CONNECTIONS 44

R&M
Convincing cabling solutions

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Ready for the Future

Dear Business Partners

As mentioned in the last issue of CONNECTIONS, I have been CEO at R&M since the beginning of September 2012. It is both a pleasure and an honor for me to be the first external CEO to lead the fortunes of this company together with my management colleagues, some of whom are new.

Last year we introduced a range of different measures to get R&M back onto a long-term path of growth. We are doing everything in our power to successfully implement our growth targets – helped of course by motivated employees, our high innovative strength and increased marketing. We also invested in our decentral sales organizations to ensure we can give you – our customers – even more support in your own locations.

We took up the challenges of the new year with great vigor. It is our declared aim to further develop the quality brand R&M at an international level and establish it long term in the strategic segments with our innovative solutions, using our existing values as the basis. We create compelling cabling solutions with maximum transmission security and top performance. Our passion for technology and innovation drives us to offer solutions of the very best quality with excellent service.

Communication technology is currently in a state of flux. More and more people are wanting to be online at all times in all situations. We are sending and receiving bits and bytes all the time. Computer, telephone, Internet and entertainment electronics are becoming our constant companions and are gradually merging with each other. Hardware and software, from smartphones to data centers, are becoming ever more efficient. The merging of systems is making new demands of network technology. R&M is ready for the future and is positioning itself as a solutions provider in the areas Office Cabling, Data Center, FTTx, Industrial Cabling and Health Care.

In this issue of our customer magazine, we particularly focus on network convergence, but also present newly developed products such as the future-oriented MPO module, and provide background information on trends in the FTTH sector as well as information on successful customer solutions all over the world. For the largest accident insurance company in Switzerland, for example, we not only installed next-generation office cabling in a listed building, but also created a brand-new, redundant tier-3 data center that can hardly be surpassed in terms of quality.

Together with the rest of the management team and our employees, I am looking forward to being able to present you with further pioneering products, systems and solutions in the near future.

Michel Riva | CEO
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Cover picture: Fiber Optic Networks are connecting the world.

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Network Convergence – Fiber Optics as the Connecting Medium

We are in a soccer arena. Thousands of sports fans get out their smartphone, take snapshots or short videos of the thrilling game. Then they upload them to their social media site to share their impressions with friends and family. Do you know what an incredibly large volume of data is being moved here at one go?

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High definition videos are sent home to grandma's Internet-capable TV in real time directly from the ski slopes.

It's probably hundreds of gigabytes or even terabytes during the game. Enormous amounts of data are transported between smartphones, mobile radio antennae, communication networks, distributors and data centers in this kind of situation. This scene is just an example of the latest trends in the world of information and communication technology (ICT).

More and more people are wanting to be online at all times in all situations. We are constantly sending and receiving bits and bytes. Computer, telephone, Internet and entertainment electronics are becoming our constant companions and are gradually merging with each other. We are now getting programs and computing capacity from remote data centers and storing data in clouds. Instead of looking for your ideal car at your local dealer's, you just configure it virtually and three-dimensionally online. High definition videos are sent home to grandma's Internet-capable TV in real time directly from the ski slopes.

Even our everyday needs – such as heating, energy and building control, our bank accounts, the weather forecast and medical diagnoses, the 3D construction

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of new machines and medical implants, vehicle navigation and traffic regulations… there are so many things nowadays that can be digitized distributed and used via convenient, Internet-supported information technology that does not depend on a particular location.

Constant increase in performance

Just a few years ago, triple play was seen as a major success: telephone, Internet and TV via one xDSL or cable connection from a single network provider. It was referred to as convergence = the growing together of IT, Internet and media that resulted in an integral communication package.

Today, expectations and visions extend a lot further. Hardware and software, from smartphones to data centers, are becoming ever more efficient. They offer us new, surprising functions every day. The effects of such innovations and trendy information and convenience requirements are boosting each other.

The mega trend of convergence appears to be bringing us closer and closer to unlimited communication in real time. Fixed and cellular networks, clouds and apps are creating amazing symbioses and thus new kinds of business opportunities.

Even smartphones are a product of convergence: They unite telephone, Personal Digital Assistant, digital camera, entertainment electronics, Internet access, video game console, measurement technology, navigation device, mobile office and a lot more.

Demand is exploding

However, with every new application, there is an increase in

- the volume of data to be transported,
- the need for an omnipresent Internet connection that can be used on the road, and
- the desire for loss-free, immediate transmission.

Global data traffic via the Internet is growing by 32 % every year. Consequently, the demand for bandwidth in the fixed network is currently doubling around every 18 to 20 months. Video transmission in particular is causing networks to be used virtually to capacity. In August 2012, YouTube reported that worldwide around 72 hours of video material is being uploaded onto the platform every minute. Annual growth rate: 100 %. Every month, YouTube visitors are loading three to four billion hours of videos on their Internet browser.

Storage specialist EMC estimates that 2.8 zettabytes of digital data were generated and stored worldwide in 2012. By 2020, that figure could reach 40 zettabytes. This figure is 57 times the number of grains of sand on all the world's beaches, according to calculations carried out by EMC.

Cisco forecasts from May 2012 predict that global data traffic on the Internet (IP traffic) will increase fourfold by the end of 2016. Mobile devices, particularly smartphones and tablet PCs, will then deliver more than 60 % of IP traffic.

Populous countries such as China, India and Brazil are only just starting to experience the massive spread of computers, smartphones, Internet and mobile applications. Only one third of humanity is online. Only 600 million subscribers have a fixed broadband connection.

In August 2012, YouTube reported that worldwide around 72 hours of video material is being uploaded onto the platform every minute.

Cisco forecasts further that in 2016, the number of devices with an Internet connection (IP devices) will exceed the number of people threefold. Networked devices such as smartphones, electricity meters, surveillance cameras and cars with navigation systems – the "Internet of things" – are constantly generating data. All these devices need a network connection or an antenna to be able to communicate.

Need for infrastructure

But there are still obstacles to overcome. The infrastructure we need to be online everywhere at all times is often lacking. Or it is too slow. And yet users are hardly even interested in how data gets from A to B. They simply want to be able to click on "Send" or "Download", regardless of the device and network access they are currently using, and the provider should have ensured that everything would run smoothly, immediately, without any complications or loss. From the point of view of a consumer, convergence between the different transmission paths and services is a matter of course.

So how should all the data, signals, pictures, movies, music and apps be transported immediately in the future? Standard copper and coaxial cable networks, and even cellular networks, will increasingly reach their limits for physical reasons if data volume and the trend toward the digitization of our everyday routines continue – which would seem to be the case. Which technology can best meet the challenges of the future?

The answer is clear: In the long term, full-scale FO networks can only provide the necessary data throughput and the required transmission speed for all subscribers in a network together with other technologies. Fiber optics have become the backbone of the networks.

Fiber optics unbeatable on long transmission paths

From a technical point of view, fiber optics have a lot going for them. In terms of bandwidth, data rate and range, fiber optics leave copper wire standing. Electromagnetic fields do not disturb the light signals. Shielding and grounding become superfluous. FO cables are thin and lightweight, guarantee tensile strength and impact resistance. Qualified installation engineers find them easy to route. But the assembly and maintenance of distributors and connectors need some care.

Something needs to be done if network operators hope to meet, long term, the requirements in terms of availability, bandwidth and speed. They should further extend FO infrastructures, bringing them ever closer to the customer. But for this to happen, there needs to be wide public support – effectively a kind of convergence of politics, business, society and administrations.

Some countries in northern and eastern Europe, in the Middle East and Asia, and even in Switzerland are doing pioneer work and resolutely treading the path toward the fiber society. In many locations, it is the competitors of the established telecommunications providers – such as public services, municipalities, utilities and cable network operators – who are taking over the role of pacemaker and investing in new FO networks.

The question is how network operators can more quickly master the balancing act between market requirements and

EMC estimates that 2.8 zettabytes of digital data were generated and stored worldwide in 2012. By 2020, that figure could reach 40 zettabytes. This figure is 57 times the number of grains of sand on all the world's beaches.

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The splice closure with Single Circuit Management helps network operators achieve their goals.

FO trend, the amount of investment and profitability. The buzzword convergence could also point the way to the future here: Network extension is easier to promote if strengths are bundled, synergies sought and different investments united. A range of successful public private partnership projects authenticates this approach.

Something needs to be done if network operators hope to meet, long term, the requirements in terms of availability, bandwidth and speed. They should further extend FO infrastructures, bringing them ever closer to the customer.

Convergent solution

Developments by R&M illustrate how you can implement convergence in terms of network technology and thus drive FO expansion. The cabling system R&M*foxs* unites FO solutions for all levels – from the data center or central office of the network provider through core, feeder and access network to the antenna location or private connection.

Five factors rationalize the installation and maintenance of R&M*foxs* components: the modular principle of the connection and distribution technology, the standardized Single Circuit Management (SCM) system for fiber administration, fast assembly technology, uncompromising quality assurance and effective security features.

With R&M*foxs*, the effort involved in familiarization as well as the time spent on assembly and maintenance are reduced by 30 % – in comparison to standard FO cabling systems. Well planned private and home connections can be established in just an hour. Distribution frames, street cabinets, splice closures, building entry points and subscriber management are configured flexibly to suit the requirements of the architecture, market, or regulation and location conditions of the network operator. In the end, the R&M solution also supports hybrid infrastructures in the drop, feeder and access area, in the building entry points and in cabling systems, in other words is totally compliant with the convergence concept. That makes it easy to unite copper and FO infrastructure or achieve partial or step-by-step migration. ■

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Step by Step to a Faster Network

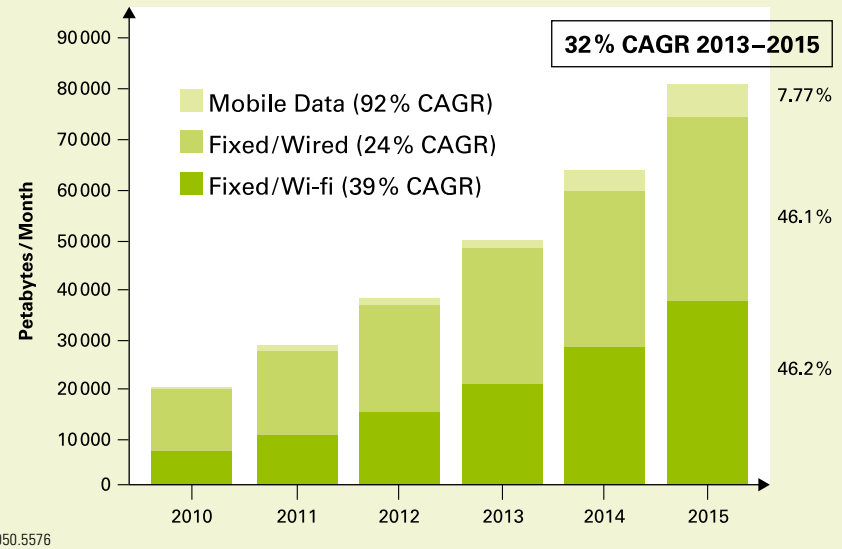
How can network operators get more bandwidth to their customers? That is a crucial question on the way to a gigabit society. Modern network technology offers a number of different approaches all of which, step by step, are pursuing the same aim.

Until the ideal state of full-scale FO infrastructure has been reached (see main article), network operators will draw on a large range of solutions – depending on the strategy, business model, investment possibilities, market and location conditions.

Large telecommunication companies often try to successively upgrade existing infrastructures. At the beginning of the broadband boom, ADSL was the solution of choice. You could use the existing copper cores and bridge several kilometers to the subscriber, but on the other hand only offer a maximum transmission speed of 10 Mbit/s.

In the meantime, many network operators have extended fiber optics starting from the core network to distribution points in town districts and villages and reduced the bottleneck of the last mile to one to two kilometers of old copper cabling. That does at least enable VDSL with a downstream speed of 50 Mbit/s. Those are acceptable transmission conditions for today's subscriber requirements, but they cannot hope to suffice long term.

Global IP Traffic by Local Access Technology



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The advent of FO and the survival of copper

DSL Vectoring is the name of a new trend driven by the investment protection of classical telecom providers (incumbents). FO infrastructures are taken to just a few hundred meters from consumers (Fiber to the Street, FTTS).

