consequences: A physical server can host several independent virtual machines. Every virtual machine (VM) can "pump" 10 gigabits per second or more into the network. The cabling infrastructure must provide a corresponding performance so that this large amount of data can actually be transported. Furthermore, hundreds of virtual networks or virtual routings are carried out over a single link.

*Fig 1: Server virtualization means that a physical host provides several virtual machines (VM). A software, called a hypervisor, controls and abstracts the required number of operating systems (OS) running the individual applications (apps) on the hardware resource.*

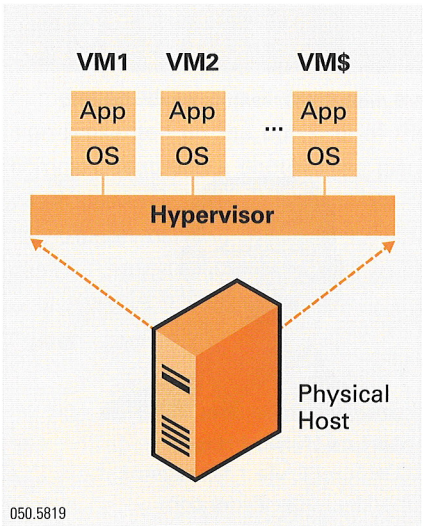
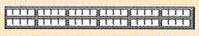
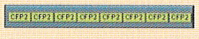
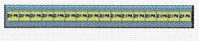
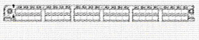
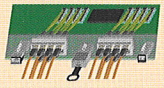



*Fig 2: The evolution of pluggable transceiver modules. The trend toward higher bandwidths requires higher port density in the front panels and lower power consumption. SFP+ is a 10 Gbit/s transceiver module; the other types support 100 Gbit/s.*

| 1 RU Capacity | Form Factor Size | Power per Module | Number of Fiber Links | Module | 1 Rack Unit Layout |
|---|---|---|---|---|---|
| 480 Gb/s | SFP+ | 4.8 W | 48 |  |  |
| 400 Gb/s | CFP | 12–24 W | 4 |  |  |
| 800 Gb/s | CFP2 | 8–12 W | 8 |  |  |
| 1600 Gb/s | CFP4 | 4–6 W | 16 |  |  |
| 3200 Gb/s | QSFP28 | 3.5 W | 32–36 |  |  |
| 4800 Gb/s | SFP48 | 1.5 W | 48 |  |  |
| 6400 Gb/s | Optics on board | < 1.5 W | NA |  |  |

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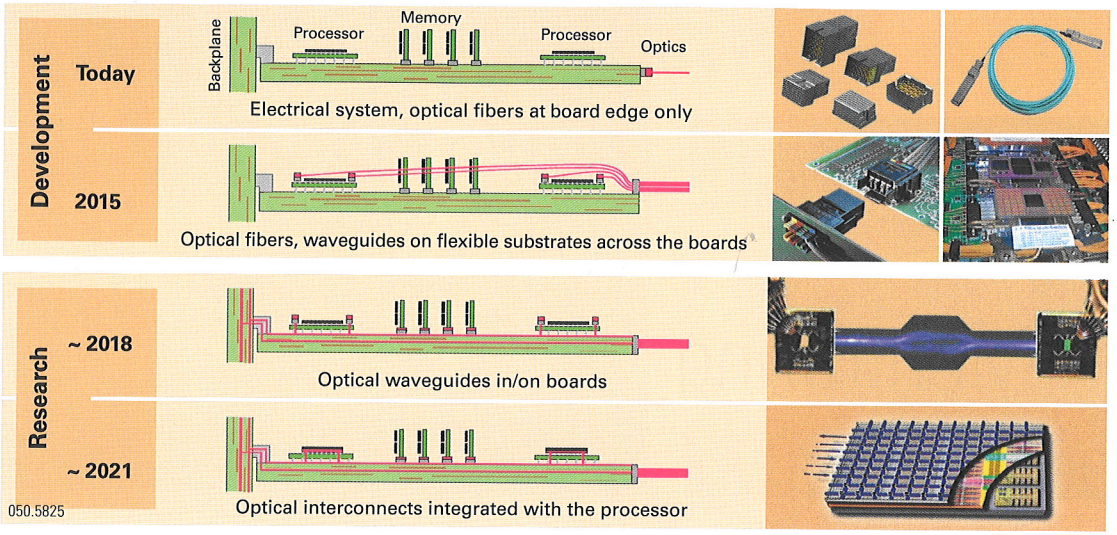


*Fig 3: Optical interconnects on boards.*

That means the failure of a single cable connection will have knock-on effects on numerous virtual machines and virtual network operations. This is why robust and reliable cabling technology with connection solutions for higher bandwidths is so important to secure network operations.

### The advantages of flat hierarchies

Data center architecture has evolved to a flat hierarchy. This "fat tree" design brings a number of advantages in comparison with the traditional three-tier architecture. Stranded capacities can be more easily accessed and hence investment costs decrease.

In addition, existing resources can be adapted and managed with much greater flexibility. For this purpose, the software-defined network abstraction (SDN, Software Defined Network) is employed. This makes it possible to lower operating costs and shorten latency.

### The road to 40/100 Gigabit

As a result of the trends mentioned, more and more data centers are exploring 10 Gigabit Ethernet networks. Soon, 40 Gigabit Ethernet will be deployed. This will result in a larger number of links with bigger variation in connection distances. Furthermore higher capacity, higher port density and lower power consumption of each link in switches/servers will also be required.

Optical media are already on the rise where large bandwidths have to be made available over medium-sized distances. When the link distance is greater than 30–50 m, optics becomes very promising. In next generation 100 Gigabit Ethernet (P802.3bm), parallel multimode optics (4 × 25 Gb/s) offers an operation reach of 100 m with OM4 fibers.

### Optics over shorter distances

To continue supporting the ever-increasing bandwidth demands aggregated on rack unit I/O interfaces and improving power consumption, the evaluation of optical transmission takes place in ever-shorter distances (Fig. 2).

In practice, it is a question of optical connections between racks and between the boards. Pluggable transceiver modules will be used more in the future. This will significantly enhance transmission performance at board and rack level. Experts are currently discussing a capacity of 6.4 Tbit (terabits) per second per rack unit.

Furthermore, to establish on-board data transmission, it is attractive to implement embedded waveguides on optical boards and/or backplanes. The next stage, following up the optics on-board, will be high-speed optical interconnects between chips and modules. In the long term, all data communication over short distances will be completely carried out by optics.

This in turn means optical interconnecting technology will continue increasing its importance. ■

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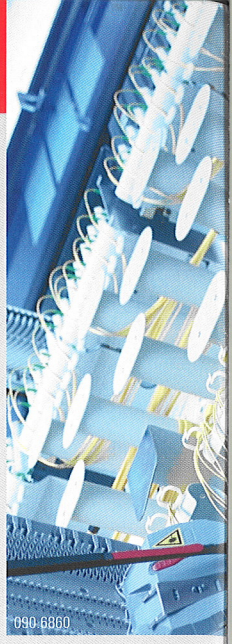



# Seamless Network Monitoring with Fiber Optics

**IBAarau – a regional supplier of electricity, natural gas, drinking water, electrical installations and telecommunications in the canton of Aargau – has set itself the ambitious goal of guaranteeing that the production of electricity will be taken care of by 90 % through renewable energy by the year 2035.**

After Aarau was given a new station with a futuristic-looking square in front of it in 2010, the course was very definitely set for the future in terms of urban planning. There are numerous new building projects planned for the town and the surrounding area over the coming years that include a completely new district with its own soccer stadium in the immediate vicinity of the station, for example. To ensure energy supplies for its more than 30 000 private and business customers, IBAarau is relying on future technologies.

### Living sustainability

IBAarau already operates its own hydraulic power station, is offering customers more and more solar power, is renting areas for exactly that purpose in industrial buildings and farms, and supports private construction projects with sizeable contributions. By 2025, the company wants to be able to cover 20 % of the overall demand with renewable organic energy derived from water, wind and sun. Forty-six of the 284 employees are trainees, a fact that clearly underscores the company's strong commitment to sustainability.

