CONNECTIONS 56

Specialist magazine by Reichle & De-Massari AG | April 2019

Time for an Edge Strategy

Europejski Hotel, Warsaw:
Warsaw's Grande Dame Lives On

A Promising Future
with **PRIME-ODF Modules**

Artificial Intelligence
for Networks?

R&M

Courtesy of H.E.S.A./ fot. J. Sokołowski
050.6725

Editorial

More Data Demands **More Intelligent Networks**

Dear Business Partners

This year R&M is looking forward to launching numerous innovations and new products. And we are constantly continuing to develop our solutions for modern network infrastructures because the innovations of today could be the sales drivers of tomorrow.

Innovations do not just happen by chance – they are the result of a holistic innovation process which we pursue resolutely using internal and external resources as a source of inspiration. The dialog with these resources is of great significance. We frequently find ourselves in a position in which we can make solutions available on a wide scale which were originally developed to suit a customer-specific requirement.

Our new products for the first half of 2019 are presented in the latest CONNECTIONS magazine: Particularly worthy of mention here are the modular fiber optic ODF PRIME main distributor frame with maximum packing density, the new Cat. 8.1 all-in-one solution for 40 Gbit solutions, new, multifunctional Polaris-boxes for FTTx indoor and outdoor applications as well as other pioneering solutions for data centers.

R&M is dedicated to constantly extending its technical expertise. The fiber optic cable plant Reichle & De-Massari Czech Republic, acquired in 2018, manufactures innovative cables to suit every need and, if required, tailor-made special constructions. The software expertise, which is becoming increasingly important for R&M, is being permanently extended and first solutions are already being implemented in our data center monitoring system R&M*inteliPhy*.

Living customer focus

Since March 2019, R&M has also had its own site on the East Coast of the United States. The acquisition of Optimum Fiberoptics Inc., a premium provider of FO solutions, consolidates the current activities carried out from the North American head office in Silicon Valley. Our customer focus is demonstrated perfectly with the tried and tested roadshow tours through Europe. By using a second roadshow truck, we are also extending our presence in this area. These vehicles are equipped with the latest solutions for the Data Center, LAN cabling and telecom network areas. We look forward to welcoming you soon to one of our trucks – for more information, please refer to page 34.

This latest issue of the CONNECTIONS magazine also features exciting background reports about our projects all over the world – for example about the private hospital AZ Zeno in Knokke in Flanders, the Raiffeisenbank in Prague and the 5-star luxury hotel William Inglis in Australia, which has its own auction arena and stables. Its high-class network is based on an innovative POLAN solution from R&M.

And, as usual, you can read specialist articles on future trends, written by R&M experts. In this edition you will find articles on 5G rollout, artificial intelligence, building automation using Single Pair Ethernet as well as on the above-ground cable laying of FTTH networks. We aim to inform you of forthcoming applications in good time as well as show you which topics we will be working on in this respect in the future. Our readers' survey in issue 55 indicated that particularly the Trends articles enjoy great popularity.

We would like to thank you for the good collaboration and hope you enjoy reading the new magazine.

Sincerely
Andreas Rüsseler, CMO

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Publication details:
CONNECTIONS 56 | April 2019

Cover picture:
Warsaw's grande dame, the iconic Europejski hotel, has been renovated over a period of five years. High-performance communication technology by R&M was integrated throughout the building.

Publisher:
Reichle & De-Massari AG, Binzstrasse 32,
CHE-8620 Wetzikon, Switzerland,
www.rdm.com
eCONNECTIONS: www.connections.rdm.com

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Layout: KplusH, CHE-Amden, Markus Kuhn

Printing: Uhl-Media GmbH, DEU-Bad Grönenbach

Print run: 13,000 copies

CONNECTIONS is published twice a year and can be ordered from the publisher.

Time for an **Edge Strategy**

There are plenty of questions about edge data centers: How can you define an edge data center? How large are edge data centers? What is the technology behind them? When the world already has a cloud, why does it need an edge data center as well? What do we have to do now?

If you know just some of the answers to these questions, you are one of the insiders in a relatively young market with an annual growth potential of more than 13 %. The industry has had edge data centers for around five years now. The first went into operation in the US in 2014. And now the global need for such centers is exploding – together with digital transformation and the Internet of Things (IoT).

According to Wikipedia the definitions of edge data centers vary. There is still a great deal of creativity concerning the definition of edge data centers which means any definition is individual and the industry does present a number of different visions.

The standardization organizations are treading warily. IEEE is trying to sort and classify edge concepts. TIA convened a task group in February 2019. It was to define standards for the various forms of the edge. And, in particular, it was to draft recommendations for security, sites, architectures, connectivity and resilience.

Power for the periphery

Basically it is all about locating cloud-like computing performance at the periphery of wide area networks. A long way away from Internet hubs and central hyperscale data centers at the edge of the cloud. The cloud or Internet infrastructure should extend to where data is actually created. Data aggregation and specific data processing processes should be available as close as possible to users, applications and digital devices.

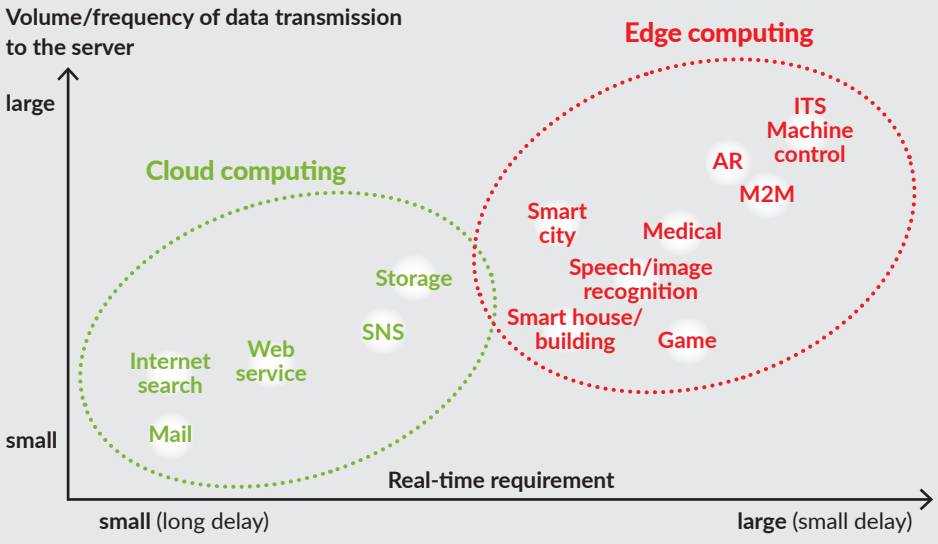
But why?

Nobody would actually fit in to many edge data centers. An individual rack in the basement of a smart building could be used as an edge if it were equipped correspondingly. Or a fully packed cabinet in the central office of a carrier. A box next to a mobile communication antenna. A container next to the highway. A face-lifted server room at the back of a factory. Or a former 1,000 square meter enterprise data center. The size cannot be defined.

Infrastructure and technology at the edge correspond to the logic and functionality of commercial cloud data centers. They are small, highly dense, highly resilient, autonomous, and can be automated and controlled from a distance. Edge data centers can be designed to suit a specific purpose. Cloud and edge are mutually dependent and can form symbioses or hybrid infrastructures. Experts know which technology and architecture are required.

When streaming is too expensive

And the question of all questions: Why exactly does the world need another kind of data center? Are there not already enough enterprise, colocation, cloud and hyperscale data centers? Can edge data centers provide something the cloud with its never-ending



Edge data centers complement the cloud by taking on tasks dependent on particularly short latencies and the local processing of large amounts of data. Source: NTT

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virtual computing offers cannot? The answer is yes!

Let's take a popular example to demonstrate this: A few years ago, Korean rapper Psy broke a barrier. A video clip of his hit was accessed more than three billion times on YouTube. An Internet service provider in Phoenix, Arizona, had to pay millions of dollars in transmission fees to his carrier. The massive quantity of video call-ups was causing problems on the line. The clip was being streamed over a carrier hotel data center in Los Angeles, 370 miles away. If it had been possible to call up a duplicate of the popular clip in an edge data center – integrated in the cloud – in Phoenix, the local provider would have saved money.

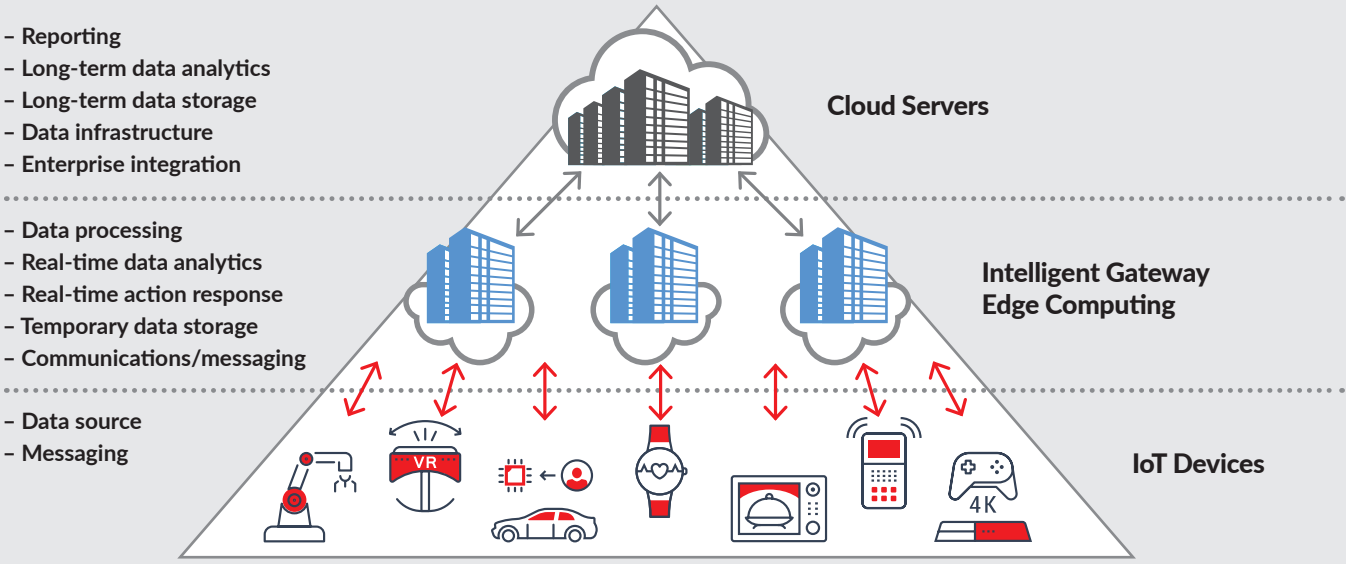
The example shows: Central mega data centers in the cloud are not a cure-all for the requirements of the digital world. Distances, data volumes, load sharing and buffering, transmission capacity and transmission costs are requiring more and more decentral solutions. They take the pressure off the core networks, the cloud and the budgets.

«The success of digital business will be decided at the edge, not in the cloud.»

Maverick Research

When the cloud is too lethargic

The future is giving providers and users even more dramatic reasons. For example: autonomous driving. It will only work if masses of information can be moved virtually at light speed between vehicles, navigation systems, mobile networks, radar and surveillance systems, traffic signals and traffic computers. Along with 5G services, this requires an FO network along the roadside. Micro data centers would have to be positioned every 10 miles along the road. They would have to guarantee interaction with ultra-short latency and process the most important data on site.



In the future, edge data centers will be required between the cloud and the Internet of Things (IoT), where large amounts of data occur. As a local turntable, they will be responsible for the capture, storage, saving, analysis and feedback of time- and business-critical applications. Source: IEEE

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Edge applications

- Data traffic, backup for 5G services
- Autonomous driving, intelligent roads
- Taking the pressure off wide area networks and cloud data centers
- Factories with neural machines and robots working autonomously
- Digital backbone for smart buildings, smart cities
- Remote controlled medical technology in hospitals
- Monitoring of airports, stations, modes of transport
- Regulation of the power supply over smart grids
- Automated stock exchange trading, financial industry, block chain
- Online gaming, streaming high resolution movies, mobile HD videos
- Online trade, logistics, warehousing
- Drones which collect traffic, agricultural and environmental data
- Augmented and virtual reality, e.g. for advertising, machine maintenance
- Bridging failed cloud data centers and networks
- Internet of Things with billions of end devices. Scalable acquisition, analysis, aggregation of data from IoT terminal equipment. Extension of the capabilities of IoT end devices. Remote control of smart «things».
- Setup of isolated private clouds for business-critical processes. Applications, content, IT workloads etc. can be prioritized, orchestrated and assigned to sites more precisely. Optimizing the cost/benefit ratio of networks.

Exchanging data using remote cloud data centers would be too slow and too risky with the typical 1 to 2 milliseconds latency.

Cars would not entrust the cloud with less time-critical data collected on the move for analysis or calculation until they had parked, were at the gas station or at the power socket. An autonomous car produces several terabytes of data a day. The Automotive Edge Computing Consortium founded by leading corporate groups in 2017 aims to develop appropriate solutions for intelligent streets.