Source, figure left:
Cisco Visual Networking Index (VNI) Global IP Traffic Forecast, 2010–2015

Source, figure right: 2011 Alcatel-Lucent

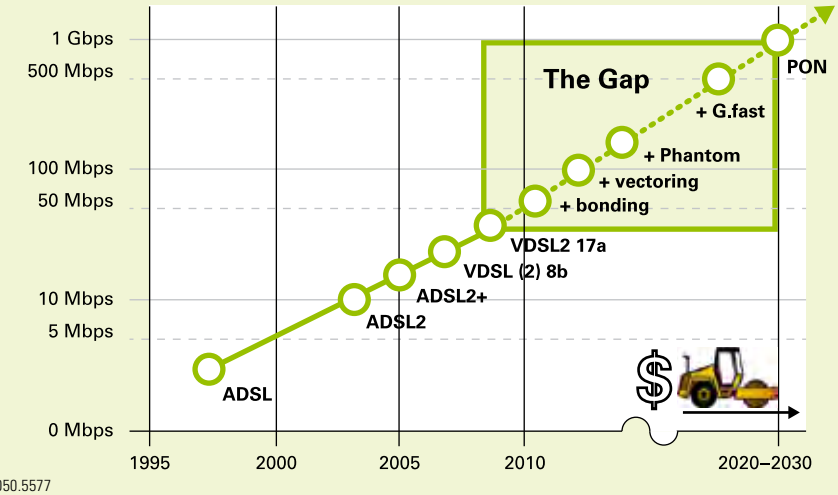
This increases the download speed to up to 100 Mbit/s over the last mile. The existing copper infrastructure will continue to provide good service on the last 200 to 300 meters for the next few years with the help of active noise suppression. A further DSL standard is expected in 2015: G.fast is to utilize the last physical possibilities of the old telephone and copper cabling and provide up to 500 Mbit/s. Under very good conditions, data rates of 1 Gbit/s are also possible.

Further increases in performance can only be achieved with Fiber to the Home (FTTH = fiber-optic cabling right into your home or apartment). For more details, see our TREND report "Progress in FTTH Technology" on page 30.

A further DSL standard is expected in 2015: G.fast is to utilize the last physical possibilities of the old telephone and copper cabling and provide up to 500 Mbit/s.

Shifting the limits of copper

Copper innovations allow operators to gradually build up their fiber network.



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Like the incumbents, cable network operators have also upgraded their access networks. The transmission standard DOCSIS makes it possible for them to offer 100 Mbit/s download speed, with upload being limited to 10 Mbit/s. The next step is to unite the Ethernet protocol with the coaxial cable, something known as EPoC. The standard is due to be approved in 2014 and will allow up to 10 Gbit/s for both upload and download providing corresponding frequencies are available. This will satisfy increased upload needs.

Cellular networks represent a further possibility for full-scale broadband coverage. Network operators are currently introducing the fourth generation, known as LTE (long term evolution). This technology provides up to 50 Mbit/s download and 25 Mbit/s upload speed. As it is a shared medium, the available data rate is split between the active participants. This can only be achieved by downsizing radio cells, leading to an increase in the number of antenna locations, mainly in conurbations. The antennae will increasingly be connected via fiber optics (FTTA – Fiber to the

Antenna) thus displacing conventional, coaxial connection technology.

What happens in the home?

Even if the data arrives in your home at an amazing speed, there is no guarantee that each individual consumer will benefit from that speed to the same extent. Full broadband coverage must not be allowed to end at the building entry point. This complex subject will be dealt with in detail at a later date.

Efficiency please!

At the other end of the line – in the central offices and data centers of the network operators – the network world is changing much faster and more dramatically than in the field or in offices and apartments which is not really surprising as they have to collect, process and transfer the growing data volume.

> Just one search in Google causes data exchange between up to 100 computers in less than one second. These dimensions can only be handled with high grade cabling.

This results in an enormous amount of data traffic particularly within the data centers – between servers, memories und distributors. Example: Just one search in Google causes data exchange

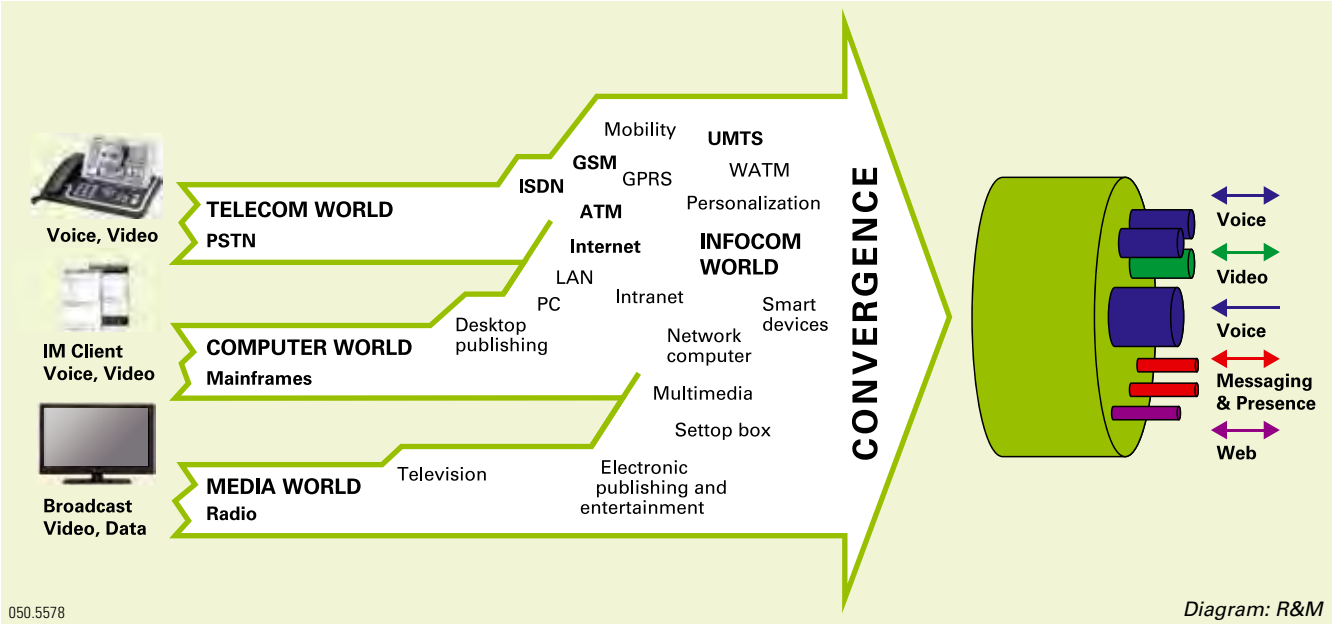

Diagram: R&M

In 2020, information and communication technology, with today's technologies, would consume around 50 % of the electricity available worldwide if current trends were to continue unbroken. Manufacturers of chips and electronic appliances as well as the operators of networks and data centers must therefore do everything in their power to optimize energy consumption with innovations in technology.

between up to 100 computers in less than one second. These dimensions can only be handled with high grade cabling which increasingly consists of fiber optics and which will exceed the performance threshold of 100 Gigabit/s Ethernet this decade. The technical development in transceiver chips is already aiming for the 400 Gigabit performance class.

With all the euphoria over network development, it must not be forgotten that this technology requires an enormous amount of electric energy. In 2020, information and communication technology, with today's technologies, would consume around 50 % of the electricity available worldwide if current trends were to continue unbroken. Today, the proportion is still under 10 %. Manufacturers of chips and electronic appliances as well as the operators of networks and data centers must therefore do everything in their power to optimize energy consumption with innovations in technology – with an increase in energy efficiency of 15 % every year, it would remain stable.

Convergence

The OECD has described the process of convergence in its report "Towards a Global Information Society". According to this report, convergence is the growing together of telecommunication engineering, IT and media which are then united on an interactive multimedia platform. When people talk about network convergence, they mean the capability to bring together communication media with different transmission technologies. This means local networks (LAN) can grow together with municipal networks (MAN) and wide area networks (WAN), fixed networks and cellular networks, individual networks and distribution networks, circuit switching can converge with packet switching, voice networks with data networks, corporate networks with IP networks or private networks with VPNs (from ITWissen.info). A supplementary definition from elektronik-kompendium.de: Convergence is the unification of two worlds thanks to one or more innovations. The prerequisite for convergence is the digitization of end devices, services and infrastructures.

The major challenge is thus: transporting ever more data ever faster, with greater security and more energy efficiency. The physical infrastructures will also be subject to the requirements of energy efficiency in future. ■

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R&M and its Top-Flight Solution for Lublin Airport

For over two decades, Poland has been experiencing intense growth, which translates into a large number of investments, among other things in transport infrastructure.

Even in the design phase, the airport was considered the most beautiful in Poland and the real thing confirms this.

Apart from the roads, the airports are a very important aspect – particularly the international ones. Since the country became a member of the European Union such investments are treated as top priority. A perfect example is Lublin Airport. The city of Lublin is the ninth largest city in Poland with over 350 thousand inhabitants. Plans to build an international airport had been circulating for a number of years but have now taken real shape since Poland implemented European Union structures. The Lublin Airport project received funding from the European Commission, together with money from both central and regional government, and work began in the fall of 2010. Even in the design phase, the airport was considered the most beautiful in Poland and the real thing confirms this. The terminal has three wings occupying a total of more than 11 thousand square meters. The airport has a direct railway connection to the city and further expansion of

THE R&M SOLUTION

- **Cable Category 7 S/FTP, 1200 MHz, 22AWG, 40 km**
- **Fully equipped 24-port panels, Cat. 6_A, 30 pcs**
- **Cat. 6_A termination outlets, 642 pcs**
- **OS2 fiber optic cable, 12 km**
- **UniRack splice type SC Duplex, 50 pcs**

the terminal was included as a possibility in the plans. The first phase implementation, according to the provisions, allows collision-free passenger service for one million passengers annually.

R&M had to demonstrate all the benefits of its R&M*freenet* system which make it perfect for use in the harsh conditions that prevail at an airport.

R&M Poland, as a manufacturer of structured cabling, was involved in the contract in the early stage of design in 2009. R&M had to demonstrate all the benefits of its R&M*freenet* system which make it perfect for use in the harsh conditions that prevail at an airport. For obvious reasons, regulations for IT systems were very strict. The safety and reliability of the operation of the whole airport depends on the quality of the IT infrastructure. R&M illustrated that the R&M*freenet* system is extremely functional as well as being safe from the standpoint of reliability. It also meets all the performance requirements necessary to support the latest IT technology used at the airport. The modularity and flexibility of the R&M solution allow the user free network development planning, another very important aspect. The performance of the R&M*freenet* system was one of the reasons why R&M was chosen as supplier of passive infrastructure for the airport. In order to protect systems from the external noise so common at airports, structured cabling is based on the double-shielded S/FTP Cat. 7 cable operating up to 1200 MHz of bandwidth. The high performance of the cables used guarantees support not only for present applications but also future ones.

Lublin Airport is state of the art in terms of safety, quality and modernity. This is true of the entire airport which has already won a number of awards. The R&M solution is perfect for the airport and the company will certainly contribute to ensuring the proper operation of this new airport in the heart of Europe. ■

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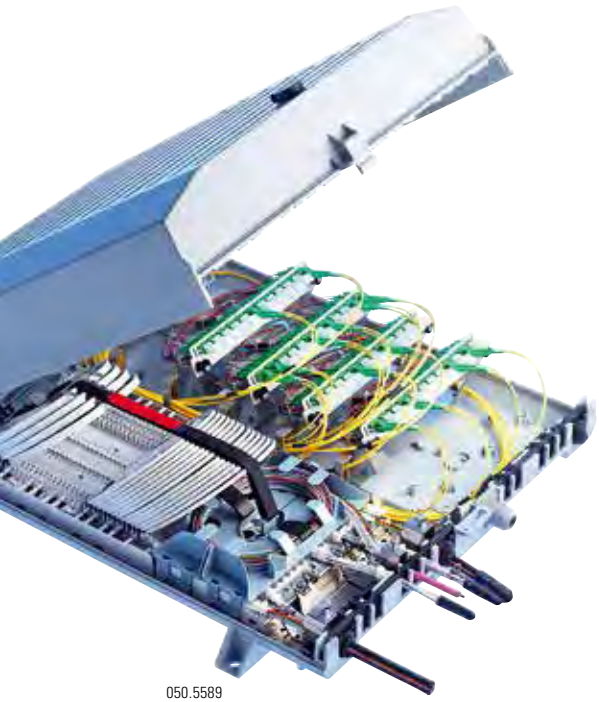
Venus: Multifunctional Distribution Cabinets for FTTH Access

The Venus family is now complete. R&M's Venus Box is now available in four different sizes for fine distribution in FTTH networks, for building entry points (BEPs) and in-house cabling.