### Ready for future challenges and bandwidths

To supply its customers in 22 communities, IBAarau has a 2000-km electricity and natural gas network with a large number of substations and distribution cabinets. A superimposed FO network

## Future-Proof with Fiber Optics

**Next-generation networks are spreading. The demand for bandwidth and new services means fiber optics are on the up and up. Network operators need new ideas for central offices, hubs and data centers to be able to organize the expansion of optical infrastructures efficiently and flexibly. R&M's answer: Optical Distribution Frame (ODF), combined with the Single Circuit Management System (SCM). This is what network operators are using to build their next-generation central office. Planning, assembly and operations are a piece of cake – thanks to the modular principle and ingenious fast assembly technology. FO networks now have the chance to develop without limits.**

### MODULAR DISTRIBUTION SYSTEM

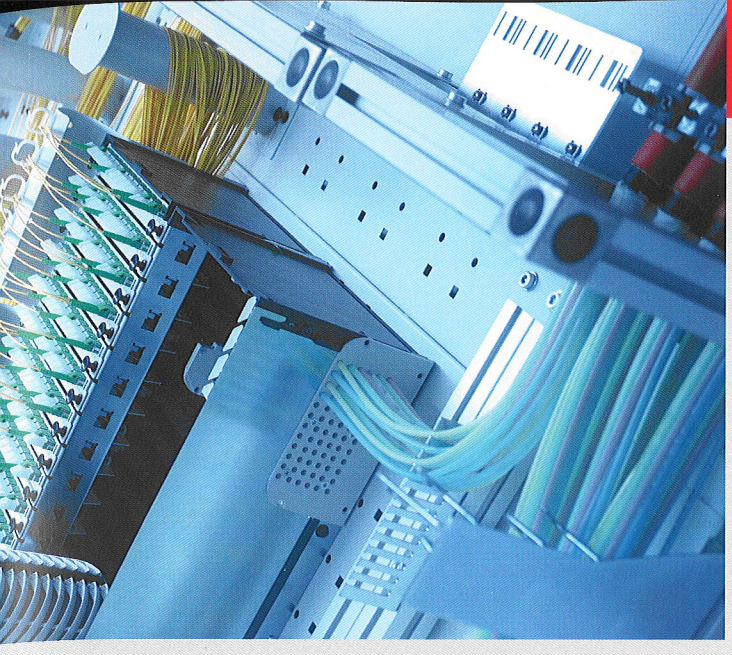
The ODF from R&M is the modular distributor platform for employing the SCM family in all network operators' central sites. Wherever profitable, highly available and easily scalable FTTx architectures have to be set up, ODF modules and SCM provide an impressive and flexible solution. Numerous configuration possibilities with the splice and patch modules open up a whole range of competitive infrastructures to users – whether in the central office, collocation point, street cabinet or building entry point (BEP).

### A SOLUTION FOR ALL LAYERS

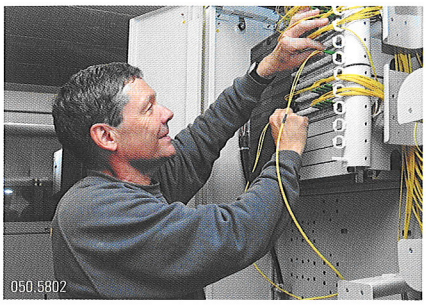
The SCM system is an end-to-end solution for concentrated and efficient fiber management at all network layers. Whether you want to connect individual buildings, large housing complexes, entire town districts or regions to the broadband network – the same fiber management module can be used in every area. Even with an extremely large fiber volume, the SCM system with its easy-to-use trays guarantees unique, secure and fast handling of the individual fibers.

### UNCOMPROMISING QUALITY

Only the very best for sophisticated broadband networks. The passive infrastructure – of layer 1 – has to be absolutely reliable. Uncompromising quality. Sturdy and lightweight construction. Simple handling. Efficient, convenient and logical assembly… these are the minimum requirements to avoid errors and interruptions in networks from the outset. A perceptible contribution to increased productivity and the associated cost scaling are also a prerequisite. All these points were decisive for the development of the ODF and SCM system.






ensures seamless network monitoring as well as performance – a major challenge for network operators. A geographic information system (GIS) documented down to the very last detail and FO management tool assign every fiber to the particular clients and their applications so that, in the case of failure, the company can react immediately and provide their clients with the appropriate information.

The FO network is also of use, however, for communication services such as Fiber to the Building (FTTB) and other applications. IBAarau does not act as a carrier in this area: Customers are totally independent in terms of technology and carrier. This is why the planning of the network focused in particular on the greatest possible flexibility up to the BEP (Building Entry Point). The network was designed to cater to future challenges and bandwidths. Due to the lack of space in ducts and trenches, four multitube conduits each with 144 fibers were laid in the urban area, and seven in out-of-town areas. Currently only one conduit is needed in each case; the others are simply there as backup.

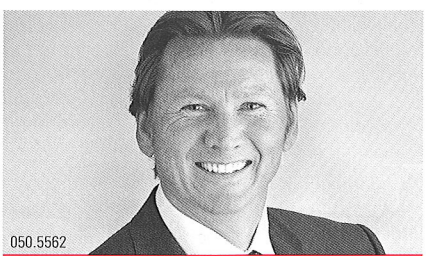



**Optical Distribution Frame (ODF) and Single Circuit Management (SCM) by R&M**

The network is based on R&M's Optical Distribution Frame ODF. Considerable flexibility was required as the individual stations are positioned in ancient, old and brand-new buildings. "The size and weight of the ODF posed no problems in terms of transport and installation, even in the most restricted of spaces, such as around the old Aarau town walls – the former home of markets and stables," says Markus Thöny, project lead for telecommunications at IBAarau. "Some of the risers, for example from the lower to the upper town, are even in the old church walls!"

Modularity was another important criterion in the project. In conjunction with other building activities, the FO network is constantly being extended, effectively from duct to duct. The R&M Singe Circuit Management, that is always based on the same components, makes work easier for installation engineers who only have to be trained for the individual products once. As the amount of space available at the individual stations varies, each subproject had to be planned individually. Bruno Lehmann, Head of Telecommunications at IBAarau: "R&M offered us unparalleled service that just could not be matched by any other supplier! As we could not work with a standard solution to cover all individual cases, each substation had to be discussed individually in detail. Even deliveries were taken care of by R&M on site, which was highly constructive."

IBAarau was familiar with R&M from earlier projects with external customers. Collaboration had always been totally satisfactory. And now finally, the two companies have managed to realize an FO project together. ■

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# Glossary of Transmission Technology

## Latency and Data Throughput

**The goal of R&M is to make communication more reliable and secure. That also entails using the correct technical terms in the correct way. With this glossary we want to help enable non-experts and experts, users, partners and R&M to use a common technical language.**

Latency and data throughput are two different variables. Latency is measured in seconds, data throughput in bits per second. But what exactly do the two terms mean? What factors influence them? Here is a brief overview.

### A comparison

Let's take an ISDN link between Zurich and Geneva, for example. The data throughput is 64 kbits/s, the latency (delay time) about 10 ms. That means the individual bits reach Geneva with a delay of about 10 ms.

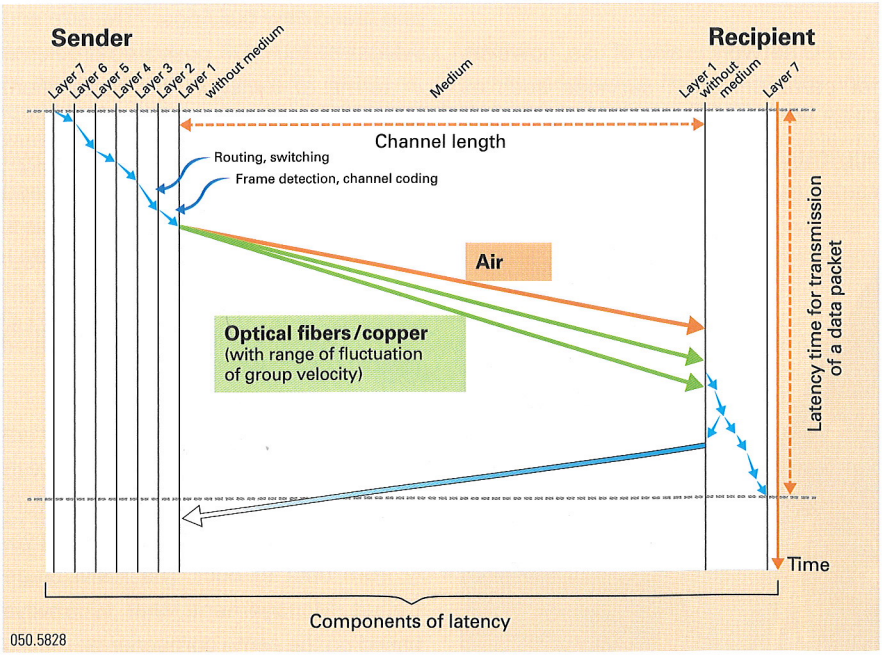
Now let's take a fictional example involving a freight train transporting hard drives. One hard drive with a 1 terabyte capacity weighs 500 grams. One freight car holds 35 tons, in other words 70 000 hard drives. The train has 10 freight cars. The trip takes 4 hours and a freight train leaves Zurich every 4 hours. This slow train with a capacity of 428 terabit/s has a larger throughput than any fast fiber optic link. However, its latency figure is 4 hours. And to be even more precise, loading and unloading add considerably to latency time.

### Components of latency time

Latency also comprises several components in communication engineering.

