CONNECTIONS 57

Data Center Market Climbs to New Heights

Creative Future
for Architectural Masterpiece

Netscale 72 / Netscale 120:
More Selection
for Perfectionists

Recognizing and Capitalizing
on the Advantages
of Digitalization

R&M

Smart Connections
from the Edge to
the Hyperscaler

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Dear Business Partners,

Nowadays nobody has to spend much time explaining at length why future-oriented cabling is immensely important. We have now reached a point where more and more people are concerning themselves with the digitalization of their everyday routine. The quantities of data are growing rapidly – and with them the demands made of their transmission.

The data center industry is booming. Many technology giants with cloud services are planning new hyperscalers. At the same time, more and more edge solutions are required at the other end of the scale: mobile micro data centers on site. New technologies are waiting in the wings wherever you look. The network transmission rates are accelerating from 100 through 400 to 800 Gigabit/s. There is no escaping fiber optics. Find out more about it in the FOCUS article of this issue of our specialist magazine CONNECTIONS.

Everybody is talking about the expansion of the mobile phone network antenna system. The providers are going to have to extend their infrastructure cleverly, and in some areas even supplement it with small cell antennas, to cope with generation 5G. It is essential to find the right balance between investment and customer requirements. R&M is also developing new distributor systems for this purpose. These play an important role when towns become smart cities. We are collaborating on numerous projects of this kind all over the world.

In the building automation sector, «All-over-IP solutions» are now a promising alternative to field bus systems. The entire building technology communicates in a uniform manner over the local data network. From the operating system to the end devices, everything can be connected using an RJ45 interface. Moreover, the first devices featuring the transmission technology «Single Pair Ethernet» (SPE) are due to come to market from 2020. Network and connection technology will become even more affordable and thus a cost-efficient alternative. Read more about it in the TRENDS section.

Investment course proves its worth

R&M is continuing on its path of investment. Our most recent acquisitions are currently in the middle of the integration process. With the takeover of the Chinese company Durack Intelligent Electric Co. Ltd. in April of this year, we can now offer enclosures for modular data centers ourselves, primarily for the market in China. As a parallel development we are creating capacities to assemble these locally. The acquisition of Optimum Fiberoptics Inc. in Elkridge, Maryland, is also complementing our activities and giving us access to data center strongholds in Washington D.C. and Northern Virginia. And the fiber optic cables from the plant in the Czech Republic are achieving outstanding performance values with our connectors. The plant was integrated and modernized within just a few months of it being taken over last year.

Among other things we feel customer orientation is about involving key partners as early as the product development stage. This is how sought-after, market-capable solutions are developed. Thanks to global, networked development sites, we are capable of quickly reacting to every local requirement. The case study on our partner Instakom in the domestic market of Switzerland demonstrates this perfectly.

R&M has already launched a number of new, future-oriented products and systems on the market in 2019. Look forward to further innovations!

Sincerely,

Stefan Grätzer, CTO

Contents

Data Center Market
Climbs to New Heights

A horizon without borders. This is what the data center market is like today for network experts. Cloud, edge and colocation are reaching new heights year after year. Take a look at what's on the radar screen with R&M.

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The data center sector and its suppliers are without doubt facing a further high. More than a dozen digital megatrends are causing this upwind.

However, the machines are constantly running at full speed. Furthermore, expansion is necessary to be able to transport and save the quantities of data at an ever faster pace. The customers (the «passengers») expect first-class service. Their data and applications should always be available one-hundred percent in real time.

The situation is not too critical yet. But nevertheless, today data center operators have to control their investments and operating expenses as well as the market development more precisely than in the past. It's all about avoiding system failure. Besides, competition, digitalization, energy requirements and a lack of specialist personnel are forcing operators to react.

New technology is to make data centers faster, more agile, more economical and more secure. It would be perfect if they could be controlled by autopilot. The network sector in particular can help operate data centers more efficiently.

This is an initial, concentrated overview. But it is essential to take a closer look at exactly what is happening on the radar screen.

Numbers, data, trends

The market research company Arizton is forecasting annual growth of 4% for the international data center market. The European market is experiencing particularly strong annual growth of 6%, according to A.T. Kearney. And the same survey indicates that this will lead to 340,000 new jobs in Europe. Budgets are increasing by up to 50%. One reason: Due to data protection, among other things, two thirds of European managers surveyed would like to see more data centers on site and not offshore.

