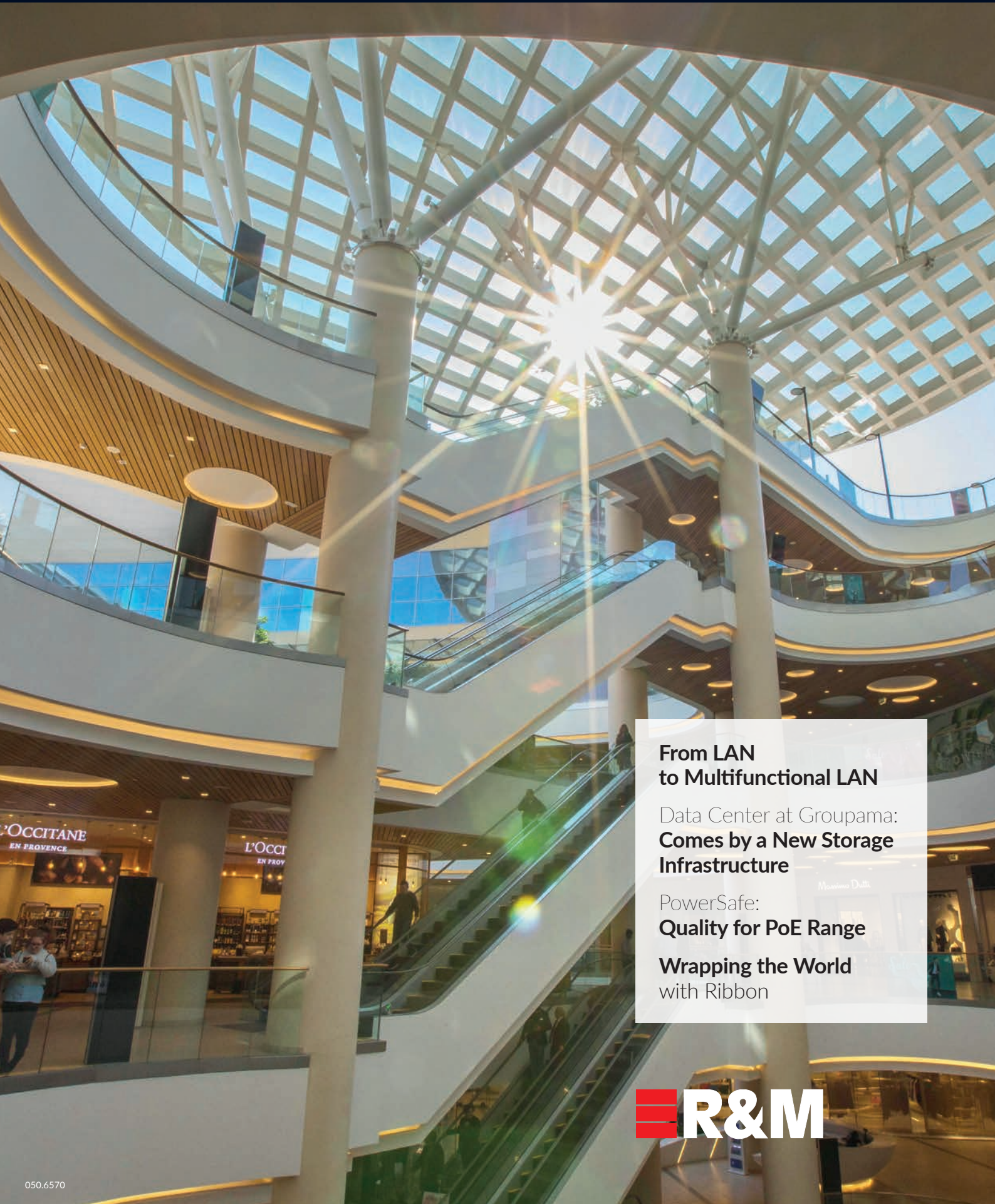


# CONNECTIONS 54



## From LAN to Multifunctional LAN

Data Center at Groupama: Comes by a New Storage Infrastructure

PowerSafe: Quality for PoE Range

Wrapping the World with Ribbon





Dear Business Partners

Over recent years R&M has established itself as a supplier of top-quality connectivity solutions in the data center sector. The new Netscale system in particular has proved to be a great success. Read about how this solution is used by the French insurance and banking group Groupama, for example, in this magazine. We are proud to be able to serve famous companies from all over the world as our customers.

But the LAN market has seen many changes, too. New applications in the PoE sector, such as for example digital ceiling and POLAN, require efficient networks which continue to be based on copper. With Cat. 8.1, a new generation is now in the starting gates. R&M has a solution in this area, too. Take a look at the magazine to find out more. There is also great interest in the new quality seal PowerSafe which R&M is introducing for the Power over Ethernet range. Considerable demand and first successes are underscoring this clearly. Because we see great potential in this area, we have dedicated the FOCUS story of this magazine to the LAN field.

In the Public Networks sector, R&M has succeeded in engaging with other global telecom suppliers both with tried and tested and with new solutions. FTTx is experiencing a notable upturn both in Europe and in the Middle East.

### **Smart path to customer benefit**

With new, smart innovation processes, R&M is ensuring it can continue to launch ambitious new developments in all market segments. Customers and a worldwide innovation network are included from the very beginning. The latest TRENDS articles in this magazine convey a wealth of information on future applications.

The owners feel very pleased that R&M is experiencing such success. The management has cleverly laid the tracks for future growth. The basis for this is, on the one hand, our strong brand, which stands for pioneering products but also for customer proximity and for the fast realization of customized solutions. Furthermore, our success is based on the aforementioned forward-looking innovation strategy which entails the development of the solutions of tomorrow today.

Our committed employees are the basis of this success and our values are lived on all continents. At the HQ in Switzerland, CEO Michel Riva was honored to receive second prize in the Prix SVC for the Zurich business region, something of which we are most proud. We owe this success to all R&M employees.

We would like to thank you for your trust and partnership, and hope you enjoy reading this new edition of our customer magazine.

Peter Reichle  
Co-Owner and Member of  
the Board of Directors



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## From LAN to Multifunctional LAN

Networking computers. That has been working well for more than 30 years. Ethernet and LAN have revolutionized the business and office world. Now comes an era of total digitalization. And structured cabling will remain the basis of upcoming data networks. But in the future, it is going to have to do a lot more than just link workstations. Three trends are challenging the LAN, the planners and the installers.

Even in the age of smartphones, WLAN and IoT, LAN cabling remains to be the backbone of all networking in IT and communication technology. No building owner should economize when it comes to this investment. Cabling costs comparatively little in relation to the rest of the IT.

But as is the case for the foundations and structure of a building, cabling has to be planned with foresight, provide headroom for further loads and generally be armed to adequately face the future. It has to be designed so that several generations of active devices can be connected. Future applications will potentially place higher demands on cabling than any systems to date.

The high significance of cabling is revealed in analyses published by Gartner and other market researchers. These show that more than half of all network interruptions are caused by the physical layer. Frequent causes: The products are of poor quality, are not reliable or are not used correctly.

Translate this into figures and you get the following: Cabling material represents just 3.5 % of the costs of an IT setup, but is responsible for more than 50 % of operational reliability. Exchanging cabling costs two and a half times as much as an installation that was planned

optimally from the outset. Using the wrong cabling or cabling that is not powerful enough has thus got to be one of the most expensive mistakes you can make.

### Logical step: 10 Gigabit

Requirements are increasing in all areas. Here a few examples and current scenarios:

- Data throughput: When a large number of computer workstations access virtual machines, cloud services, collaboration platforms, Voice over IP, software as a service and video streaming at the same time, IP traffic increases to a level never experienced before. The LAN requires enough capacity to allow for productive working with low latency.
- Everywhere Wireless: Mobile communication is ubiquitous and is also desperate for bandwidth. More and more additional WiFi access points are having to be connected in buildings and on campuses. The smart-



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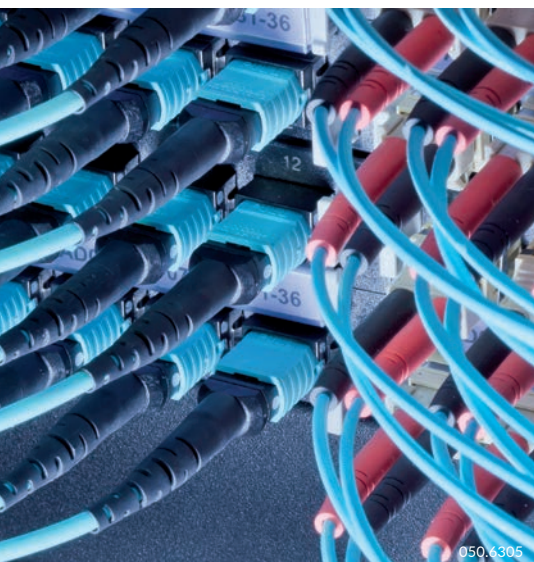


phone and tablet density of a radio cell is constantly increasing, as is applications' need for bandwidth. The aggregate data volume of a WLAN cell is thus continuously rising.

- All over IP: Offices, buildings and factories are increasingly becoming more intelligent. More and more systems and functions, also those in remote places, are being connected and integrated in central building management systems. This task could nicely be taken care of with IP, Ethernet and LAN. Alongside data transfer, the LAN is increasingly being tasked with providing IP-based end devices with energy using Power over Ethernet (PoE).

Conclusion: You cannot get away from the fact that the LAN has to be designed for more demanding tasks. Old office networks with 1 Gigabit Ethernet, poor-quality connectivity or shoddily installed cabling will fail in the scenarios described.

The market has recognized this at the right time. Standards, product developments and market statistics are all pointing in one direction. The name of the next logical step is 10 Gigabit Ethernet. The standardization committees have prepared the change of generation to Cat. 6<sub>A</sub>/Class EA and 10GBase-T early on.



As a technology leader, R&M adapted the LAN range to the 10G era at an early stage. Now demand is increasing for top-flight solutions for using 10G in offices and buildings. In the financial year 2017, the share of Cat. 6<sub>A</sub> reached the 50% mark of all sales of copper products for the first time. 10G is going to be the leading technology. It ensures that a LAN will be able to support the applications and scenarios that are currently discernible for longer than the typical lifespan of the cabling.

### Additional challenges

So that is what the situation looks like at the moment. But the new demands also entail additional challenges for cabling. The underlying conditions will in part change dramatically wherever higher bandwidths, ubiquitous availability, remote power supplies, consolidation and digitalization are introduced.

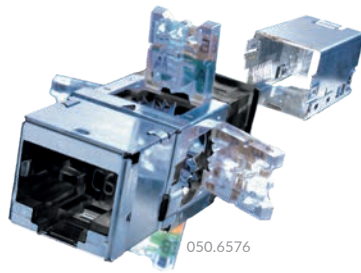
First example: 10GBase-T reacts very sensitively to external noise. It is around one

hundred times more sensitive in terms of electromagnetic disturbances from outside than today's widely used 1000Base-T. Cabling standards will have to be adhered to 100 % for 10GBase-T to work; there is no concealed headroom. But further effects which so far have not been covered by the standards will also become important (see the box at the top of page 8).

R&M is a pioneer when it comes to investigating these effects and developing cabling systems which ensure 10G compatibility, also above and beyond what is specified by the standards. R&M places great emphasis on product quality so that signals can be transmitted without interference even under difficult conditions.

But IEEE development never stops. 10GBase-T is used as the basic technology for further transmission protocols (see the box at the bottom of page 6).





R&M currently feels that one of these protocols, 25GBase-T, could be the long-awaited next evolution step in the LAN sector. With a maximum transmission distance of 30 m, 40GBase-T is more suitable for data center infrastructures. With 25GBase-T, the transmission distance should be considerably higher. The expected range of 50 m would be sufficient for many typical LAN environments and cover around 70 % of the links installed today.

The 2.5- and 5GBase-T protocols only extend the lifespan of existing cabling to support broadband WLAN in compliance with IEEE 802.11ac. The next generation of wireless access points requires 10GBase-T.

### RJ45 stays – Cat. 8.1 moves in

The new category 8.1, specified for transmission frequencies up to 2000 MHz, is recommended as a connection solution for 40- and 25GBase-T. The tried and tested RJ45 format is to be retained. The standards TIA 568-C.2 Cat. 8 and ISO/IEC 11801 Ed. 3 have been approved and the manufacturers of measuring instruments have already developed appropriate devices. But as yet there

are no Cat. 8.1 products available commercially for the permanent link (as at: Q1 2018).