These examples answer in part the question as to the why. But there is a whole range of digital scenarios and everyday applications which could be supported by edge data centers in conjunction with the cloud (see box). They all demand data transmission effectively in real time, application-oriented processing of time- and business-critical data, immediate analysis, independent responses and total availability of powerful computing performance.

What do we have to do now?

The increasing requirement for edge computing necessitates action from a number of participants: Network operators, towns, trade, media, utilities, industrial companies, traffic carriers, IT and real estate companies – to name just a few. They should reserve and plan sites and FO lines now (!) and not wait until the rollout of 5G.

Edge data centers are in the town or region they serve. The greater the computing performance required, the more dense the locations. Edge clusters can create clouds. This makes it possible to increase performance, capacity, geo-redundancy and the security of regional networks.

Network nodes such as central offices, hubs, POPs, gateway exchanges and cellular phone network base stations in particular are possibilities. Edge data centers are to become peering/exchange points through which the largest part of the regional Internet traffic flows. Flat, locally organized hierarchies then come into play. Edge data centers need redundant and synchronous fiber optic hyper-connectivity in every direction: to the cloud, to cellular phone networks, to neighboring edges and to the users.

Further possible edge locations: wind power plants, solar parks, railway stations, highway service areas, industrial zones, warehouses, former enterprise data centers etc. Edge data centers can be used for a number of different purposes – for private and hybrid cloud, as a resource for external users and even as building heating.

Technical requirements

Edge data centers will often have to cope with a lack of space and harsh environmental conditions. They have to be positioned at protected, discreet, dry places. Interruption-free power supply, fire protection, air-conditioning, cooling systems, sound protection, dust protection, locking and access control are all part of it – as is, naturally, a direct connection to fiber optic links. What is important is to reserve sufficient space for high count fiber cables and cable management. And it is also sensible to construct edge data centers which will provide decades of operating time.

Sturdy, low-maintenance micro or container data centers completely equipped for autonomous operation are possible solutions. Standardized designs facilitate scaling, stacking and daisy chaining. Pre-terminated racks, one-housing systems and turnkey containers can be set up quickly and maintained efficiently. The planning, acquisition

«Edge Computing will create a range of possibilities for organizations of all kinds and sizes – from governments to retail outlets. We are going to witness a fundamental change in today's Internet.»

Linux Foundation

and installation of an edge data center should only take a few months.

The units have to be made as compact as possible. Ultra-High Density cabling is a must. For this requirement R&M developed the modular, high density turnkey solution EdgeGo and the fiber optic distribution platform Netscale.

The plug & play principle applies to connectivity and IT. Cabling and connectivity technology should be designed to be self-explanatory and repair-friendly. Installers and technicians should be able to operate the systems intuitively. It is very difficult to grip connectors with highly dense cabling. A push-pull mechanism as used by R&M's Quick Release connector family simplifies the work.

R&M's edge solutions

EdgeGo: Turn-key, autonomous edge data center in the container. Saves building a server room. Sound-proofed housing (99 % IT noise reduction) with the footprint of a rack. In addition to cabling and IT, it contains the cooling, power supply, surveillance camera, automated infrastructure management for remote monitoring on 42 height units.

Netscale: Ultra-High Density fiber optic patch panel with up to 120 ports per unit in a 19" rack. World's highest packing density in this segment.

Quick Release connector family: LC and MPO connectors with push-pull mechanism operable on the back at the strain relief sleeve for maximum packing density.

R&M*inteliPhy*: Multifunctional automated infrastructure management system.

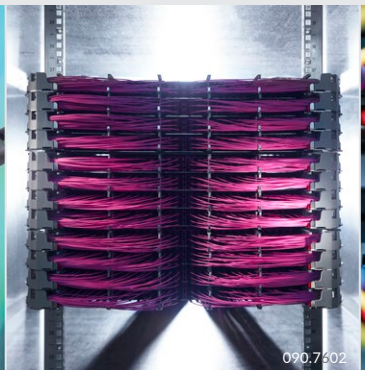
And the management?

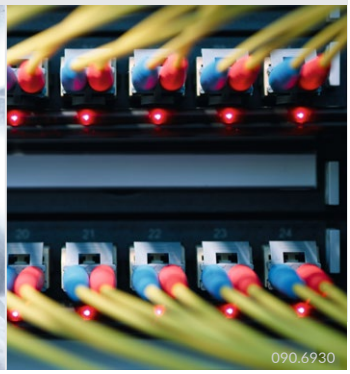
What strategy can be used to operate dozens, hundreds or even thousands of edge data centers simultaneously? It seems impossible to manage a larger number of remote edge data centers in a conventional way.

Edge providers will require manpower and will have to train specialists. But only uncompromising remote monitoring and fully automated infrastructure management can help to guarantee interruption-free operation.

Forward-looking solutions will master more than the accurate documentation of the ports and cables or the real-time detection of faults and tampering. They have to be able to be used for the management of access control, working instructions, MAC plans, software, resources, assets and service levels. And danger prevention, predictive maintenance and cost control are also all desirable features.

Integrated hardware and software solutions such as R&M*inteliPhy* are just the thing. They support these features and make a lasting contribution to an increase in efficiency at the edge.





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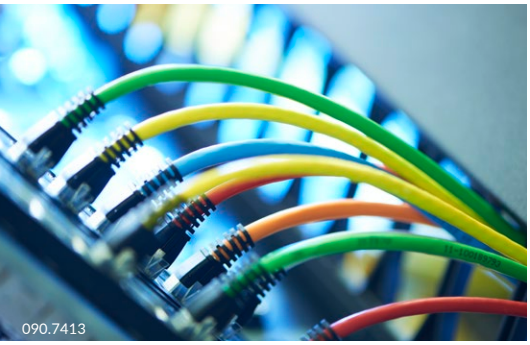
A Place of Recovery and Harmony

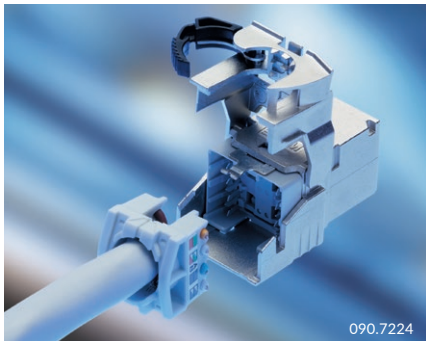
Futuristic, bright, gentle architecture. A surreal object that floats over the flat coastal landscape like a cloud. Daylight and harmony in all rooms. High-tech medicine, combined with pioneering patient care. The AZ Zeno in Knokke is a place of recovery and well-being.

«Ceci n'est pas un hôpital» (This is not a hospital). This maxim was the inspiration for the architects planning the AZ Zeno hospital in the town of Knokke on the Belgian coast. Their idea is based on the philosophy of surrealist René Magritte. In 1929, underneath the naturalistic picture of a pipe, the artist wrote: «Ceci n'est pas une pipe» (This is not a pipe). In this way, the Belgian artist questioned traditional thinking patterns.

And the designers at AA Prog Architects, B2AI and Detoo architects & engineering, together with Ingenium for building services, obviously thought along similar lines. Ingenium opted for multimode OM4 or singlemode cabling to correspond with the transmission distance in each case and also in respect of the galvanic separation for the security of the patient on an operation table. In an architectural competition, they came up with a plan for a hospital that does not feel like a hospital. Not a bulky tower block that instills the fear of illness and sterile medicine. In fact, quite the opposite: an organic, aesthetic place of security and natural, holistic healthcare.

Daylight fills every floor and every patient room. That saves energy as well as having a positive effect on the healing and recovery process. The patients enjoy the views over the dunes and green polder landscapes. Atria and parks are available to patients for relaxation.





Future-proof network

The technology behind the smart building is as pragmatic and sustainable as the building for traditional medicine is surreal. The local data network with its 10,000 links satisfies the requirements of current and future healthcare IT. «At an early stage of the planning phase, in 2014, we decided to install a future-proof network infrastructure,» explains engineer Tim Opsomer from engineering company Ingenium. The company is responsible for the building and network technology. Ingenium recommended a tried and tested solution offering resources for a long operational life and growing data traffic.

Tim Opsomer: «At the time we were very aware of the challenges we were facing with high-grade medical images quickly having to be transmitted across the network». This is why Ingenium recommended equipping the operating rooms with fiber optics. The plan also included a redundant server room being connected with a redundant data center using fiber optics. Ingenium opted

«It was the offer with the best price/quality ratio. That is why we opted for R&M.»

Tom Croes, Datacom Project Lead, ENGIE Fabricom

for multimode OM4 or singlemode cabling to correspond with the transmission distance in each case.

Patient rooms, public spaces, offices and the security network were to be equipped with shielded Cat. 6_A copper cabling. Naturally the cables had to satisfy the high security and fire protection requirements of a hospital. The use of Power over Ethernet was also discussed. Network connections for loudspeakers, surveillance cameras and WiFi were prepared so that upgrading would be possible at all times.

Flexible and perfect

The installation partners ENGIE Fabricom and EEG Gullegem were able to implement their extensive experience in healthcare projects.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AZ Zeno

- Construction 2015 to 2018, opened March 2018
- 100 doctors, 800 specialist workers, 324 beds
- Area 52,000 m², 5 floors
- Investment volume approx. 220 million EUR

Functions: private hospital in Knokke-Heist for the region Northwest Flanders, outpatient and healthcare center, rehabilitation center, nursing home, auditoriums, public event rooms, heliport.

They also opted for a pragmatic solution and recommended the cabling system from R&M. Tom Croes, Datacom Project Lead at ENGIE, explains the decision as follows: «It was the offer with the best price/quality ratio. That is why we opted for R&M.»

Furthermore, he was impressed by the convenient installation technology of the shielded Cat. 6_A EL module. «It made it possible for us to work fast and flexibly over the course of the two-year project,» explains Tom Croes.

No hitches were experienced during installation. The R&M West Europe (WEU) team together with reseller 6X International saw to that. They provided flexible logistical support with partial deliveries. The R&M specialists Luc de Bruycker and Jean Paul Rooseleer were always close at hand if there were matters to be clarified or if practical help was needed. Not a single problem escalated. Adaptations to a third-party front panel layout were an immediate success.

The resulting installation was as perfect as the surrounding architecture. The 6,500 copper links were found to have zero errors. Tom Croes: «Very impressive and something we had never seen before. The cabling solution proved to be installation-friendly and extremely robust.»

The project leads at Zeno hospital – Nick Roels for IT and Frank Vandierendonck for infrastructure and technology – confirmed that on the commissioning of the hospital in the spring of 2018: «The flexibility during construction and the communication with the installation company resulted in a smooth-running, correct installation and completion of the project.»

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The R&M solution

- Cat. 6_A copper cabling, approx. 6,500 links, with shielded Cat. 6_A EL modules and F/FTP LSFROH F2 cable for:
  - patient rooms
  - offices
  - public areas
  - security network
- Patch cords and security options for the rooms
- Integration of the EL connector into the Hospital Bed Bar
- Compliance with the fire rating standards IEC 60332-3-24 for Belgium (high risk building)

R&M's skills

- Best price/quality ratio
- Support during planning
- Communication between all those involved in the project
- Installation-friendly, robust products
- Flexible, fast logistics with partial deliveries
- Expert on-site support in the current project
- Adaptation to third-party front panel layout
- Monitoring and support for a zero-error installation


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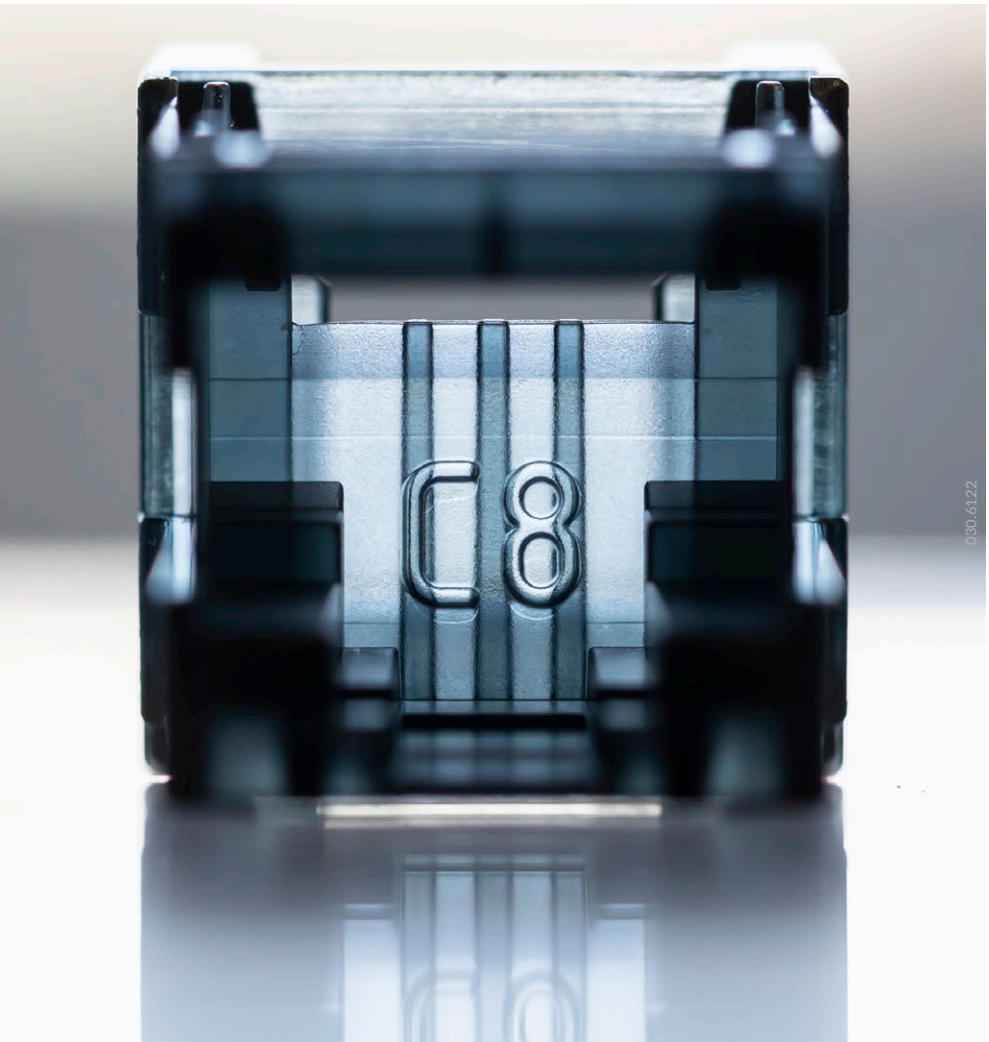


All-Purpose
Cat. 8.1 System

Everything is in place for the quantum leap to 40 Gigabit in LANs and data centers. The Cat. 8.1 total solution from R&M is ready for the off. The new high-end copper system with the universal RJ45 format can be installed in a flash.