**Latency as a result of the finite velocity of propagation:**

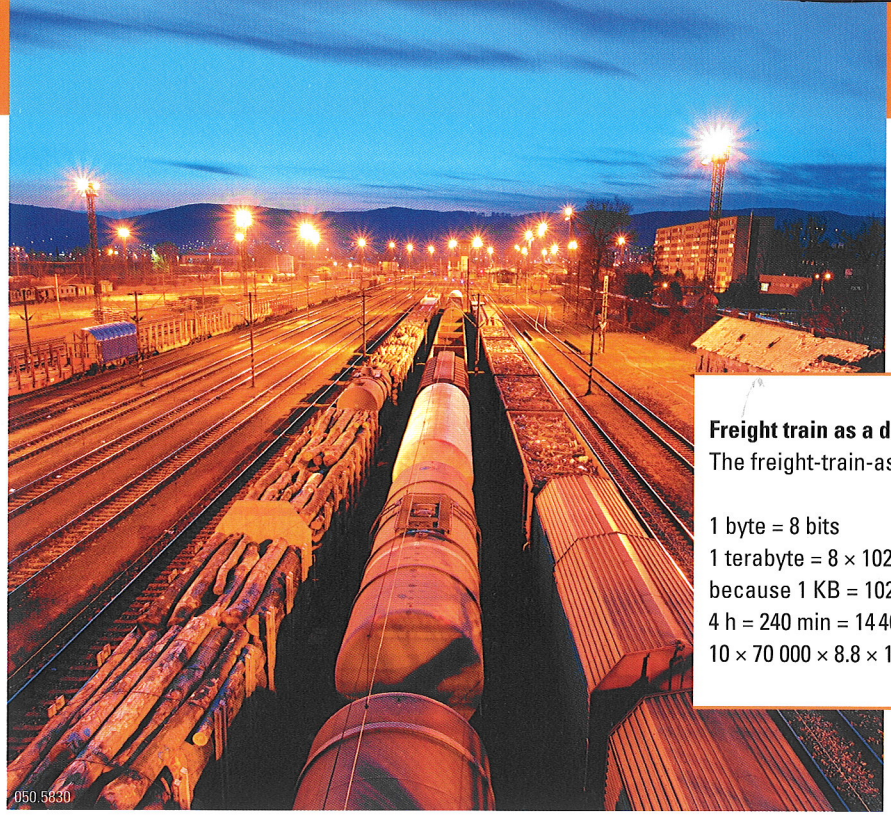
The decisive factor is the group velocity with which a wave packet propagates over the line. In copper cables, the group velocity is 40 % to 80 % of the speed of light; in fiber optic cables it is about 70 %. Latency is calculated as the length of the line divided by group velocity. There are types of applications where the latency caused by the velocity of propagation is critical. In high-frequency trading, for example, use is made of microwave radio relay links over which




*In the case of packet loss, the data throughput declines approximately proportionally to $\frac{1}{\sqrt{p}}$ when the TCP protocol is used. In this case, p is the packet loss rate.* Many protocols also provide for the reduction of the transmission speed in the event of repeated interference. In a human conversation, one person would say: "...I'm having a hard time understanding you. Please speak more slowly."*

*All of these processes affect latency and data throughput although the two terms must still be clearly distinguished from each other.*

** Mathis et al., The Macroscopic Behavior of the TCP Congestion Avoidance Algorithm, Comp. Comm. Rev, vol. 27, no. 3, 1997.*




**Freight train as a data link?**
The freight-train-as-data-carrier analogy goes as follows:

1 byte = 8 bits
1 terabyte = 8 × 1024 × 1024 × 1024 × 1024 bits ≈ $8.8 \times 10^{12}$ bits, because 1 KB = 1024 bytes, 1 MB = 1024 KB, etc.
4 h = 240 min = 14 400 s
10 × 70 000 × $8.8 \times 10^{12}$ bits / 14 400 s ≈ 428 terabits/s

the signal is propagated at a rate of more than 99 % the speed of light. It is considered a law of nature that the speed of light cannot be exceeded; the limit is thus 3.3 ms per 1000 km.

**Latency as a result of serialization:**
Big data blocks have to be subdivided into small segments and reassembled at the recipient's end. This component is relevant only if the complete data block on the recipient's end turns out to be a meaningful message. Latency in this case results from the size of the data blocks divided by the data throughput. Video on demand, for instance, is not greatly affected by latency resulting from serialization because a film comprising several GB can begin to be played even before the file has been entirely transmitted. Other files such as file archives cannot be used until the transfer is finished.

**Latency as a result of channel coding and error correction:**
Latency here is the amount of time one has to wait for an arriving symbol or Ethernet frame to be decoded and recognized as valid. Fiber optic connections are faster in this case than BASE-T technologies (Ethernet over Twisted Pair), because they use binary symbols and need no compensation for return loss (RL) and near-end crosstalk (NEXT).

**Latency as a result of transmission protocols:**
Protocols use handshakes and acknowledgements to signal connection status and errors and to synchronize transmitters and recipients. The same is true of human communication. On initial contact, one person says: "Hi, who are you? Do you understand me?" Establishing and breaking this connection takes time and becomes relevant especially if short messages are being exchanged among a number of destinations.

**Latency as a result of routing and switching:**
Latency occurs at each network transit node as a result of channel coding and error correction and as a result of transmission protocols. The routing decision also requires a certain amount of time. The latency time incurred in this regard depends greatly on the capacity utilization of the network node and the lines emanating from it and the capacity utilization of the nodes at the other end. It also depends on the routing guidelines, which control the load and ensure quality of service (QoS).

**Interconnections**
The matter becomes all the more complicated if one adds frame loss and packet loss. In the case of packet loss, a request for a retransmission is made at layer 4 in the ISO/OSI layer model. If we stick with our analogy with human communication, one person would say in this case: "...I'm sorry. I didn't understand you. Could you repeat what you said?" This situation can lead to delays and is further exacerbated by the fact that the discarding of packets is a legitimate way of preventing an overload. ■

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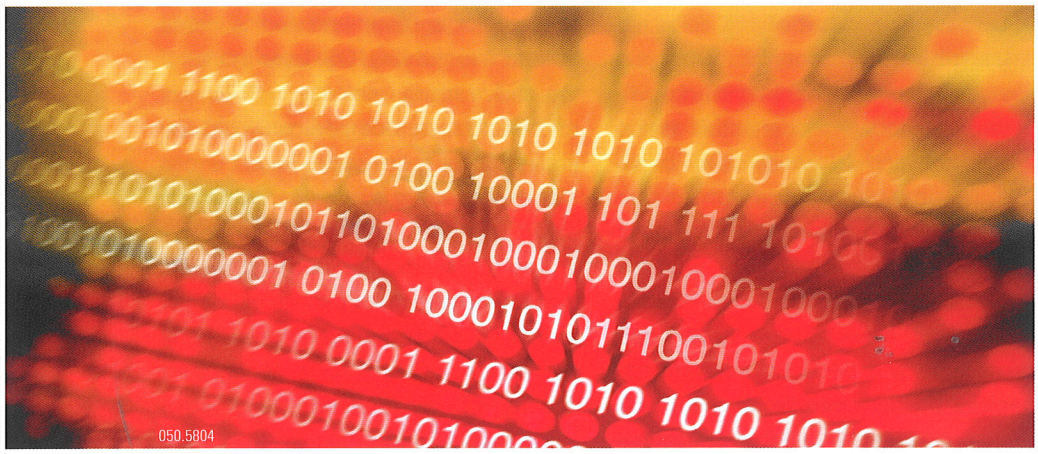
# New MTS Ukraine Data Center

The mobile operator "MTS Ukraine" has built a new data center with a level of reliability and resilience (fault tolerance) of infrastructure not less than TIER III (TIA-942).







"The opportune implementation of the project was among the strategic objectives for MTS Ukraine and it was successfully accomplished by the MTS working group, the general contractor and subcontractors. MTS Ukraine is now ready to meet the needs of the future for the third and fourth generation. MTS is also ready to deploy new IT technologies, including cloud services/technologies, in the new data center."

Mykola Tantsyura,
Project manager of MTS Ukraine

The data center is one of the most powerful in Ukraine and has a design capacity of about 1.6 MW, with a possible total of 3 MW in the future (with 1.2 MW implemented in Phase 1). The construction of the data center was completed in August 2013 after an implementation phase of ten months.

The new data center complements other MTS data centers on the territory of Ukraine with high-speed geographically dispersed communication channels constructed on fiber optic lines and modern DWDM equipment. With the main data center, the data rate can reach up to 400 Gbit/s for IP networks and up to 256 Gbit/s for the storage network and data processing SAN.

The data center is connected to two independent urban high-voltage power supply inputs of the first category, which are connected to their distribution points and the transformer substations (power is 10/0, 4 kW).

Several diesel generator sets with redundancy level N+1 guarantee operation of the power supply system, and an uninterrupted power supply system provides parallel working UPS with redundancy level 2N.