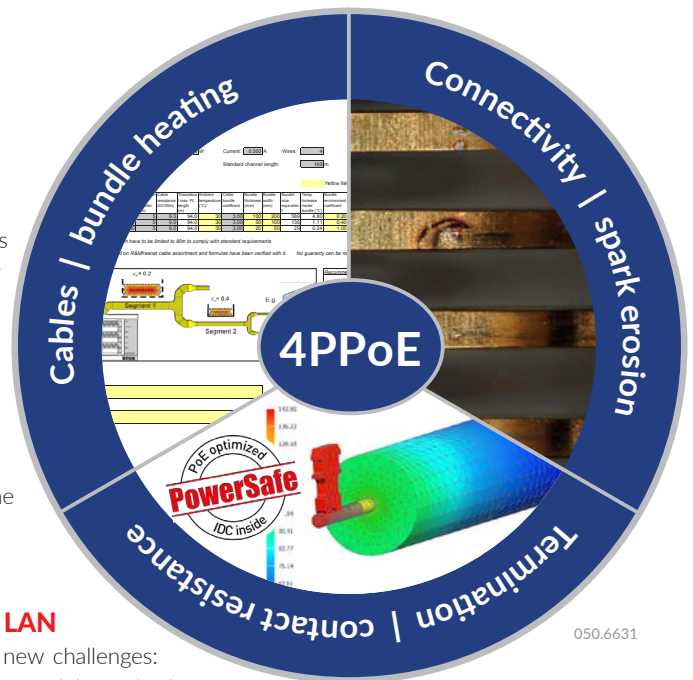
R&M also has a Cat. 8.1 solution ready to be implemented and will be launching it as soon as the technical conditions for 25GBase-T are clear.

### The heat is on in the LAN

The second example of new challenges: remote power supply. As it delivers both the energy supply and the data, PoE could become a key technology for the Internet of Things (IoT). The third generation of Power over Ethernet (PoE) is waiting in the wings. It uses all four twisted pairs (4PPoE) and will support output of up to 90 watts with currents of 1 ampere per twisted pair. With 4PPoE an even greater number of devices, sensors, antennas, cameras, controllers and LED light sources can be operated via LAN cost-effectively while saving energy.

To date, PoE peak loads have often only lasted a short time, for example during start-up or switching operations. Some new applications, however, require electrical power around the clock, e.g. smart lighting and digital signage. But to date, LANs are often not specifically designed to cope with such permanent loads. The risks in planning, installation and operating the network must not be disregarded. 4PPoE takes cables, contacts and ports to their technical limits.

The cables and cable bundles heat up in continuous PoE operation as a result of the electrical resistance. If the heat cannot escape from large cable bundles, the temperature can rise massively and the cable attenuation increase inadmissibly. This problem can be controlled by choosing cable with a greater wire diameter, by adapting planning accordingly to specify shorter link lengths and by altering the way cable is laid in smaller bundles. The «PoE Calculator» tool from R&M can help in this.



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### Protocol mix in the LAN

On the basis of 10G technology, the IEEE has standardized four further transmission speeds over recent years:

- **2.5GBase-T** (= 10G x 0.25-fold frequency) for WiFi, WAP connection over Cat. 5e up to 90 m
- **5GBase-T** (= 10G x 0.5-fold frequency) for WiFi, WAP connection over Cat. 6 up to 90 m
- **25GBase-T** (= 10G x 2.5-fold frequency, 1000 MHz) for connecting high-performance computers up to 30 - x m
- **40GBase-T** (= 10G x 4-fold frequency, 1600 MHz) for connecting servers up to 30 m



Further PoE risks:

- If connectors are unmated under load, the contacts involved are subject to spark erosion. The higher the current, the greater the damage. With an ideal contact design, the contact and sparking point are physically separate and the contact quality is thus safeguarded.
- In piercing technology, which is widely used to terminate wires in patch cords, the connection between the wire and the plug contact can deteriorate so much due to aging that the connector self-destructs due to overheating when transmitting power. The insulation displacement contact (IDC) used by R&M excludes such risks. The company is the only supplier of patch cords with IDC technology.

To ensure reliable 4PPoE transmission, the cabling must be planned accordingly, the correct products need to be selected and the installation must be carried out professionally.

The PowerSafe seal from R&M indicates products which are particularly suitable for the reliable transmission of permanently high currents in the LAN.



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**GENERIC CABLING**  
Structured work area cabling

**POWER OVER ETHERNET**  
Remote powering for selected devices

**DIGITAL BUILDING**  
Structured building automation cabling

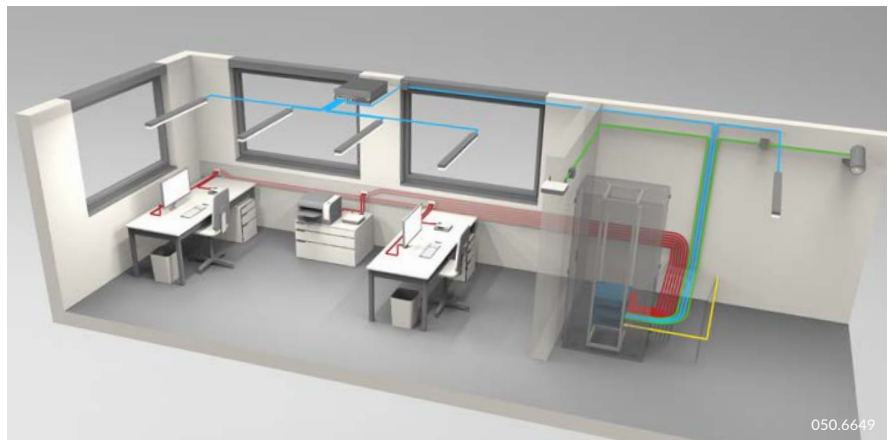
**Structured cabling for the infrastructure**

Challenge no. 3: All over IP and consolidation. Applications and infrastructures which to date have been separate are increasingly being consolidated towards IP and LAN. The cabling no longer focuses solely on connecting the work areas. In addition, it shall provide coverage of Ethernet- / IP services for building automation devices throughout the building.

ISO/IEC 11801-6 and EN50173-6 describe a cabling structure which fulfills these requirements. It is routed additionally and separately from the work area connections, but ideally planned and installed at the same time.

Large areas and spaces can efficiently be split into zones using a honeycomb structure. Service outlets (SO) form the center of these zones and serve as connection points for the IP-supported devices. The radius of the zones is normally based on the coverage or range of WLAN access points. Today it is normally between 8 and 12 m, but may need to be reduced further for future use. SOs are perfect for connecting WLAN, LED lights and other building automation applications. Every application requires a port at the SO to ensure the connection to the floor distributor. According to use, the cabling should be equipped for 10G (Next Generation WLAN). As more and more applications are connected to the SO, either the number of ports at the SO has to be further increased or network switches have to be introduced into the zone to multiply the number of ports. R&M has developed appropriate solutions for both cases.

The ceiling is often seen as the best place for service outlets. This is why the concept is also referred to as «Digital Ceiling». The growing number of ports in the zone increases the complexity of the cabling within the zones and thus requires more expert knowledge. R&M can provide help in the practical implementation of the Digital Ceiling with the concept of pre-installed zone cabling.



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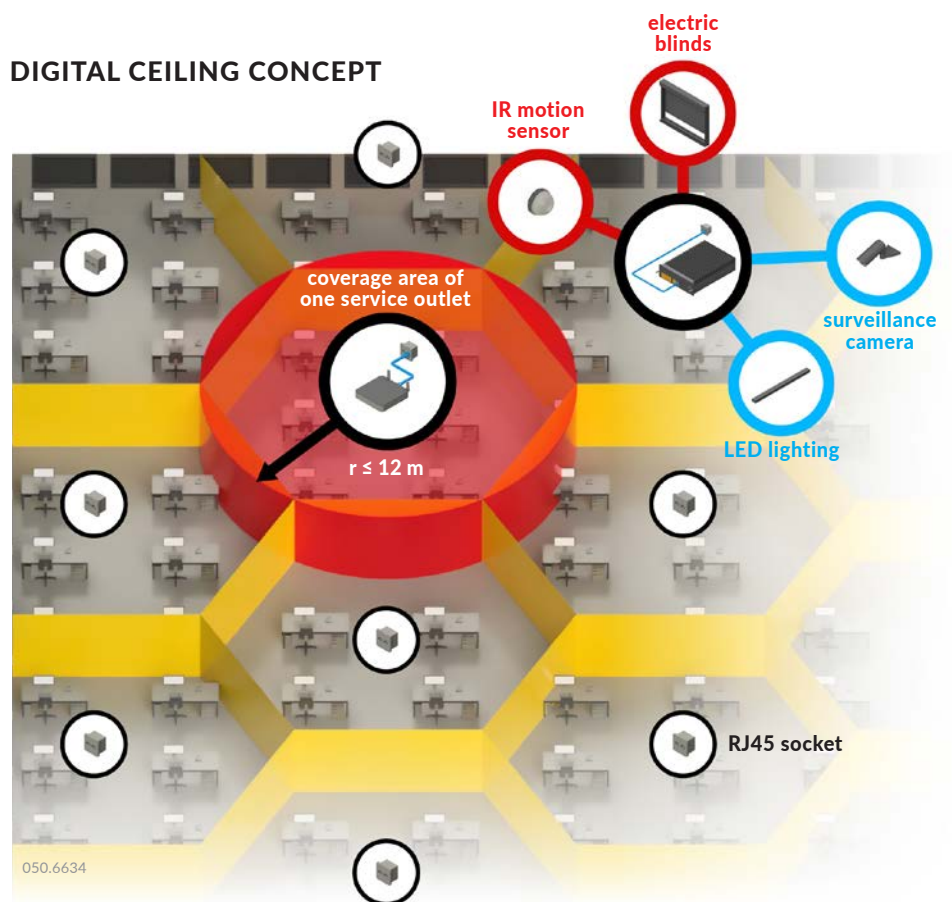
**Additional optical fiber options**

More and more, fiber optic cables are finding their way into the office floors. Seeing the developments to come, R&M has created ready to install solutions. Fiber to the Office (FTTO) and Passive Optical LAN (POL) provide large bandwidth at an attractive price.

The last meters, however, require specific cabling solutions. Microswitches or optical

network terminals (ONT) connect the FO backbone and the copper connections of the IT devices. POL requires just one single-mode fiber per workstation. It thus replaces four to eight twisted-pair copper cables in floor cabling. However, all connection points are developed from the beginning. Active ports thus remain unused, something which has to be taken into consideration during planning.

**DIGITAL CEILING CONCEPT**



050.6634

## Challenges for the LAN

A range of technologies is challenging manufacturers, planners, installers and even the LAN itself. Today cabling and connectivity in offices and buildings have to be designed to support, for example, the following:

- Interference-sensitive 10 GbE, several NGBase-T protocols
- Remote powering with up to 90 watts and cable heating
- WLAN with up to 7 Gigabit/s and small radio cells
- Digital ceiling, separate connection for all-IP building automation
- Distributed building services and LED lighting
- Consolidation of infrastructures and functions
- Merging of copper and FO networks

## Unknown effects in the LAN

Along with known effects such as attenuation, return loss and crosstalk, effects which have been mostly neglected to date, such as cable symmetry (Transverse Conversion Loss (TCL)) and cable dynamics, play a critical role in 10GBase-T support.

Transverse Conversion Loss (TCL) describes the undesired conversion of a symmetrical data signal between a pair into a common mode disturber voltage on the pair. TCL can cause additional near-end crosstalk (NEXT) in an adjacent component due to mode conversion. Today the TCL of a standard-compliant patch cord can generate so much additional NEXT in a standard-compliant permanent link, that the complete channel is no longer suitable for 10GBase-T.

Cable dynamics describes the change in cable characteristics, e.g. return loss, when cables are moved. The cable characteristics are compensated electronically in the 10GBase-T protocol. If the cable characteristics change too much and too quickly, the compensation gets out of sync and this results in data loss. The effect of servers being moved on a slide rail, resulting in a decreased data rate or even a reboot, is notorious. And cables often have to be moved in office environments.



## Function variety in the LAN

Power over Ethernet (PoE) is rapidly spreading in office and commercial building cabling. Powering devices using data cables is paving the way to smart buildings and the IoT. PoE supports a fascinating variety of devices, functions and applications, and enables their direct integration into the LAN:

- WLAN antennas
- Voice over IP telephones

- Surveillance cameras
- LED lighting
- Distress/emergency calls, alarms
- Access control
- Motion sensors
- Card/fingerprint readers
- Smoke alarms
- Climate sensors, climate control
- Air quality measuring
- Weather observation
- Heating regulation
- Shading control
- Smart metering
- Medical technology
- Patient monitoring
- Intercom systems
- Cash registers, ATMs
- Self-service terminals
- Battery charging stations
- Display boards, monitors
- Digital signage
- Lift control
- Thin clients
- Backup systems
- Sound systems
- Entertainment systems
- Augmented reality



The wide R&M product range facilitates the installation of tailor-made and robust variants of the optical network termination and gives planners great freedom in the design of the topology and the selection of the connection technology.