R&M is launching the Cat. 8.1 cabling system on the market. It consists of the Cat. 8.1 connection module, a Cat. 8.2 S/FTP installation cable and wiring tool. Standard-compliant permanent links can be created in accordance with ISO/IEC 11801, Class I, and ANSI/TIA-568-C.2-1 with the module and cable.

The advantage for users: This is a universal and backward-compatible Cat. 8.1 solution.

RJ45 connectors, patch cords and devices from existing data networks correspond to the new Cat. 8.1 connection modules. In the case of a migration, users of third-party products do not require additional adapters or fiber-optic solutions. If faster devices are used in future, these can be plugged in directly.

The Cat. 8.1 cabling system is mainly used in data centers, particularly with regard to top of rack and end of row cabling. Here it supports the new dimensions of data transmission: 2000 MHz and 40 Gigabit/s Ethernet (40GBase-T).

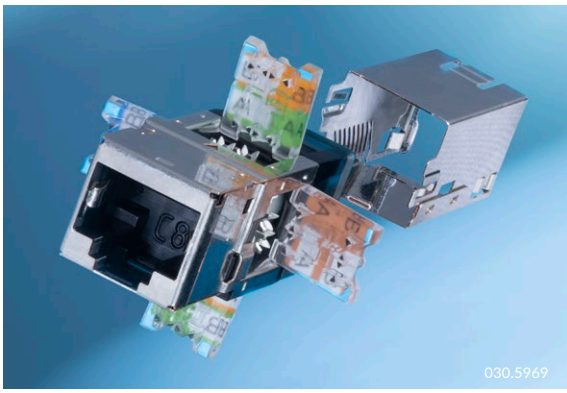
In accordance with the standard, the permanent link can be a maximum of 24 meters long and have two connectors. The two standardization committees ISO/IEC SC25 and TIA TR42 have defined different lengths for the channel, but R&M stipulates a maximum channel length of 28 meters.

With this specification and standard-compliant installation, data throughput of 40 Gigabit/s can be guaranteed. Adhering to R&M's specifications also ensures that the specifications of both standardization families are fulfilled even if different types of patch cords are used.

The second area of use is LAN cabling in buildings which require extremely fast data transmission. Here the Cat. 8.1 system from R&M supports the new performance level of 25 Gigabit/s (25GBASE-T) and link distances up to 50 meters. It thus covers two thirds of all typical link lengths and furthermore is suitable for using Power over Ethernet.

Fast wiring

The charcoal Cat. 8.1 connection module is based on the design of the tried and tested Cat. 6_A module and is just as easy to wire. With the Cat. 8.1 module, the copper conductors are also wired using insulation displacement contacts (IDC). Installers use the wiring tool to generate sufficient force to push the conductors quickly and correctly into the insulation displacement contacts with overlengths being cut off at the same time.



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How Fast is 5G Likely to Arrive?

The fifth generation of cellular mobile communication is waiting in the wings. This year Switzerland is granting the rights of use for particular frequencies. A 5G network has been up and running in the skiing resort of Laax since November 2018. But the nationwide roll-out needs time and strong FO networks.

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The topic of 5G networks is an all-consuming one for the entire telecommunications world. Virtually every day, network operators, test users and chip manufacturers are reporting on the latest developments. The first roll-outs will be taking place in agglomerations where there is already a well-developed infrastructure.

At the start of September 2018, Swisscom set up a 5G test network in Burgdorf. Since November, operations have been up and running in Lucerne, Bern, Geneva and Zurich. Since October 2018, Verizon has been offering 5G in four US cities. The first customers are now surfing with up to 940 Mbit/s and an unlimited flat rate.

In December 2018, T-Mobile Polska opened up its first local network in Warsaw. In the future, this will, for example, make it possible to monitor patients' vital parameters continuously from a distance. At the port of Hamburg, trucks in the port area have been being controlled with 5G data traffic as part of a test since the start of 2018. In Singapore, network operator Singtel is experimenting with drones for commercial 5G applications.

But the pilot schemes should not gloss over the fact that patience is a major requirement. It will take a few years to get devices, applications, service and business models in place. In October 2018, market researchers from BMI Research reported that there are currently only a few applications that specifically need 5G. The mass market with affordable devices has yet to be developed. Suitable smartphones are due to be launched in 2019.

5G in figures

- Data rate: up to 10 Gbit/s
- Latency: under 1 millisecond per ping
- Capacity: approx. 1,000 times larger than with LTE
- Subscribers: 100 billion devices can be addressed simultaneously
- Energy consumption: up to 90 % less per mobile service

Connection via Fiber to the Antenna

The nationwide roll-out presents network operators with a number of challenges. They need approval for lots of new antenna sites. Antennas are going to have to be erected closer together than was previously the case to ensure loss-free transmission of the high frequencies.

It is no longer sufficient to connect the base stations with each other using radio links. They have to be integrated in FO networks. This is the only way the expected quantities of data will be able to be transported effectively in real time. Depending on the location, around one and a half to three times as many base stations and two to three times more optical fibers are required.

Fiber to the Antenna (FTTA) is the name of the investment program that now has to be mastered. FTTA requires innovative cabling solutions. R&M is one of the companies working on the development of such solutions and is helping mobile communication suppliers create 5G infrastructures.

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Warsaw's Grande Dame Lives On

Courtesy of H.E.S.A./ fot. J. Sokołowski | 050.6741

Warsaw is experiencing the rebirth of its grande dame, The Europejski hotel. It shines majestically and glamorously on the historic Royal Route. This is the 5-star Raffles Europejski Warsaw hotel which reopened in 2018. With its carefully curated art, design, interiors and the network by R&M, The Europejski is a jewel of the XXI century hotel scene.

Courtesy of H.E.S.A./ fot. J. Sokołowski | 050.6742

The visionary and far-sighted investor H.E.S.A. company is behind the rebirth of the historical establishment, situated between the National Opera and Presidential Palace. They had The Europejski renovated over a period of five years. Behind the Neorenaissance facade, visitors will discover the essence of Poland's spirit, conveyed through art, details and unique memory rooms, which take one on a journey through The Europejski's history.

In keeping with its creative and vivid past, the new Europejski was furnished with almost 500 works by contemporary Polish artists. «The building reflects the culture and atmosphere of the city. The dynamic history of Warsaw was treated with the greatest respect. Preserving this cultural heritage by restoring this historical landmark to its former glory is of great importance,» say representatives of the investor company H.E.S.A.


Courtesy of H.E.S.A./ fot. J. Sokołowski | 050.6743


Courtesy of H.E.S.A./ fot. J. Sokołowski | 050.6744

Creative heart of the city

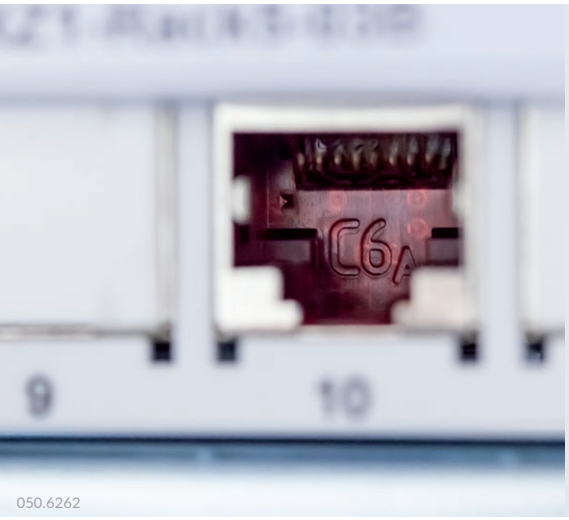
The hotel was designed by architect Enrico Marconi in 1857 and soon became the creative heart of the city. This was where novelists, poets, artists, citizens and the nobility all met. They enjoyed the glamor of the age. During the course of its 160-year history, the establishment witnessed world-changing politics and an impressive cultural diversity, but also destruction and rebuilding.

Contemporary elegance and modern luxury – harmoniously united with historical accents – transformed the lobby, restaurants, patisserie, as well as the 106 rooms and suites into genuinely pleasant places to tarry.

High-performance network

All rooms and suites are fitted with HD LED Sat TV, a premium audio system and a media hub. WiFi is available on all floors. Two top levels of the building, The Europejski Offices, provide 7,100 m² A+ Class unique office space for representative tasks where enterprises which want to develop their success in the aura of The Europejski, are located.

The mission of R&M was to integrate high-performance communication technology throughout the building while preserving its unique aura of elegance and prestige. The LAN infrastructure for guest rooms and offices is based on a sophisticated, structured cabling solution from R&M with consolidation points between the backbone and the rooms.



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LAN infrastructure with consolidation points

The R&M solution for the Raffles Europejski Warsaw consists of:

- 4 km fiber optic cable, 12 x OM3 Approx. 150 km copper cable, F/FTP, Cat. 7, 650 MHz
- Approx. 3,000 shielded Cat. 6_A EL connection modules
- 24 port patch panels, Cat. 6_A, shielded Cat. 6_A patch cords
- 106 U-Boxes as consolidation points between the backbone and rooms, each equipped for RJ45 Cat. 6/s EL modules


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Best Practice
for Data Centers

Well-structured and future-oriented planning is the most crucial factor in the reliable operation of a modern data center. As everything from the network to the applications themselves relies on the physical layer, it is crucial that this is designed to meet today's and tomorrow's data center needs.

R&M illustrates this in its updated handbook intended to assist data center planners and operators. The Data Center Handbook is a rich source of details on how to successfully design, build, manage and support a data center. It is available free of charge on the R&M website.

In-depth focus on AIM

This book is of great value for all data center stakeholders and professionals. It contains detailed and use-oriented answers to all questions pertaining to the infrastructure and operation of a data center. Topics include networking technologies and next-generation structured cabling, with the handbook focusing in depth on Automated Infrastructure Management (AIM).

The handbook is based on the extensive experience of R&M experts who provide support in constructing and equipping data centers throughout the world. It also serves as a reference work on relevant standards, technical terms, trends, applications and compliance issues.

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Market Manager Data Center
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Raiffeisenbank Seizes the Opportunity

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This was an opportunity Raiffeisenbank in the Czech Republic did not want to miss. Just before the start of a data center project, it opted for a new path. The bank selected high density solutions from R&M and discovered the benefit of automated infrastructure management.

After a thorough evaluation, Raiffeisenbank in Prague had decided to completely modernize one of its data centers. Planning was virtually complete. And that was when the bank's IT team was given the opportunity to experience the R&M cabling systems for data centers.

In a seminar, consultants from R&M demonstrated how easy it is to operate high density patch panels from R&M. The participants discovered how cabling management can be automated. The IT experts from Raiffeisenbank were convinced by the new cabling system on the spot.

After a further presentation there was only one way forward: «We want the best and most user-friendly solution available on the market.» From a technical point of view and in terms of smooth operations, R&M products were the only remaining choice. The consulting partner, IBM Česká Republika, spol. s r.o., supported this approach.

The bank changed its plans at short notice. It opted for the Ultra-High Density platform Netscale as standard patch panel for the FO infrastructure. MPO trunk cables and patch cords with the LC QR connector from R&M connect the network sections. The copper infrastructure consists of shielded Cat. 6_A ISO products and high density patch panels from R&M. With the support of the R&M partner truconneXion, a.s., the project was realized on schedule and within a tight time frame.