**Structured cabling system**

Sixteen-gigabit fiber channel technology was implemented in the storage area network and fiber optic LC connectors with Grade A and Grade B were used. These high parameter require-




"MTS is always under pressure to deliver more and more bandwidth to millions of users. We provide new services, improve the quality of communications but our customers' expectations rise almost as fast as their data consumption rates. Mobile data traffic has been steadily increasing and now cloud services are not a fantasy, but a reality. To fulfill these expectations, we planned a reliable upgrade path. The new data center was built in accordance with our strategy to develop our IT infrastructure.

R&M has a very good reputation on the Ukrainian market. And we were also very impressed by the international experience of R&M. All solutions, all equipment were chosen after very careful consideration. Only the best partners/system integrators worked on this project. With the new data center, we are convinced that MTS will be able to maintain its position as the most reliable mobile operator in Ukraine and meet all market requirements."

Anatoliy Klimashevsky, CIO MTS Ukraine

ments were due to the high link length and the presence of several FO connections in the link. ODF SCM was the best option: It ensured easy installation and operation and also guaranteed the possibility to upgrade in the future. It was a great time-saver in terms of installation in the communication area. The pre-installed MPO/MTP solution also saved installation time and reduced the number of fiber optic patch cords. It is the best solution for systems with a high communications/mounting density as well as saving space in the cabinet. HD also allowed the use of copper and optical permutations in one patch panel. Digital Cross with DDF modules and copper cable with an impedance of 120 ohms were used for the implementation of E1 links. The whole system was constructed to allow the operation of the existing data center today, and provide the gradual migration to new technology with high data rates of 40-100 Gbit/s in the future. ■

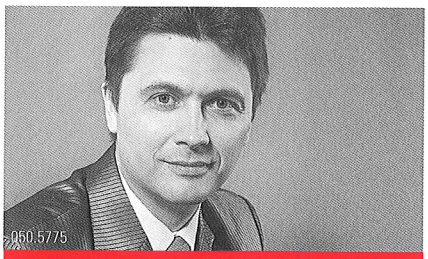
## About MTS

Mobile TeleSystems (MTS) is the largest operator of cellular communication in Russia and CIS countries, rendering service for more than 74 million subscribers. The license portfolio of MTS includes most regions in Russia, Ukraine, Belarus, Uzbekistan and Turkmenistan, and the population living in an operative range of the MTS network totals more than 230 million.

The network of MTS Ukraine, PrJSC, covers more than 98 % of the territory of Ukraine and is inhabited by 99 % of its population. The company renders services to more than 18.28 million subscribers. It holds licenses for the provision of mobile (GSM-900/1800, CDMA-450 standard), fixed-line and international/inter-city communication as well as providing international roaming services on five continents. In 2010 its revenues totaled UAH 8.5 billion.

**THE R&M SOLUTION**

- **140 MPO HD modules with LC OM4 adapters**
- **60 1U Unirack panels for 24 LC Duplex connections**
- **80 1U patch panels with 24 RJ45 Cat. $6_A$ ISO**
- **50 km installation cable Cat. $6_A$ ISO**
- **4 km FO cable**
- **ODF SCM system with six CombiModules and 800 FO connections**
- **VS Compact systems with 120 DDF modules**
- **Patch cords**
- **Color coding security system**

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# New Procedures for Network Monitoring

**Fast, precise and affordable fault finding in FO networks is vitally important for network operators. This is why manufacturers of measurement technology are currently developing several methods of network monitoring. Research groups are looking for improved monitoring procedures at the physical limits of fiber optics. Users should investigate the background before investing.**

Ideally, FO networks have to work error-free. Network operators and service providers are thus doing everything in their power to ensure transmission quality and to remedy faults as soon as they occur. The experts are extremely occupied with the search for better and more affordable monitoring procedures. The goals: to localize faults more precisely and be able to cover large parts of the network with as little measurement technology as possible.

Reflectometry procedures (Fig. 1) are usually used for the automatic, centralized in-service monitoring of passive optical networks (PON). Optical time domain reflectometry, OTDR, detects in milliseconds whether there is any erratic attenuation loss on the transmission path and how strong it is.

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**Reflector-based solutions**

In centralized monitoring using OTDR, reflectors tend to be used at the end of the line on subscriber premises (ONU). This is because simple OTDR measurements without reflectors cannot resolve the signals at higher split ratios (≥ 1:16). A PON subscriber is monitored when the relevant reflector peak is monitored. The prerequisite for the differentiation

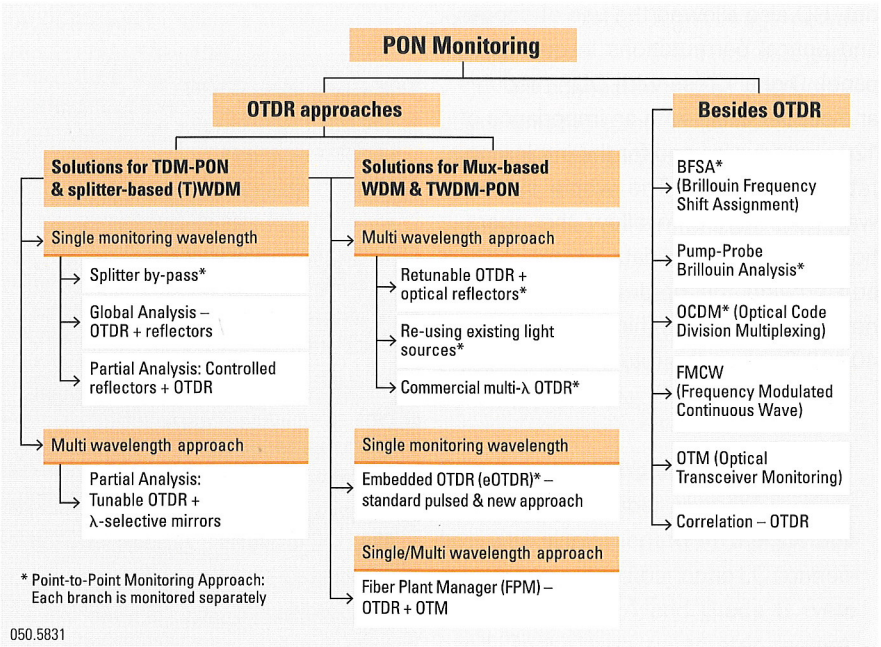
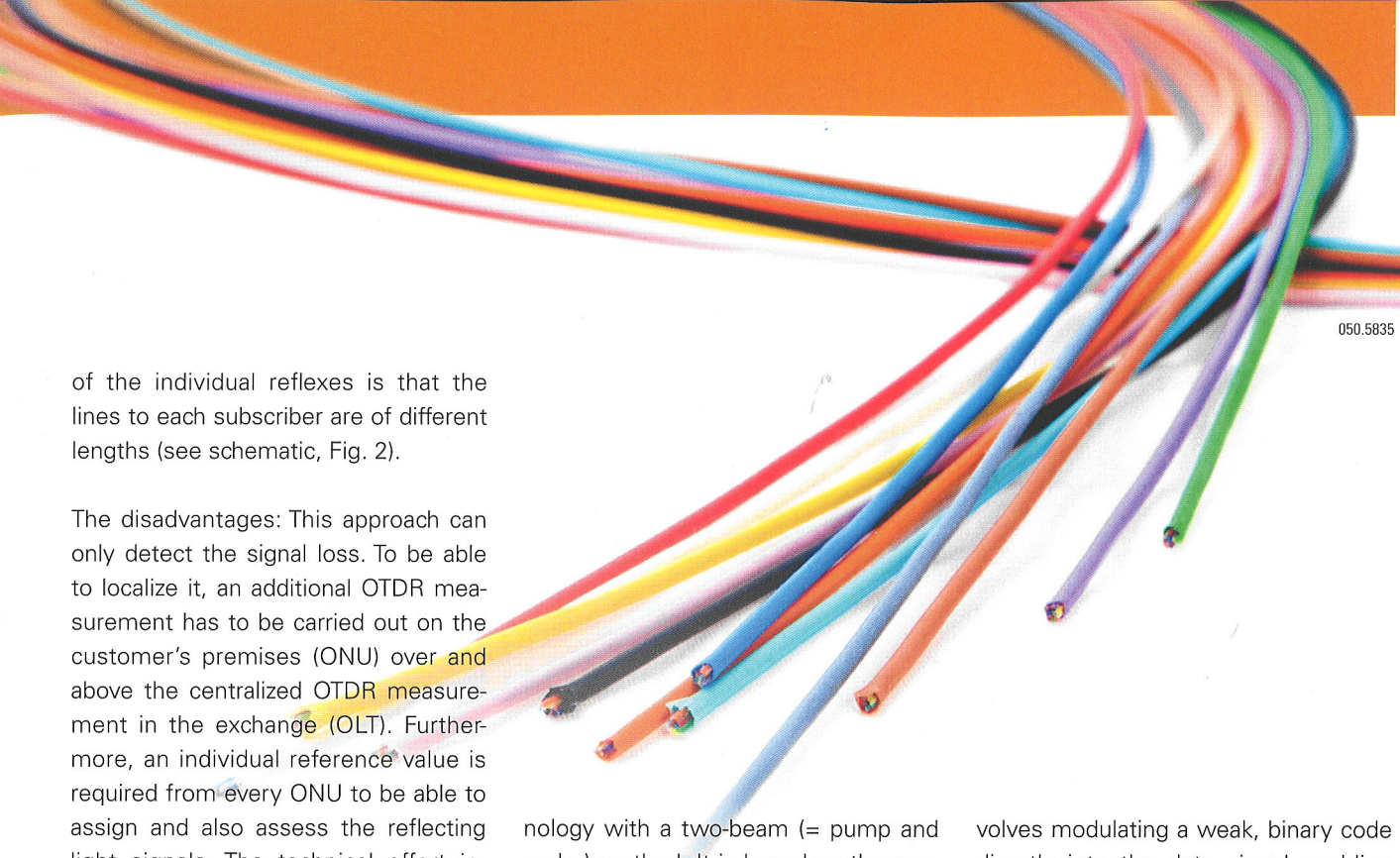