## New era – safe path

In the history of data networks, there has hardly ever been such diverse and complex challenges for LAN cabling. With careful foresight and planning and expert installation, however, the tasks can be discharged in a routine manner. What is crucial, is to select top-quality and future-proof products and cleverly use tried and tested processes.

A sustainable innovation strategy makes it possible for R&M to recognize the developments in data communication at an early stage and provide suitable cabling solutions. These solutions implement best practice experience and market knowledge from the last 25 years. This means that R&M can provide the very best advice to project partners and customers when it comes to investment decisions and the perfect planning of a new LAN.



**Matthias Gerber**  
Market Manager LAN Cabling  
matthias.gerber@rdm.com





## Port Monitoring for Switch and Server

090.7907

The automation system *R&MinteliPhy* is widening its horizons and is now reaching the ports of active devices such as servers and switches. This is how genuine end-to-end cable management is achieved in the data center.

R&M is extending the *R&MinteliPhy* family with active port cables. The new development is now available to users. To date, *R&MinteliPhy* was particularly suitable for use in cross-connect architectures with automatic monitoring of connections on patch panels in real time.

Now data centers can also deploy the solution in fiber optic interconnect structures. In this way active port cables are extending the monitoring range of Automated Infrastructure Management (AIM) with FO connections which lead directly from the patch panel to the port of an active device.

The active port cable system consists of two elements: port markers and cables.

- The port marker is fixed onto the port of the active device and stays there. It contains an RFID tag which identifies the port uniquely at global level.
- A special cable reads out the RFID tag

and transmits the status information to the *R&MinteliPhy* Analyzer in the network cabinet.

This means the connection between the patch panel and the active device can be monitored without interruption. The system detects connectivity errors immediately, precisely and reliably. If patch cords are not plugged into the port or plugged into the wrong port, *R&MinteliPhy* immediately issues an alarm with a precise error description. This dramatically reduces the time involved in localizing and rectifying cabling problems. The availability of the data center increases.

New connections to active devices are documented correctly automatically. Furthermore *R&MinteliPhy* can generate, control and monitor corresponding assignments for service technicians.

The *R&MinteliPhy* active port cables are available for OM4 fiber optic cables with LC Duplex connectors and come in two lengths.

They fit into the *R&MinteliPhy* architecture perfectly and require no additional hardware in the patch panel or network cabinet. Even a mixed operation of active port cables and classic patch cords on the same patch panel is possible.

Conclusion: With *R&MinteliPhy*, R&M provides a comprehensive AIM solution which documents, manages and monitors all connections in data centers down to the ports of the active devices. And that is unique in the market.





## Workplace of the Future on Lake Zurich

The glass facade of Swiss Re Next. Classic pillars within look like breaking waves, an analogy to the waves on Lake Zurich.

050.6581

Your quality of life is already high if you work overlooking Lake Zurich.  
But Swiss reinsurer Swiss Re has made an additional quantum leap for its employees.

A glass office complex on Lake Zurich is a pioneering example of the working world of the future: Swiss Re Next. Here reinsurer Swiss Re is implementing the agile working concept. It does away with the traditional rigid structures of office activity and makes it mobile. Assigned desks have been replaced by home bases and user-friendly docking stations for laptops, tablets and smartphones.

The insurance and financial experts enjoy new opportunities to be even more productive with the help of digitalization, and thus feel even more at ease at work. The architecturally eye-catching complex with a facade

of glass waves also features highly intelligent building automation. Nobody here has to switch the lights on or off manually. Energy consumption is 80% lower per workspace than in conventional office buildings.

The employees moved into the new building in the fall of 2017. Since then they have been gathering valuable experience with the next generation workplace. Findings from the project are also of help at the new Swiss Re

Power over Ethernet (PoE) was used to supply power to antennas, end devices and controllers. Numerous technical connections and separate cabling had to be integrated for security systems, access control and the numerous functions of digitized building automation.

«The project went off smoothly implementing almost exclusively standard solutions from R&M for the structured cabling of office

**«R&M is always open to improvements. The company takes the opinions of an installer seriously.»**

**Thomas Läderach, project lead at AZ Elektro**

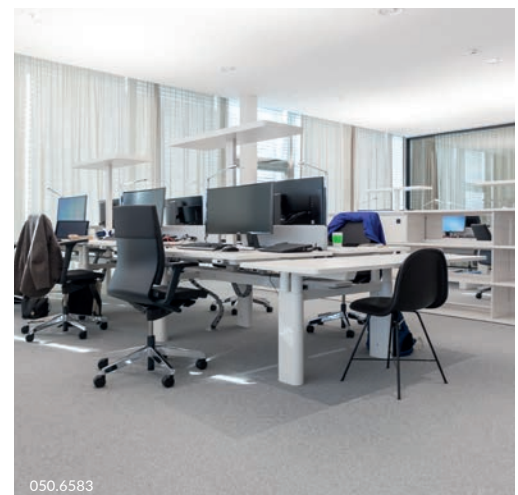
site in India (see info box). In both cases, the LAN cabling solution from R&M forms the backbone for the networking of workstations and building technology.

### Standard solutions fit the bill

Swiss Re had defined a range of important infrastructure requirements. The reinsurer needed and expected absolute operational reliability. Performance headroom had to be included in the equation for mobile working, data and video transmission. Above all, the customer required full WLAN coverage on all six floors.



Custom-made by R&M for Swiss Re Next: compact DDS outlets in the desks.



050.6583



**«We would never have been able to put anything else comparable into place as quickly. Never change a winning partnership.»**

**Christian Zürrer, project lead for building technology, Swiss Re**

buildings,» says Thomas Läderach, project lead at installation partner AZ Elektro AG. The project partners selected the tried and tested combination of FO backbone and horizontal copper cabling. The video technology was connected to the FO infrastructure for two reasons: to provide the necessary transmission capacity and to take the pressure off the IT network. Swiss Re operates a state-of-the-art TV studio in the new building and requires high bandwidths for moving image transmission and video streaming. The FO network can be extended to suit requirements.

### Compact outlet developed

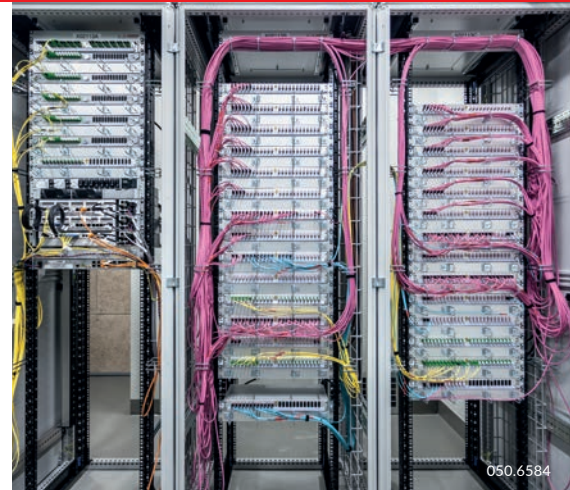
«An important question was how many and which connectors we needed for the docking stations,» says Christian Zürrer from Swiss Re of a further challenge. The project lead for building technology reports: «The connection solution had to be as slim-line as possible and fit in the raceways in the desks.» But the connectors also had to be easy to operate. R&M quickly developed a customized compact desk distributor strip (DDS) outlet with six power and four LAN connectors.

Christian Zürrer on his experience with R&M's customizing: «We quickly approved the concept. We would never have been able

to put anything else comparable into place as quickly.» Swiss Re values the partnership the company has enjoyed with R&M for years. As Christian Zürrer says: «Never change a winning partnership». Thomas Läderach agrees: «AZ Elektro has enjoyed excellent collaboration with R&M for years now. The range suits us. R&M is always open to improvements and the company takes the opinions of an installer seriously.» With the cabling system from R&M, Swiss Re has a stable, future-proof and cost-efficient infrastructure. Moreover, the R&M copper distributor VS Modular also proved its worth once more in the project. It enabled telecommunication on the construction site.

At the end, R&M verified that the FO cabling met all the standards. «The service was perfect for us and the customer. R&M documented the results of the OTDR measurements, confirmed the quality of our installation and then issued the 25-year system warranty,» says Thomas Läderach.

Christian Zürrer confirms: «The installation was a job well done. AZ Elektro sets great store by that and we really appreciate it».



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**From left to right: Christian Zürrer, project lead building technology, Swiss Re; Beat Stucki, R&M Switzerland, Thomas Läderach, project lead AZ Elektro AG**

### R&M solution for Swiss Re Next

The LAN cabling includes:

- 9 km OM4/OS2 FO cables with 12 to 48 fibers
- 80 fiber optic distributors
- 190 km Cat. 7<sub>A</sub> S/FTP AWG22 copper cable
- 5,500 shielded Cat. 6<sub>A</sub> EL modules
- 600 DDS outlets, customized solution

The solution also includes OTDR measuring by R&M.

### Agile working concept in India

Swiss Re also introduced its agile working concept in Bangalore with the move into the new building. In the new Indian branch, 1,200 workstations and 3,500 LAN connections had to be networked. The reinsurer selected the same cabling solution from R&M as it used for the new building on the shores of Lake Zurich: shielded Cat. 6<sub>A</sub> EL modules and Cat. 7<sub>A</sub> S/FTP installation cable. R&M also provided color-coded patch cords.

R&M India convinced the customer that this was the right solution because all requirements could be met locally in exactly the same way as they would have been in Switzerland. The R&M team in Bangalore carefully documented the product quality, efficiency and qualification. The worldwide closely networked R&M Supply Chain guaranteed

the logistics and technical expertise.



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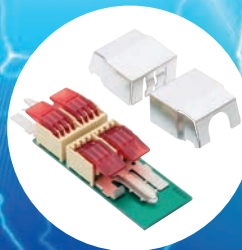
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R&M is labeling the powerful PoE range with the new PowerSafe quality seal.

## Quality Seal for PoE Range

Power over Ethernet (PoE) will be making even higher demands on connectivity in the future. Alongside IP data, data cables will have to transport high currents in continuous operation. R&M is now marking the suitable PoE range with a quality seal.

050.6586

R&M is introducing a quality seal for the Power over Ethernet product range. Its name: PowerSafe. The cabling products marked with PowerSafe can continuously transmit high currents in local data networks. The range includes patch cords, cable assemblies such as CP and trunk cables, RJ45 connection modules, cable couplers and FM45 connectors.

The wire termination in these products is based exclusively on the proven insulation displacement contact (IDC) technology, in the unsurpassed quality defined by R&M. The company is the only supplier of RJ45 patch cords with IDC technology.

R&M has introduced this additional quality seal to help customers in their planning and ordering processes to meet the increasing demands of PoE applications. PoE is becoming more and more efficient. Since the

launch of PoE, transmittable electrical output has multiplied and will soon reach 90 watts. The current rating will then reach 1 ampere per twisted pair. In the future, current is to flow over all four twisted pairs (4PPoE). The relevant standard IEEE 802.3bt is likely to be ratified in 2018. And this will bring with it a whole new range of applications. For example, the entire LED lighting of large buildings (referred to as connected lighting or smart lighting) and LED advertising spaces (digital signage) can now be operated with PoE.

This means high currents will be flowing through the wires 24/7 – alongside data transmission signals. Can the connection technology cope or will the contact resistance in the wire termination of RJ45 connectors increase? R&M findings indicate that unsuitable termination technology in patch cords could be a particular danger. The IDC technology used by R&M excludes such

risks. IDC terminations are the one and only basis for using Power over Ethernet with high currents in continuous operation.



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## On the Road to Augmented Reality

It sounds like a dream. You can analyze network cabinets or entire data centers from inside and out, without actually being on site. You can carry out complex assembly without ever having read the manual. And it's all down to augmented reality.

Augmented reality is the name of a relatively new and promising branch of the software and IT industry. It is also referred to as the future of man/machine interaction and is akin to modern computer games. The term encompasses new technologies which enable users to have extended three-dimensional perception with digital aids. Digital and real perception become intermingled. Additional information can be added to a user's own sensory perception.

Here is a specific example: On a building site, an installer touches an object, let's say an R&M patch panel. At the same time the assembly instructions appear on his tablet or portable display, including a three-dimensional CAD drawing which can be looked at from all sides. An instructor or network administrator at some distant location observes the scene via a camera in the display. He sends the installer important tips or

alternatively the patching commands by radio. Once assembly is completed, the result can be examined and certified from afar. Besides, the freshly equipped patch panel can be included in the automated infrastructure management system with just a few clicks because all the information about the location, ports and links is already available digitally.