Raiffeisen BANK
Banka inspirovaná klienty

On the whole, the solution saves a lot of space, is easy to operate and reduces the level of investment long term. The free space is available for later extensions.

Ready for R&M*inteliPhy*

The planners opted for a new path in terms of infrastructure management. As they learned from R&M, automation offers a range of benefits for the future. The data center can thus be operated in a highly efficient manner.

And so they prepared the entire installation for the use of the monitoring system R&M*inteliPhy*. Ports and patch cords were equipped in such a way that they can be integrated in the monitoring system in a flash. To this end, R&M delivered pre-terminated trunk, breakout and copper cables. Great support was given by the R&M*inteliPhy* service partner VTG Engineering s.r.o.

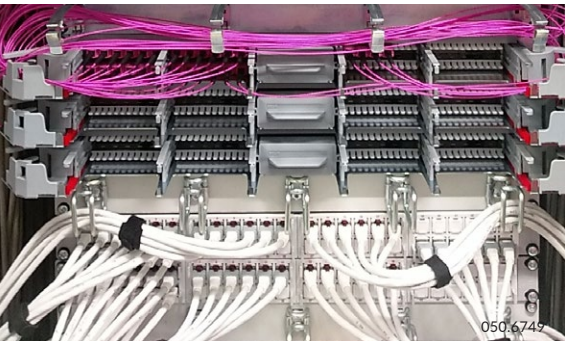
The result: Raiffeisenbank can implement the infrastructure management system R&M*inteliPhy* in a second step without having to interrupt operations.

FO infrastructure:

- 82 x 1U Netscale UHD patch panels
- MPO to LC modules
- 1700 x LC QR patch cords
- 230 x MPO trunk cables, OM4
- 50 x breakout cables, OM4

Copper infrastructure:

- 80 x 24 port PC PP patch panels
- 12 x 48 port HD PP patch panels
- 580 Cat. 6_A ISO CP cables for active port presentation
- 1500 x Cat. 6_A patch cords
- 12 km Cat. 6_A S/FTP 650MHz cables



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Passive Optical LAN
in a Luxury Hotel

Australia's thoroughbreds write history. As breeding and racing horses they enjoy a legendary reputation. For lovers of the animals, William Inglis created a new hotspot: a luxury hotel with an auction arena and stables southwest of Sydney. A fiber-based LAN enhances the comfort of guests and customers.

Since 1867 the name William Inglis & Son Ltd has stood for excellence in the business of productive livestock and Australian thoroughbreds. Inglis plays a leading role in the history of Australian horse racing and the breeding of thoroughbreds. Since the start of the twentieth century the focus has been on auctioning thoroughbreds. Stud farmers, breeders, racing stables and equitation specialists from all over the world meet at Inglis to find the best horses on the continent.

For five generations, Inglis has been based on the principles of honesty and integrity. The owner family pays attention to each individual detail. Outstanding, impeccable customer service is a top priority for them. The company is looking ahead to the future, wants to expand and increase the quality and convenience of its auction operations.

This is why William Inglis & Son Ltd opened a massive world-class location in January 2018: the Riverside Stables. The 29-hectare site is at the Warwick Farm racing course to the southwest of Sydney. In just two years, 800 modern stables, expansive parade spaces with rubberized asphalt and artificial turf, and an air-conditioned sales area for 1,000 visitors were created.

«Inglis' engagement with R&M has proven to be an essential part of our project success. Their POLAN solution allowed us to reduce the amount of cabling and improved the overall infrastructure distribution across the site. The POLAN allows us to deliver all services to the benefit of our guests across the Riverside Stables site and hotel rooms. I would highly recommend R&M to any organization or company that is looking for a supplier of communication cabling.»

Deane Jooste-Jacobs, CIO, William Inglis & Son Ltd

The site includes The Big Barn event hall which can hold 300 people, a garden pavilion, eateries and a brewery. The icing on the cake is the eight-story hotel with 144 rooms and suites, a fitness, spa and wellness center, and a rooftop pool with a view over the racecourse.

Scene of horse culture

The 5-star boutique hotel The William Inglis – named after the company's founder and operated by the Accor/Sofitel Group – primarily welcomes horse lovers and horse racing fans. The establishment celebrates a passion for equine culture and heartfelt hospitality. Every accessory tells part of the story of William Inglis & Son Ltd, showcasing famous thoroughbreds and racing successes. Every room and every suite bears the name of a champion racehorse sold by Inglis and is designed to suit the name.

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The William Inglis

However, there are only around 20 auctions a year and so the venue also has plenty to offer outside the auction and racing season: packages for tourism, weddings, meetings, conferences, concerts and events. This diversity requires extremely high-performance connectivity. International guests and conference organizers expect more than just the fastest possible data transmission.

Digitalization is also of great significance to the thoroughbred business. William Inglis & Son Ltd has started to conduct real time auctions on the Internet. And the auction house uses the Internet as an integral marketing instrument. On the premises, messages, offers, auctions and sales statistics are transmitted live on monitors and by WiFi.

Top-class network

True to its goal of offering outstanding customer service, the Inglis family opted for a top-class and future-oriented solution when it came to network infrastructure. It had the entire Riverside Stables complex equipped with a fiber-based local data network from R&M.

Consulting engineer Danny Tsung from Aurecon supported the project with the corresponding planning. The team from JCB Communications with John Anastasiou, Jason James and Michael Cianci took care of material deliveries, installation and testing. And the team from R&M Australia was also kept on its toes. Specific products had to be developed to correspond to the installation and the topology.

The Passive Optical LAN (POLAN) provides high-speed Internet to every hotel room, to the two floors of offices and to every corner of the premises. Data traffic, WiFi, telephone, surveillance, live streaming, TV … every form of communication can be broadcast brilliantly over the FO network. That can be seen on the 4.5 x 2.5 meter LED video displays in the auction arena.

Successful start

In February 2018, the Riverside Stables enjoyed a successful debut and Australian horse racing celebrated the start of a new era. The first Inglis Classic Yearling Auction at the new venue was also the largest in the company's history. 800 beautiful thoroughbreds were presented. And, during the auction races, thousands of visitors tested all the functions of the high-performance network.

Inglis Managing Director Mark Webster: «An ideal location for the next 100 years.»

Award-wining POLAN

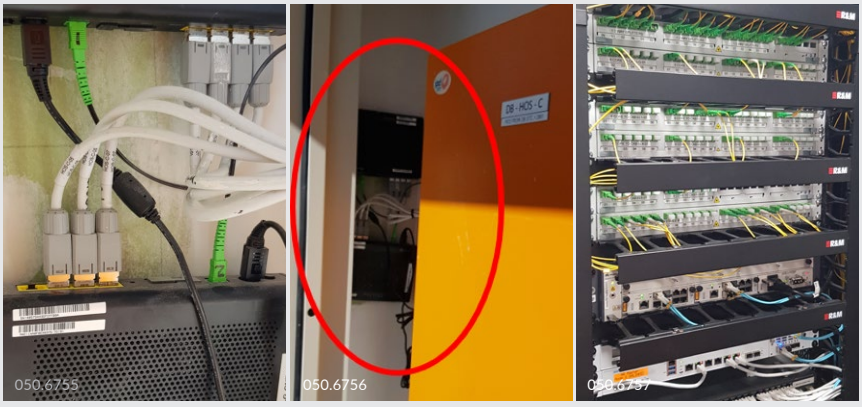
The Inglis project gave R&M the chance to demonstrate the advantages of a Passive Optical LAN (POLAN) for the first time in Australia. This good value fiber solution is particularly suitable for expansive local data networks which have to offer resources for Gigabit speed and are planned for long-term use.

POLAN is based on the Passive Optical Network (PON) technology. It was developed for wide-area networks and Fiber to the Home (FTTH). Signal transmission by light is application neutral, virtually inexhaustible and suitable for distances of several kilometers. POLAN can provide Gigabit speed for 20 km virtually loss free. Inherent encrypting and passive optical transmission technology make the network tamper-proof.

Once installed the singlemode cabling can transmit virtually any amount of data likely to be necessary in the future. In a POLAN infrastructure, the bandwidth can be increased without having to recable. That means: No installation effort is required for upgrades, changes and extensions. All that is necessary is a quick swap or extension of the active equipment in distributors and end points.

A further advantage of POLAN cabling: It needs only a fraction of the space comparable copper cabling would need. In communication and equipment rooms, that leaves plenty of space for other infrastructures.

The project also convinced the regional jury of the National Electrical and Communications Association (NECA) of New South Wales (NSW). In September 2018, they awarded the project partners the NECA NSW Excellence Award in the category Voice/Data Communications & Audio Visual Project.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POLAN infrastructures require little space.


090.6344

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050.6110

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Ethernet Goes Lean

Advantages of Single Pair Ethernet
- Continuous IP-based transmission
- Manufacturer-neutral standard products
- Field bus systems no longer necessary
- Synergies reduce operating expenses
- Inexpensive, lean, light cables
- Space-saving and cables quick to lay
- Significantly higher connection density than with RJ45
- Transmission rates to Gigabit/s
- Range up to one kilometer
- Remote power supply over cables

With the Internet of Things, Ethernet is now making inroads into the sensor layer of building and factory automation. Extremely high data rates are not usually required, but a high connection density is. The new application Single Pair Ethernet is the perfect solution.

Smart buildings and factories are less expensive and even easier to realize with the Internet of Things (IoT). With the IP protocol, LED lamps, switches, sensors, thermostats, machine controls and motors for blinds can be connected to the building management system over the local data network and the cloud.

Application-specific field bus systems thus become superfluous and with them the expensive gateways, complex interfaces and different protocols. The components of smart building and factory automation and the structured work area cabling would be united seamlessly via IP. This simplifies installation, maintenance and network management.

An important aspect is: High data rates are not mandatory for IoT networks. It is more important to reliably cable the numerous sensors, actuators and terminal equipment under at times harsh and cramped environmental conditions. Classic copper data cables and RJ45 connectors are theoretically suitable, but over the long term are too large and would quickly reach their capacity limitations with an increasing number of sensors.

SPE as a lean solution

The concept of the Single Pair Ethernet (SPE) solution comes from the automotive industry which required lean Ethernet cabling for vehicles. These xBase-T1 protocols can also be used in building and factory automation. In international standardization committees, manufacturers such as R&M are currently defining how these applications should be used.

SPE requires – as the name suggests – just a single twisted pair for data transmission. A thin two-core cable and a compact connector are sufficient for the cabling. In comparison to classic Ethernet cabling, the number of possible connection points is multiplied.

Single Pair Ethernet works with transmission rates of 10 Mbit/s (10BASE-T1) to 1 Gigabit/s (1000Base-T1). The link ranges are 15 to 1000 meters. What is more, SPE cabling can supply the terminal equipment with up to 50 watts with Power over DataLine (PoDL).

SPE is seen as a cost effective and space-saving extension of and supplement to the LAN. The connection to the LAN takes place using switches either centrally in the floor distributor or distributed in the zone at the service outlets.

The transmission standard 10Base-T1 is due to be adopted in 2019. It specifies 10 Mbit/s SPE transmissions over up to 1,000 meters. This protocol is likely to enable the use of existing cabling from the digital ceiling, providing planning was sufficiently forward-looking.

R&M plays a leading role in the standardization committees and was involved in the joint development of an SPE connector. Predictions suggest that the first terminal equipment and applications based on 10Base-T1 will be launched in 2020.