*Fig 1: Overview of the existing monitoring procedures for passive optical networks (PON). This article focuses on the three most important approaches.*



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of the individual reflexes is that the lines to each subscriber are of different lengths (see schematic, Fig. 2).

The disadvantages: This approach can only detect the signal loss. To be able to localize it, an additional OTDR measurement has to be carried out on the customer's premises (ONU) over and above the centralized OTDR measurement in the exchange (OLT). Furthermore, an individual reference value is required from every ONU to be able to assign and also assess the reflecting light signals. The technical effort involved to date is relatively large.

One solution would be to cascade the reflectors. Then you would be able to detect network faults on individual sections. For example, you can install additional reflectors with a low degree of reflection (20–30 %) in front of the splitters. Additional observation of the splitter reflexes can thus pinpoint the faulty section.

A pioneering approach is a new procedure combining OTDR reflector technology with a two-beam (= pump and probe) method. It is based on the nonlinearly optical Brillouin effect. The two-beam approach enables direct fault localization. This approach is the subject of current research. One prototype has enabled monitoring up to a split ratio of 1:32. The disadvantage: As in the previous solution, a reference value has to be taken from every subscriber. Currently there are only prototypes of this solution.

**New: code in the light signal**

A new development on the market is the embedded OTDR solution. This involves modulating a weak, binary code directly into the data signal enabling each individual line to be monitored continuously during data transmission. And no reflectors are needed at the other end.

Embedded OTDR is thus relatively inexpensive and freely scalable, as well as supporting coming PON generations. The disadvantage: To date, weak signal loss cannot be detected behind a splitter with a split ratio greater than 1:8 and local resolution is still low. ■

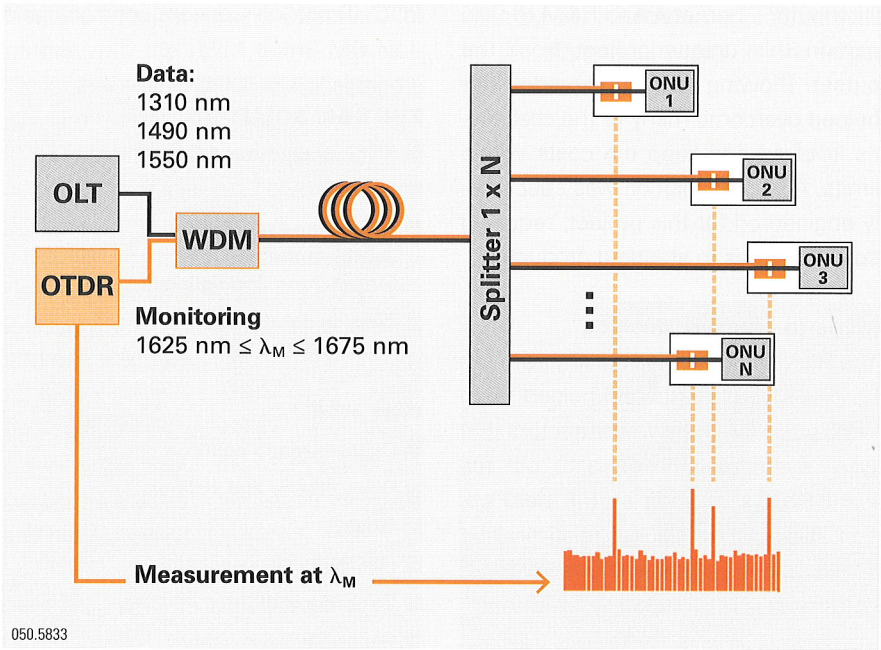


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*Fig 2: Schematic of the OTDR reflector monitoring solution. The network is monitored centrally and automatically by observing the OTDR reflexes of the individual customers. Diagram: R&M*



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# New Age in Healthcare with Solution for University Hospital Aarhus

## R&M and Fibernet introduce pioneering fiber solution across new hospital campus.

Denmark is currently spending over five billion euros on 14 "super-hospitals" featuring state-of-the-art innovations. The country aims to consolidate its hospital infrastructure to arrive at fewer, larger and more specialized hospitals, in which use of health IT is intensified.

**Fiber to the Office: setting new standards**

Amongst the first projects is the New University Hospital (DNU) Aarhus. One of the goals of the hospital was to provide FO cables to every single outlet across its large campus-like environment. This involves some 80 000 fibers and a vast number of terminations, making it possibly the largest project of its kind in the world.

### Fiber to the Office (FTTO)

One fiber link goes directly to an in-building outlet, where a small switch handles communications.

Two fibers run from one end of the campus, two more run from the other side, and can be switched on in case of an emergency. The new network opens up all sorts of new possibilities, such as vast data storage, transfer and analysis, as well as support for patient monitoring and high definition cameras. Off-site medical consultants can advise or oversee medical procedures, operations or diagnostics. Patient services in the area of entertainment and communications can also be converged onto a single system. For the hospital, this means easier, more efficient management, at a lower cost.

**Full built-in redundancy**

Distributor Fibernet asked R&M to take part in this unique project from the outset. Blowing and singlemode fiber helped overcome many of the challenges involved and keep the costs within limits. A unique solution was specifically engineered for this project, requiring some changes to standard products.

**Made-to-measure designs**

The R&M team worked closely with the hospital's consultants and helped them write a tender. The two contractors that were eventually chosen both put forward R&M's solution as the best option. This solution requires relatively little space due to economic use of cable pathways. EMF, crosstalk and other interference issues are absent, which is vital in a hospital environment. An additional advantage is the fact that future-proofing is easy, as fibers can be added to existing tubes without any need for digging or reconstruction.

Finding a way to manage such a large number of pre-terminated fibers on the way to the outlet was a big part of the challenge, but the R&M ODF system could do it. Cable and tube management brackets were redesigned so they could take more tubes to each rack. The POC (Proof of Concept) designs and

**THE R&M SOLUTION**

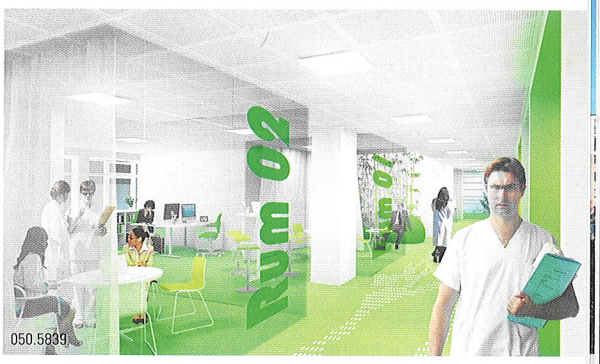
- R&M singlemode LC
- ODF
- Tailor-made prefab combi-modules for patching and splicing
- Blow-in solution to the wall outlet

**WHY R&M?**

- Custom-made solution
- Consultancy and support
- Quality
- Flexibility
- Ease of handling
- Reliability






schematics demonstrating ideas about main and sub patch rooms were well-received, as was the mockup for the cable solution, which used 50-meter coiled lengths of prewired cable, each containing 72 runs. These 50 meter runs were used for running feeds from the active equipment room into the main patch room.

Contractors from the other hospital construction sites around Denmark followed this project with great interest.

**Fibernet: over 20 years of fiber business knowledge**

Fibernet has been involved in huge Data Center projects (IBM, CSC, KMD, PBS), and has installed more than 100 000 fiber ports. "We were involved in planning and predesign, when DNU decided ODF SCM was the only feasible, flexible and professional solution." explains Henrik Mütze, Managing Director. "Together with the R&M team, MB Networks and the hospital, we designed a solution that sets the standard for such huge projects. Some components had not been developed yet. For example, we designed and produced a small splice and patch box to install inside the ducts. One key reason for choosing R&M was the high fiber density possible on the 900 mm x 300 mm 2304 fiber footprint. All ODFs are preinstalled, so ensuring they're ready for splicing is vital – especially when more than 30 000 fibers have to be spliced in two separate splice and patch rooms."