### Objective: smart networks

The example described above is still science fiction. But R&M has already sensed the fascinating possibilities of augmented reality technologies and is monitoring market development. Application possibilities are becoming clear in all segments, in the Data Center and LAN Cabling segments as well as in the Public Networks segment.

Networks are becoming smart. That is the declared objective of R&M (see the article in the magazine CONNECTIONS No. 51). With

the digitalization of all information about cabling and with augmented reality it will be possible to make this smartness both tangible and usable. As soon as benefit and value added become perceptible for installation technology, R&M will provide the appropriate solutions.



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## Data Center at Groupama Comes by a New Storage Infrastructure

The mutualist insurance and banking group Groupama is present in eleven countries. In addition to the brands Groupama and Gan, it also owns the website Amaguiz.com. Its range includes banking and insurance offerings for companies and private individuals.

### Background

To increase the protection of its intangible assets, Groupama built a backup data center in Brittany, France, in 2014. Two years later, the Group initiated the SAN project with the aim of renewing the storage infrastructure of

the seven-year-old data center architecture at its headquarters in Bourges. The «Groupama Support et Système» (G2S) department issued a call for tender for the project.

### Premium technology from R&M

With perfectly customized solutions, R&M clearly stood out from the competition. The cabling specialist has been working together with Groupama for more than 20 years. Extensive work to renew the cabling and fiber optic infrastructure started in the two buildings on the 800 m<sup>2</sup> campus. The existing space had to suffice for the installation of a modern, reliable and secure network infrastructure, including an upgrade of the 1,800 SAN ports.

Bernard Mignot, DTPI-Architecture Data Center, Head of Production / Systems & Networks at Groupama Supports & Services: «Our long-term partner R&M offers many advantages that are important to us: reliable, top-quality products at sensible prices, geographic proximity with a production location in Switzerland as well as the associated logistics and flexibility.»

### Netscale, a strategic technology

Data volumes are increasing drastically and more and more resources have to be connected to data centers and managed there. Maximum port density has to be achieved on

a minimal space. The high density can lead to problems in cable management and in searching for errors. Netscale, the ultra high density solution for fiber optic cables, features integrated infrastructure management functions. By using the finest Unicord patch cords, cable volume remains limited with a packing density up to 67% higher.

The Netscale solution philosophy caters to Groupama's requirements perfectly. In total 19 3U and 119 1U sub-racks were installed.

«The installation of Netscale high density sub-racks in our data center is one of the largest projects using this new technology in France. In comparison to conventional solutions, a Netscale rack provides three times as much capacity – this means that you do not have to install an unnecessarily high number of racks in a limited space. Axians Networks was responsible for realizing the cabling. The specialist for complex IT infrastructures installed 70 server racks in just three weeks. Sales and the collective delivery of R&M played a major part in this fast handling,» explains Bernard Mignot.

### Precision craftsmanship

«Thanks to the change-over tests in October 2017, we were perfectly prepared for the switch of 25% of the productive infrastructure at the end of November. In the first stage 400 of a total





of 1,800 ports were changed over: The rest were taken care of over a series of four weekends. In this way we spread the risks and gave ourselves a certain amount of leeway in case there were any problems. The work was finished at the end of January 2018.»

«The patch phase went off without a hitch. But the very fine optical fibers required considerable precision craftsmanship. We value the Netscale

solution because of its high packing density in such tight spaces and that also has a positive effect on the costs per port.»

«At Group level there are currently other projects in collaboration with R&M, for example the tertiary cabling of a 65,000 m<sup>2</sup> campus with five buildings in Nanterre, west of Paris. The change is continuing!» concludes Bernard Mignot.

#### Netscale solutions from R&M

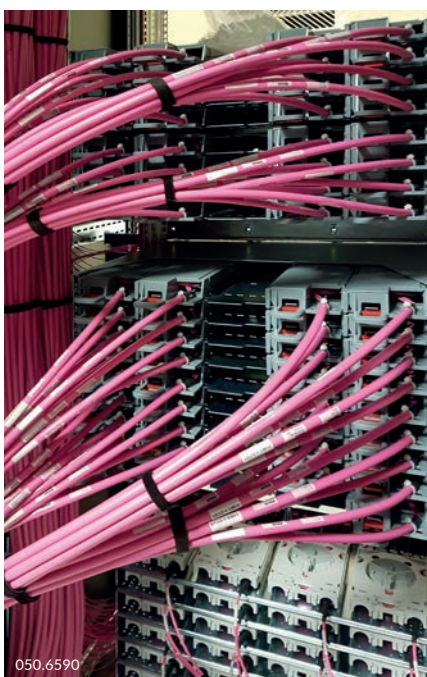
- 19 sub-racks on 3U
- 119 sub-racks on 1U
- 548 MPO/MTP modules
- 274 36xF0 trunks
- 5,000 LC-QR patch cords

#### Active components

- 54 1U HD panels
- 208 LC-QR/LC-QR trunks



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## The Heat is on with Power over Ethernet

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The new performance levels of Power over Ethernet (PoE) could mean death by overheating for unsuitable cabling. But the next PoE generation is offering enormous opportunities of making buildings both more intelligent and more efficient.

Supplying power remotely, using Power over Ethernet, is electrifying the network market. Since the launch of PoE, transmittable electrical output has multiplied. Soon it will reach 90 watts and the current is to flow over all four twisted pairs (4PPoE). The relevant standard IEEE 802.3bt is likely to be ratified in 2018 and the current rating will increase to 1 ampere per twisted pair. At the same time, the LAN is to continue to ensure fast data transmission with 10 Gigabit Ethernet.

This means PoE is opening up fascinating new possibilities for the Internet of Things (IoT). A wide range of building automation sensors, powerful WiFi antennas and video cameras, emergency and access control systems, medical technology, remote maintenance, checkouts and terminals, lighting, air-conditioning and heating technology, thin clients and lots more digital systems can be integrated. The convergence of power supply and data transmission makes it easier for buildings to become intelligent.

Furthermore, with LED technology the lighting of office buildings, shopping malls and

concert halls can now be operated with Power over Ethernet. Connected lighting or smart lighting is the name of the innovation. This approach too leads to energy savings. But particularly, the lighting can be adjusted via the data network to suit local requirements. Every LED light or chain of lights has its own IP address and can be addressed individually.

A further innovation on the market is digital signage: the remote powering and control of LED monitors, video walls and scoreboards. This makes it possible to broadcast and manage messages, traffic warnings, live pictures and advertising quickly over data networks.

### High currents around the clock

The new feature of these PoE applications: They need maximum electrical output 24 hours a day, seven days a week. To date, peak loads have only lasted a few seconds or at most minutes, for example during start-up or switching operations.

The question is whether, in addition to the active network equipment, the passive cabling infrastructure is also equipped for this new

constant power load. What effect will the high currents have long term on the contacts, the cabling and signal transmission quality?

Possible escalations: Cable bundles heat up. LAN performance suffers. The contact resistance increases with lower-quality contacts. This can lead to overheating, sparking and destruction. R&M findings indicate that the widely-used insulation piercing contact (IPC) could be a particular danger. It is often used for termination in RJ45 plugs on patch cords, but it is not inherently suitable for 4PPoE.

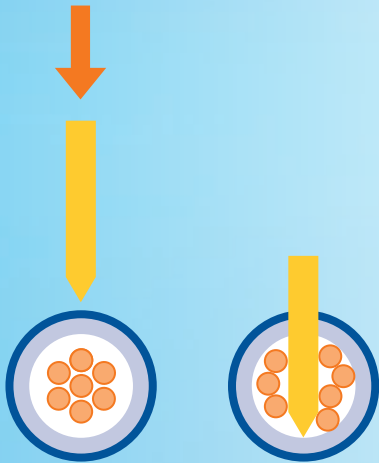
In the case of IPC connections, the contact resistance increases continuously and unpredictably, even if the connection initially appears to be working well. Simulations from R&M indicate that contact resistance levels as small as 50 – 100 mΩ can cause the entire connector to ultimately overheat and destroy itself. A current R&M white paper explains the background (see [www.rdm.com](http://www.rdm.com)).

### Wire termination decisive

If patch cords are used for high-current PoE applications, the termination technology

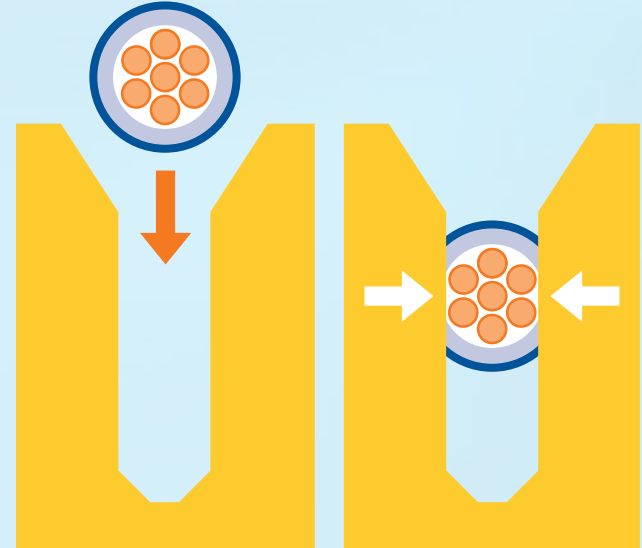


### IPC functional principle



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### IDC functional principle



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can no longer be ignored. Any shortcomings could have critical consequences for the entire infrastructure of a building. A worst-case scenario can result in the destruction of much more than just the patch cord. Exchanging a single patch cord may well not be enough to guarantee or restore the operational reliability of the network.

The insulation displacement contact (IDC) used by R&M excludes such risks. This is underscored by the new R&M PowerSafe

quality seal. The company is the only supplier of RJ45 patch cords with IDC technology.

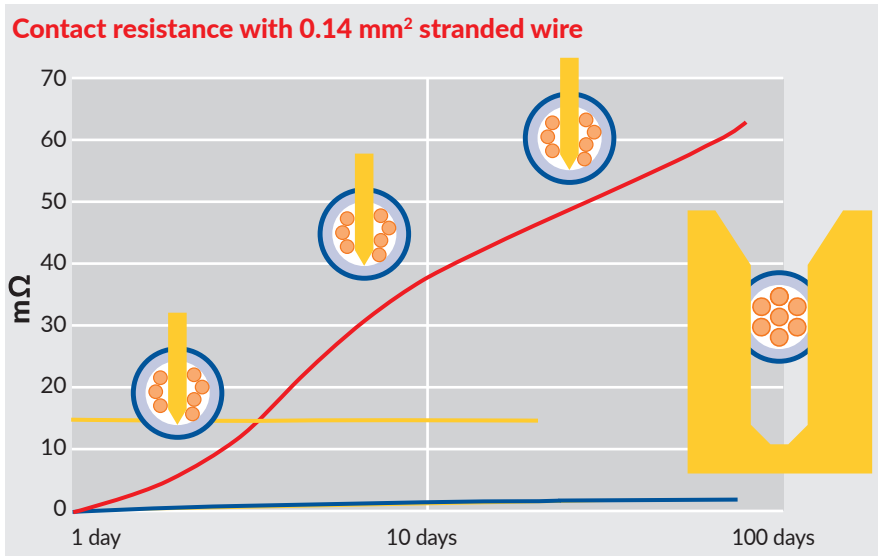
### Only solution for high power

IDC offers long-term safety: In the case of IDC, two sides of a spring contact clamp the wires permanently. The contact halves cut through the insulation and elastically contact the wire. Providing it is state of the art, the IDC termination is fatigue-proof, mechanical stress- and vibration-resistant, temperature-

and moisture-resistant, dust- and gas-tight, and thus corrosion-protected.

Laboratory tests and R&M experience show that the contact resistance of an IDC connection remains consistently low and stable. IDC is thus the one and only safe choice as termination technology for Power over Ethernet with high currents in continuous operation.

Tools and specialist information for planning PoE installations are made available by R&M on its website:



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## Plug & Play Cabling with Netscale BCM

Fewer height units for cable management. Clearly arranged cable guidance to the blades. Handling on the front and back as easy as can be. These wishes are all fulfilled by the R&M Netscale Blade Cabling Manager (BCM).

The new member of the Netscale family increases the packing density of FO cabling around large switches and SAN directors with high port density. The BCM is a modular, compact and easy-to-operate system for cable management.

The BCM occupies just two height units (U) in the 19" rack or network cabinet and terminates up to 2,592 fibers. This means the valuable space in hyperscale and cloud data

centers can be used to optimal capacity. A logical continuation of R&M's market-leading ultra high density concept.