With capacities of four to 864 splice or two to 192 patch connections, the Venus Boxes now cover virtually all packing requirements of fiber optic fine distribution – from smaller installations with just a few fibers to larger building entry points.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Venus FML, the smallest box in the Venus family, is easy to stow on a facade, in a cellar or on individual floors of a building. The Venus FML can accommodate up to six fibers or four adaptors. It is designed for use with R40 standard splice trays and standard connectors from the R&M range.

The Venus FLA with Single Circuit Management (SCM) is the solution for smaller apartment blocks and up to 12 subscribers. It is characterized by an increased level of flexibility: The box can accommodate 144 FO connections, divided between six trays of 24 splices. Or six trays each with one 1:32 splitter. Or 24 connectors of the types E-2000™*, SC or LC. For the backplane of the Venus FLA, R&M provides individually modifiable holders – also for active components such as DSLAM, converters, switches and antennae.

The largest model is the FXXL Box. It gives network operators a multifunctional distribution platform for larger delivery points both indoors and out. The FXXL can accommodate 864 slice connections on two carrier trays. Depending on the requirements, you equip the box with SE, SC and splitter trays from R&M's Single Circuit Management (SCM) system family. This means that up to 72 fibers or subscribers can be separated with SC trays.

When combined with a carrier tray and four patch inserts, there is enough space for 96 LC, SC or E-2000™* connections. With high density LC duplex, the packing volume is even greater at 192 patch connections. Up to four inserts with a 1:32 splitter can also fit in the FXXL Box. The factory-made recesses for cable inlets and outlets facilitate installation and enable the use of dropwire or cable inserts for sealing the box in accordance with protection index IP43 or IP54.

Further wall housings of the Venus family called FLA2 and FXL are already under development and will soon be available. ■

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


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Lavasa, a Modern Urban City Picks R&M for the Cabling of its Buildings


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Lavasa is India's first planned hill city and is being developed by HCC (Hindustan Construction Company). Located in the western region of India in the picturesque landscape of the Sahyadri Mountains, Lavasa is built on the concept of life in full i.e. "live, work, learn and play" in harmony with nature. A city planned for the entire spectrum of the population, Lavasa is one of the largest urban infrastructure projects in India and brings significant economic benefits to the region.

The ICT infrastructure network at Lavasa provides connectivity to various establishments for over 10 000 connections across the perimeter. R&M's cabling solutions were selected based on an extensive technical evaluation.

Challenge

As a futuristic, planned city with technology-centric environments, as well as various commercial and residential establishments, Lavasa could not afford down time on its network and needed a solution that would be fail-proof and would offer scalability, more density and high up-time while reducing the overall foot-print of the network room and server room. The project on the whole required a high level of ICT infrastructure planning in terms of both the solution and the materials. R&M's cabling solution was selected based on an extensive technical evaluation involving a series of technical presentations detailing the product advantages and their end-to end performance along with product demonstrations and sample tests for evaluation as part of the process. R&M backed up its standards-based, high performance solution with aggressive and firm delivery commitments. With Lavasa being a hill city, the terrain and the environmental factors presented a formidable challenge in terms of the solution and installation.


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"R&M has provided us with a network cabling infrastructure which is ahead of the standards in terms of performance. The products are aesthetically appealing and sturdy and backed by their 25-year system warranty giving us peace of mind that we have a future-ready infrastructure in place."

Abhijeet Waddkar, Senior Manager, IT, Lavasa

Solution

R&M proposed open frame racks with angled panels and 10 Gbit/s fiber backbone connectivity. The solution proposed keeps in mind future technology and growth requirements. The R&M solution provided high speed, scalability and plug-and-go connectivity on 10 Gbit/s fiber Ethernet. The angled panel was proposed with an open rack system that offers high port density in the racks while enhanced cable managers provide convenient cable management. The network was designed in a star topology on distributed network architecture. Various commercial projects such as hotels, educational institutions, hospitals, and offices along with the network rooms and main central network room are networked on 12 core multimode cable (OM3) which serves the backbone and runs through the main network room. Multiple color coding systems and colored patch cords were proposed for easy visual identification and better manageability. All the cables run through under-trunks or ceiling-ducts, as per the raceway path to their respective locations in the network and hub room. All the LAN cables terminate on 24-port angular patch panels which are hosted on open frame or closed racks.


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Even though each establishment has its own unique design totaling over 5000 ports, R&M handled the supply of material quite easily including increased and sporadic requirements during project implementation within short delivery periods. ■


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Hotel Holiday Inn Kiev:
Part of the InterContinental Hotels Group

The four-star Holiday Inn Kiev was opened in June 2012 and is the city's second hotel from the InterContinental Hotels Group. It has 208 rooms, 12 floors, conference facilities, a fitness center, a lobby bar with summer terrace and a lounge bar with panoramic views. The hotel is located in the heart of the city – opposite the Catholic Church of St. Nicholas.

The hotel design combines a freshness and simplicity of colors and shapes, and its proximity to the Gothic style gives it an impression of rigor and completeness. It is only a five-minute walk from the Olympic Stadium that hosted the UEFA European Football Championship final.

Situated in the heart of the financial district that is also home to the Ukrainian presidential administration, parliament, and governmental departments, the Holiday Inn Kiev is ideally located for both business and leisure travelers.

The part of the project involving the engineering systems was realized by the company "Sald" (system integrator), a partner of Synergia SE, exclusive distributor of R&M solutions in Ukraine.


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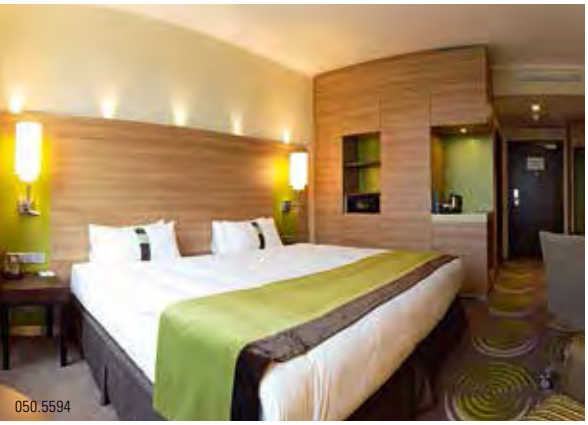
THE R&M SOLUTION

- **Cat. 6a S/FTP installation cables (1.5 km)**
- **Cat. 5e UTP installation cables (62 km)**
- **Cat. 5e UTP modules (1200 pieces) in outlets**
- **Cat. 6a FTP modules and patch cords in backbone links**
- **Cat. 5e UTP patch panels (55 pieces)**
- **Patch cords**
- **Color coding security system**
- **VS Compact 19" cross system (15 25-pair modules and 70 10-pair modules)**

Sald Ltd takes care of the design and installation of engineering systems in a whole range of segments in all complexities: banks, offices and business centers, hotels, shopping centers, residential buildings, public buildings, etc. The company was founded in 1994. Over the years, they have implemented more than 1500 projects. Engineering systems have been installed and are still operating successfully at 500 projects of varying degrees of complexity.

Andrey Kuraksa, IT director at Sald Ltd: "Sald has really good experience in the hotel segment in Ukraine. But the Holiday Inn is an international hotel which is part of a very famous hotel group – Intercontinental. Furthermore, the building was connected with EURO 2012 making it a significant project for us. In terms of telecommunications, we needed a well-known international company that could guarantee the best quality. R&M represents Swiss quality and has an outstanding track record in the hotel business all over the world, including in famous international chains. So R&M seemed an obvious choice for this project. In Ukraine, R&M is represented by the company Synergia, a partner of ours for many years now. It is down to this synergy work and cooperation that the Hotel Holiday Inn in Kiev has turned out so well!" ■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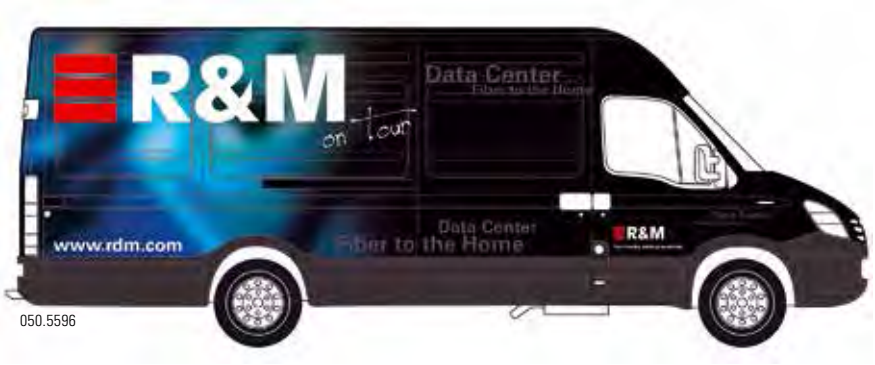

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R&M On Tour: Roadshow 2013

In the spring of 2013, R&M is launching a roadshow to give customers and partners the opportunity to meet industry experts from R&M and discuss the subjects of FTTH and Data Center. The systems R&M*foxs* and R&M*freenet* will be presented at various locations in Germany, Austria and Switzerland.

From April to July, the entire fiber optic cross connection system R&M*foxs* will be the focus of the mobile exhibition. This modular system unifies all the factors that network operators need for a successful FTTH future. The proven Single Circuit Management (SCM) family from R&M is the basis of smooth, high-density fiber and subscriber management on all platforms, whether Optical Distribution Frame, splitters, dome closures or building entry points. Concentrating on a few, easy-to-handle core components that can be scaled to any desired level simplifies planning, assembly, maintenance and modification and thus reduces the total cost of ownership. The R&M*foxs* system stands out due to its simple operation and quick assembly, largely without any tools. Pre-terminated and factory-tested units must only be clicked into the housing. Many distribution systems and residential connections can be set up as much as thirty percent faster than conventional cabling systems. The roadshow covers topics such as the evolution of PON networks and the corresponding effects on Layer 1. We talk about how hunger for broadband is constantly growing worldwide and how that in itself necessitates the development of new PON technologies in fiber networks. This technology evolution also has an impact on the passive infrastructure. Customers and partners can test the products on location.

From August, the second part of the roadshow will be focusing on R&M solutions for flexible and reliable data center network infrastructures. R&M's comprehensive range of data center products will help you to find the optimal infrastructure design, saving costs by reducing installation and reconfiguration time while keeping the future requirements of the network in focus. End-to-end modularity includes a mixture of transmission technologies within the same platform and simplifies planning, installation and operation. With the record-breaking 40G transmission demonstration, we have proven that superior quality has a significant impact on network performance – ensuring maximum throughput and reliability for your Ethernet and fiber channel links. Our uniPhy system automatically detects changes in the infrastructure and generates up-to-date documentation in the form of network drawings and customized reports. The integrated work order management system ensures efficient and controlled execution of MACs through their entire lifecycle. R&M is the right partner for any organization that is looking for reliable advice and tailor-made cabling infrastructure. We will help our customers optimize their next-generation bandwidth requirements for computer systems and storage networking applications. ■

More on Data Center:
www.datacenter.rdm.com

More on R&M*foxs*:
www.ftth.rdm.com


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The HD MTP System – More Reliable, Simpler and Faster

The increase in FO links in data centers leads to a shortage of space. Amazing progress can be made with the flexible, bend-insensitive multimode fiber BIMMF and innovative connection technology, as can be seen with the HD MTP System from R&M.

R&M has devoted considerable attention to the pressing needs of data centers. The entire FO range for data centers is converting to bend-insensitive multimode fiber in 2013.

The number of network ports in data centers is on the increase. The cabling has to be greatly densified to ensure that it can be accommodated. And that entails major challenges for FO infrastructures.

At the same time, data center managers and network administrators are concerned that part of their network could fail. The risk is either in the area of patching or in the area of trunk cabling. Not everyone sticks to all the specifications for patching and the minimum bending radius is often undercut. In trunk cabling, the mounds of cable can lead to mechanical stress and pinching.

R&M has devoted considerable attention to the pressing needs of data centers. The result is that we are changing the entire FO range for data centers over to bend-insensitive multimode fibers, BIMMF, in 2013.