"We worked with MB Networks, one of Denmark's most experienced full-service companies in the area of FO installations, who supported the Danish energy sector in establishing FTTH across Denmark. They were happy with the R&M system's quality, flexibility and ease of handling, which meant an optimal installation process with great savings on man-hours. Moreover, Fibernet and R&M are seen as extremely helpful, flexible suppliers. The first phase of the installation project is halfway and all products are working perfectly!" says Henrik Mütze.

**No room for error**

"In the world of healthcare, there's no room for error," concludes Lars Ganzhorn Knudsen, IT project manager at DNU. "We were very pleased that the suppliers were highly pro-active and could develop a solution that matched our needs precisely. We were also happy with the easy installation, made possible by the modular approach, as well as the support provided in this large, challenging project." ■

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# Focusing on the Customer

**One of R&M's core competencies is being able to fulfill individual customer requirements expertly and at great speed. Customer Product Management (CPM) makes sure that product adaptations, custom-built items and tailor-made solutions are realized fast.**

A communication network is as individual as a company. Virtually every customer has special needs and requirements when it comes to cabling infrastructure. R&M has a dedicated, highly efficient team to deal with these specific requirements. At the outset, the most important aspect is to understand the details of the requirements correctly. A CPM consultant from R&M Headquarters and the customer advisor meet up with the customer directly on the customer's premises. The consultant asks the necessary questions, pertaining to the particular circumstances, and makes a note of all requirements in detail. Then, a kick-off meeting is initiated with the CPM Development and Support team and tasks are clearly assigned.

### As fast as possible

The CPM teams now have to develop a solution in the shortest possible time. That usually takes just a few days because R&M has an immense pool of dedicated expertise at its disposal and also works on a basis of close interdisciplinary collaboration. The consultants draft the concept; the Application Engineering team develops samples, some of which are already operational, and runs feasibility studies.

Ultimately the solution is presented to the customer on the customer's own premises. Any necessary adaptations are made. If the presentation was successful and the customer is impressed, Product Support then takes on the entire task of order processing right through to delivery. The highly efficient customizing process is naturally subject to R&M's notoriously strict quality management that brooks no compro-

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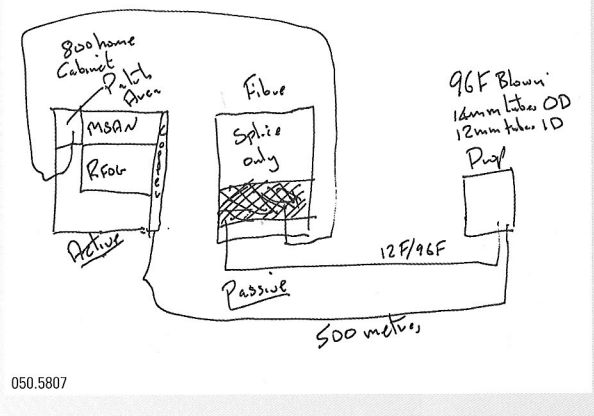


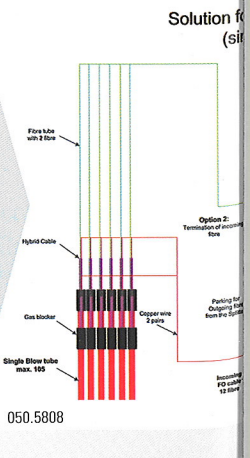


Figures 1 to 3:
**From the first sketch through conceptual design to the individual prototype.**
The hybrid cabling in a street cabinet was developed for a network provider that wanted to accommodate copper and FO connections for 96 subscribers in an existing housing.

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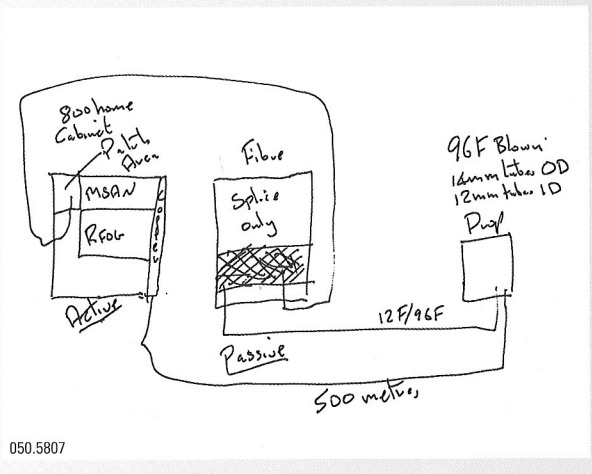


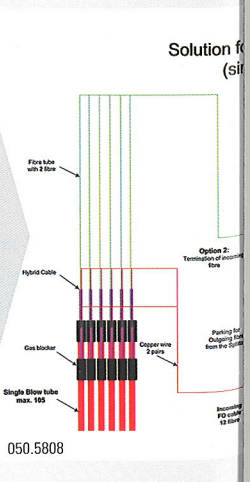


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**Customizing example: upgrade for street cabinet**

"An existing street cabinet is to be equipped with a new distributor system. The goal is hybrid cabling for 96 subscribers." This was what one network provider required of R&M. A typical challenge for Customer Product Management (CPM).

The provider wanted to supply each of the 96 customers with two FO and two copper pairs. The lines were to be routed from the street cabinet to each of the households using blow-in technology. The aim was to establish a point-to-multipoint network architecture. The entire distribution and splitting of the connections had to be accommodated in the old cabinet. The available power lines were a twelve-fiber FO cable and a 100-copper-twisted-pair cable.

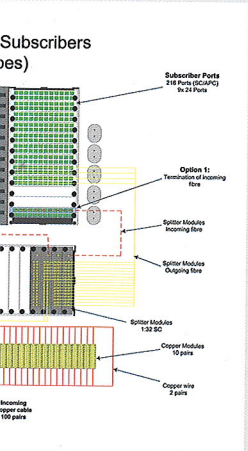
Once the general conditions had been defined and recorded in a sketch (Fig. 1), work started on the actual conceptual design. The customer wanted the fibers to be split in a ratio of 1:32. R&M suggested including free port resources to enable a later upgrade to point-to-point supply to meet the challenges the future will bring. This means the provider will be able to offer its customers more services in the future without having to reorganize the cabinet.

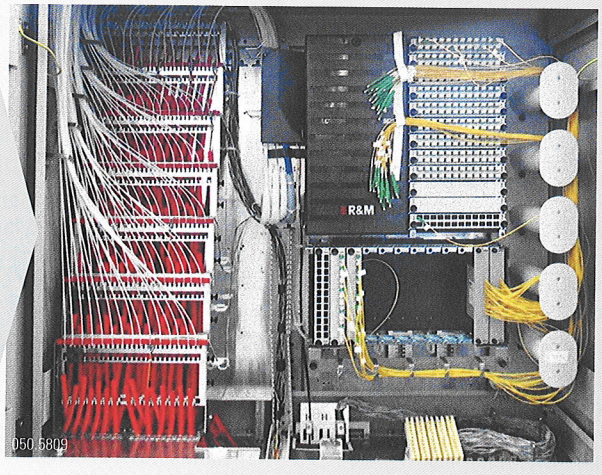
> After just a few days, R&M proved what could be done. A few weeks later, we already had an operational tailor-made prototype.

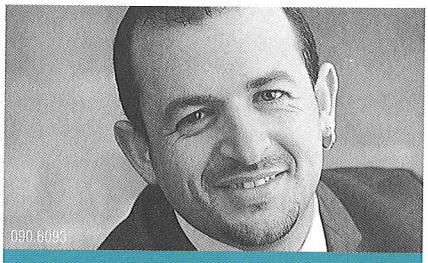
Fitting the splitters into the restricted housing space turned out to be a great challenge. The CombiModule from R&M's ODF range was used as distributor platform. The copper lines could be distributed using tried and tested 10-twisted-pair connector strips. A further challenge was to route the 96 hybrid cables so that the FO and copper lines could be split sensibly within the cabinet and rendered easy to handle. The company had to come up with an ingenious solution of how to protect the FO tubes while making them easy to identify when integrated and terminated.

Once the conceptual work had come up with a clear scheme for the different functions (Fig. 2), work started on the practical implementation. After just a few days, R&M proved what could be done. A few weeks later, we already had an operational tailor-made prototype (Fig. 3).