Direct Connections Cassettes (DCC) are positioned in the twelve slots to accommodate a maximum of six cable sets with a small fan-out box or three cable sets with a large fan-out box. Alternatively all inserts of the Netscale family can be used. This is how to store LC Simplex, LC Duplex or MPO ports. The clearly arranged slide-in units can be configured freely.

The Netscale BCM guides cables directly and crossover-free from the switch ports to the patch panel which can be below, above or next to the switch. Every switch module (blade) is given a corresponding slot in the BCM. Cable guides on the side of the cabinet, which would otherwise take up a considerable amount of space, are no longer necessary. The use of the most slim-line patch cords with a diameter of 1.4 mm helps save even more space.

Cable management on the front and back is specially designed to quickly deal with daily configuration tasks and simple trunk cable

installation. Clear cable guidance and port representation as well as the rear cabling guide (RCG) simplify administration. Plugging and unplugging are as easy as can be with the LC Duplex solution developed by R&M featuring Uniboot and a push/pull mechanism.

Users are free to choose the cable lengths between the BCM and the switches. If required, R&M can supply pre-terminated BCM cable sets with standardized or individual cable lengths. Fan-out boxes can be fixed in various positions, DCC and RCG offer a number of possibilities. This flexibility reduces the number of offset schemes.







## Cabling Hyperscale Data Centers – but how?

The hyperscale data center market is currently growing by an average 20% per year. All over the world operators are setting up gigantic, fail-safe, distributed and innovative cloud capacities. But how can complex hyperscale cabling be kept in check?

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Hyperscale data centers have an incredibly scalable computing architecture which can be managed like a single unit. Hyperscale solutions allow operators to start out modestly with lower investments and then react accordingly to growing demand. New infrastructure solutions make it possible to immediately aggregate or extend networks smoothly without having to interrupt operations.

Hyperscale capability is based in particular on there being an abundance of available optical fibers. High-count fiber cables with more than 2,000 or 4,000 multi fiber cables are typically needed to cover the connectivity requirement. The economic advantages of fiber optics: low costs, low energy requirements and high performance. Hyperscale providers are already working with a performance of 100 Gbit/s and are striving for 200 or 400 Gbit/s.

The cabling solutions also have to be further developed due to magnitude and complexity, the required agility and scalability. This essentially depends on the following factors: packing density, handling, transparency, automation and management.

R&M is familiar with these factors from its long-term support of data center customers and has developed pragmatic, innovative

solutions for FO infrastructures in the hyperscale segment. A few examples:

- The splice cabinet BEF-60 – the starting point for scalable spine and leaf topologies – was constructed based on the company's experience with large-volume distribution cabinets. The capacity: 23,040 splices over 60 drawers. With up to 120 ports per height unit in the 19" rack, the R&M distributor Netscale achieves maximum port density. The modular concept enables flexible scaling and fast migration over and above 10 or 40 Gigabit Ethernet.
- The Netscale Blade Cabling Manager (BCM) accelerates the cabling of modular switches for cloud networks. It leads cables directly from switch ports to patch panel ports. Cable management in the cabinet is thus no longer necessary.
- R&MintelIPhy for Netscale brings transparency and intelligent network monitoring into the data center. Thousands of FO connections can be monitored simultaneously, fully automatically and in real time. An indispensable management solution for hyperscale data centers.
- The slim-line FO connector LC Quick Release (LC-QR) increases packing density by 60% per height unit. Push/pull operation over Uniboot and boot facilitates fast plug-



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ging and unplugging in narrow patch panels. – With OM5 cables from R&M, data centers are making first forays into Wavelength Division Multiplexing (WDM) for multi-mode fibers. What is referred to as SWDM quadruples the transmission performance of inexpensive multimode fibers.



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## Lebanon's Largest Mall Selects R&M for High-Speed Cabling across Premises

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ABC is the most prominent mall and department store in Lebanon, offering unique shopping, dining, leisure and entertainment experience. With a more than 75-year heritage built on the tradition of innovation, ABC was keen to ensure the very best shopping experience for customers at its newest mall in Lebanon, ABC Verdun.

For this reason, ABC Verdun invested in state-of-the-art cabling infrastructure from R&M. This network serves as the platform on which critical mall services, including Internet, point-of-sales systems, CCTV, digital signage, and the Building Management System (BMS), now run.

ABC was the first retailer to introduce the mall concept to the Lebanese market, and has become the country's favorite brand and preferred lifestyle and shopping destination. Located in the heart of Beirut, ABC Verdun is a prime urban retail and entertainment destination. The mall is spread across around 1.5 million square feet – with more than 140,000 square feet of GLA across six levels. The project hosts over 200 stores including a wide selection of international must-have brands, as well as movie theaters, and around 30 restaurants and coffee shops, and several new concept stores.

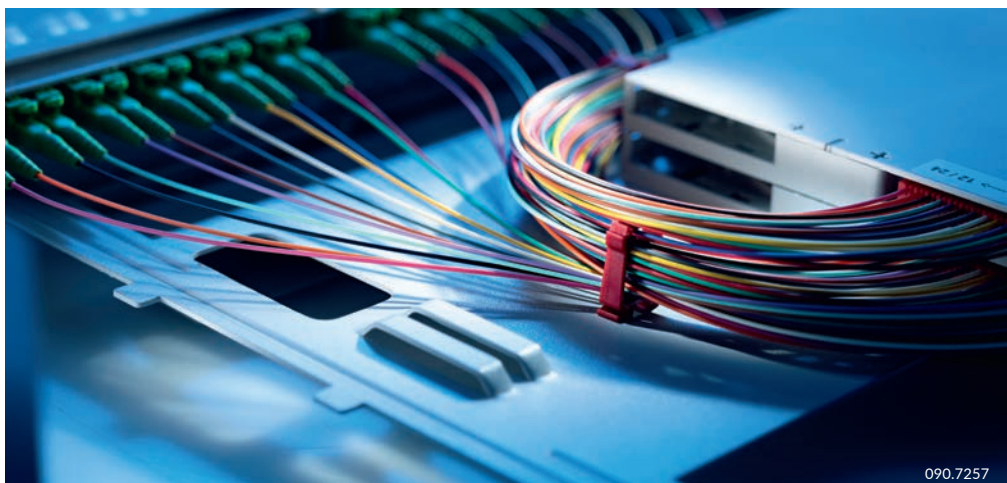
This prioritization of convenience for its customers prompted the IT team to shortlist R&M as the cabling vendor has an established reputation for quality and service. Moreover, R&M was capable of offering an unmatched

25-year system warranty on the cabling infrastructure – thereby ensuring it will be reliable and future-proof. As a result, key systems now efficiently run on the high-speed cable

network enabling everything from in-store payments to mall security and even systems that optimize its 1,700 car parking spaces.

**«R&M's products definitely meet the expectations of our client and live up to the well-known Swiss quality.»**

**Antoine Abi Nassif, General Manager QBRANDS Sàrl**



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R&M's long-standing presence in the Middle East proved an added benefit to ABC Verdun. The installation time was greatly reduced by use of the high-performance field-installable connector which made it possible to connect the FO Field connectors to fiber cables at the site itself in under a minute. This innovation allowed the costly and time-consuming step of fusion splicing to be skipped, as pigtails, patch cables, and installation cables were directly connected.

For the connectivity of its retail stores, the mall has utilized the very latest Cat. 7 S/FTP cables with Cat. 6<sub>A</sub> outlets, while CCTV connectivity is built on high-grade Cat. 6 cabling. This copper cabling network connects to a high-speed FO backbone that utilizes OM3 fiber cabling.



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Left: Mohammad Sweidan, R&M Levant, Africa & Kuwait; right: Antoine Abi Nassif, General Manager QBRANDS Sàrl

R&M's strengths in copper and fiber presented ABC Verdun with the opportunity to fulfill all its cabling requirements, thus simplifying the implementation. Parts of the network are built on R&M's cabling systems, providing a 25-year system warranty which safeguards the Group's investment and ensures its successful operation for years to come.

Antoine Abi Nassif, General Manager of Qbrands, R&M's implementation partner in Lebanon said: «After several years of hard work, we have achieved great success with R&M in Lebanon. It was crucial for us to win this project as ABC Verdun is one of the most important projects executed in Lebanon in recent years. R&M has provided us with its full support in order to fulfill the require-

ments of the client and consultant Khatib & Alami. R&M's products definitely meet the expectations of our client and live up to the well-known Swiss quality.»



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## Big, Bigger, Safer: Safe Host

Switzerland's Biggest Data Center with Connectivity from R&M

Discerning data center clients receive perfect service here. Safe Host SA has opened Switzerland's biggest data center in Gland in the French-speaking part of the country. Whether managed services, hosting, colocation or server housing – Safe Host opts for connectivity solutions from R&M.

Photograph: Lucien Kolly 050.6599

Swiss market leader Safe Host SA currently operates three data centers. The first one is in downtown Geneva and has a usable space of 5,000 square meters. The second one is in Gland on Lake Geneva. The third one is in Avenches, between Lausanne and Fribourg.

As the high-end data center in Geneva was reaching its capacity limits, Safe Host decided to build the new data center in Gland - the

largest one in Switzerland. The capacity of the new data center corresponds to a performance of 40 megawatts. On an area of 14,000 square meters, users can take advantage of all manner of possibilities. Over four floors, business customers and organizations can occupy separate and secured rooms or accommodate their own cabinets and racks in lockable units within open spaces.

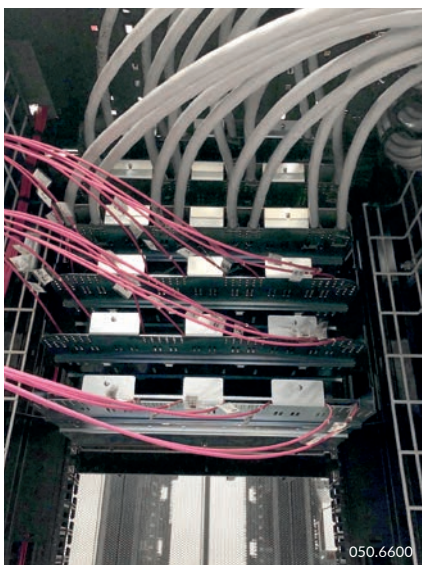
### Entirely pre-terminated

R&M's solution for this property initially consists of structured cabling with copper and fiber optic connections for the entire building. Cat. 6<sub>A</sub> EL modules are providing the basis. The R&M raceway system is used as a cable guide. Together with installation partner Swisspro from Renens and project lead Simon Carrard, R&M quickly implemented the concept. Frank Jurain and experts from Betelec were engaged as consulting engineers.

R&M delivered the high-end module Cat. 6<sub>A</sub> ISO as a version which was pre-terminated for specific applications and high density units. It is used together with the HD panel in the racks for hosting customers. The company also delivered the FO trunks with MPO connectors and OM4 fibers entirely

pre-terminated. This did away with the need for splicing on site. Safe Host also recommends that new hosting customers realize their infrastructures with the leading products from R&M.

Abdelhalim Ouali, Facility Operations Coordinator in the Gland Data Center, highlights the positive experience with R&M: «My contact at R&M was and still is always available for



f.l.t.r.: Fabio Carafa, Head of Swisspro Lausanne; Abdelhalim Ouali, Facility Operations Coordinator, Safe Host S.A.; Walter Kurzen, R&M Switzerland; Simon Carrard, Project Manager, Swisspro



**«My contact at R&M was and still is always available for me, on every conceivable communication channel, and often pays us a personal visit. He understands me and my needs and always goes that extra mile for Safe Host.»**

**Abdelhalim Ouali, Facility Operations Coordinator, Safe Host S.A.**



Photograph: Lucien Kolly 050.6603

me, on every conceivable communication channel, and often pays us a personal visit. He understands me and my needs and always goes that extra mile for Safe Host. We have intense discussions about requirements and desires and talk about them together. They are then all taken into consideration and implemented to my total satisfaction!»

### Full service – wide portfolio

Among other things, the product range of the Safe Host data center in Gland comprises the modular offers SafeSuite, SafeCage and SafeRack. They can be scaled individually. This means Safe Host can offer excellent value for money. The customers only pay for what they really need. As everything from the technology to the costs is transparent, customers can select the most profitable solution for their needs. Safe Host optimizes the service portfolio in close collaboration with the customers.