R&M is launching a new, modular cabling system on the data center market as a platform for BIMMF applications. It will set unrivaled standards in terms of port density and the efficient use of space, in terms of reliability, modularity and ease of installation.

New Data Center range

The new system for data centers consists of Type S MTP modules, MTP adapter plates, HD panels, MTP trunk cables and patch cords. R&M delivers the Type S MTP modules pre-terminated. Simple handling thanks to fast assembly technology and one-hundred percent factory testing help exclude installation errors. Furthermore, the HD System is already uniPhy-compliant which means the administration and monitoring of the numerous connections can be automated.

More on the HD MTP range:

■ MTP trunks: The trunk consists of an optical cable with factory-terminated MTP connectors at both ends. The MTP trunks are available in different fiber types. When ordering MTP trunks, R&M

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recommends fitting the "male" connectors with alignment pins at both ends. The advantage: The trunk can also be used in a later migration to 40G Ethernet. The network only has to be extended and not rebuilt.

■ MTP modules: The Type S modules convert MTP connectors in the trunk to connectors needed in transceivers. This means you can make much more efficient use of the small space.

Some features of the Type S modules rationalize the installation process. They make it possible to use the same modules and patch cables at both ends without having to invert the duplex connectors or configure something else to maintain the polarity. Clever fiber guidance inside the modules makes this possible. The color coding on the front

Simple handling thanks to fast assembly technology and one-hundred percent factory testing help exclude installation errors.

makes it possible to identify the type of fiber and polish at a glance. The Tx and Rx interfaces on the back are clearly marked. The modules are easy to exchange if your expectations of connectivity should change. The trunk cabling stays exactly where it should be – in the double floor or in the cable guide. This simple and straightforward procedure saves time in installation and reduces the pressure placed on infrastructure to a minimum.

Using BIMMF is an additional guarantee for stable operations in data centers but not a license to "patch as you please". 1G Ethernet is still pretty unforgiving. And you cannot afford to make mistakes with 10G and 40G, making loss-free and carefully routed cabling more important than ever before. ■

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R&M Provides a Robust and Highly-Secure Cabling Solution

for HyperOne Hypermarket's Network Infrastructure

HyperOne is one of the biggest hypermarkets in Egypt. This massive retail facility carries a broad selection of products including a wide range of fresh food, fast moving goods, non-food commodities, textiles and furniture.

The first retail outlet of this mega store was opened at the entrance to Sheikh Zayed city and stocks over 60 thousand items. The branch has seen a daily footfall of 65 thousand visitors in summer and 35 thousand visitors in winter. This overwhelming success prompted expansion and the chain looked to establish a second branch at Tenth of Ramadan City on the Cairo Ismaileya Desert Road.

One of the critical requirements for the new outlet was to have a robust network infrastructure in place in order to run sensitive online applications necessary for the retail process. The cabling used for this network would have to withstand harsh operational conditions such as large temperature variations and the effects of powerful electric fields generated from the coolers and ovens distributed throughout the hypermarket. This tolerance was absolutely vital to the smooth operation of the network.

Furthermore, beyond the physical robustness of the system, network security was earmarked as a key consideration given its use for sensitive online applications and monetary transactions at checkout counters.

> "R&M is well known in the market for having the highest quality products and the fact that they offer a 25-year system warranty is clear evidence of this."
>
> Amr Afify, Network Unit Manager at HyperOne

Amr Afify, Network Unit Manager at HyperOne, elaborates: "When we decided to invest in the infrastructure for the new retail outlet, we were determined to account for every factor so as to assure the long-term performance of the system. Through our careful evaluation

of the structured cabling market, we were able to identify R&M as the vendor of choice. Their broad product portfolio and expertise in both copper and fiber optic cabling meant that we could rely on them to deliver the best cabling solution. The company is well known in the market for having the highest quality products and the fact that they offer a 25-year system warranty is clear evidence of this."

Convinced by R&M's innovative cabling solutions and excellent support services in the country, HyperOne began the installation of a complete copper and fiber optic cabling infrastructure for its network. The implementation was carried out by QUIP, R&M's certified partner in Egypt. The project involved R&M's Real10 Cat. 6 SFTP copper cabling solution and OM2 fiber optic cables. These were selected as they could withstand all environmental conditions as well as the effects of electric fields generated by devices within the hypermarket.

In addition, to ensure that the components matched and surpassed the required Ingress Protection (IP) ratings, R&M indoor cabinets were deployed. Thanks to this, the physical infrastructure can now withstand extreme mechanical, ingress, climatic and environmental conditions.

Given the sensitive nature of applications being deployed on the network, special considerations were made beyond the physical influences. R&M's three-layer security system was implemented to mitigate human error and prevent the cabling systems from being manipulated either intentionally or unintentionally. The security system also provides up-to-date information on the network's status and lets HyperOne reduce the cost of changes and extensions during scaling of the network.

Engineer Hisham Magdy, Network Administrator at Hyper One, commended R&M's professionalism throughout the project: "In any project, the actual performance of the network is essentially dependent on the components being used and their installation. With R&M, we now have an application-neutral network that is consistent, durable and future-proof. The added advantage is that with R&M's security systems, we also have complete control over the entire solution."

Effat Ahmed, QUIP Managing Director, concludes: "The key to winning the contract and carrying out a successful implementation is the fact that R&M has a local presence through QUIP, great technical capabilities and top-quality Swiss products. We have built a great working relationship with the customer and hope to extend this to future projects as well."

Thanks to the overwhelming success of the project, HyperOne is considering R&M as a preferred cabling supplier for its new branches. ■


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A Genuine Alternative to Splicing – the FO Field from R&M

Field terminable connectors instead of splicing. That would be a dream come true for many FO installations. R&M has understood the needs of the industry and developed the first field terminable LC connector which offers a genuine alternative to splicing. The FO Field is ready to be launched.

The field terminable connectors for FO cabling currently available on the market have serious disadvantages. Their mechanical and optical characteristics do not come up to the values of conventionally manufactured and factory-tested connectors of a pigtail or patch cord. Splicing on site is often the only answer…

> APC solutions are already common in Europe and in many other markets because they are more future-proof and support video overlay.

Their greatest weakness: the optical values, in particular return loss. Virtually all well-known solutions use a 0° cleave to manufacture the fiber junctions in the connector. Even with the help of modern index-matching gels, return loss (RL) cannot exceed 45 dB in this procedure. It is simply not physically feasible.

The field of possible applications for singlemode PC connectors is very limited. These products are only used as the last connector in the outlet or for repair purposes. They are certainly not suitable for high performance links in structured cabling that require low insertion loss connectivity.

Professional and quality-conscious users of FO cabling demand precise APC contacts (APC = Angled Physical Contact) for the entire transmission path. In this solution, the fiber polish is 8°. That reduces reflections and improves light transmission. In other words, better attenuation values are achieved. APC solutions are already common in Europe and in many other markets because they are more future-proof and support video overlay.

Assembly in just one minute

And it was at this high level that R&M positioned its latest development project. The aim was to develop a field terminable APC connector, the FO Field. It was to comply with upcoming standards* and fulfill R&M's uncompromising quality philosophy. Installation engineers should not have to depend on expensive splicing devices or any other appliances when it comes to termination. Assembling a connector should take a minute at the most and the connector should be able to be reassembled.

> Installation engineers should not have to relys on expensive splicing devices or any other appliances when it comes to termination.

The result: an LC connector for singlemode fibers and APC polish (SM APC) with top-class performance in the Grade C/1 range. At this performance level, insertion loss is under 0.5 dB and return loss over 60 dB (IL ≤ 0.5 dB each-to-each, RL > 60 dB plugged, > 55 dB unplugged) – always referring to the connector and fiber junction together. The new field terminable FO Field connector adheres to the modular principle of all R&M solutions. It can be used to assemble both full and compact fibers of 0.6 to 0.9 mm diameter. A crimp-free strain relief was also developed specially for cables of up to 3.0 mm.

The field terminable LC is available for SM PC and SM APC cabling as well as for multimode cabling of categories OM2, OM3 and OM4. The SC type is due to follow shortly.

Simple tools will do

Installation engineers require hardly any tools to assemble the FO Field. A pair of scissors, wire strippers and a standard cleaver are all you need. You simply cut the fiber at the required point, position it in the fiber guidance, put the components together – and you've got your LC connector. And the only thing you need to check that fiber contacting is correct is a standard infra-red source. If the light goes out in the semi-transparent side window of the housing, the connection is perfect.

Depending on the performance aimed for, you can use existing 0° cleavers for assembly (up to RL 40 dB for PC and RL 45 dB for APC). So initial costs are low. You start off with existing or standard tools. If installation engineers want to attain RL Grade 1 (> 60 dB plugged, > 55 dB unplugged), they can obtain a new kind of 8° cleaver from R&M that is extremely easy to use.

The cost-benefit equation shows that the field terminable connector is the perfect solution for many FO projects. It is easy and fast in terms of implementation and can be used in large numbers. You just have to provide cables and components. Installation engineers do not need any additional special training. The classical procedure, on the other hand, requires the provision of valuable pigtails and the deployment of splice specialists, devices and protection.

The cost-benefit equation shows that the field terminable connector is the perfect solution for many FO projects.

Field terminable connectors from R&M are thus the alternative to splicing everyone has been waiting for – both technically and commercially. ■

* *Field terminable FO connectors are not explicitly standardized. Classification refers to applicable, previously available standards. Future standards will, however, require field terminable connectors to fulfill performance levels Grade C/2 and Grade C/1. The new development from R&M is already offering this performance today.*

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More Safety and Security for Swiss Insured

The goals set for the new Suva data center were tough: triple the performance with no change in footprint plus the ultimate in safety and security. In fact, the public Swiss insurance company did quite a bit more for its 1.9 million insured. Suva geared up its networks for the future without interrupting regular operations.

The time was ripe for a new data center. Suva wanted to install a brand new data center at its headquarters in Lucerne. The data center was supposed to meet the highest standards of a modern IT infrastructure and be designed for a service life of 15 to 20 years. All electric installations had to comply with at least the Tier 3 availability standard. The new IT was to deliver three times more performance than the old. The desired capacity was 600 kW – driven by an 850 kVA power supply system. The backbone was to be rated for the use of 40 Gigabit Ethernet (GbE); the server to be connected with 10 GbE.

These requirements are certainly typical of a responsible insurance company today that is forward-looking and oriented to safety and security. Yet Suva made additional, highly specific requests of the planners, installers and IT and cabling suppliers. It wanted the new data center to be housed in the same space as the old one. Space for further expansion and for a 100 GbE infrastructure was also supposed to be figured in. In other words, the installation had to be much more compact. The project was also supposed to be finished within a year, which required precise planning and just-in-time deliveries. Afterwards Suva IT Project Manager René Zubler summed up the task in a nutshell: "Planning was the best imaginable; the schedule was an athletic challenge."

Great planning – intensive training

"Incorrectly planned systems rated for a service life of ten and more years can incur high costs if they need to be subsequently upgraded or retrofitted," René Zubler said from experience. That is why the IT Department at Suva first invested in good planning. The SUVA Project Manager: "A data center should always be planned with an eye to the future." The design had to accommodate successive expansions. The partners were also selected according to this approach. R&M was among them as the supplier of the copper and fiber-optic infrastructure.

Andy Koller and Pascal Javet, the two men in charge of the network at Suva: "We decided on products from R&M in the Suva submission process." The R&M Data Center range fit the planning to a tee. As an additional service, R&M produced a manual with clear specifications and guidelines to simplify planning and installation. At the start of the project, R&M trained all participating installers as part of its Qualified Partner Program (QPP). Suva considered this initial workshop essential for ensuring that the project went smoothly. Based on the planning and intensive QPP training, R&M granted a system warranty of 25 years, which was another decisive factor for Suva.

Following these comprehensive preparations, the project proceeded exactly as planned, from the removal of the old data center to the installation of the new infrastructure. The handover to Suva occurred punctually on the desired deadline in June 2012 and Suva put the new data center into productive operation even before the summer holidays. While construction progressed, Suva ran a provisional data center that had been set up in the underground garage of the building at Rösslimatt.