The example impressively demonstrates what happens between an inquiry, a customer-oriented and future-proof solution, and the actual installation. ■

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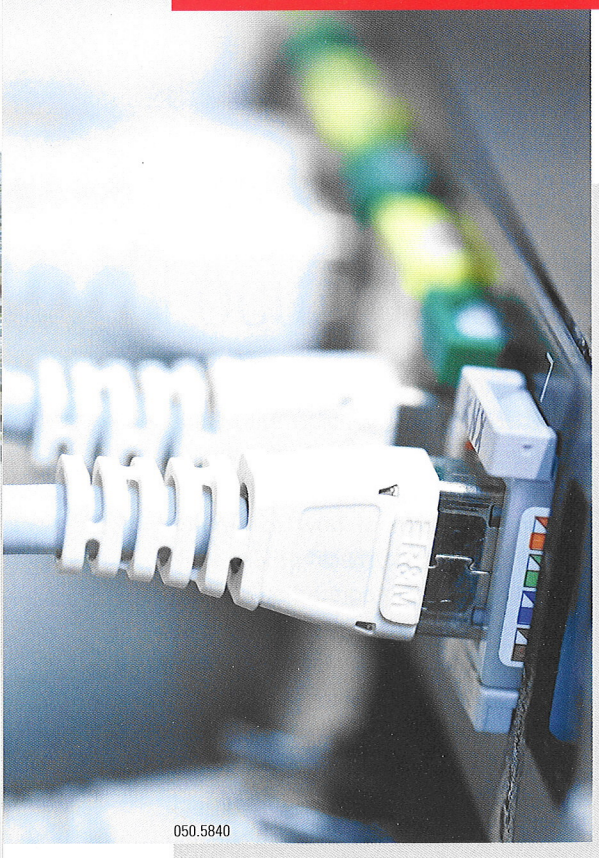



# Housing Cooperative Chooses Homewiring

**Living 11 is a modern, inexpensive form of living on a cooperative basis in Zurich. The ASIG housing cooperative is setting trends with this building project in which homewiring cabling from R&M plays a central role. Tenants all benefit from a multimedia network.**

"The trend toward leading a digital lifestyle has now moved into ASIG properties. Our tenants and cooperative members are online ever more frequently. They use all kinds of devices, communication and entertainment services," says Roberto Colella, Project Manager of Building Projects at ASIG.

From the very outset ASIG wanted to implement future-proof infrastructures and optimal prerequisites for such modern needs in Living 11, fulfilling the cooperative's claim: "living and more". The new-build project, completed in 2013, features 163 apartments in Zurich-Seebach and was to be attractive and sustainable in every way, providing value added that would score points on the local housing market.

**Quickly recognizing the advantages**

It was an electrical engineer who gave the ultimate incentive. "A modern apartment should be equipped with universal communication or multimedia cabling compliant with EN 50173-4," he explained to the cooperative's planning committee. After all, it is state of the art, future-proof and the logical progression of the buildings' FO connections, something also increasingly in demand in Zurich.

ASIG was quick to recognize the advantages of application-neutral cabling:

- The tenants can use all communication and online services, telephones, cable, sat and digital TV, radio and Internet with a single integrated cabling system. In terms of convergence, they can combine a lot of things and even set up small local data networks for their computers or game consoles. The current concept of office and residential cabling supports open access for telephone, Internet and cable providers. The tenants can choose what they need. ASIG as landlord makes the passive, star-shaped infrastructure available; it is future-proof and offers value added potential.
- To equip an apartment via radio only is not an option for ASIG. This would only serve selected, mobile use.

## The ASIG Housing Cooperative

The ASIG housing cooperative is a non-profit-making, independent cooperative. It was founded in 1943 and currently has a portfolio of 2421 apartments in Zurich and in five communities in the region.

ASIG builds affordable rented property for its members and ensures that the properties remain in good condition long term. Furthermore, tenants and landlords in the cooperative see themselves as a community running the company democratically, with solidarity, and, at least in part, on a voluntary basis. They are also committed to common cultural and social projects.

Sustainability and ecology are of top priority at ASIG. In Zurich, the cooperative is the largest private producer of electricity generated in an environmentally-friendly way for its own requirements. This is why it was awarded the Zurich Genossenschaftspreis (Cooperative Award) 2012. Already half of the general electricity required in ASIG rented properties comes from ASIG solar cells on the roofs. The tenants have commissioned a solidarity fund which provides financing for things such as ecology projects.




*Just plug it in: The multimedia outlet is the connecting point for all communication and entertainment devices.*




"The R&M solution embodies our philosophy in every way – living and more."

ASIG project manager Roberto Colella




*Modern, social rented property on Schaffhauserstrasse in Zurich. The project Living 11 provides value added thanks to modern multimedia homewiring. Photo: ASIG*

■ In the central communication distributor, the tenants can specify which of the individual services they want for each room or even each outlet. This effectively makes them master of their very own multimedia network.

■ Later extensions or cable retrofitting are no longer necessary as the infrastructure installed supports all today's connection technologies as well as those expected in the next few decades: a true reflection of ASIG's forward-looking thinking.

■ Independent subsequent installations by the landlord, which in the past often resulted in cable spaghetti, drilling and broken-through walls, can thus be avoided. The apartments retain their quality.

The question of quality played a central role when it came to choosing the installation technology. After long deliberation, the ASIG planning committee decided on the modular homewiring system from R&M.

**Value added in the outlet**

The outstanding component of the system is the compact multimedia outlet. It actually has five connections: three for coax or MiniDat cabling and two for twisted-pair copper cabling. This means, for example, that radio, set-top box and cable TV with feedback channel, telephone devices and computers can all be plugged into one single outlet.

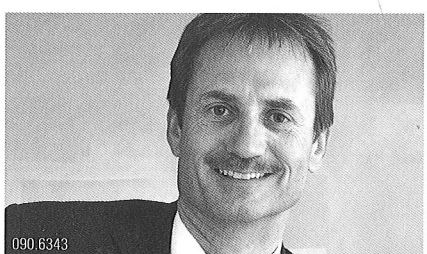
With one multimedia outlet per room and two outlets per apartment, ASIG can serve all their tenants' communication and media requirements. Standard cabling would have necessitated at least twice the number of outlets.

Additional empty conduits and dummy outlets were also installed so that, for example, FO connections could be installed in future with very little effort. "The R&M solution embodies our philosophy in every way – living and more," sums up a satisfied Roberto Colella.

As a domestic manufacturer, R&M also offered logistic support and the entire expertise for the installation and commissioning of the 163 apartment cabling systems. This meant all services could be implemented hand in hand with the planner and the installation company Holder Huber AG from Dällikon.

The ASIG cooperative met its goals exactly on schedule: Living 11 is one of the first residential projects in Zurich that is completely equipped with future-proof multimedia homewiring. Others will follow.

Roberto Colella concluded: "If you don't integrate homewiring from the very start, you will end up paying more sooner or later. Homewiring greatly increases the value of our properties!" ■

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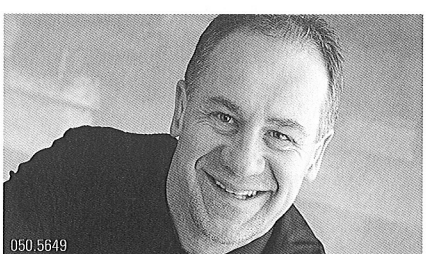


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# Cabling Certification – More Important Than Ever Before

**In the future, local data networks in offices, buildings and data centers will need "zero error" cabling. How can the high quality demands be reconciled with the planning and installation process?**

Broad-band chip sets will soon be storming the markets. They are paving the way to using 10 and 40/100 Gigabit Ethernet. But progress is still necessary in cabling – particularly in FO infrastructures.

To date, transceivers had no trouble correcting bit error rates stemming from physical causes. Compromises have to be made with these active components if you want to save energy and costs. Which is why cabling must make a considerable contribution to low-loss data transmission in future.

The result is zero tolerance in cabling. Material, components, handling and installation have to be subjected to uncompromising quality targets. And no compromises should be made in the acceptance inspection. Depending on the type and size of the network and the inspection equipment used, 3 to 10 % of the costs can be attributed to the measuring and certification of the cabling. Pricing pressure and the associated outsourcing of cabling work to subcontractors complicate quality assurance. Cutting corners here is likely to be an ill-advised choice.

**What does network failure cost?**

According to Contingency Planning Group, the failure of a company network can cost between EUR 12000 and five million an hour depending on the scope and branch of industry. In a similar survey, the Gartner Group cites EUR 32000 as the average cost. And those are only the estimable costs. The damage to a company's image is far more expensive.