The security of Switzerland as a location for industry as well as exceptional services distinguish Safe Host from other suppliers in a highly competitive market. One of these

services is the active support provided when moving servers. If required, Safe Host transports entire cabinets and active components and rebuilds them in the data center. The expertise and commitment of the employees are also outstanding. Elena Sikias, Marketing Project Coordinator, describes product design as follows: «Really, we have the same kind of situation as on the property market. You rent an empty apartment with a corresponding infrastructure. Then you decide which parts of the infrastructure you actually need. And we are quite willing to support customers during setup if they so require. Here you get everything from one source. This means that our customers can concentrate entirely on their core competencies.»

In the managed port sector, Safe Host offers connectivity solutions on demand on the basis of Fast Type or Gigabit Ethernet. In this field of application, the cabling is also from R&M.

### Maximum security

Safe Host SA is a private company headquartered in Geneva. The company offers a com-

plete, modular and transparent data center portfolio. Safe Host now has more than 120 customers. Initially these were from the financial sector as well as from international and multinational organizations. Companies from other markets are now constantly being added to the customer base.

Maximum security and availability are part of the Safe Host DNA. All the Safe Host data centers meet top requirements in terms of operational reliability and availability. Safe Host offers corresponding security guarantees. The data centers are certified in accordance with ISO 9001 and ISO 27001. They comply with the guidelines of the Swiss financial regulatory authority FINMA. Customers can rely on a zero-error tolerance and need have no hesitation in entrusting their data to the professional service provider.

In the Gland data center, the data from two separate rooms is routed to the server rooms via the raceway using color-coded cable bundles. Cooling, fire protection, energy and emergency power supply are accommodated redundantly in two separate rooms each. The cooling systems each consist of four groups. Each of these groups could cool the surface of an ice rink. The nitrogen system for fire protection is also set up redundantly in separate parts of the building.



Photograph: Lucien Kolly 050.6602



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## Fire Protection Worldwide

**When there is a fire in a building, the resilience of the cables is crucial. Installing the right cables helps save lives. R&M is now making the necessary fire class information available worldwide.**

In Switzerland the European Union's Construction Products Regulation (CPR) and the corresponding standard EN 50575 have been in place since 2017. They stipulate that low-voltage, data and communication cables have to feature special marking. Details on the fire protection classification, the number of the Declaration of Performance (DoP) and the CPR CE marking also have to be supplied.

R&M also fulfills these requirements worldwide. Since the start of 2018, R&M has been marking all copper and FO installation cables available on the international market in accordance with the specifications of EN 50575. In the online catalog, customers will find a definition of the fire classes B2ca, Cca, Dca and Eca beside every product. The cables can be selected according to these classes. Data sheets and DoPs are available digitally if so required.

When ordering using the R&M online configurator, every delivery is given an additional label featuring the fire class information. This means customers can check goods as soon as they arrive to ensure they meet their requirements.

Customers ordering cables from R&M can be sure they fulfill the European safety regulations. All over the world, builders, planners and installers can thus define a building's fire protection safety in accordance with strict, recognized criteria. Smoke production, dripping behavior and the acidity of the cable material are defined consistently in each case.

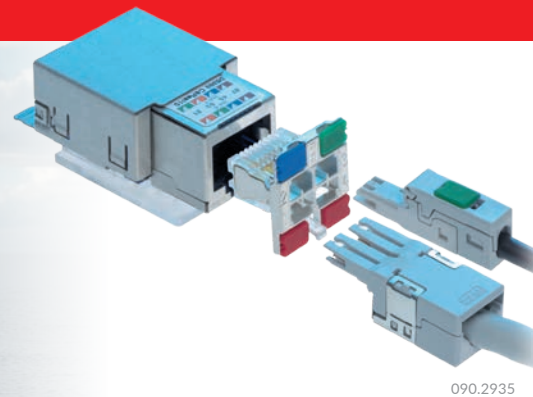
Different states, cities and regions have varying, sometimes stricter fire protection regulations. These local regulations are not always available to R&M in their most recent and complete form. This is why it is

recommended to inquire on ordering and compare the R&M declarations with local regulations. R&M sales staff and technical customer advisors are more than willing to help. Furthermore, the company is constantly being sent information on local regulations by partners to supplement product data and ensure conformity.



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## Data Network for State-of-the-Art Cruise Liner

Cruise liners and comfort. They go together like vacation and sunshine. Even out on the high seas, there is no room for compromise. That is particularly true of the IT and communication infrastructure on board. And also the reason why leading shipyards and shipping companies use cabling solutions from R&M.

Current example: The Meyer Turku Oy shipyard in Turku, Finland, is furnishing the cabins of two new cruise liners with Cat. 6 copper cabling from R&M. These are the second generation of the cruise liners «Mein Schiff» from TUI Cruises which are due to be launched in 2018 and 2019.

Cruise liners for more than 2,500 passengers and around 1,000 crew members are a technical challenge. The dimensions, for example with 365 meters of dry deck, are impressive. The shipyard and its suppliers have great responsibility when it comes to equipping the cruise liner to be both safe and comfortable when on the high seas. And that is particularly the case for the inside.

This is why R&M equips its connectivity solutions especially for ship operation. The regional R&M distribution partner Nylund Group Oy, which has worked together with the Meyer Turku shipyard for many years now, sheathes and bundles the cables so that they can withstand the vibrations of a ship long term and do not suffer any damage due to friction.

There are around 300 to 400 kilometers of cable installed in a modern cruise liner. Extensive data networks provide telecommunication, Internet, infotainment and TV on board. WLAN is available without exception on 15 decks and in more than 1,400 cabins, naturally also in the restaurants, bistros, bars and lounges, on-board movie theater, spa and sports areas. Even more important are video surveillance, warning systems and sensors for ship control and automation.

The fact that the cabling of the cabins on «Neue Mein Schiff 1» and «Neue Mein Schiff 2» is from R&M underscores the shipyard's safety- and quality-oriented product selection. Before the current project, Meyer Turku had already equipped six ships with cables and components from R&M. In each of the two new TUI cruise liners, 4,000 to 5,000 Cat. 6 connections and the above-mentioned several hundred kilometers of shielded cables will ensure reliable 1 Gigabit Ethernet.



### Meyer Turku Oy

Meyer Turku Oy employs 1,700 persons and specializes in building highly complex, innovative and environmentally friendly cruise ships, car-passenger ferries and special vessels. Together with two sister shipyards in Germany, Meyer Werft in Papenburg and Neptun Werft in Rostock, Meyer Turku is one of the world's leading cruise ship builders. The successful shipbuilding tradition in Turku has been ongoing since 1737. The company is currently building cruise ships for TUI Cruises. The company will also build two cruise ships for Costa Crociere, Carnival Corporation and Royal Caribbean International.

The design and construction of the ships are supported by the subsidiaries of Meyer Turku: Piikkiö Works Oy, which is a cabin factory in Piikkiö, Shipbuilding Completion Oy, which provides turnkey solutions to public spaces in ships, and ENG'ND Oy, which is an engineering company offering services for shipbuilding and offshore.

### As reliable as on land

In-ship data networks must be as reliable as the Internet on land or the LAN in data centers, factories and offices. The comfortable interior design of cruise liners belies the fact that a maritime environment has totally different requirements than those of a hotel on land. The installation has to withstand salt air, changing climate zones, some of them extreme, and, last but not least, constant vibrations for years.



050.6606

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## Flawil: Consequent Path to FTTH



050.6607

The municipality of Flawil in northeastern Switzerland is home to around 10,000 inhabitants and has chosen a resolute path into the gigabit era. The municipality's utility is using an R&M solution to create an autonomous FO network that offers a wide range of options.

The decision was clear. In March 2012 virtually all the residents in Flawil voted in favor of the construction of an autonomous,

full-coverage FTTH network. Flawil did not want to wait for the fiber optic rollout of major network operators but instead decided to take charge of things itself. TBF (Technische Betriebe Flawil) is the municipality's utility and is responsible for the project. By the end of 2018, around 5,000 connections should have been provided.

From the middle of 2018, all buildings in Flawil will have an FTTH connection with four fibers each and a wide range of options for the future. TBF designed the network as an open dark fiber solution. Various communication service providers lease fibers, making their respective offers available to the local network.



050.6608

Andreas Lämmlin, project lead TB Flawil (left); Thomas De Steffani, R&M Switzerland (right)

### Compelling ODF capacity

Several factors are contributing to the fact that TBF will be completing its project a few months earlier than planned: professional planning, expertise and experience, smooth project organization and installation-friendly cabling systems. The R&M Optical Distribution Frame (ODF) is being used as the platform for the distributors. The experts from TBF were impressed both by its capacity and modular design.

The communal utility has been familiar with FO cabling since 1992 when the company set up its first internal FO connection. It was used to quickly exchange data between two sites. Gradually other FO routes were set up for steering the gas, water and electricity supply. Soon there were two backbones available – a northern ring and a southern ring.

Early on TBF opened up the local FO network to external users, including the



## «The capacity and modular design of the ODF from R&M convinced us.»

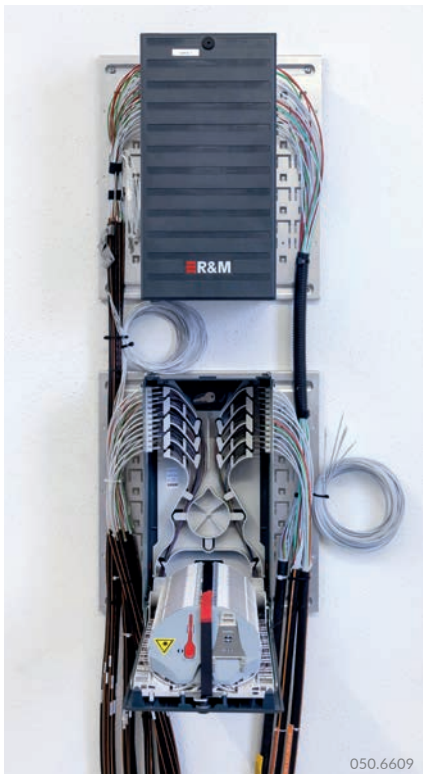
Andreas Lämmlin, project lead TB Flawil

communication network of the authorities and municipalities of the canton of St. Gallen (Kom SG). GAS&COM AG, a provider of FO connections with high-security requirements, also leases fibers.

### Starting signal and financing

As TBF was celebrating its centenary in 2011, it was also ringing in a new era. Flawil was to be provided with full-coverage FTTH and gigabit-speed Internet – a considerable advantage for the more than 10,000 inhabitants of the municipality.

The company was determined to manage the investment of more than CHF 10 million itself. «That is one of our USPs: We do everything ourselves and the citizens place great confidence in us,» explains TBF project lead Andreas Lämmlin. «We will be reaching the profit zone earlier than planned because we have had paying customers from the beginning,» says Andreas Lämmlin.



Service area interface: ODF splice module from R&M

### Distribution centers

Compact, modular and above all cost-optimized R&Mfoxs ODF solutions are used in the POP and substation distribution centers. The ODFs were expanded with the backbone and then extended with insertions depending on the expansion area, fully complying with the «pay as you grow» principle.

New high density insertions were mixed with standard insertions to clearly separate the backbone and subscriber, and thus keep costs low.

The flexible R&Mfoxs modules were used to realize optimal wall solutions in the different sized substations, some of which have restricted space.



Technische Betriebe Flawil

### Many customers – strong partner

TBF secured its customer base with the acquisition of two local cable TV networks. This gave the utility easy access to a lot of residential properties. The coax infrastructure was replaced by FO cabling.

«It is a better idea to replace an old network than construct an additional one. That brings a certain basic load,» sums up Andreas Lämmlin. For subscribers, it is best when they can receive as many services as possible from one standard, new FO network.

Furthermore, Swisscom became a strong cooperation partner of TBF: It uses two of the four fibers for each house and does not have to set up its own FTTH network in Flawil. Instead, Swisscom contributes to the capacity usage and financing of the infrastructure.

### OTO as service area interface

The redundant FO network consists of a ring with four POPs and 26 substations. Star cabling radiates out from these stations to residential and corporate buildings. TBF lays a conduit with FO cables into each house or if possible uses existing conduits.



Distribution center with the R&Mfoxs system: Among other things, 311.5 km of micro cable with 12-72 fibers as well as 35.5 km of feeder cable with 288-576 fibers were used

Local electrical installers are commissioned by TBF to assemble the service area interface. This consists of the Optical Termination Outlet (OTO) from R&M. Local partners chose OTO as their favorite because it is easy to install. TBF does not provide any other equipment. This keeps the infrastructure lean, clear-cut and inexpensive. The subscribers or house owners adapt the infrastructure inside the buildings themselves and establish the connection to the OTO.



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## University of California Santa Barbara's Growing Campus has Solved its Space Issue

UCSB (University of California, Santa Barbara) is one of the most sought-after universities in the United States to attend. It was ranked the eighth best public university and the 24th best global university in 2016 by the U.S. News and World Report. The institution is considered a Public Ivy university, meaning that students can get an Ivy League experience at a public university.