The partners in the Suva project

Suva IT/network:	Pascal Javet, Andy Koller, Kurt Dormann, René Zubler
SCS, headquarters:	CKW Conex AG; Frey & Cie Elektro AG; Maréchaux Elektro AG; Edwin Würsch AG (electrical planner)
Data center:	Etavis AG; Charles Wyss, Kiwi AG (overall project manager); BDS AG (general planner)
Suva agencies:	Regional planning and installation companies

Suva: safety for working people

Suva is an independent Swiss company incorporated under public law and insures about 118000 companies and 1.9 million working people against the consequences of accidents and occupational diseases. This insurance company has been in business since 1918 and has about 3100 employees at its head office in Lucerne, its 18 agencies and its two rehabilitation clinics. It generates about CHF 4.4 billion in premiums. The services provided by Suva encompass prevention, insurance and rehabilitation. Suva is self-financed, operating without government subsidies. It returns any profits to its insurees in the form of lower premiums. The social partners – employers and employees – are represented on the Board of Directors, as is the Swiss federal government. **www.suva.ch**


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The new data center consists of multiple self-contained cubes with sealed-off hot aisles. Sufficient reserves have been provided for further expansion based on long-term planning. Color coding and individual labeling of the cables, as well as other security features, help to guarantee the constant high availability desired for the passive infrastructure.

An uninterruptible power supply (UPS) with a high efficiency rating exceeding 93 % keeps the data center in operation at all times even in the event of bottlenecks. Pendulum gates provide full access control. Multi-stage fire detectors and a two-zone fire extinguishing system of the latest generation make the data center and the work in it as safe as possible.

New cabling overnight

The data center is just one of several IT modernization projects the insurance company is carrying out. The administrative building on Fluhmattstrasse in Lucerne, a venerable Baroque structure, also shines with the new cabling recently installed in it. Products from R&M were selected for this project too as part of the Suva submission procedure and in compliance with the contract awarding process.

A generation change had to be made to enable the network to handle the growing requirements in safety, security and operations and to accommodate more services. As with the data center, the installation work on Fluhmattstrasse had to proceed without interrupting regular operations. Horizontal cabling in the corridors was installed during the day. When Suva employees went home at night, their offices were cabled. Using this method, a total of 230 kilometers of new cabling and 3000 links were installed in a short time.

The installation team went through all the installation steps like clockwork night after night, office after office. The next morning, the Suva employees were able to continue working without interruption. The only visible difference is this: The network cables for their computers are now plugged into the red Cat. 6_A connection modules from R&M and transport data much faster than ever before. ■

THE R&M SOLUTION:

- **In general, RJ45 Cat 6_A/s, 1200 MHz SF UTP cable**
- **Pre-terminated 12-fiber FO OM4 cables with LC connector**
- **Color-coded connection cables and patch cords (some labeled)**
- **25-year system warranty (QPP)**


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Glossary of Transmission Technology
Today: Bandwidth vs. Data Rate

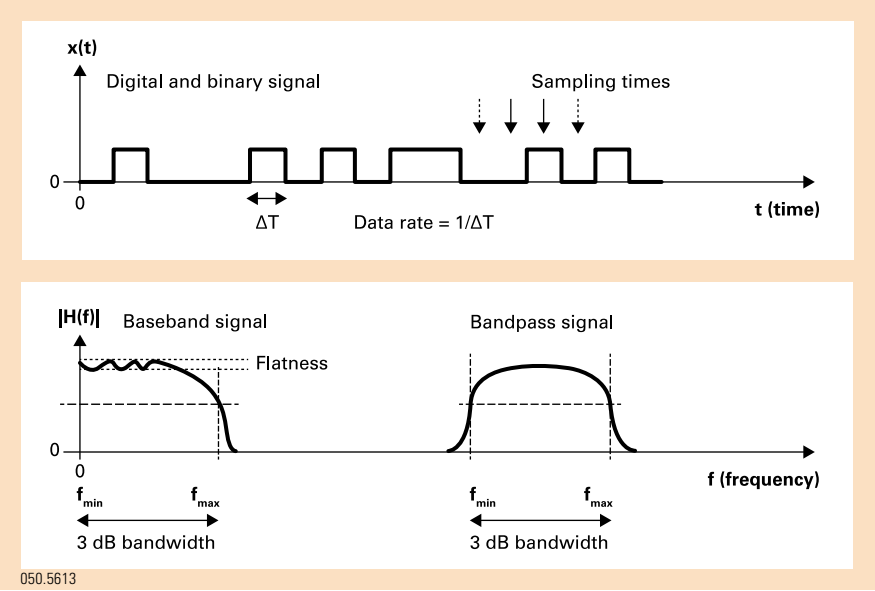
R&M aims to provide more security in communication. And that also means using the right terminology in the right way. With this glossary, we want to help everyone – laypeople and experts, users, partners and of course R&M itself – use a common technical language.

Bandwidth = usable frequency range
The bandwidth specifies a usable frequency range (= passband) in which the dominating parts of a signal to be transmitted lie. Generally spectral signal parts with less than 50 % drop in performance (-3 dB) are defined as dominating. Exact signal generators also define what is referred to as flatness within the passband (= amplitude differences of the spectral parts to be transmitted) that are usually in the 0.1 dB range.

An upper and lower cut-off frequency (f_{min}, f_{max}) determine the bandwidth which is specified in hertz = 1/second. If the lower cut-off frequency is 0, people talk about baseband signals, otherwise about bandpass signals. In the case of baseband signals, the sampling rate must be greater than 2 × f_{max} in order to be able to fully reconstruct the signal theoretically (Shannon-Nyquist sampling theorem).

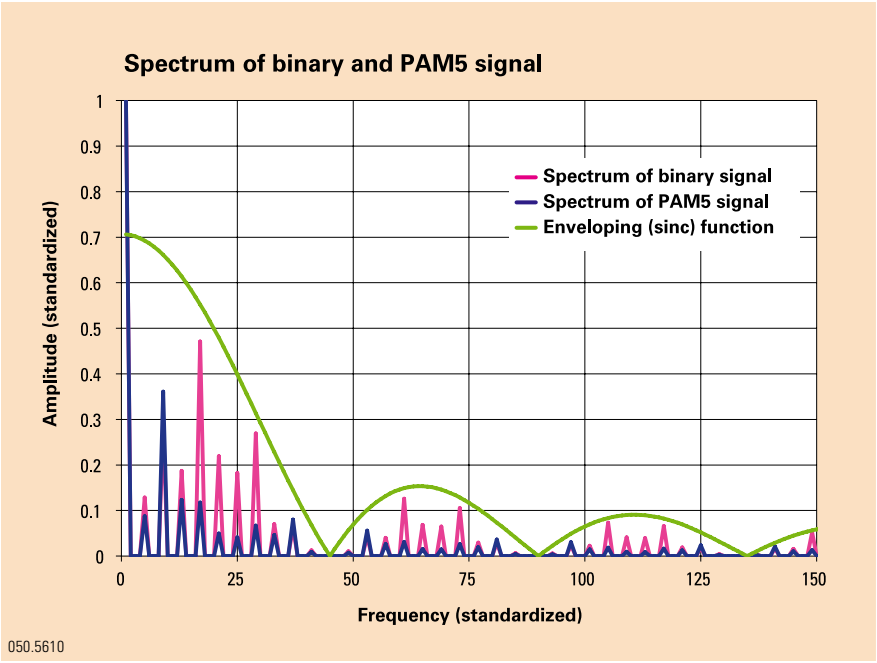
In spite of the fact that they use the same physical unit, the bandwidth must not be confused with the frequency. The term can be used in a number of ways. On the one hand, it refers to a specific line in the spectral range (e.g. carrier frequency). On the other, it also refers to the frequency specification of pulse repetitions (which is why it is often seen as "x MHz clock").

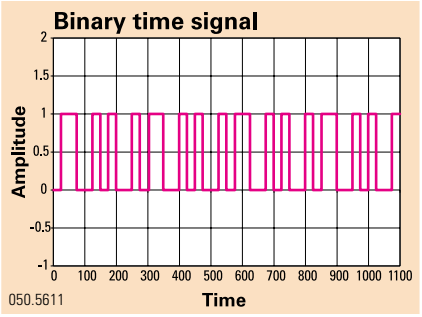
Data rate = bit per time unit
The data rate or bit rate specifies how many basic units (bits) per time unit are transmitted whereas the information rate represents the capacity without the overhead. The symbol rate describes higher information units whereby a symbol (baud) consists of a sequence of several bits. The data rate can thus only be defined for digital signals and gener-

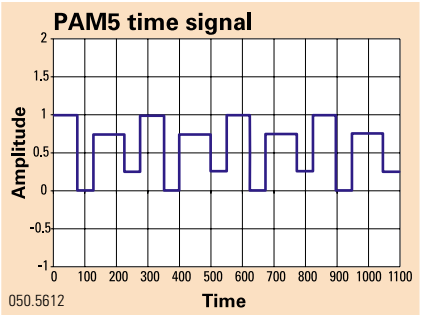


Top: The data rate specifies how many basic units (bits) are transferred per time unit.

Bottom: The bandwidth of a signal transmission is the usable frequency range.







The graphic on the left shows the spectral analysis of two temporal signals whereby a multi-phase signal allows more efficient bandwidth transmission than a binary one does. Diagram: R&M

ates a specific bandwidth. Conversely, a bandwidth does not generate a data rate but instead limits it.

Analog signals require or likewise generate a specific bandwidth. This means that you cannot actually tell whether a frequency response is an analog or digital signal. Bandwidths can be limited using filters to avoid parasitic induction.

Spectral efficiency can be influenced with the symbol rate. The optimization involves as many bits as possible being allocated per symbol and several voltage levels being used. The spectral or bandwidth efficiency is specified in the unit $\frac{bit/s}{Hz}$.

The spectral efficiency of 10GBase-T is, for example, five times better than that of 1GBase-T, 15 times better than 10GBase-SR4 [1], 1.3 times better than LTE, 1.2 times better than standard telephony and equally good as the forthcoming 40GBase-T.

There is a connection between bandwidth and data rate: For a specific bandwidth B, there is a maximum channel capacity C (in bit/s) in which error-free transmission is theoretically possible [2]: $C = B \times \log_2 (1+SNR)$. SNR is the Signal to Noise Ratio.

As we have already explained, the bandwidth refers to a specific drop in performance of spectral parts. For the above formula, however, a drop of 0 % applies to the entire nominal bandwidth. That means any possible frequency-dependent performance fluctuations of the transmitting system have to be taken into consideration [3]. In fact, the 3 dB bandwidth for insertion loss is just 2 MHz for class E_A cabling although around 500 MHz are required.

But it is the frequency content of the analog or digital signal that counts. Because according to the Fourier theory, there is a connection between a temporal signal change and its generated spectral part. The theory says that any signal can be simulated with a sequence of sine functions. A binary signal does indeed have the spectral part f = data rate, but also other frequency shares. Their strength depends on how steep the edge of the binary signal is. A time signal always has a corresponding frequency spectrum [4]. ■

1 The comparison refers to the RF/ modulation bandwidth.

2 Applies to AWGN channels. In acc. with Claude E. Shannon, "The mathematical theory of communication", 1949.

3 PSD of the sender, frequency selectivity of the receiver as well as insertion loss of the transmission system.

4 The discrete Fourier spectrum X[m] of a sampled time signal x[n] with N sample values is calculated as follows:

$$X[m] = \sum_{n=0}^{N-1} x[n] \cdot e^{-j\frac{2\pi}{N}mn} \quad \Big| \quad m = 0,1,\ldots,N-1$$

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Fiber Optics Powering Trains to the Future

A modern railroad track is much more than a way of transporting people and goods. With the right cabling, it becomes a multimedia data highway. Together with its subsidiaries, the Swiss railway company SBB is constantly extending and renewing its data networks, as can be seen in a project in eastern Switzerland.

Pilot project: renewal of railroad track "Wil-Weinfelden"

The railroad in Thurgau has been working since 1911. The regional trains of Thurbo AG, a subsidiary of SBB, transport around 86500 passengers every day between Lake Constance and Toggenburg. Thurbo AG is one of the most well used railways in Switzerland and is one of the top performers among the regional railways in terms of customer satisfaction.

Large sections of the Wil-Weinfelden rail infrastructure had come to the end of their useful life. Many track sections, signal boxes, barriers (crossings) and systems no longer satisfied today's technical requirements. As the owner of the Wil-Weinfelden track, Thurbo AG commissioned the SBB infrastructure to thoroughly modernize this section. Almost CHF 50 million were invested between the spring of 2011 and the fall of 2012.