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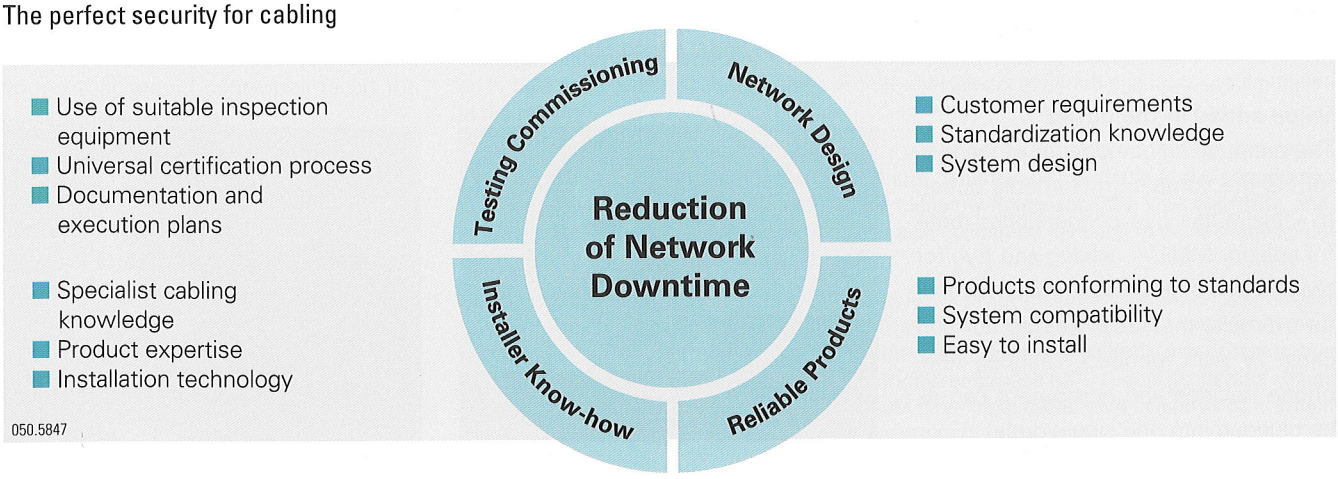
In such cases, you have to ask: Would it not have been less expensive to invest in a more secure, certified network?

The perfect security for cabling





What concepts can you employ to avoid such mishaps? R&M's understanding of quality would suggest there are four paths that must be followed with the utmost resolution.

**The four paths**

■ Network design: Technologies are changing all the time – particularly in the IT environment. Which is why planners have to be aware of customer requirements both today and in the future. Expert knowledge is also required because it is the only way to successfully implement well-thought-out IT concepts taking relevant standards into consideration.

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■ Reliable products: Users like to trust manufacturers' product guarantees. Using inexpensive no-name products may look interesting on paper – particularly if they come with declarations of conformity from a lab. But these often refer to hand-picked samples and not to the whole system. If you have ever had to replace cabling, you will be all too familiar with the risks of cutting corners when selecting products. In contrast, products conforming to standards – which are constantly tested during manufacture – ensure extensive system compatibility.

■ Installation expertise: Good products are only good if they are installed correctly. Alongside project experience, subject, material and product expertise are indispensable. Installation engineers should also be proficient in rational processes. They should be able to order the right products straight away, define the right cableway, use tips and tricks of the manufacturer and be able to install channels without any problem.

■ Testing and commissioning: Measuring the cabling in accordance with the specified standards will demonstrate whether the installation engineer knows what he is doing and whether the infrastructure is also equipped to cope with future applications. You will only save yourself both money and heartache if you demand measurement protocols without fail and always check them. A rational and universal certification process – supported by the manufacturer – is absolutely essential.

**The fifth element**

But it is also crucial to add a fifth element: Customers need all the security they can get. What people investing in a data network want most of all is security – the security that it is always going to work.

With its R&M Academy and the universal warranty concept, R&M provides compelling solutions. These include practice-oriented training sessions for planners and installation engineers, a well-thought-out warranty model and tailored support from an expert team that will provide support on site if necessary. ■



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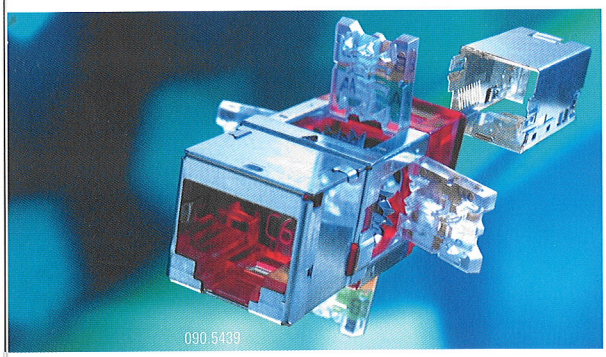
# High-Capacity Network for Educational Center of Excellence

**Alliance University is a private university established in Karnataka, India, and is recognized by the University Grants Commission (UGC) in New Delhi. It is a renowned university of higher learning located on an extensive state-of-the-art campus in Bangalore.**

The university has four academic schools – the School of Business, the School of Law, the College of Engineering and Design, and the Ascent College – and is in the process of establishing other academic units. Alliance School of Business is consistently ranked among the top ten private business schools in India by various ranking agencies.

Due to the large number of students resident on the campus, Alliance University has a large amount of data transmission. This is why it was looking for the best-quality structured cabling solutions to ease the strain on its network and ensure error-free, top performance long term. The emphasis on quality and durability was something that was critical to the networking system.



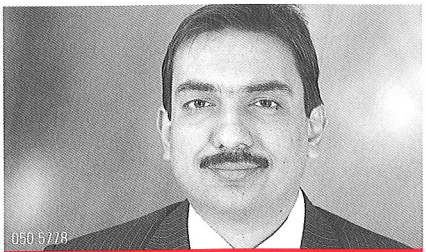

> "R&M has helped us commission a secure network with faster data transfer capabilities. R&M solutions corresponded perfectly to our requirements and we are sure that these products will be reliable in the long run."
>
> Santosh Kawari, Head of ITS at Alliance University

Alliance University conducted a survey of various brands and selected R&M because of the great emphasis the company makes on quality and innovative products.

After a thorough evaluation procedure, the university ultimately chose R&M to create the cabling infrastructure of its campus. Alliance was convinced by the solution put forward by R&M as it exactly matched the university's requirements and would also facilitate any future expansion plans. The decision-makers were also impressed by the consistently high quality of the R&M products.

In total, 7500 Cat. 6 UTP and 800 Cat. $6_A$ SFTP copper connections were installed as well as 600 fiber ports with OM3 and singlemode. The fiber optic cable used in the project totaled 30 km. R&M's security system was also of immense importance as it reduces concerns about possible downtimes.

Alliance University now has an ultra-flexible, high-capacity network to provide optimum support for data transmission on the campus. The system ensures loss-free and highly available data transmission and also brings with it long-term reserves for the future. Alliance University's expansion plans are now underway and the collaboration with R&M will continue for all work on the rest of the campus. ■

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# Trusting Your Instincts

Not too long ago, a code of conduct for employees, the Evolution Drivers, was developed at R&M – involving employees from all areas and hierarchies. And there were many discussions in the numerous workshops that accompanied the process. The most debated matter was the subject of trusting your instincts. We finally managed to agree on the following code of conduct: If, in important decisions, all "rational" lights are on green and only one team member's "internal lamp" is showing red, the decision should be postponed for 24 hours without questions being asked and reasons having to be found.

This happened on three occasions during my time on the executive board. In each of those three cases, a subsequent reassessment of the situation as well as a close examination of the reasons for the decision led to better results. But why do we always find it so difficult to trust our instincts?

**What is intuition?**

To be able to trust your instincts, you first of all have to accept that you have these instincts. The training and education systems of recent decades have concentrated primarily on knowledge transfer. But that only addresses the left-hand side of your brain. Intuition, something each and every one of us possesses, is "situated" in the right-hand side of the brain. And, in the past, has been quite wrongly neglected. As modern research shows, the fact that we have not developed and integrated both halves of our brain sufficiently represents an incredible amount of unused potential.

Intuition is said to be unconscious intelligence or "perceived knowledge". A quality that is prevalent in women in particular. We men may well find it difficult because we feel uncomfortable talking about feelings and feelings often cannot be described comprehensively in our language. This act of describing, on the other hand, is a function of the left-hand side of the brain which is usually better developed in men. And that is the crux.

Because intuition is often not even noticed and is not based on provable facts, our (management) society has difficulty coping with it. But using it – in combination with facts – represents fantastic value added and leads to better decisions because both sides of the brain are involved to the same extent.

**Telling the future: feelings or facts?**

Both in business and in our private lives, we have been fighting for years now with increasing instabilities and an uncertain future. Ever more frequently decisions have to be made under pressure and without having all the necessary details to hand. Furthermore, increasing complexity and quickly changing parameters represent additional challenges.

This is why many universities have started to include the development of this intuitive, creative potential into their learning program. According to recent surveys, around half of all decisions in management are now made with the "right mixture" of instinct and reason.

**The perfect mixture: openness and "space"**

So it all depends on the right mixture. Nothing can be done without instinct – but without knowledge and experience, you simply do not have the wherewithal to be able to assess this instinct correctly. I feel it is important to recognize that intuition is a complementary tool when it comes to making decisions and that it should therefore be an integral part of the management toolbox.

Unlike decisions based on pure logic, which are made relatively fast, intuition and the creativity it necessarily entails need plenty of time and space. So I hope that, in future, you will take the time to use your instinct more when it comes to making decisions. It's worth it! ■




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