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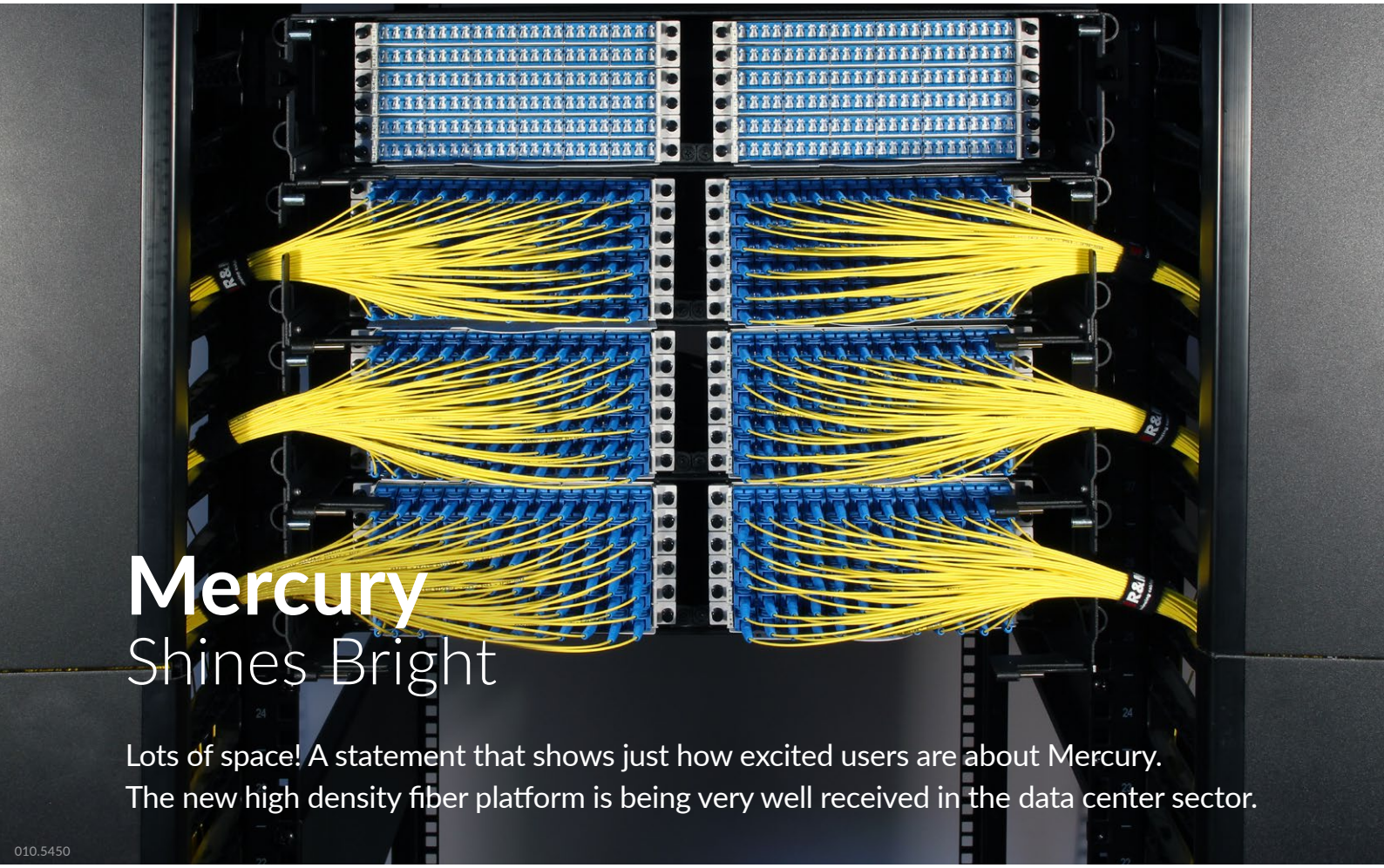

Mercury
Shines Bright

Lots of space! A statement that shows just how excited users are about Mercury. The new high density fiber platform is being very well received in the data center sector.

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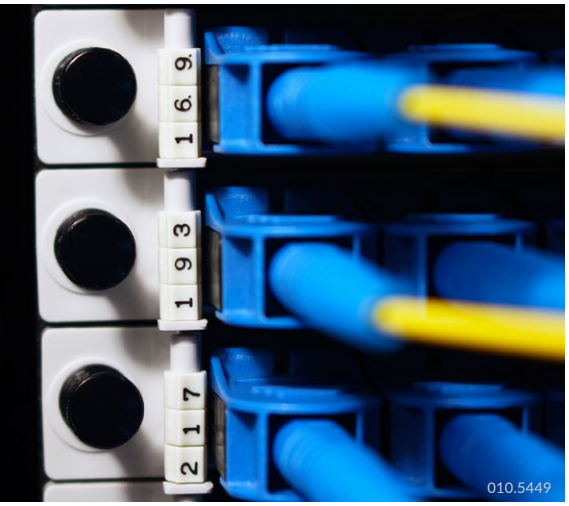
The modular splice distributor system Mercury, developed by R&M USA and launched six months ago, is cutting a convincing figure thanks to its ease of operation and user friendliness. «The splice drawer offers plenty of space for pleasant, fast working,» customers agree.

Clients find the variant for six rack units outstanding because the housing offers so much space for storing excess cable and overlengths. Part of the cited ease of handling includes the fact that trays and splice drawers are easily accessible at all times. Users particularly appreciate the integrated dust shutters. These not only protect the ends of the optical fibers but also save technicians several work steps, thus increasing their productivity.



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The typical packing density corresponds exactly to the current needs of the users who confirm: The 864 terminations on six rack units is currently sufficient; at the same time, the system always remains flexible. To be able to terminate larger cables with 1,728 fibers, an additional unit has to be added on top and the cable has to be passed-through internally.

R&M's intention behind the development of Mercury was primarily the cabling of ribbon fibers. The primary areas of use include data center interconnect cabling and campus backbones in which the packing density of the fibers has to be increased considerably. This is why R&M actively promotes high density, stackability and scalability.

The standard chassis occupies two height units in a 19" rack. The front modular patch panel can accommodate up to 288 LC connections per section. A typical configuration occupies six rack units and terminates 864 fibers. With maximum occupation on 48 height units, Mercury boxes connect up to 6,912 fibers in a rack.

A major plus for users: Mercury saves you time. In comparison to conventional platforms, the time involved in installation, configuration and testing is halved. Drawers which can be pulled out wide and the all-round open architecture ensure easy, fast access to cables, overlength, splice and patch units.

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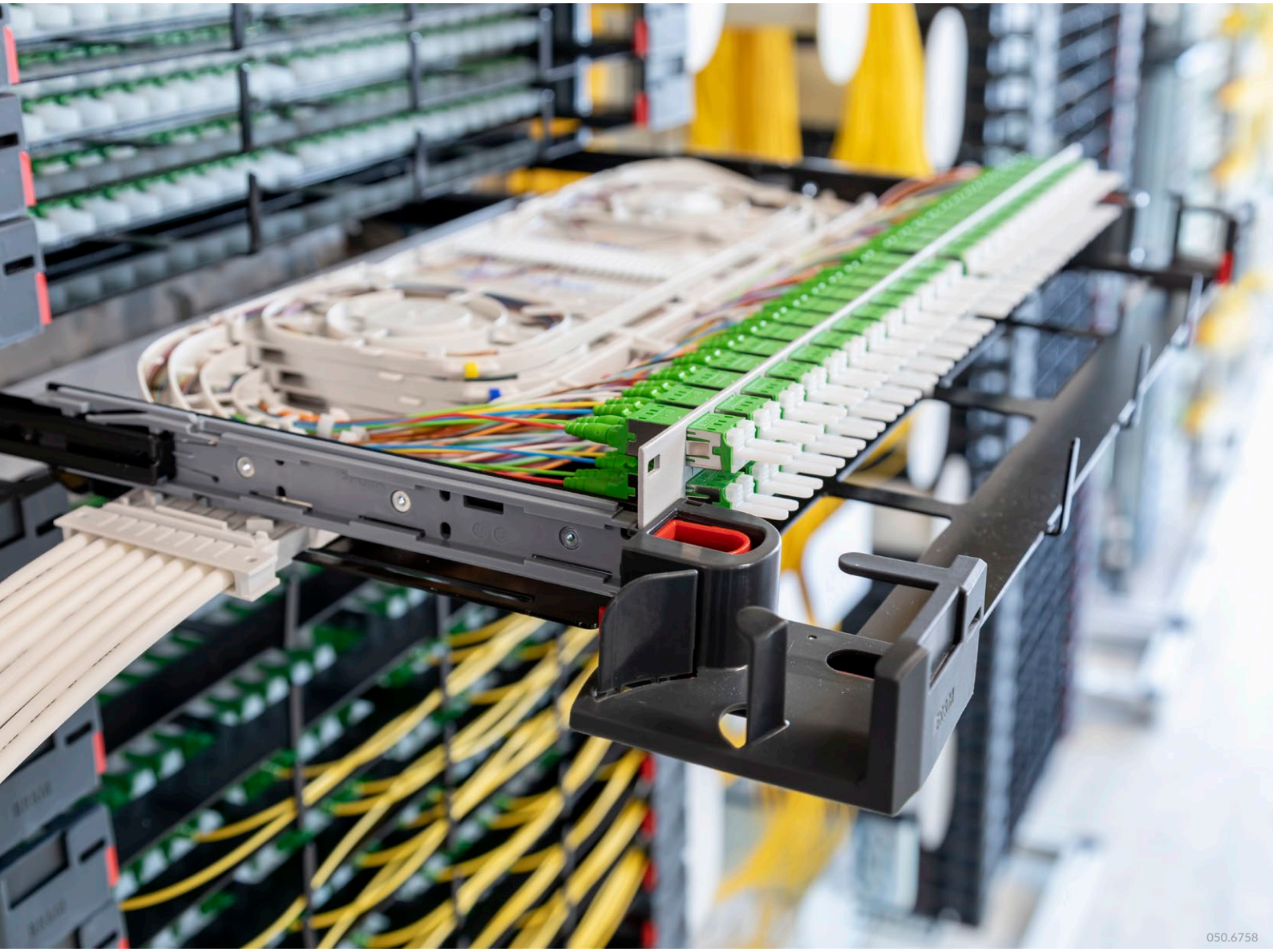


A Promising Future
with PRIME ODF Modules

Above-ground street cabinets and distributor rooms are bursting at the seams. But FO networks continue to grow. The number of fibers is increasing. Backbone, city ring and feeder networks need new structures. And R&M is solving the dilemma.

Network operators have to pack more fibers into the cramped fiber distribution hub units and simplify migration to scalable broadband networks. R&M is helping them along the way and has created a new generation of compact, multiple-use and user-friendly optical distribution modules that go under the name of PRIME ODF.

The PRIME modules for Optical Distribution Frames (ODF) are based on a front pullout system with quick mounting technology. The range is setting new standards for network operators. A PRIME ODF can accommodate 5,376 FO connections with a footprint of around one third of a square meter.

The PRIME range is suitable for flexible network expansion, cramped spaces and sites with high fiber density. These include above-ground street cabinets, POPs, hubs and basements. Areas of application: backbone, city ring, feeder networks and data centers.

Technicians do not need any tools for assembling the PRIME modules in the R&M ETSI rack. And this is how distributors can be set up quickly and spontaneously. The high degree of modularity means planners do not have to stick to rigid expansion concepts.

This approach makes it possible to start off with manageable investment costs. Network operators only order the specific number of components they actually need (pay as you grow). The high packing density also results in lower costs per fiber or port.

The new PRIME modules from R&M are setting new standards on the FTTH market.

The distributors can be supplemented or extended to fit a particular purpose at any time. This simplifies migrations in operations whether in existing or new infrastructures. A future-oriented connectivity solution which guarantees permanent network availability.

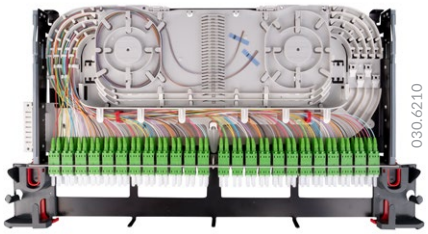
PRIME modules

The 3/4 U PRIME modules in combination with the 3U sub-rack are the basis of the new platform. The modules correspond to both types of rack: ETSI rack and 19" solutions. R&M has a suitable range of racks for ETSI installations. The fiber and patch cord management is perfectly tailored to the different configurations.

The 3U sub-rack can be assembled at the front or back of the 19" solutions. The front and fiber-sided patch cord management is completely integrated in the 3/4 U PRIME module. All PRIME modules can be equipped flexibly to suit requirements in the 3U sub-rack and retrofitted without tools.

To ensure all the network operators' requirements are covered, R&M is launching four different PRIME modules:

- PRIME FTU for fiber optic termination
- PRIME FSU for splice cabling
- PRIME FBU for breakout cabling
- PRIME FOU for overlength storage



The **PRIME FTU** (Fiber Termination Unit) module is the splice/patch variant with fully integrated fiber management concept and front access to the connections.

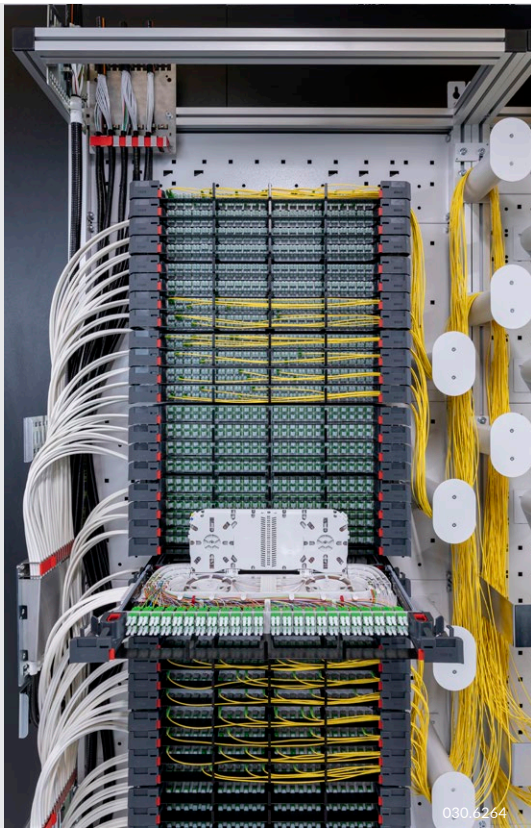
When pushed in, the connections are easy to detect and operate. For cleaning and inspections of the connectors, the module can be pulled into a service position. The capacity: up to max. 48 adapters of the types SC, E-2000™ and LC-D and 96 HS/ANT splice connections.