Four electronic signal boxes, new safety equipment and access for the disabled were built during this time. Furthermore, new conduits with copper and FO cable were laid along the embankment. To be able to conclude the project as efficiently as possible, both in terms of time and money, the 22-kilometer stretch with its four stations and four stops were taken out of service for six months.

Railway telecommunication mainly with optical fiber

SBB and its subsidiaries operate one of the best railway systems in the world. But there is much more to it than that: They also maintain one of the largest and most innovative telecommunication networks in Europe, "under their own steam" so to speak. The redundant FO network covering several thousands of kilometers was laid along many towns and villages in Switzerland and is constantly being extended.

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FO network integrated in R&M*foxs* distribution frames

In the Wil-Weinfelden project, a new FO network was installed for rail telecommunication to ensure fast connections and redundant networks.

R&M's state-of-the-art solution was chosen for flexible FO distribution: the R&M*foxs* cabling system with the Optical Distribution Frame (ODF). Both the outdoor cabinets along the track and the distribution frames in the station buildings were easy to install. The modular principle and R&M's fast assembly technology helped the technicians during assembly. Up to 680 FO connections were plugged. The pre-terminated ODF inserts with the distribution technology were installed in next to no time. The entire FO network went online at the end of August 2012.

What has been learned from the FO project

The rail specialists confirmed that the project was characterized by, "Uncomplicated handling, no superfluous components and cost-conscious planning." And that was exactly what the SBB infrastructure had intended: Those responsible only wanted to carry out as much reconstruction and invest as much money as absolutely necessary. They wanted the cable infrastructure to have a future-proof design, be standardized and easy to use. Investments in particular should result in as many benefits as possible for the company but also be able to be extended at a later date without having to invest significant sums of money.

Conclusion

R&M aims to recognize customer needs at an early stage and integrate them in the product development process, something which has proved itself over and over again. The R&M*foxs* cabling system was already known to those responsible for infrastructure at SBB after an in-depth visit to the R&M stand at the specialist show in Lucerne in 2010. On this occasion, R&M*foxs* was presented and technical information and opinions exchanged. Due to the company's expertise, product quality, simple solutions and result-oriented customer service, R&M has been an SBB supplier for many years now. Further criteria that helped swing the decision in favor of R&M were:

- Modularity
- Simplicity
- Fast assembly
- Pre-termination
- Compactness

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Progress in FTTH Technology

Fiber optics instead of copper: Fiber optics bring what seems to be an unlimited bandwidth to the end subscriber. But here too, quite naturally, there are limits – physically, technically, economically. So where are these limits? In this article, we take stock of the status quo and even dare to take a peek into the future.

Fiber To The Home, or FTTH for short, is based on an access network that links a large number of end subscribers to a central node, the Point Of Presence (POP), via fiber optics. The active components of the POP form the interface to the metropolitan or wide area network (MAN or WAN) that links several POPs in the region with one another.

Whereas a modernization of the active components in the access network, whether on the POP or subscriber side, is possible at any time and usually at an affordable price, a modernization of the FO infrastructure is difficult to justify. This is why the passive optical infrastructure of an FTTH network is designed to last for many years and has to be

- reliable
- open to higher bandwidth use and
- flexible enough to cope with new technologies.

The topology

Today's FTTH networks can be divided into point-to-point (P2P) and point-to-multipoint (P2MP) networks. In P2P networks, each subscriber has a dedicated physical connection to the POP. In P2MP networks, several subscribers share part of the network infrastructure, making the connection less expensive.

FTTH networks are usually passive optical networks (PON). These consist purely of the active components of the POP, usually localized in a Central Office, CO, and the active components of the end subscribers, which are referred to as Optical Network Units (ONU) – in between, only fibers and passive optical components. A passive power splitter assigns the data from the POP (downstream) to the subscribers or unites the data from the subscribers (upstream) on what is called the feeder fiber. This simple architecture permits data transport with different, so also future, technologies.

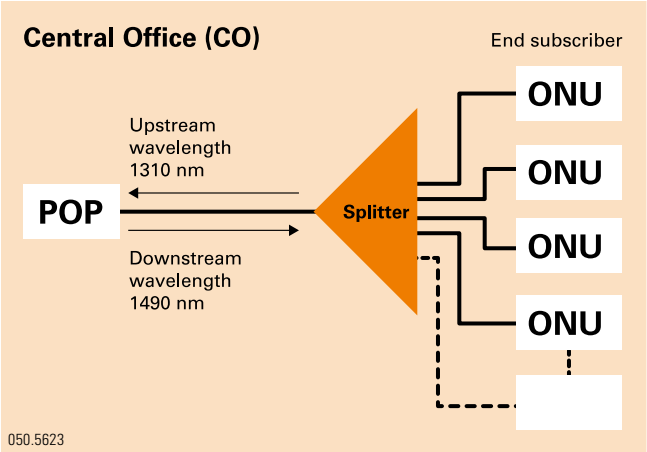
The standards

So that network components made by different manufacturers can work together, the standardization committees ITU-T and IEEE have defined transmission protocols and technical specifications for passive optical networks (see table).

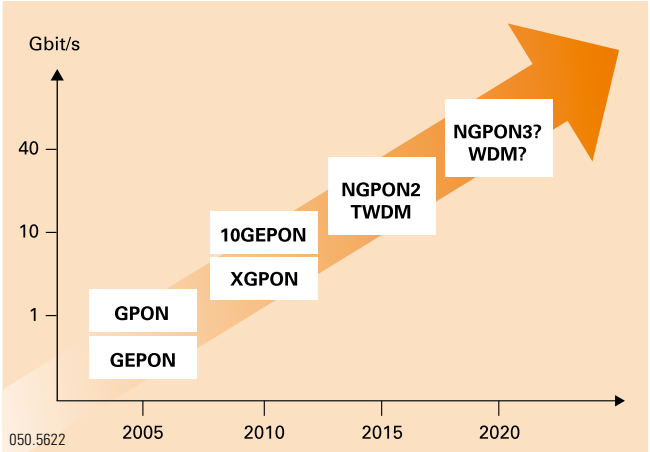
- ITU-T published initial standards for an FTTH network (APON and BPON) in 1998 and 2001 respectively.
- From 2003, there was a new-generation ITU-T standard (GPON) to fulfill Internet broadband requirements.
- In 2004, IEEE published the GEPON standard and, in 2009, the 10GEPON standard.
- The most recent ITU-T-Standard, XGPON, was ratified in 2010. It provides for an aggregate data rate of 10 Gbit/s downstream and 2.5 Gbit/s upstream. Pilot networks are currently being implemented in accordance with this standard.
- FSAN, the Full Service Access Network Group, is already working

	Name	Standard	Aggregate data rate uplink/downlink
APON	ATM PON	ITU-T G.983.1 (1998)	622/155 Mbit/s
BPON	Broadband PON	ITU-T G.983.3 (2001)	622/155 Mbit/s
GEPON	Gigabit Ethernet capable PON	IEEE 802.3ah (2004)	1.2 Gbit/s symmetrical
GPON	Gigabit capable PON	ITU-T G.984 (2003/08)	2.5/1.2 Gbit/s
10GEPON	10 Gigabit Ethernet capable PON	IEEE 802.3av (2009)	10/1 Gbit/s, 10/10 Gbit/s
XGPON	Next Generation PON	ITU-T G.987 (2012)	10/2.5 Gbit/s
NGPON1	General abbreviation for XGPON		
NGPON2	Second-level next generation PON	Proposals under development	40 Gbit/s and more

Overview of the development of passive optical networks (PON):
FTTH brings FO transmission rates from the backbone directly to the end subscriber via the metropolitan area network and the access network.



Left: Topology of a point-to-multipoint PON. Uplink and downlink direction are separated by the wavelength used. The end subscribers have to share the aggregate date rate on the feeder fiber. Diagram: R&M



Right: The development of FTTH network standards. Diagram: R&M

on NGPON2, the second-level next generation PON with 40 Gbit/s and more to be able to submit an appropriate standardization proposal to ITU-T.

The future

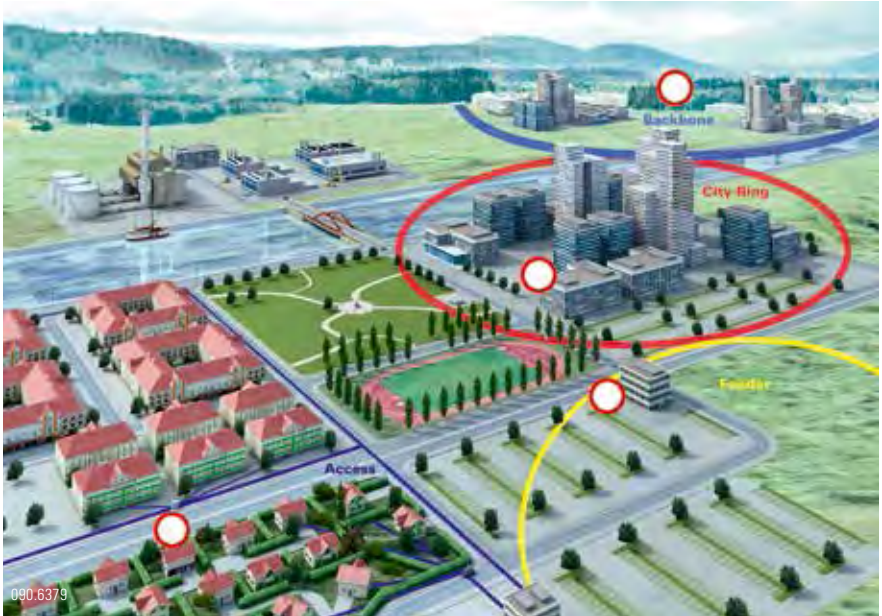
Further development depends on technical and commercial factors. The technical challenges of achieving such high data rates using standard TDM (Time Division Multiplexing) are considerable due to the extremely short light impulses that have to be achieved.

TWDM (Time and Wavelength Division Multiplexing) as an alternative is not only under discussion but is already available as a proprietary solution. This involves the TDM data flows being distributed over different wavelengths or "colors" so that one and the same fiber can be put to multiple use. The infrastructure is effectively occupied by, for example, four XGPONs, providing POPs, splitters and ONUs are equipped with the appropriate transmitters and filters. The FSAN has already decided on a TWDM with four to eight wavelengths for the NGPON2 with a genuine WDM-PON, in which all end subscribers are assigned their own wavelength, only being available in the distant future.

Ultimately it is the costs per bit that count. Network operators want to reduce the number of network nodes and divide the infrastructure costs between as many subscribers as possible. Accordingly, more recent PON generations have to bridge longer distances between COs and ONUs and allow higher split relations.

This does, however, result in optical loss in the system due to increased fiber attenuation. It is thus all the more important to keep the insertion losses of connections and splices and the loss in the splitter low. Conclusion: The use of high-quality fibers, connectors and splitters is the prerequisite for an FTTH infrastructure that can meet the requirements of the coming years. ■

***Zones:** Every FTTH network setup is subdivided into different zones that are connected with one another, but which must fulfill different requirements. The actual FTTH infrastructure begins with the Feeder Zone and extends into the Access Area. The underlying areas the City Ring and Backbone generally already exist.*



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Lviv International Airport – the Largest Aviation Junction in Western Ukraine

Ukraine and Poland jointly hosted the UEFA EURO 2012 Football Championship and Lviv was one of the four Ukrainian cities chosen as host. In preparation for the tournament, the Ukrainian government modernized infrastructure at key airports in the country.

The history of Lviv Airport

Lviv Airport was built between 1923 and 1928 when the city was being developed as an aviation hub. New logistics aircraft were introduced between 1946 and 1959. The airport building dates back to 1950 and, from 1996 onward, the airport became the major air cargo hub of western Ukraine. The state took over ownership of Lviv Airport in 2007. Since then, it has been operated by the Ukrainian Ministry of Transport. In 2011, Lviv Airport served 296900 passengers, a decline of 38 % from 2010. Passenger traffic is expected to exceed 3.7 million by 2020.

Expansion project at Lviv International Airport

The airport's existing infrastructure was insufficient to accommodate international flights.

The $ 200 million reconstruction project involved resurfacing and extending the existing runway by 700 m, as well as reconstruction work which included work on taxiways, the construction of 200 undercover car parking spaces and 1000 open parking spaces, as well as a hotel complex to accommodate 1200 people. The completion of the terminal took around two years. Work started on a new terminal building in September 2009. The total cost of the new terminal is $ 114 million.