New, very promising country markets are the result. Examples: Data Economy is forecasting a potential of 7 billion $ for India's

Four trends are driving change in the data center market

Demand: Changing requirements

	Impact
Big data	High
Cloud	High
Digital products and services	Medium-High
Internet of Things	Medium
Social media	Medium
Industry 4.0	Medium
Wearables	Medium
Augmented	Medium

Low impact — Medium impact — High impact

New technologies

	Impact
Big data technology	High
Security technologies	Medium-High
In-memory storage	Medium-High
Virtualization technology	Medium-High
Internet of Things	Medium
Power-efficient cooling	Medium
«Rack on chip»	Medium

Low impact — Medium impact — High impact

Data Center 2020

Supply: Changing delivery models

		Today	2020
Cloud (14% to 39%)	Public	4 %	16 %
	Private	11 %	
Outsourced (37% to 36%)	Standard	19 %	23 %
	Customized	18 %	24 %
Internal (49% to 27%)	Standard	28 %	12 %
			18 %
	Customized	21 %	9 %

More budget for investment

Higher data center budgets

150 % budget compared to today	49 %
Same as today	44 %
Less than today	7 %

Willingness to pay

50 % more	20 %
20 % more	64 %
Not prepared to pay more	16 %

Source: A.T. Kearney

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Driving forces and upcoming changes on the international data center market.

data center market by 2023. According to Structure Research, the colocation market in the Asia-Pacific region is growing 39.2 % every year. Russia is intending to invest around 7.4 billion $ by 2024 in the setup of a national cloud platform. A whole range of data centers are being built in Africa and South America.

The amount of data worldwide in 2025 will be ten times the amount recorded in 2016, according to IDC and Seagate. Market observers from IHS expect that around 125 billion devices will constantly be generating data in the Internet of Things (IoT) in 2030.

Digital megatrends are causing upwind for data centers

- Video streaming, gaming, social media
- Big data, blockchain, cloud, software services
- Artificial intelligence, machine learning
- 5G services, real-time applications
- Internet of Things (IoT), digitalized industry
- Online trade, advertising, media
- Smart cities, smart buildings
- Data security

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One of today's largest and architecturally most outstanding cloud computing data centers is near Hohhot in Inner Mongolia. It is operated by telecommunications company China Mobile.
Graph: WZMH Architects

Focus

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The big and the small

Let's take a look at the individual categories. At the top, the radar screen shows the hyperscale data centers – the jumbo jets in the cloud so to speak. Further categories: colocation, edge, enterprise and micro data centers. And then there are the systems of the major network operators: telecom data centers, carrier hotels, exchange points.

By 2023, the hyperscale market will reach a volume of almost 360 billion $ according to Research and Markets. The growth rate is 26 %. In 2018, Synergy Research recorded worldwide 430 hyperscale data centers (or HDC for short), 40 % of which are in the US,

8 % in China, 6 % in Japan. And a further 132 were in the planning stages.

The HDCs belong to a few companies: Alibaba, Amazon, Baidu, Facebook, Google, Microsoft, Tencent etc. The revenue from their systems is growing 20 % annually. In 2018, the operators invested 120 billion $ in HDC projects – an increase of 45 %.

The sector of colocation data centers (or colo for short) is characterized by diverse operating models. BCC Research says that this fragmented market sees an annual expansion of 15.4 %. It is likely to reach a volume of 54.8 billion $ in 2020. The demand is booming

because companies recognize the benefits of outsourcing and can thus concentrate on their core business.

Opportunities at the edge

Edge data centers have a great future (see FOCUS article in CONNECTIONS No. 56 published April 2019). The reason is that in the future large quantities of data are going to have to be made available, temporarily stored, analyzed and processed at the edge of the cloud.

According to Alliedmarketresearch, the edge market will grow by 32.8 % a year up until 2025, then reaching a volume of 16.6 billion $. Edge providers are expecting an average increase of edge computing sites of 226 % by 2025 according to a survey by Vertiv.