Up to 5,376 connections

Up to 14 PRIME sub-racks (3U) can fit in a PRIME ETSI rack (900x300x2200 mm). The 3U ETSI sub-racks and the required elements for patch cord management are assembled without tools in the ETSI rack. This permits fast and flexible installation and migration. R&M has a sophisticated rack range which is tailored to flexible customer requirements.

The capacities:

- Up to 384 fiber connections per 3U sub-rack.
- In the main rack with HD solution, up to 2,688 connections with SC, LC, E-2000™
- In the main rack with UHD solution with LC-D, up to 5,376 connections
- For the UHD variant, R&M recommends considering additional space for optimal fiber management
- The 300x300x2200 mm racks can be added to the main rack if required



The **PRIME FSU** (Fiber Splice Unit) module is a strictly cable-to-cable splicing solution. The first 24 ANT or 48 HS splices are stored in the basic fiber tray. In the case of greater fiber density, up to three additional MCM splice trays with the same number of fibers can be retrofitted. The capacity: 96 ANT crimp or 192 HS shrink/splice connections.

Both modules – FTU and FSU – feature motion-enhanced fiber routing. This protects and is gentle to the fibers during splicing and maintenance work. The fiber routing (moving channel) is under the splice carrier and protects the fibers on the way to the splice area. The result: safe and simple fiber migration.

The **PRIME FBU** (Fiber Breakout Unit) module is used for the simple connection of pre-terminated cables. The cables are routed from the front or rear depending on the rack type (ETSI or 19") and connected. The capacity: depending on the format 24 or 48 fibers as well as 24 SC, E-2000™ or LC-D adapters. A fastening strap also holds the fanout cables in place in the module.

The **PRIME FOU** (Fiber Overlength Unit) module is used as storage for surplus loose tubes or patch cords. The drawer can accommodate up to 30 m excess fiber.

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Fiber Optic Cables
in R&M Quality

Whether two or 432 fibers. Whether single or multimode. Whether central or stranded loose tubes. Whether micro or steel wire armored outdoor cables, the R&M cable plant manufactures standard cables for all kinds of applications as well as tailored special constructions if required.


030.6462

The fiber optic cable plant in Děčín, Czech Republic, acquired by R&M in the early summer of 2018, produces a large range of cables as well as ensuring a high ability to deliver. Cables in around 20 different categories are part of the permanent range, particularly:

- Micro cables for blowing-in into micro tubes
- Duct cables with standard rodent protection or improved level of rodent protection
- SWA – steel wire armored cables
- CSTA – corrugated steel tape armored cables, with a single or double jacket
- FRPA – fiber reinforced plastic rod armored cables
- Fire-resistant cables in compliance with EN 603331-25
- Dielectric aerial cables
- Sensor cables

These are mainly loose tube constructions with central or stranded loose tubes, referred to as Central Loose Tubes (CLT) or Stranded Loose Tubes (SLT). The largest standard cable contains 432 fibers in strands of 18.

The extensive range confirms just how wide the construction and production know-how of the cable plant is. R&M provides cables for all typical applications, for common duct - indoor and outdoor installations, for aerial drop or direct buried installations.

Cables for the toughest jobs

Rodents are a threat to buried cables everywhere. And that is why R&M pays particular attention to rodent protection. Alongside corrugated steel tape armoring, the range includes cost-optimized cables with varying glass roving layer thicknesses under the outer jacket.

The plant's strengths include the manufacture of cables which satisfy the requirements of maximum fire classification. Furthermore, the cable factory produces fire-retardant and fire-resistant cables which consist of halogen-free material and satisfy the IEC 60331-25 standard requirements of 180 minutes at 750°C.

The range also includes cables equipped with increased protection against mechanical loads which are thus suitable for direct burial underground.


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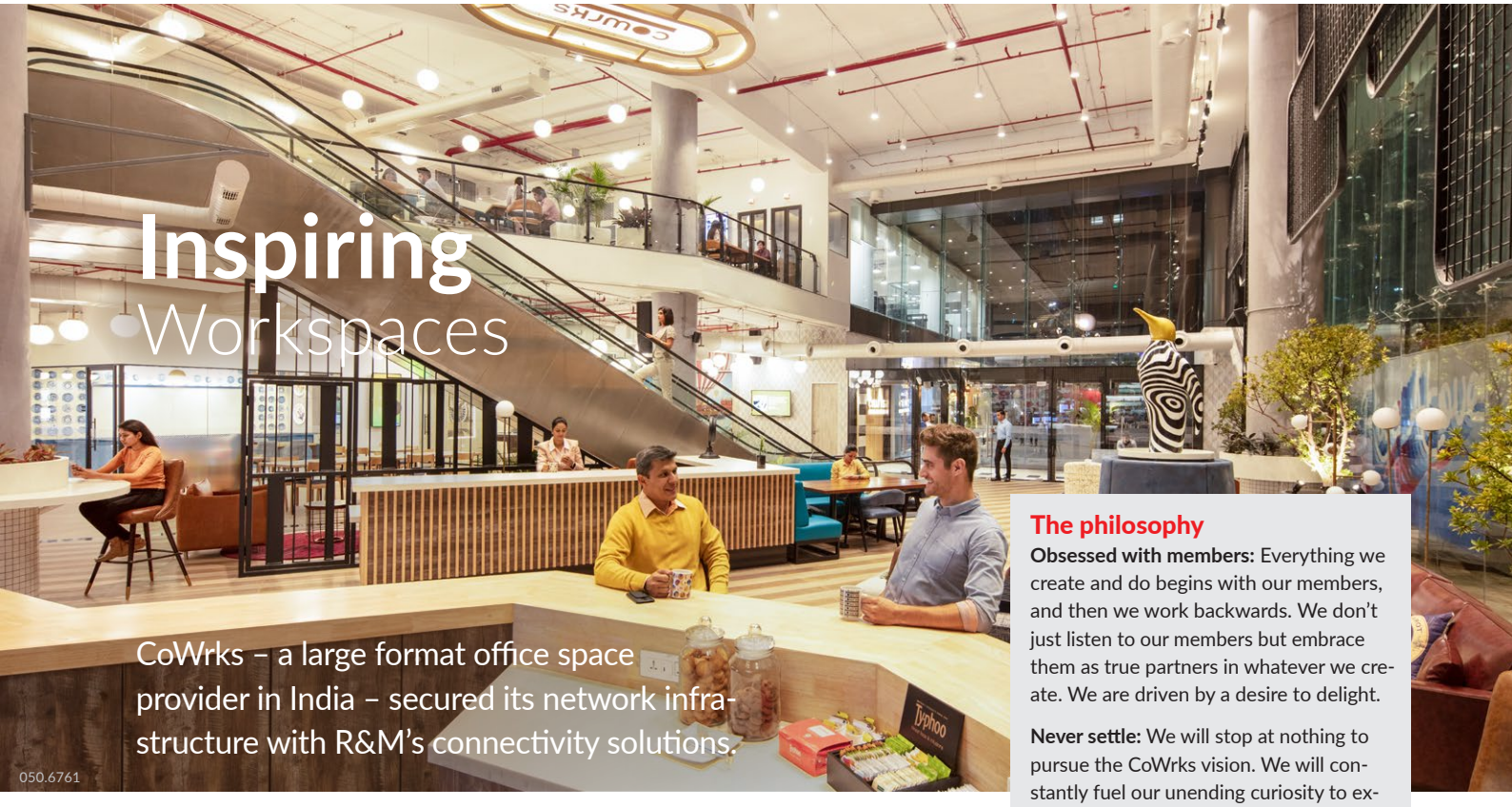

Inspiring Workspaces

CoWrks – a large format office space provider in India – secured its network infrastructure with R&M's connectivity solutions.

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With the purpose of bringing together the largest community of working professionals across the globe, CoWrks offers premium work spaces with flexible contract terms, customizable offices and enterprise-grade security for businesses of all sizes.

CoWrks started its journey throughout the Indian co-working industry in 2016 and built a close community of 23000+ members, including a pool of freelancers, independent professionals, start-ups, small scale enterprises and Fortune 500 companies. Embarked on Indian soil, they are now widely spread across 23 centers located in five major cities – Bengaluru, Mumbai, Delhi (NCR), Chennai and Hyderabad.

The flagship center situated in RMZ Ecoworld, Bangalore, is spread across 1.6 lakh square feet in space and is home to 3000+ members. CoWrks approached R&M to deploy secure and future-proof network cabling with excellent transmission speeds.

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Network requirements met best with R&M's connectivity solutions

The IT team at CoWrks was convinced that R&M's cabling was the best option to address their network requirements. R&M's network solution is future-proof and offers excellent transmission speeds. Other factors that convinced the client were the simple and user-friendly handling, quality of the products and the security solutions that were available in the portfolio.

R&M provided CoWrks with Cat. 6 and Cat. 6_A LSZH solutions for horizontal cabling as well as singlemode and multimode fiber solutions for backbone connectivity. With this high-performance network connectivity, interruption-free connections are expected across the centers throughout India. CoWrks is impressed by the solutions provided by R&M and looks forward to continuing collaboration on future projects.

«R&M has helped us get a secure network with faster data transfer capabilities. We can rely on the solution & support provided by R&M and this will also enable us to have a future-proof network as well.»

Mr. Nikhil Sud, Chief Technology Officer, CoWrks

The philosophy

Obsessed with members: Everything we create and do begins with our members, and then we work backwards. We don't just listen to our members but embrace them as true partners in whatever we create. We are driven by a desire to delight.

Never settle: We will stop at nothing to pursue the CoWrks vision. We will constantly fuel our unending curiosity to explore, learn and grow. We will keep pushing the boundaries and challenging the status quo, thriving outside our comfort zones.

Be worthy of trust: We say what we believe, and we do what we say. We are consistently reliable. We listen attentively and treat others respectfully while being vocally self-critical. We constantly strive to earn and retain the trust of our members and team.

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The most important functions of R&M*inteliPhy*:

- Monitoring of connectivity in real time
- Automatic alarms
- Automatic documentation of connection paths, equipment etc.
- Technician guidance during patching
- Monitoring of patching operations with automatic subsequent documentation of the network connections

100 %
End-to-End Monitoring

With the new port monitoring cord from R&M, data centers are now making the network segment between patch panels and devices transparent. At the moment, this can still be something of a blind spot.

The port monitoring cord extends the AIM system R&M*inteliPhy*. It identifies RFID markers at the SFP+ ports of the active devices and establishes the connection to the monitoring system. R&M*inteliPhy* thus receives all the status information via the physical network connections of the devices.

The benefit for data centers is that they can seamlessly and automatically monitor the network segment between the patch panels and devices in real time. Faults or changes to connectors can be detected and localized immediately. Downtimes and repair times are shortened.

Furthermore R&M*inteliPhy* can generate, verify, standardize and control assignments for service technicians. Moves, adds & changes can be planned and monitored precisely. Network management can analyze risks at an earlier stage.

No more blind spot

For the first time, data centers are achieving completely automatic end-to-end documentation. Network administrators have so far tended to document the segment between patch panels and devices manually. The more complex and dynamic the infrastructures, the more difficult and fault-prone the manual documentation. A blind spot is the problem, representing an enormous risk for companies from sectors with critical infrastructures, such as airports and hospitals.

The port monitoring cord as part of R&M*inteliPhy* expands the monitoring possibilities to the level of the server, switch and storage ports. The blind spot disappears.

The solution for monitoring the active ports is based on OM4 fiber optic cables and LC Duplex connectors. It is compatible with all LC transceivers. The main components are port markers and special cables.

- The port marker can be found at the port of the active device. It contains the RFID tag which identifies the port uniquely at global level.

- The special cable reads out the RFID tag. It transmits the status information to the R&M*inteliPhy* Analyzer in the network cabinet.

There is no need for additional hardware in the patch panel or network cabinet. Port monitoring cords and classic patch cords can be mixed on the patch panel.

To date, R&M*inteliPhy* has been particularly good for use in the cross-connect architecture. Now, data centers can also deploy the solution in the fiber optic interconnect architecture.

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Artificial Intelligence for Networks?

Society has great expectations of artificial intelligence (AI). The intention behind it, among other things, is to be able to make machines and computers able to learn independently and then enable them to use their acquired knowledge to control complex worlds. What does that mean for connectivity?

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The latest forecasts confirm long-term dramatic growth in Internet data traffic. In three years, the world will be moving as much data in the net as was moved in total in the last 30 years. More than 28 billion devices will then be networked by cable and radio according to predictions from Cisco.

Soon we will be welcoming autonomous cars, fully automated production sites and smart cities. They will all use innumerable digitalized systems and functions, the connection and monitoring of which should be fail-safe.

The data center market is getting ready for just that situation. The number of hyperscale data centers is growing. Innumerable edge data centers are being set up at the edges of the cloud. The infrastructures in computer rooms will be compacted even further. Thousands upon thousands of servers and hundreds of thousands or even millions of cables, glass fibers and connectors have to be accommodated here.

People need help

The conclusion of such future scenarios: the complexity and dynamism of the infrastructures are reaching dimensions that people can no longer manage without artificial help.