Lviv International Airport today

Lviv Airport's new terminal building has an area of 48320 m² and can handle about 2000 passengers an hour. The airport building itself consists of two areas

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LVIV INTERNATIONAL AIRPORT

- **Passenger handling capacity: 2000 passengers/hour**
- **Length of runway: 3.5 km**
- **Parking spaces for 1200 vehicles**
- **Located 6 km from the center of Lviv**

"It was a very important project for our company. We had very strict requirements and we needed absolutely reliable partners. It was a pleasant and effective combination. – Swiss quality from R&M, the service from Synergia, exclusive distributor of R&M solutions in Ukraine, and our professionalism and experience. – And the result is one of the best projects in Ukraine in 2012. It was a real success."

Alexander Stepanchuk, IT Director of Altis Holding

of different sizes: the main passenger and technological part and the communications and assistance gallery. Technical reserve areas and service offices are housed in the gallery. The commercial part of this section in the terminal occupies 1083 m², and airline offices occupy 627 m². The airport aims to serve class A, B, C and D (such as the Boeing 767) aircraft.

The new terminal at Lviv International Airport meets international architectural, construction and technical standards as well as requirements of the ICAO (International Civil Aviation Organization) and recommendations of the International Air Transport Association, IATA. The interior of the airport was decorated in Ukrainian ethno style.

R&M solutions

As part of the state enterprise "Directorate of Building EURO 2012 Facilities in Lviv", Synergia SE implemented R&M structured cabling systems at Lviv International Airport. There were optical and copper cables with a protocol performance of 10 GbE: in total 138 km of copper cable and 17 km of optic cable. Cat. 6_A/s ISO was chosen for copper transmission and 2185 copper ports were installed. High-density HD panels were widely used for the first time in Ukraine. MPO Modules 6XLC-Quad were also installed (32 modules with connection cables). With R&M VARIO-*line* fiber optic cabling, OM3 with LC connectors were used as well. Furthermore, 846 optical ports were installed.

Technology based on the VS Standard with a total capacity of 11 000 pairs was implemented to create a fit-for-purpose system (loud-speaker system etc.). Uni-Rack, optical coupling LC, Venus boxes and optical cables from R&M were used to establish the optical connections from remote terminal facilities. R&M's passive safety security system was implemented to solve problems of cable management and security.

Altis Holding Corp. – general contractor for the new terminal

The general contractor for the new terminal is Altis Holding Corp., a major partner of Synergia SE. Altis Holding Corp. was founded in 2002 as a management structure for the group and the basic contract holder on general contract terms. The Altis Holding group consists of 14 enterprises. They cover a wide spectrum of services for construction and production such as general contracting, designing and engineering, a full spectrum of IT services, planning and installation of plates and foundations, installation of roads and external engineering communications, production of aluminum constructions, among other things. ■

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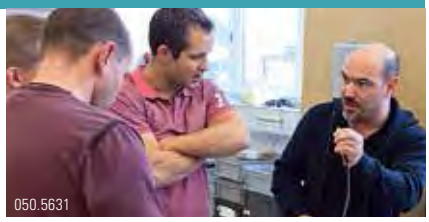
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Training at R&M and on Customer Premises

With its Qualified Partner Program (QPP), R&M supports professionals in network technology and structured cabling. The program consists of a long established training and testing concept.

An important component of the R&M service is the system warranty. The experts responsible for network installation are trained and certified by R&M specialists. An installation is not approved and consequently the warranty certificate is not issued until the certification process has been successfully completed. Every warranty request is tested internally and the measured results checked meticulously. If errors are detected, Technical Support contacts the end customer to determine or inform the customer of the cause.

As part of the QPP program, regular training sessions are held in all sales regions for installation engineers, project managers and planners. In Switzerland, these training sessions are conducted by employees from the HQ Technical Support. This gives the employees the opportunity to have valuable direct contact with our business partners. The training sessions are often held at HQ, but can also be held on customer premises if so required, something much appreciated by large installation companies. The specialists are also responsible for training the regional training heads as part of the "Teach the Teacher" seminars.

Top quality down to the very last detail

The standard training sessions are tailored to suit two user groups: installation engineers and project managers. They consist of a theoretical and a practical part. Naturally, the focus of the training session for installation engineers is on the practical part, whereas the focus for project managers is more on the theoretical part. In the training sessions, we pay particular attention to the high R&M quality, from the product through installation to the correct measuring of the link. The installation engineers are required to construct an entire installation in which they become more familiar with using R&M products. Practice-oriented training sessions are on offer for the two growth segments FTTH and Data Center. FTTH training sessions have already been conducted for network operators and external associations.

Technical Support is also active when it comes to cabling-specific customer complaints. Damage to cables and connectors due to mechanical influences, dampness, incorrect installations or measuring errors are often the cause of disturbances. All connections have to be measured in both directions – in the case of FO installations, even on different wavelengths. It is often the case that problems can be solved directly on the phone or by e-mail. If necessary, specialists will travel to the customer and check the installation on site.

The QPP certificates are valid for two years: A recertification training session can then be attended. Those responsible for training at R&M set great store by training sessions being continuously adapted to feature new products and to correspond to changed market conditions. This means that both they and the certified partners can be sure that they are always up to date.■


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Qualified Partner Program

The Technical Support and Training team works as part of the Customer Project Management department and provides support to all technical experts in the market regions.

The team consists of former installation engineers, project managers and cabling consultants who provide a wealth of experience and ensure support provided by R&M is of the highest quality. In a collaboration meeting held at the R&M Headquarters in December 2012, the TST team brought together the R&M regional experts to develop two new training programs to support our principal business focuses.

New data center courses

The new Data Center designer course delves not only into the standards, but also into best practices and guidelines for the design of a Data Center. The course touches on all elements concerning the holistic design of Data Center spaces and demonstrates the need to understand many of the other trades that provide services to a Data Center.

The Data Center installer course concentrates on the practical elements and challenges faced by engineers working in the complex and challenging environment of the computer room floor of a Data Center. We demonstrate the inner workings of Data Center cabinets and how to make the most of the space available for structured cabling.

The two new Data Center courses are open to existing QPP holders of "Installation Manager" or "Planner" status.

FTTH courses

R&M now offers an FTTH designer course that details the technologies and topologies with global and local authoritative guidelines and best practices for the planning of FTTH systems. The course highlights the needs of quality components within such systems and how best to implement the most appropriate technologies, distribution methods and components.

The FTTH installer course is separated in accordance with the product differences between the ISP and OSP equipment. The course offers complete immersion into practical challenges facing the engineer.

Both the ISP and OSP practical exercises take the opportunity to allow familiarization with the R&M SCM platforms that form the core of the FTTH termination world.

Please contact your local representative for further information about all courses.

Ensured quality

The TST team in Switzerland has now finally accepted some new testers which enable customers to have greater choice when testing an R&M installed system for warranty applications. In line with the new testers accepted by R&M come the updated warranty terms and condition documents and a new set of R&M installation guidelines which will prove to be a valuable asset to the installer. ■


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A Pre-Terminated Network for the CUB


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The CUB (Communauté Urbaine de Bordeaux) in the department of Gironde in Aquitaine is the second largest conurbation in France, after Paris, in terms of its size. The 27 boroughs total around 800 000 inhabitants and forecasts would suggest there could be one million residents in the CUB by 2030.

The Communauté Urbaine de Bordeaux is committed in particular to

- the development of the economy and the job market
- the development of housing space
- transport planning
- the protection of the environment and natural habitats

During the comprehensive renovation of the Hôtel de Communauté, the head office of the CUB, the Head of the IT department got to know R&M and its solutions. Further modification meant the data center had to be rehoused and this in turn meant completely new organization. Decision makers at the CUB once again decided to opt for pre-terminated solutions (components and cables) from R&M to fit out the network.

A first in France

In this project, the CUB installed a pre-terminated solution in a French server room, a first in the country. The installation technology thus corresponds to the modern environment. And the CUB network is now once again state of the art, something required by the growing demand for more bandwidth and optimal quality.

With the installation of MPO/MTP® for FO and DCC/DCL for copper, the data center benefits from all the technological progress at R&M. The installation comprises 456 RJ45 modules, 24 monomode fibers and 432 multimode fibers. The solutions are 100% R&M thus excluding any compatibility problems. A 25-year system warranty was granted for the entire solution. The connections were pre-terminated in Switzerland. All relevant parameters were tested in the factory in advance and all delivery deadlines adhered to.

The R&M system for cable management simplifies installation and guarantees the quality of the structured cabling over its entire lifecycle. The clear installation ensures simple maintenance and simplifies future migrations in the long term. The pre-terminated copper cables accelerate installation and significantly simplify any future physical extensions.

As a public authority, the CUB particularly must be able to rely on a secure and powerful network. This is why particular attention was paid to quality, reliability and longevity when it came to infrastructure.

> "We are so pleased we decided to opt for a pre-terminated solution from R&M. The time saving was noticeable during installation; commissioning was fast and the system could be integrated perfectly."
>
> Ludovic Doit,
> Head of IT Systems,
> Telecommunications and Radio Officer

Server room operative in just six months

After the strengthening of the floor, which was given a fire-resistant coating, the CUB Planning Department started equipping the room. Cabling was taken care of by Sigma Réseaux/Bordeaux, an R&M installation partner.

"Essentially, pre-termination ensures that classical installation errors are avoided and commissioning runs smoothly. Furthermore, the system can be extended at any time to meet any changed requirements."

In June 2012, it took just three weeks for the DSI to fit all IT equipment.

"We are so pleased we decided to opt for a pre-terminated solution from R&M. The time saving was noticeable during installation; commissioning was fast and the system could be integrated perfectly. We were able to make optimum use of the space in the intermediate floors for cable guidance. Everything went according to plan. The result is exactly what we were hoping for," says Ludovic Doit, Head of IT Systems, Telecommunications and Radio Officer.

During project development and solution selection, Ludovic Doit was in close cooperation with a team consisting of Frédéric Aubert (responsible for infrastructure, appointed project head for the draft designs, the definition of the architecture, the evaluation of the offered solutions, the planning and supervision of the work and the equipment move) as well as Jean-Yves Mussard (cabling technician, responsible for execution and the coordination of the companies involved). ■

THE R&M SOLUTION

- **Copper cabling**
- **80 trunk cables (480 connections)**
- **Fiber optics**
- **20 trunk cables (120 Duplex connections)**
- **20 trays, highly compact**

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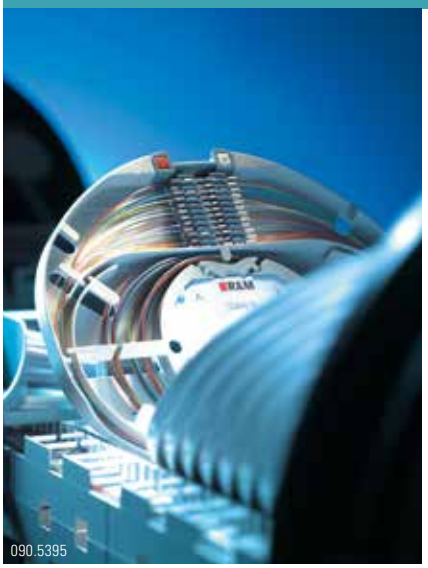

Enduring Human Relations – The New CSR Report

Corporate responsibility has always been a key issue for R&M. The new CSR Report details how sustainability is practiced in the areas of economy, ecology and social responsibility. For the first time, the report adheres strictly to the standards of the Global Reporting Initiative (GRI).

With the CSR Report 2012, R&M is documenting a new era for its customers and business partners. R&M has used the two years since the presentation of the first report to look into current activities in more detail and initiate any necessary optimization measures. Sustained, settled corporate management is an important pillar of the growth strategy resolutely pursued by the company. Difficult external conditions meant R&M was unfortunately not quite able to meet its financial targets last year, but the company did move back into positive territory. The sustained financial health of the company is underscored by the fact that in 2012 R&M was awarded the D&M Certificate from Dun & Bradstreet with Risk Indicator 1 for the second time – an award that has been issued to only two percent of Swiss companies.

Today, environmental aspects and social responsibility – alongside general economic and legal conditions – are increasingly determining how companies such as R&M act. With this sustainability report, we are meeting the increasing desire on all sides to have our sustained corporate management documented in a standardized form. Having said that, a basic sense of responsibility has always been an integral part of the DNA of the company culture. It is based on the values practiced every day by the owner family: honesty, modesty, respect and sustainable thinking long term.