Educational excellence is not the only reason why students want to attend UCSB. The university is nestled along the pristine southern California coastline near the town of Isla Vista, 8 miles (16 km) north of Santa Barbara and 100 miles (160 km) north of Los Angeles. The 1022-acre (413.6-hectare) campus is located on some of the most breathtaking coastline in California. The university has more than 10 sandy beaches within a 15-minute drive and Santa Barbara has a burgeoning night life.

UCSB's sprawling campus has created several communication infrastructure issues. Many of the existing conduits are full, without any

room to add additional cables. With newly developed student housing and a 33-acre remote campus, located well outside of the footprint of the main campus, the university facilities are physically spread out. Older buildings and available space are scheduled to become new facilities for both departmental buildings and student housing. Communications Services will need to run new fiber optic infrastructures among these remote locations and existing campus buildings need more fiber to accommodate their bandwidth requirements. Connectivity has to be managed in a logical fashion.

R&M has been working with the IT department to help solve these issues. The RDS 4U panel with its splice cartridges offers the university a user-friendly platform to terminate fiber services. Splice cartridges offer clean splicing and termination solutions which can be serviced without disturbing other circuits. This technology also allows the user to add services to existing panels with available capacity. UCSB appreciates the RDS 4U's user-friendly design, which allows flexibility, as well as its robust construction.



The university has made the decision to move to ribbon and rollable ribbon fiber cable to maximize the amount of fiber they can install in their crowded conduits. High density patching will be required along with the deployment of this high capacity technology. UCSB is considering using MTP patching and breaking out individual circuits using a slave patch panel loaded with MPO to LC cassettes.

### The R&M solution

- Sliding Chassis Patch & Splice Panel 4RU
- Splice Cartridge LC/UPC SM Duplex with internal shutter, ribbon fiber





## Preannouncement

# FO Field – Evolution Follows Revolution

The second generation of the field-terminable fiber-optic connector FO Field is now connecting even more cable types. And what is more, R&M has further simplified assembly. The connector is being launched in June 2018 as the FO Field 2.0.

050.6612

Three years ago, R&M launched a revolutionary field-terminable fiber-optic connector: the FO Field. Since then, its technical advantages, the intuitive handling and the outstanding optical transmission properties have proved their worth in many projects. The practical experience from the field and feedback from partners gave the R&M development team in Wetzikon an incentive to further develop the FO Field. The FO Field 2.0 is the result of this evolution. Even good things can be made better.

Among other things, R&M is pursuing the ambitious goal of achieving compatibility with all cable types. That was not actually possible with the current solution. Individual cable types proved to be a real test for the

cable clamping of the FO Field. At times, increased attenuation values were detected after connection. This was particularly the case with hard 900 µm buffered fibers with a jacket made of high density polyethylene (HDPE). It turned out that the plastic did actually give after a while. Experts refer to this as plastic flow. Thermal and mechanical loads can cause it.

The aim of the development department was to offset this effect, something the R&M team has successfully achieved. Now the connector can be connected to a greater number of cable types.

### Cable and core fixing

The solution is to clamp not just the cable but also the actual core inside. This consists mainly of glass and that is much more durable than plastic. R&M has created a form of core fixing that really works without the core being stressed but still providing 100% performance.

The cable clamping itself was also further optimized. With the FO Field 2.0, there is now only one clamping position. And that simplifies assembly. The ingenious two-phase cable clamping of its predecessor, the FO Field 1.1, was a decisive step in the direction of optimal strain relief. But in the field it

became clear that it was not always easy to determine whether the first or second phase should be used. The FO Field 2.0 thus now only features one clamping position.

### Connecting other cable types

From June 2018 the FO Field – initially the SC connector – will also cover butterfly cables. For this purpose, there is a modified connector type perfectly suited to the special cable design. The profile of the butterfly cables differs considerably from classic cable design with glass strain relief.

R&M has also improved the patch set. It now comes as a crocodile clamp. This is used to clamp the glass yarn during the connector assembly process. This means the optical fiber cannot move or be twisted. To date a screw collar was used to clamp the glass yarn. When the sleeve was screwed up, however, the fiber could move which in turn could result in microbending. R&M offers the new patch set for cable types with diameters of 2.0 and 3.0 mm.



**A crocodile clamp fixes the glass yarn while the fiber-optic connector FO Field 2.0 is being assembled. This means the inner core of the wire cannot move or be twisted. A metal sleeve clamps the entire thing.**



050.6629

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## Wrapping the World with Ribbon

Cables using ribbon fiber is the trending technology in the US and is becoming slowly accepted in non-traditional markets. Cables with this technology have been around since the 1980s. In the past, ribbon cable seemed to be a specialty offering mostly used by Japanese customers and the major telco carriers. Today's demand for more bandwidth and limited duct space has created unprecedented demand for the use of ribbon fiber technology.

Traditionally ribbon cable was constructed with flat ribbons based on 250  $\mu\text{m}$  buffered fibers. Designs were like conventional central loose tube (CLT), cables with subunits wrapped around a central strength member (unitized), and slotted core. Patch cords consisted of a 250  $\mu\text{m}$  flat ribbon surrounded by aramid yarn and a PVC jacket. Today's ribbon cables share many of these established and proven designs.

### Saving scarce duct space and splicing time with mass fusion splicing

Ribbon cables have many advantages over single fiber loose tube cable. They allow for a smaller outside sheath diameter and for faster splicing. Smaller outside diameter allows more cable to be placed in existing duct banks and longer cable put-ups. Faster splicing allows for more work to be completed in a shorter timeframe. For example: It may take a two-person splicing team three to four days to splice an 864 single fiber, loose tube, outside plant cable. The same team can mass fusion splice an 864 fiber ribbon cable in four hours. In addition, mass fusion splicing has become the norm in Silicon Valley

for emergency restoration of a cut loose tube single fiber cable. The splicing crew will take the loose fibers, ribbonize them into a 12 fiber ribbon and mass fusion splice them. This practice is becoming commonplace when splicing new loose tube cables in a greenfield environment.

Ribbon splices require less splice storage. A 12 fiber splice takes up considerably less real estate in a splice tray than 12 individual single splices. The R&M USA ST-08 splice tray will accept 32 @ 12 fiber ribbon splices

(384 fibers) or 48 single fiber splices. This tray with ribbon will hold the same number of spliced fibers as eight trays loaded with single fiber splices. This higher density allows for a smaller splice enclosure.

### Smaller cable outside diameter via rollable ribbon, bend insensitive fiber

Rollable ribbon is a technology developed by NTT which allows ribbon fibers to act like loose buffered fibers. Other cable manufacturers developed similar technologies. Rollable ribbon technology allows the fiber

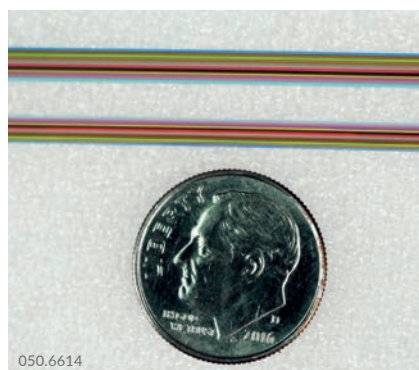


Figure 3: 250 $\mu\text{m}$  vs 200 $\mu\text{m}$  flat ribbon fiber

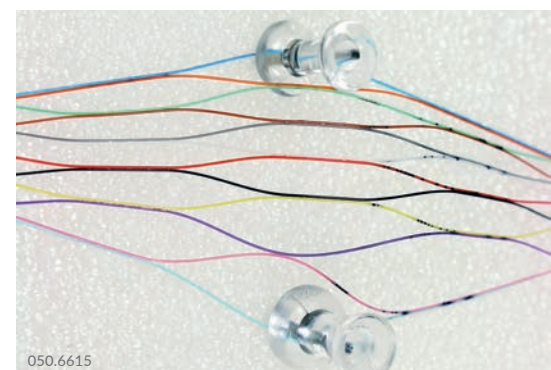


Figure 2: Rollable ribbon





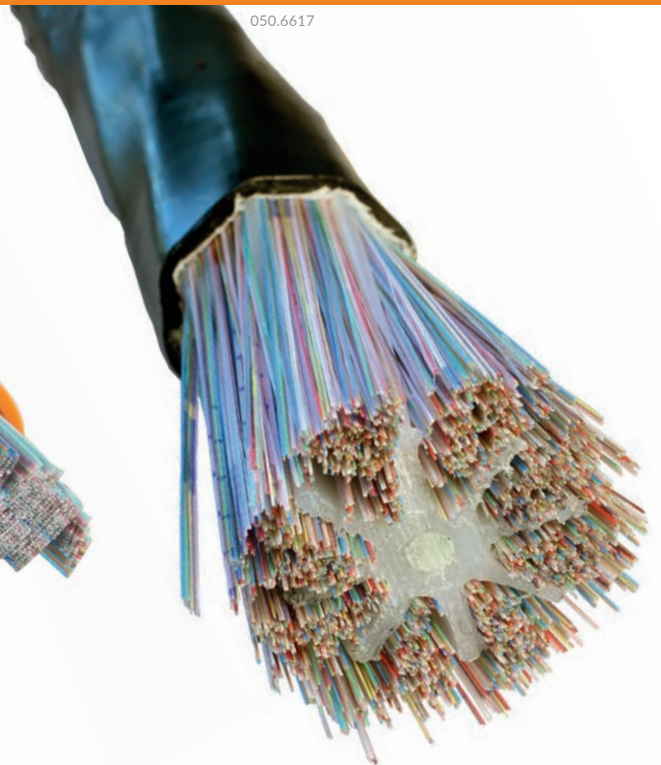
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**Figure 1:**  
864 flat ribbon fiber  
unitized in tubes

050.6617



**Figure 4:**  
3,456 rollable ribbon fiber  
in a slotted core design

cables to be densely packed. There is significant unused space around fibers in flat ribbon cable. Rollable ribbon has also eliminated the problem with the outside fibers of a flat ribbon having high attenuation when bent sideways. The use of bend insensitive fiber has also allowed fibers to be tightly packed inside today's cables.

### Smaller cable outside diameter via 200 μm fiber

The use of 200 μm based fiber ribbons has allowed cable manufacturers to build smaller diameter high fiber count cables. The glass fiber still has a 125 μm outside diameter. However, it is constructed with a 200 μm buffer versus the traditional 250 μm. This smaller fiber buffer allows cables to be constructed with 30-40 % more fiber in the same diameter package. Both flat and rollable ribbons are constructed with 200 μm fibers. Some manufacturers produce a ribbon using 200 μm buffered fibers with a 250 μm fiber pitch. This creates a ribbon with the same width as a 250 μm ribbon that is 50 μm less thick and this allows them to be spliced using a splicer setup for 250 μm ribbons.

Splicing many of today's ribbons has issues. Older mass fusion splicers have holders which may not grip the rollable ribbons tight enough. The ribbons slip in the holders and create a splicing problem because all the fiber end-faces are not parallel. This often requires the technician to glue them or to apply a mechanical clamp to keep them aligned during splicing. Some of the splicer manufacturers have developed new holders with tighter clamps and fiber grooves to keep slipping to a minimum. Many of the new rollable fibers require a high temperature heat stripper to remove the ribbon matrix. Heat strippers often need adjusting to handle the newer ribbons. Two-hundred-micron ribbon creates other issues. A special splicer is required for mass fusion splicing 200 μm fiber with a 200 μm pitch. The v-grooves and holders on a 250 μm based mass fusion splicer will create issues. To splice 200 μm to 250 μm ribbon requires a special holder. The 200 μm fibers need to be fanned out with a parallel 250 μm pitch. This is cumbersome with today's technology. Therefore, R&M recommends using either 250μm or 200μm fiber from termination point A to termination point B.

### Conclusion

R&M believes that ribbon fiber will be popular and will increase in demand in the foreseeable future. Dan Hendrickson, Senior Manager, Product Line Manager OFS, forecasts that «cables will continue to increase in fiber count in the outside plant environment. The only limiting factor is the diameter of the duct that it will go into».