It is already foreseeable that automated infrastructure management (AIM) – as we know it today, for example with R&M*inteliPhy* – will have to be developed further. Future evolution steps in AIM will also use AI to ensure we can continue to control the infrastructures.

Under its own organization AI will independently manage connectivity from the data center to the extremes of a smart city, economically efficiently and to suit requirements. It can predict certain things from findings gained in monitoring and machine learning. For example, where and when cables are aging and failing or where there are overloads and what the causes are. AI is becoming a value creation factor in network operation.

In addition, AI, just like cloud services, requires sufficiently dimensioned cabling that can be scaled at any time, is latency-free and fail-safe. Otherwise it will not be able to fulfill expectations. **In other words connectivity and AI are mutually dependent.**

R&M has long-term experience in the development and production of AIM systems, is always up on any developments in the technology and, in the future, will implement corresponding functions, such as device positioning and the optimization of cable runs.

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Lagardère Media News
Moves to the New Media District in Paris

R&M solutions support the new high-performance network for voice and data communication in the offices and studios of Europe 1, Virgin and RFM.

Lagardère is one of the main players in the media sector and number 1 in radio and TV production in France and Spain. Furthermore the group is one of France's leading magazine publishers. Lagardère Media News is behind radio stations such as Europe 1, Virgin and RFM, and popular magazines such as JDD and Paris Match.

Initial situation

Since the foundation of Europe 1 in 1955, the radio stations of Lagardère Media News had been producing their shows at rue François 1er in the heart of Paris. At the end of 2018, the 860 employees left the historical building to move to what used to be the head office of Canal+ in the 15th arrondissement, the Parisian media district.

The extensive construction work beforehand had taken two years. The entire voice and data network for the offices, ten recording studios and 28 production rooms had been newly planned and designed. The cabling of the 14,000 square meter building also had to be replaced in entirety.

R&M wins the public tender

The two Lagardère project managers knew exactly what they were looking for. Julien Delucinges, IT architect for radio at Lagardère, is responsible for the entire cable and IT infrastructure and everything that entails. He is supported by Cyrille Laroque, infrastructure administrator, responsible for office and building cabling.

The most important requirements for Lagardère were that the solutions would be future-proof, give excellent performance and

«We particularly appreciate the fact that R&M developed a customized cabling solution for our special switches. This also includes a sophisticated numbering system for the cable labeling.»

Julien Delucinges, IT architect for radio, Lagardère

support future applications. They therefore opted for Cat. 6_A components for the copper area (10 Gigabit and 4PPoE) as well as OM4 and OS2 products (LC connectors) for the optical connections. The solution would have to support massive amounts of data. An important criterion in the product selection were reliability and the 25-year warranty.

«We have known R&M for six years now and already deploy R&M solutions. And that's why we asked them for an offer for this project, too,» explains Julien Delucinges.

Numerous challenges for implementation

A joint venture of three installation companies – Mermin, BMS and Vidélio – was responsible for implementation, under the direction of Vidélio.

«It wasn't just the tight deadlines that were a challenge in this project, but also the laying of the cables. Some of the hollow floors in the building are 100 m long which proved difficult in terms of installation. Solutions also had to be found for the gangways. The work lasted more than six months and mostly went off smoothly. We particularly appreciate the fact that R&M developed a customized cabling solution (copper cable bundle) for our special switches. This also includes a sophisticated numbering system for labeling the cable ends,» continues Julien Delucinges.

«To ensure interruption-free continuous operation, we selected a high-performance solution with redundant connections and high density singlemode fibers for the 4G-AV equipment in the studios,» adds Cyrille Laroque.

The network infrastructure comprises two main computer rooms, 14 floor distributors for the offices and five technical rooms for the studios.

«We have been working with R&M for many years. The quality of the products is simply outstanding. As this project involved the installation of many components with a production time of three to four weeks, the consistent support and step-by-step coordination through our R&M contact were all the more important for us,» confirms Bertrand Bossier from installer BMS.

Julien Delucinges and Cyrille Laroque, Lagardère Media News

R&M solutions

Horizontal infrastructure
- 3,500 Cat. 6_A advanced / Cat. 7 S/FTP links
- Fiber backbone UniRack OM4 24xLCD
- 175 km Cat. 7 S/FTP MHz cable
- 15 km OM4 fiber optic cables with 24 fibers

Recording studios
- 8,000 Cat. 6_A advanced links
- Fiber backbone 110 UniRack OS2 24xLCD
- 120 km Cat. 7 S/FTP MHz cable
- 30 km OS2 fiber optic cables with 24 fibers

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Fiber Optics to Remote Locations?

The goal of the digital age is to provide everyone with fiber optics. But Fiber to the Home is very difficult to realize in a number of places. Long distances in the countryside increase the price of tried and tested underground cabling. Could above-ground network expansion be the answer?

The telecommunications sector prefers underground cabling in many regions. In the ground or underneath road surfaces, the valuable FO cables are protected for decades. And are still flexible in terms of management – for example with the R&M SYNO dome closure. Apart from rodents and excavators, there is very little danger and very few threats. A Return on Investment is guaranteed as long as there are plenty of subscribers to the FTTH connection.

It is difficult to bury cables in rocky areas. In some places, the protection of historic monuments or lack of permission can stop cables being laid underground. At the furthest corners of a canton and in sparsely populated areas, the long distances make network expansion pricey. Does an isolated farmhouse need a fiber optic connection? Is it really worth connecting an attractive, but remote mountain village? The more the market demands FTTH, the more often network operators are confronted with questions of this kind. They have to decide whether it makes sense to lay cables underground.

Alternative «aerial deployment»

Aerial deployment is the alternative. Aerial cables are easy to suspend between masts and buildings – even over longish distances. The masts may seem a little out of date, but aerial deployment costs only a fraction of what it costs to put cables underground. The network can be expanded quickly, at short notice and with very little planning effort. Residents and traffic are not disturbed with civil engineering works as masts used by existing electricity and telephone networks can be used. In vast countries like the US, 80% of the FTTH rollout is based on aerial deployment.

The risk of downtime is high. Storms, lightning, ice, accidents, birds and sabotage can break the cables. The environment is constantly changing. Network operators have to check the routes and keep them clear of vegetation. The cables age due to sunshine, temperature fluctuations and mechanical forces. But there are suitable highly stable, durable products on the market – for example the flat, self-supporting cables produced by R&M's cable plant.

Due to its relatively favorable CAPEX/ OPEX ratio, aerial cabling remains attractive for rural areas. It is often the only solution for an FTTH rollout.

Planning aerial deployment

The careful planning of FTTH aerial cabling in remote areas includes:

- Familiarization with the location and climatic conditions
- Specification of the span of the suspended cables and how much the cables might shrink or expand
- Selection of highly robust material for tension relief, insulation, mounting, distribution housing, splice and connection boxes etc.
- Standardization of the range to be able to build and carry out maintenance work efficiently

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R&M Demonstrates Sustainability

R&M is presenting the report on the sustainable effect of the entire company for the fifth time. It is published every two years and is intended to provide transparency for both stakeholders and the general public.

The CSR Report gives insight into the strategies, goals, values and conduct of R&M. It is based on the standards of the Global Reporting Initiative (GRI).

R&M sees sustainability as being more than continuous growth, reliable management and resource-conserving production. For example, R&M attaches great importance to customers always getting value added. This includes the fact that the Swiss quality philosophy applies in all plants and branches and that products have to be future-proof.

The report also details the company's mission. In the era of digitalization, R&M is making a contribution to ensuring that connections between people and applications are becoming ever more secure. This is why R&M develops and produces innovative and stable connectivity systems for reliable data transmission in private and public networks.

Above-average training quotient

Training and further education also play an important role at R&M as shown in the report. The proportion of trainees at the company's headquarters in Wetzikon is above the Swiss average. In Bulgaria, R&M is training several apprentices and also regularly trains interns as part of a state project. All employees are given ongoing training on the corporate values. The focus in 2018 was «COOPERATE», or to put it another way: the promotion of international and intercultural collaboration.

R&M takes part in external tests and audits. For example, alongside ISO certifications, R&M successfully completed an EcoVadis Assessment in 2018 which evaluates the strengths of companies on 150 procurement markets according to 21 indicators. R&M has now been included in the global Supplier Sustainability Rating. This qualification underscores the fact that R&M is a reliable partner in the Supply Chain and that communication, delivery reliability and collaboration work perfectly.

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The report is available both as an electronic version (and in printed form – upon request): www.rdm.com/Company/About-R-M/Corporate-Social-Responsibility

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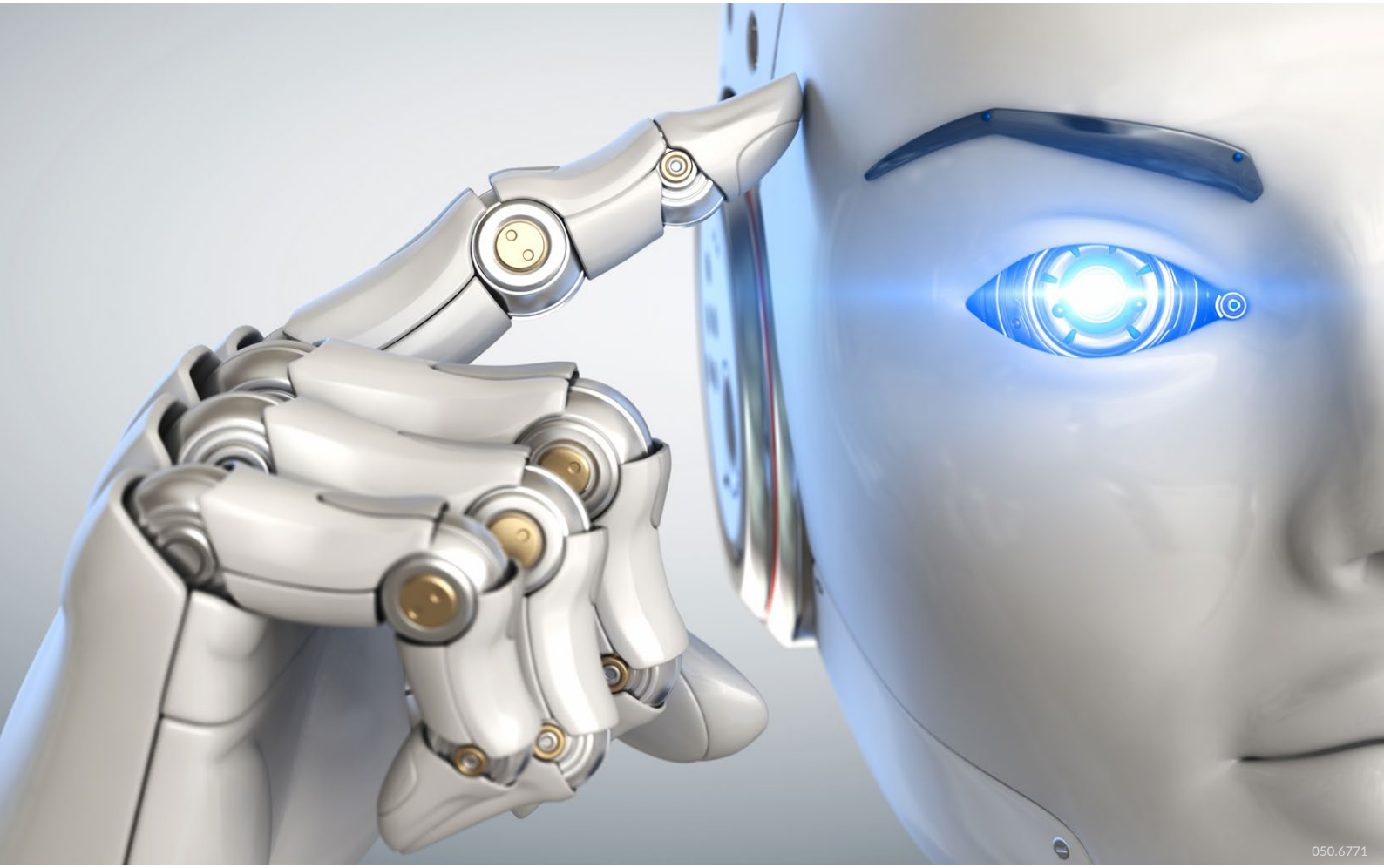

Will Algorithms soon **have Human Capabilities?**

An examination of dynamic technological developments using artificial intelligence as an example.

It is beginning to dawn on a lot of people that future technologies will not just change nature around us, as has been the case so far, but will soon be reshaping us too. Possible fundamental changes to our biology, our psyche and perception as well as our consciousness are already becoming apparent. Artificial intelligence is playing a major role in this.