The new CSR Report shows R&M's contribution to unimpeded, secure communication between people. Because future-proof, high grade products support the best possible understanding between people, companies, administrations and machines. Trust, transparency and collaboration are the result wherever reliable communication is possible – the basic framework for sustained actions in economy, politics and society in general. The report gives an in-depth view of the innovation and development philosophy of the company: the basics for new, beneficial products and solutions in the areas Office Cabling, Data Center and FTTx that, thanks to increased marketing and a stronger regional sales organization, are closer to the customer and also reach the customer both faster and, thanks to an intelligent supply-chain philosophy, in a more environmentally friendly way.

The CSR Report devotes a lot of time and attention to the company's ecological performance. For example, you can read all about how R&M ensures the quality of its products, systems and services. Reporting also focuses on the introduction of a video conference system that saves the company's employees from numerous time-consuming business trips and at the same time protects the environment. In 2012, this led to a saving of 12.5 t of the greenhouse gas CO_2. With the presentation of the CSR Report, R&M is announcing the certification of the environment management system ISO 14001.

A considerable section of the report focuses on the company's social respon-

sibility. For example, there are presentations of the further training program "Academy", projects that focus on prevention when it comes to employees' health, and the active commitment to upcoming talents in the company. In the last two years, R&M has doubled the proportion of apprentices, well above the Swiss average, to give as many young people as possible the chance to benefit from a qualified training program.

The selection of topics discussed was based on the central ideas of company strategy as well as on wishes of our stakeholders who were actively involved in choosing the subjects for the report.

For more information on the CSR Report, take a look at our website. You can both download and order the report there. ■

Link:
www.rdm.com, About us > Corporate Social Responsibility


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New Data Center Handbook

R&M's new Data Center Handbook provides answers to all kinds of questions that arise during the planning and operation of data centers. It is available free of charge as an e-Book on the R&M website and as a limited bound edition at the R&M market organizations.

Operators and planners will benefit from the expertise and experience of the world's leading provider of physical network infrastructures in data centers.

The following key topics are dealt with on over 150 pages:

- Overview of the standards, energy requirements and safety and security aspects
- Information on the types, classes and legal requirements
- Notes on the relevant standards, layout and network hierarchies
- Cabling architectures and cable guide variants
- Network hardware and migration paths to 40/100 Gigabit Ethernet
- Overview of LAN & storage applications and the corresponding transmission media
- Trends in convergence and virtualization of networks
- Implementations and analyses (Power over Ethernet, Short Links, EMC, etc.)

The new R&M Data Center Handbook is intended as a guidebook for decision makers to increase flexibility, efficiency and security in the data center. ■

Link:
www.rdm.com/datacenterhandbook


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R&M Equips Groupama's Top-Flight Data Center


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The insurance and banking group Groupama is the largest cooperative insurance association in France. Groupama has had an external IT emergency scenario for quite some time now to ensure continued operations at all times, even in the case of a disaster. In 2009, Groupama decided to once again cover this service with internal resources. And that was the start of the "Mordelles project", the creation of a top-flight data center near Rennes.

The modern building houses ultra-efficient technology. The IT rooms cover 800 m^2 and have direct, pure air conditioning in accordance with the free-cooling system. This was the first time that this kind of infrastructure was being used in France. The numerous security loops and the complete redundancy in air conditioning and power supply fulfill all "tier III" criteria in accordance with the TIA-942 standard. Roland Male, Project Lead in the building of this data center, emphasizes: "The Group wanted to equip its data center with whatever was possible in terms of ecology and economic energy consumption. We will reach our goal in just a few months: a PUE (power usage effectiveness) of 1.3".

Clémançon, a subsidiary of Vinci, was commissioned with the installation of the passive network cabling. "We were given very generous deadlines in the preparation phase. But we only had six weeks for the actual installation. And that was a little tight. We had R&M deliver the twelve FO cable harnesses pre-terminated and equipped with 6000 connections. To be able to complete the project successfully in the specified time, we had to be able to rely unconditionally on error-free deliveries," explains Frédéric Van Bunderen, who headed up the project for the installer. "The time saved in connecting the 60 pre-installed racks and the unrivaled product quality justified greater material costs on the final bill than would normally be the case. The 25-year warranty on the installation and the respectability of the Swiss supplier confirm just how right we were to choose R&M". ■

Groupama

Groupama is an insurance and banking group offering products for all kinds of sectors. The group uses a range of different sales channels. The customer portfolio includes private individuals, companies, industry, and public authorities. The largest French cooperative insurance association is active in fourteen countries and has its own data centers.

Clémançon

Clémançon, the oldest electricity company in Paris, is now a 100% subsidiary of Vinci Energie, a company within the Vinci Holding. It specializes in cabling in the low and mains current sector.


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PROJECT SCOPE

- **1400 copper connections Cat. 6_A ISO**
- **584 MPO/MTP® 12-fiber FO trunk cables OM3 and OM4**
- **584 MPO/MTP® trays**
- **3256 FO connecting cables**
- **60 racks**


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Swiss Connectivity in New Aurecon Headquarters in Melbourne


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Aurecon provides engineering, management and specialist technical services for public and private sector clients all over the world. With an office network extending across 25 countries, Aurecon has been involved in projects in over 80 countries across Africa, Asia Pacific, the Middle East and the Americas and employs around 7500 people throughout 11 industry groups.

R&M was engaged as the end-to-end cabling solution provider for Aurecon's new headquarters, situated at Collins Street, Victoria Harbour, Docklands. With a Green Star rating of 5 and NABERS rating of 4.5, the modern sustainable office building comprises 16 000 m^2 of A Grade commercial office space, with 1400 m^2 space for retail and car parking.

For 700 of its Melbourne-based staff, Aurecon occupies five interconnected floors in this green building, which offers innovative, market-leading standards in terms of air quality, energy efficiency and sustainability in a high-quality working environment. The Aurecon Centre was designed by Aurecon's engineers, in partnership with developers Lend Lease, with the aim of enhancing colleagues' well-being and ability to connect and collaborate. The fit out design aims to bring to life the brand and business objectives.

R&M was awarded the project with the help of its contractor APPS Electrical, who recommended R&M solutions to the customer because of its product offerings and suitability. Michael Dvorak, Divisional Manager, Communications: "We have been working with R&M for one year now. Through the past year, we've cultivated an excellent working relationship. They have been a great bunch of people to work with, both in terms of their experience and their professional attitude. Product-wise, R&M definitely lives up to our expectations and to the image people have of Swiss quality, giving us peace of mind."

Quality, performance and security were key factors in choosing the right cabling system. For a large corporation like Aurecon, where high network usage is expected, a performance-driven cabling system is necessary to fulfill the requirements. Based on that, the R&M Cat. 6_A UTP copper system and OM4 fiber pre-term solution were chosen. This being R&M Australia's first Cat. 6_A UTP project, where 3000 outlets were installed, it is of great importance and definitely a milestone. R&M is honored to be part of it and believes this is a good project reference in the portfolio.


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The project timeline was relatively short and everything had to commence within a short notice period. The team was faced with the pressure of bringing in the cables on time to ensure project commencement. Despite the challenges faced, R&M and CRS (official distributor of R&M Australia) reacted swiftly and were able to bring in the materials on time, allowing smooth project execution.

R&M is grateful to have appointed CRS as distribution partner. The company provided excellent support and did a fantastic job in making sure the items were delivered on time despite the short timeline. Special thanks go to Mark Dessent, Victorian State Manager of CRS, and Steve McLeod, Victorian Operations Manager of CRS, for their hard work and commitment. ■


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By using the 24-port panel and part-populating it, the University enjoys a "pay as you grow" option for its network.

New Data Center for Warwick University

Originally founded in 1965, the University of Warwick now has over 23 000 students, is consistently ranked in the top 10 universities in the UK and is the third biggest employer in Coventry. In addition to providing research and teaching the university offers a wide range of services to local, regional, national and international businesses, from research and development to consultancy, executive education and conference facilities. The University Science Park has around 150 tenant companies employing around 2000 staff.

The University campus occupies 290 hectares on three adjacent sites and had two existing data centers supporting all users. It was becoming apparent that these existing data centers were reaching their maximum capacity in terms of space, power and cooling and so the decision was made to build a new data center in the University's Science Park.

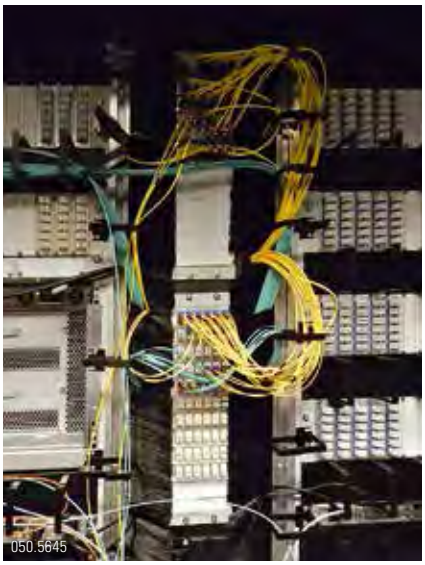
After much research and careful consideration, and mindful of the need to provide excellent IT services to both academic and commercial users, the University selected R&M for the new data center cabling infrastructure.

The R&M solution was selected for the Data Center as it met all the requirements of the University's IT Services department: The product is of consistently high quality, the rack-mount panels allow copper and fiber modules to be used giving great flexibility to configure the cabinets, and the lifetime warranty offered for the solution also included short links (< 15 m).

The decision was made to use pre-terminated copper and Fiber looms as these would be quick and simple to install and the amount of on-site debris would be minimized.

The cabling infrastructure was installed by Dimension Data, an accredited R&M installer. The work was completed on time and on budget, much to the satisfaction of the University.

Steve Silver Service Owner for Data Centers and Infrastructure at the University: "We are really pleased with our new data center, the installation went smoothly and the end result exceeds our expectations. The R&M solution allows us to plan for growth and we will have no hesitation in using them to refurbish our existing data centers." ■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THE R&M SOLUTION

- **1632 OM3 fiber ports**
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- **1848 Cat. 6 UTP copper links and 624 Cat. 6_A copper links**
- **Pre-terminated copper in 6-way looms**
- **R&M*freenet* solution using global panels**

WHY R&M?

- **Product quality**
- **System warranty**
- **Versatility of panels to accept copper or fiber modules**


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Learning from Experience

What was the most significant thing you learned in the last six months? Think about it for a while and write down what has made a major impact on you in terms of learning before you read the rest of the article.

We recently carried out this little test at a further training seminar aimed at around 50 experienced executives. And what was the result? Fifty different answers of course! And what we all found very surprising was the fact that the significant things we learned all had to do with a personal experience we had had in dealing with people.

As you get older, you increasingly notice that young people are making exactly the same mistakes we made when we were younger. We quite rightly refrained from telling them about these mistakes earlier. Our ancestors were obviously not able to pass on their experiences either otherwise we wouldn't have had to make the mistakes ourselves.

This conclusion is probably one of the oldest truths and also something that cannot be improved with classical teaching alone. And even if you could incorporate this into lessons at school, it probably wouldn't help much as we often learn best from our own mistakes – "learning from experience". This experience can lead to wisdom and in turn to a component of our future success. Which basically means we should change our attitude toward mistakes and just enjoy the fact that we are being given the opportunity to learn something new.

Learning success =
IQ × EQ squared × creativity

Confucius said that mistakes are a way for us to gain experience and that this experience leads to realization resulting in a change of behavior.

Why is it that the most intelligent people often fail? Intelligence (IQ) alone is like a Porsche without wheels and a steering wheel. To travel along life's bumpy road successfully, safely taking all of its twists and turns, you need wheels with shock absorbers that intuitively adjust themselves to suit the particular terrain – just like the emotional intelligence (EQ) of people who treat their fellowmen with respect. And finally you need a steering wheel, a symbol of the motorist's personal responsibility. This enables us – even when GPS fails – to use our creativity to choose a new route that will safely take us past the traffic jam by finding our own way.

Having a healthy IQ is a good basis for future learning success. But it has to be coupled with a well-developed EQ. And you can develop your EQ by being interested in each individual counterpart and also by learning from your experience with your fellowmen.

Conclusion: The important things in life are not only learned at school. ■

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