090.6853

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## FM45 Portfolio Being Extended

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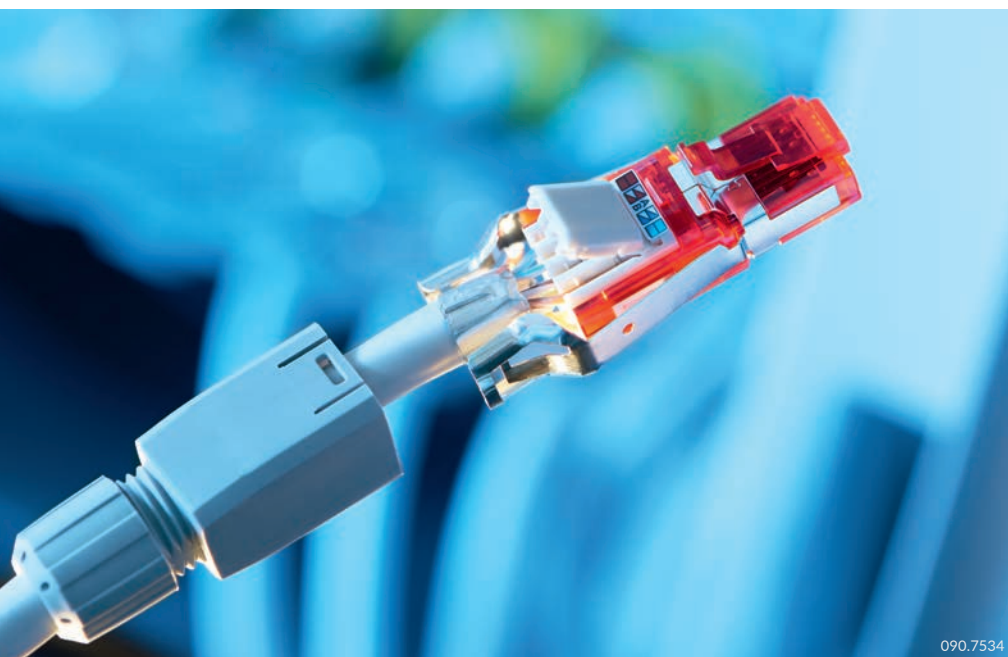
The field-mountable FM45 connector makes installers more flexible. They can decide on site how the cable is to be laid and where it is to be cut, and also where the connector is to be placed. They can react to customers' requirements, changes of plan or surprises immediately without any wastage. Now the FM45 family is offering even more flexibility. R&M is going to update and round out the portfolio. The following innovations are gradually going to be introduced:

- Cat. 5e unshielded, straight
- Cat. 6<sub>A</sub> unshielded, straight and angled
- A/B wiring in combination instead of individual versions
- Leaner, more comprehensible portfolio

Currently the packaging of the Cat. 5e connectors is being renewed. The new packaging for the Cat. 5e variant has the installation instructions written on it. No other additional information is necessary.

The advantages: less waste, fast help in installation.

Standard-compliant Cat. 5e and Cat. 6<sub>A</sub> connections can be established anywhere without any special tools with the compact FM45. Termination just takes a minute. Contact is made by means of IDCs. The tin-coated R&M IDCs guarantee gas-tight, vibration-resistant and corrosion-protected wiring with tensile strength and long-term stability and are ideal for PoE applications. The FM45 family supports data transmission up to 10 Gigabit Ethernet. It is suitable for structured cabling, direct connections and lots of other applications of twisted-pair copper cabling. The FM45 has proved itself in thousands of installations already in this way.



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090.7783

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## Efficient Technology Thanks to R&M

050.6618

Reliability is of major importance to the global supplier of technology and services Robert Bosch GmbH. In a project in Ukraine, it is no surprise that the conglomerate opted for a solution provided by R&M.

A high-performance cabling network was built with R&M connectivity and cable assembling components of Cat. 6<sub>A</sub> ISO for the global supplier of technology and services in its new office in Kiev, Ukraine. The Bosch Group has been present on the Ukrainian market since 1993. The business has developed successfully in the region over the years. Today, Bosch is a leading provider of solutions for the automotive industry and aftermarket business, as well as for the industrial technology and household appliances markets in Ukraine.

The Bosch Group's strategic objective is to deliver innovation for a connected life so corporate IT infrastructure requires an advanced connectivity system for efficient business. The R&Mfreenet Cat. 6<sub>A</sub> ISO solution ensures perfect performance, significant reserves and stable characteristics that guarantee a reliable and long-term basis for future development.

The new Bosch offices occupy an entire floor of the modern A class Silver Breeze Business Center in Kiev. The office space project was designed to ensure convenience and productive working. The open-space working area with collaboration and print zone, project room, classroom and board room is the perfect stage for outstanding business processes. Several meeting and conference rooms as well as the spacious reception contribute to successful negotiations. The company has also thought about employees' recreation, providing them with a lounge zone, silence room, sport zone, kitchen and a number of coffee points.

Such infrastructures must be highly functional and need a reliable and high-performing IT network. The main goals and requirements of the project are to provide Wi-Fi compliant with IEEE 802.11ac and cable networks which can deliver 10 Gbit data and voice transmission. That is why the passive cabling network was built with R&Mfreenet connectivity of Cat. 6<sub>A</sub> ISO.



050.6620

Limont Stanislav, Director of the NETWORK STANDARD company involved in the installation and commissioning of the network, says the hardest task of the project was the short time available for the installation process. Using R&M connection modules of Cat. 6<sub>A</sub> ISO and special tools for them made the process both easier and faster.

Commercial Director Antonov Alexander emphasizes that connectivity network tests show the excellent performance and significant characteristic reserve even in the case of short links.



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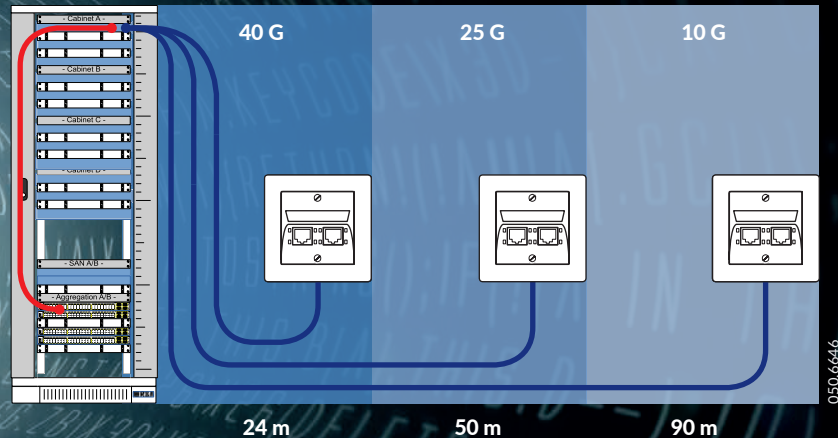
**The R&M Solution**

- Total number of ports: 398
- Patch panels, 24 x RJ45, Cat. 6<sub>A</sub> ISO: 19
- Connection modules Cat. 6<sub>A</sub> ISO RJ45/s: 796
- Patch cords Cat. 6<sub>A</sub> ISO RJ45/s: 796
- Installation cable Cat. 7, S/FTP, 4P, 1000 MHz, LSFRZH: 24 km

050.6235

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## LAN: Variable speed zones



## Cat. 8.1 – the RJ45 Success Story Continues

Things are getting exciting on the Ethernet roadmap. Potentially longer links for 25GBase-T are being tested for standardization. This will have a knock-on effect on the planning of LAN cabling to be used long term as well as on product evaluation.

The transmission performance in the twisted-pair copper cable is increasing from 10 to 25 and 40 Gigabit/s, the transmission frequency up to 2000 MHz. The link will then have to be shortened to be able to control attenuation losses. With 40GBase-T the link distance is still 24 m which is why it was mainly applications in the data center which were taken into consideration.

With 25GBase-T, on the other hand, latest findings would suggest that a distance of 50 m may well be feasible. With this range, 25GBase-T could cover two-thirds of all typical link lengths in the LAN. All of a sudden this once again makes Cat. 8.1 interesting for the LAN environment. First possible applications for 25G are already becoming apparent. For example, WLAN access points of coming generations will require bandwidths higher than 10 Gbit/s. This is why 25GBase-T could well represent the long awaited next evolutionary advance in the LAN.

What is important now is for planners, users and decision makers to be forward-looking and take these new possibilities into consideration. Experience shows that anybody investing in a LAN today is going to want

to use the cabling for more than 15 years. People are looking for a guaranteed future and investment security.

An installation with Cat. 8.1 would result in LAN cabling with length-dependent transmission speed (see figure). The active devices automatically select the highest transmission rate possible at the particular location. Well-thought-out utilization planning in operation is thus how even the most challenging requirements in the LAN sector can be satisfied.

This scenario presents us, however, with a few points which have to be taken into consideration:

- Cat. 8.1 RJ45 components should be used. The alternative Cat. 8.2 connector systems are not any more advantageous in terms of transmission speed and require comparatively expensive, cumbersome adapter cables.
- The Cat. 8.1 components should be backward-compatible. In other words when using Cat. 6<sub>A</sub> patch cords at least one 10GBase-T transmission should be possible. (Warning! This is not the case with some products.)
- Two measurements should be made to test the new LAN, one for Cat. 8.1 and one for Cat. 6<sub>A</sub>.



R&M is on the front line for this quantum leap in copper cabling. The R&M lab in Wetzikon is developing innovative Cat. 8.1 products for LAN cabling. They will be 100% backward-compatible and offer unbeatable performance. The market launch is due to take place in a few months' time.



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050.6622

## Prestigious University with Secure Network

NSBM Green University Town in Pitipana, Sri Lanka, is the first ever green university in southern Asia and sets an example for the whole area by paving the way for environmental sustainability. The university is open for both national and international students and has opened a new chapter in Sri Lankan higher education.

NSBM (National School of Business Management) Green University Town was established under the Ministry of Skills Development and Vocational Training and is renowned for its world-class academic offerings. The state-of-the-art university offers nationally and internationally recognized, UGC approved degree programs and foreign degree programs in three faculties: Management, Computing and Engineering.

The university is spread over an area of 26 acres and the massive university complex was built with the intention of providing an opportunity for both national and international students to have a fully-fledged education in Sri Lanka. Currently around 9,000 students are studying at the university and the highly qualified local and foreign lecturers who teach there are committed to prepare these undergraduates to face any challenge the world has to offer. The university's commitment to excellence in education extends beyond the actual courses since it has created mutually beneficial relationships with industry to provide students with opportunities of experiencing real-world workplaces at first hand.

Inspired by the vision of making Sri Lanka the best educational hub in Asia, NSBM Green University Town is dedicated to shaping future world leaders in its fully-fledged university.



R&M's solution for NSBM requirements comprised Cat. 6 cables and components to go along with 12 core SM fiber. A local IT consultant was brought onboard for the approval process of the brand. R&M faced tough competition from local players and OEMs, but had the upper hand in terms of the tool-less IO which appealed to both the end client and consultant. Enterprise Technology Private Ltd (ETPL), as systems integrator, played a major role in getting R&M approved and winning this prestigious greenfield project. There could well be openings for R&M in the future in upcoming NSBM facilities.



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**«R&M has helped us achieve a secure network with faster data transfer capabilities. The R&M solutions are the perfect match and we are sure that these products will be reliable long term.»**

**Chamindra Attanayaka, IT Manager, NSBM**



090.6622

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# Switzerland – a Land of SMEs



On January 18, 2018, the renowned SME prize «Prix SVC» for the Zurich region was awarded for the sixth time by the Swiss Venture Club. R&M was one of six finalists and ended up winning second prize.

The SME association Swiss Venture Club (SVC) is the most well-known business network in Switzerland. The association's focus is very much on promoting and strengthening the business community, particularly SMEs (small and medium-sized enterprises). SMEs network more than 3,000 members from all industries and regions as well as 500 sponsors and partners in all seven business regions of Switzerland. The SVC brings together innova-

tive figures from business, academia, politics, the media and culture, and gives them the chance to nurture valuable contacts. The regular awarding of the Prix SVC in all regions is one of the network's main tasks.

SMEs are the backbone of the Swiss economy. They employ two-thirds of all employees in the country. One of the Swiss Venture Club's goals is to ensure that these companies are given a greater platform in political decisions in the future. Representatives from politics are now also getting on board and would like to bring SMEs more into the public eye.

January 18, 2018, to celebrate the fact that it took second place in the Zurich business region. A team of 30 employees enjoyed an exciting, informative and celebratory evening. CEO Michel Riva on receiving the award: «I am honored to be accepting this award on behalf of all our dedicated employees. The award is also a tribute to company owners Martin and Peter Reichle who, in the second generation, are successfully developing the values of the company founders who started the business in 1964.» First prize went to the Schibli Group, a long-term customer of R&M.

[www.swiss-venture-club.ch](http://www.swiss-venture-club.ch)

## In-depth selection procedure beforehand

An expert jury engages in an in-depth selection procedure before the final nominations are made and puts the six finalists through their paces. Several weeks pass between the initial nomination and the awards being announced.

R&M took all the hurdles and, with five other finalists, attended Zurich's Hallenstadion on

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