The term «artificial intelligence» (AI) was coined back in 1956 by John McCarthy at a conference in Dartmouth. But it was not until the last five to ten years that this field evolved into a future key technology with an ever more powerful impact on our lives. Increasingly, it deals with tasks that were previously reserved for human cognition, such as recognizing patterns, predicting events clouded by uncertainty, and taking decisions in complex circumstances. AI researchers currently maintain that their algorithms will soon even be capable of intuition, genuine creativity and expressing emotions and will thus move into areas which most of us until now had seen as incontrovertible domains of human capability. But regardless of whether one day they will actually possess these specific human abilities, they can already recognize them in humans today. Reading emotions from a human facial expression is now actually easier for an AI than it is for humans. And, as far as creativity is concerned, it has to be said that at chess tournaments in which computers are not permissible, particularly uncommon and creative moves are seen as an indication that a player is cheating by secretly using a computer.

Fast development

So what has suddenly made this technology that just 15 years ago was seen as a playground for freaks so powerful? Behind it is what is referred to as «deep learning»: an architecture with artificial neurons and their interconnections inspired by the human brain. These networks can be many neuronal layers deep and are «trained» on huge amounts of labeled data. Afterwards, they use what they have «learned», i.e. how they have, based on the learning data, chosen their many different parameters to detect subtle patterns in other mounds of data. In addition to the new structural paradigm of deep learning, there was a second requirement for AI to emerge: huge amounts of data (big data). This is exactly what has become available due to the immense increase in our online activities. The major American Internet companies Google, Facebook, and Microsoft, but increasingly also their Chinese counterparts, Baidu, Tencent, and Alibaba, are collecting, storing, and using all the data they can about our behavior, our preferences, and our intentions that we surprisingly so voluntarily provide them with. With this combination of computing power and mounds of data, AI quickly became better

at understanding language and text, recognizing faces, playing chess and Go, examining MRI images and skin tissue for malignant tumor cells, and calculating the likelihood of credit defaults or credit card fraud.

The speed of the development of AI research is demonstrated by the further development of the AI of Google's «AlphaGo». Only 18 months after its spectacular victory over the best human Go player, Google had already created a new version of Go artificial intelligence. «AlphaGo Zero» did not need to be fed with past games anymore in order to reach its playing ability. Like the well-known Dr. B from Stefan Zweig's Chess novella, his developers let it play only against itself and thus learn, in other words optimize its neural connections. After just three days in which the machine played 4.9 million games against itself, AlphaGo Zero had reached a level of skill in the Go game, which enabled it to defeat its still real-data trained predecessor and human world champion defeater AlphaGo with 100 to zero in 100 games. No less impressive was AlphaGo Zero's performance in chess. It beat the hitherto world's best chess computer, which had been trained with millions of historical chess games and the centuries-old experience of chess players and possessed a processing power of evaluating 70 million positions per second, in 28 games and tied 72 games out of 100 games. The amazing thing was: The machine had learned chess only four hours before and had developed its skill by playing against itself without being taught about opening moves or strategies. In just four hours from beginner to becoming the unbeatable, best chess machine in the world! An AI like AlphaGo Zero is so powerful because it is «no longer constrained by the limits of human knowledge,» says one of the creators of AlphaGo and AlphaGo Zero, Demis Hassabis. That is certainly a statement that provides some food for thought.

New AI players «thanks to» a lack of data protection

However, all this also means that the focus of AI development has changed significantly in the past two to three years, from projects in top research laboratories in specialized institutes (including those at Google, IBM, or Facebook) to real-world applications with real-world data. The necessary combination of AI and big data is allowing there to be completely new players on the global market, with amazing global political consequences: To date, the US with its leading AI research institutes and software companies has been the undisputed leader of the AI revolution. In the last two years, China, with its huge market of more than a billion people as well as the immense and completely unprotected data provided by its Internet users, has quickly grown into an AI superpower. Specifically one point that horrifies Europeans is proving to be one of China's biggest competitive advantages: the complete absence of any data protection laws. The free access of Chinese Internet companies to their customers' personal data is hailed as the greatest advantage of Baidu and Tencent in the global competition for leadership in AI.

Obligations for political and social decision-makers

Many real AI experts are not shying away from making dramatic statements about the future development of artificial intelligence. AI pioneer Stuart Russell paints a drastic picture of us humans in a car driving towards a cliff hoping to run out of gas before we plunge into the abyss. Both Russel and Elon Musk claim that AI can be as dangerous to humans as nuclear weapons. Experts are literally begging governments to provide a framework of laws and regulations. This is based on their serious concern that policymakers oversleep technological developments, do not take them seriously or, as is often the case, simply do not understand them at all. In the meantime, scientific and technological progress has become so rapid and is displaying such complex dynamics that it eludes the imaginative and creative potential of the vast majority of political and social decision-makers.

To date the transfer of scientific knowledge to technologies was subject either to a capitalist or military exploitation logic. There has been absolutely no sign of active shaping, let alone democratic legitimization. Intervention at state level has only ever taken place when the technology was already «out there» and its dangers had become obvious. In the future, that will no longer be enough! Surrendering such an important playing field as AI to the American capitalists or Chinese communists could prove fatal.

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Good AI requires good connectivity

Without fail-safe, clean connectivity, AI will not work (for more information see page 25). With its solutions, R&M is, on the one hand, providing the basis for artificial intelligences to do their job reliably and without interference, but, on the other, would like to call for responsible dealings with this new technology. This is why articles such as this one are published in CONNECTIONS. Companies should use the new possibilities carefully to market their products successfully, but should never lose sight of the overall ethical picture and should sensitize their stakeholders accordingly.

With his commitment and dedication, scientist and academic Lars Jaeger is making a valuable contribution to sensitizing society to the importance of reliable dealings with modern technologies. His latest book «Braving more future – how we all benefit from progress» will be published in the summer of 2019, initially in German.
www.larsjaeger.ch.

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Acquisition on the US East Coast

A perfect opportunity for R&M: At the beginning of March, R&M announced its takeover of Optimum Fiberoptics Inc. in Elkridge, Maryland. The company is a premium supplier of fiber optic solutions.

The location could hardly be better. Optimum Fiberoptics Inc. is situated directly on the two major traffic axes of the East Coast. The Interstate 95 and the U.S. Route 1 are less than two miles away. To the north it is only 13 miles to Baltimore, and only 30 miles to Washington D.C.. But other important East Coast states, such as Virginia, New York, Pennsylvania and North and South Carolina, can be reached in a relatively short time.

In Optimum Fiberoptics Inc. R&M is taking over a specialist for fiber optics and connectivity with outstanding customer relations in the Mid-Atlantic US states. In this economically, politically and culturally significant region, there is already a range of rapidly growing data center strongholds.

The new site is perfect for serving the existing customer base on the US East Coast and will be able to focus on new customer groups. R&M can now offer its entire range of products and services throughout the United States. At the same time the company will provide outstanding customer care for Optimum Fiberoptics' customer base and utilize new possibilities of market development.

Further market position expansion

The acquisition is extending the current activities which are based in the North American R&M HQ in Silicon Valley. Further investments will follow over the next 24 months to consolidate the company's presence on the North American market.

Optimum Fiberoptics Inc., founded by Jay and Mark Megan in 1997, assembles and sells mainly high-quality cable and fiber management products. The range includes multimode and singlemode cables, active cables, custom-configured patch cords, transceivers, switches, converters, cabinets and connectivity products. Over the last 20 years, excellent customer relations have been built up thanks to the company's in-depth expertise in fiber optic technology and the ability to react quickly on customer needs. R&M is looking forward to taking the business in North America to a new level with these additional resources.

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Cable Management **Now Simpler**

Modular switches with a high port density are important components for creating cloud infrastructures in hyper-scale data centers. R&M has developed the Netscale Blade Cabling Manager (BCM) for the fast, uncomplicated addressing of these switches.

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The new member of the Netscale family is replacing conventional and space-consuming cable management in cabinets. The plug & play solution routes cables crossover-free directly from switch ports to patch panel ports and simplifies handling at the rack.

The BCM occupies two height units and serves, for example, an SAN (Storage Area Network) director with 384 ports – a solution with outstanding packing density. Based on the modular principle, it can be assembled vertically or horizontally. Every switch module (blade) is given a corresponding slot in the BCM.

There are twelve MPO trays and twelve MPO12 adapters in the twelve slots. Alternatively, Direct Connection Cassettes (DCCs) can be equipped with LC or MPO trunk cables which address the switch ports directly. The R&M range for data centers has suitable standard products for every variant.

The cable lengths between BCM and switches can be determined individually. R&M also supports data centers with pre-terminated, graded cable sets for various port distances.

With the help of the Blade Cabling Manager, the data center staff quickly and efficiently executes the daily configuration tasks on switches and SAN directors. Patching errors can be avoided, work time and operating costs reduced. Cable management is simplified due to the clear cable guides and port representation as well as the simple operation on the front and back. The connections are easy to get hold of in spite of the high packing density.

The Netscale family also includes fine 1.4 mm patch cords. This best-in-industry small cable diameter considerably facilitates handling. Conventional patch cords are at least 2 mm thick.

The adapters consist of an innovative push-pull mechanism with textured cap, making it ultra convenient to operate the connectors. Polarity can be changed in a flash without the need for tools.

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The R&M Roadshow: **Living Customer Focus**

Having a break during worktime is always a pleasure. But it is even more of a pleasure if you can use it to pick up all the latest exclusive and practical information. The R&M Roadshow provides just this opportunity to cabling experts throughout Europe.

From France to Russia and from England to Greece, the R&M truck visited lots of contacts in their own locations in the past season. At some places, excitement and enthusiasm were palpable as experts eagerly awaited the truck's arrival.

The truck is the meeting point for customers and partners, planners, project leads, system integrators, installers, buyers and users. Managers of data centers, IT companies, universities, hospitals, industrial companies and providers currently planning a network project also dropped by.

Visitors treat themselves to a break and use the opportunity to indulge in expert discussions with colleagues and the R&M team. Topics such as cyber security, infrastructure management and bandwidth requirements make for lengthy discussions. And there is immediately a great atmosphere in the small meetings between racks, patch cords and other exciting R&M products. Ideal conditions for exchanging information.

Everything on site

For R&M it is all about living customer focus with value added. Because the roadshow is not just about meeting up with long-term and new partners in their own locations. The visitors can «play» with R&M products in the truck, for example with the field-mountable FM45 connector. For many users «touch and feel» is just as important as the data sheet.

Planners use the truck to give practical demonstrations to project clients at their leisure on how to work with R&M solutions. This simplifies the decision processes and speeds up the building project. The roadshow makes short trainings possible, saving on travel to distant seminars, and updates partners on all the latest findings.

The R&M Roadshow concept is popular. The truck demonstrates the wide range of R&M solutions for Fiber to the Home, LAN and data centers. Questions on installation can be answered spontaneously. In the truck, installers can familiarize themselves with technologies that are still relatively new to them, such as Passive Optical LAN (POLAN). IT managers discover the benefits of automated infrastructure management as they get to know the R&M*inteliPhy* system. The Ultra-High Density platform Netscale and the Power over Ethernet products with the R&M PowerSafe seal are equally interesting.

The journey goes on. R&M will be intensifying its focus on the European markets «on the road» even more in future and is even adding a further truck to the roadshow fleet.


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New Additions
to the Polaris-box Family

The Polaris-box 6 is proud to present its new siblings. R&M is expanding the range with the Polaris-boxes 16, 24 and 36. This will open up more possibilities to Fiber to the Home providers.

The new variants are continuing the recipe for success. They can be used for a number of functions and can be equipped individually with patch, splice and splitter configurations. With their innovative seals, Polaris-boxes fulfill the requirements of protection class IP65.

FTTH providers can create any typical topology in the access area with Polaris-boxes. They can be used in all kinds of premises from a single dwelling unit, such as a family home, to extensive building complexes or residential estates. Within a building, Polaris-boxes can be deployed for building entry points, risers, floor distributor and optical termination outlets.

FTTH: more and more cable

Network operators are now laying more and more fiber optic cables to residential areas and houses. The connectivity platforms need more space and greater packing density. This is why R&M is extending the Polaris range.

The new, deeper housings can accommodate more loose tubes, subscriber cables, as well as splice, splitter and patch modules. Multi-part seals make it easier to insert the cables. The splice and plug connectors are positioned on pivotable inlays.

The capacities of the three new Polaris-boxes:

- **Polaris-box 16**: Up to 24 splices. If required, 3 splitters with a split ratio of 1:8 or 2:8. In the upper part 16 or 24 adapters or 2 pre-terminated LGX splitter modules.
- **Polaris-box 24**: Fiber core for 12 TPU (Tray Position Units) for assemblies with splice or splitter trays. 144 splices when fully assembled with the 12-fiber 1TPU splice trays. The space is sufficient for 24 SC, E-2000™ or LC Duplex adapters or 48 LC plug connectors. Cable entries for 8 round cables or several drop cables.
- **Polaris-box 36**: Upper side of the fiber core with two chambers. Links up to 24 TPU, equipped with splice and/or splitter trays. 288 splices when fully assembled with the 12-fiber 1TPU splice tray. On the right, pigtail, drop and patch cord connections, up to 36 SC, E-2000™ or LC Duplex adapters or 72 LC. Cable entries for 12 round cables (diameter 16 mm) or 144 subscriber or drop cables.

The new boxes help FTTH providers to quickly bridge the last meters to the building. At the same time, they are securing themselves options for the future because they can condense the cabling further at a later date.

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