Growth in the cloud / Expenses of IT service providers

Source: LightCounting, Forbes

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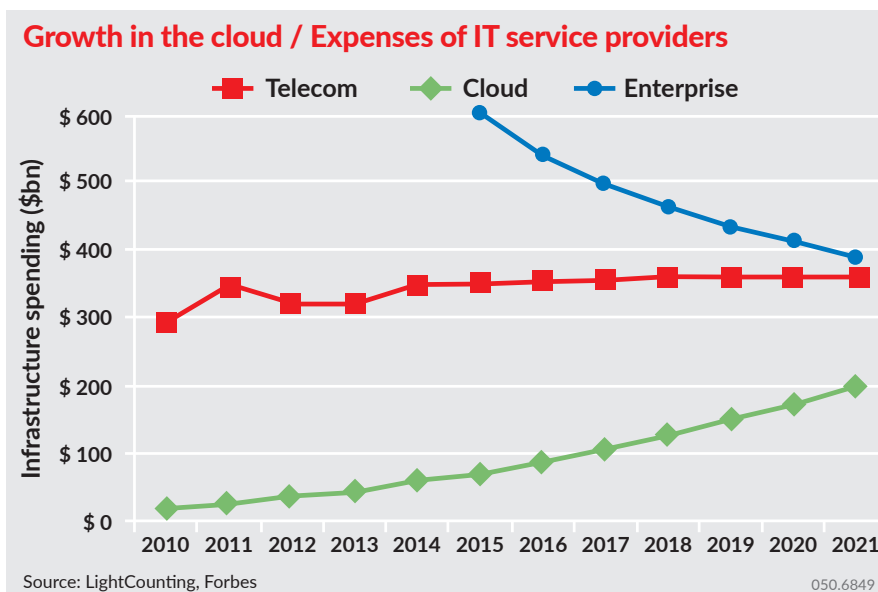
Long-term comparison of infrastructure investments. Enterprise data centers are experiencing a slump. Service providers are investing more and more in cloud data centers every year.
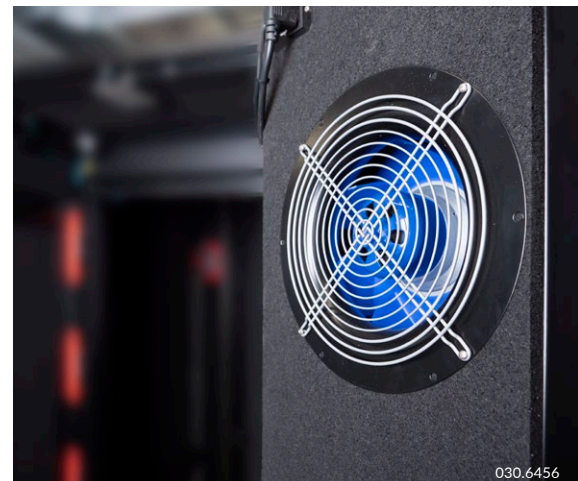
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«The quantities of data are growing faster than their transmission possibilities.»

Mark Bregman, NetApp

Wide range of demands

The demands of data centers today have to be considered from a number of perspectives:
– They need more space. At the same time, they require high density infrastructures to be able to efficiently use the precious white space.
– They need total security because data thieves are here to stay.
– They have to ensure automation because people alone cannot manage the quantities of devices, cables and ports.

And naturally, expectations of data center cabling are increasing too. Bandwidths of 40 and 100 Gbit/s are a must.

The mobile micro data center market is growing by 26.1 % every year. Markets and Markets estimates a global business volume of 8.47 billion $. They are often implemented as container data centers. They can be used flexibly anywhere where computing power is needed quickly.

Operating them loses out to efficient cloud and colo offers especially as their control and security tasks, investment, operating and personnel costs are greater. Redundant high-speed connections to cloud, WAN and Internet service providers are often lacking.

Out of the building

The category of enterprise or on-premises data centers, which companies and authorities run themselves on their own premises, is experiencing something of a slump. Market observers at Gartner believe that by 2025 around 80 % of conventional enterprise data centers will land on the scrap heap.

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Categories

Hyperscale
Scalable systems from a magnitude of around 5,000 servers, 500 cabinets, 100 Gigabit Ethernet, high fiber count cabling, thousands of square meters of white space. Tasks: Centers for big data and cloud computing, separate hardware and software services, storage, provision of platforms for blockchain, digital media, virtualization and artificial intelligence, use of operators' own systems and technologies.

Colocation
Colocation is the generic term for multi-tenant, wholesale, retail, shared hosting and similar business models. The providers offer rooms, infrastructures, connectivity, platforms, equipment, management as well as cloud, IT and software services for leasing, purchase or rental. They can provide every conceivable solution, application and dimension. The spectrum ranges from the empty shell through fully equipped cabinets to flexible services. Colo customers can operate and control the dedicated infrastructures on their own responsibility.

Enterprise
Classic corporate data centers in various sizes. The operators finance, plan, build and operate them on their own responsibility. The systems are usually to be found on their own campus. Tasks: Provision of IT equipment, platforms, software, storage etc. for internal use, in some cases also cloud services. Sizes: from an individual cabinet or server to several hundred servers.

Edge
The category starts with the high density system or rack format or remotely controlled containers and extends to the size of an enterprise data center. Most important task: Providing computing performance at the periphery of the cloud and the wide area networks as close as possible to the point of action and taking pressure off the networks. They stand where lots of extensive cloud data is required in real time or has to be buffered (e.g. for streaming). Where quantities of fresh data (e.g. IoT) occur and have to be aggregated, analyzed or processed on site in real time.
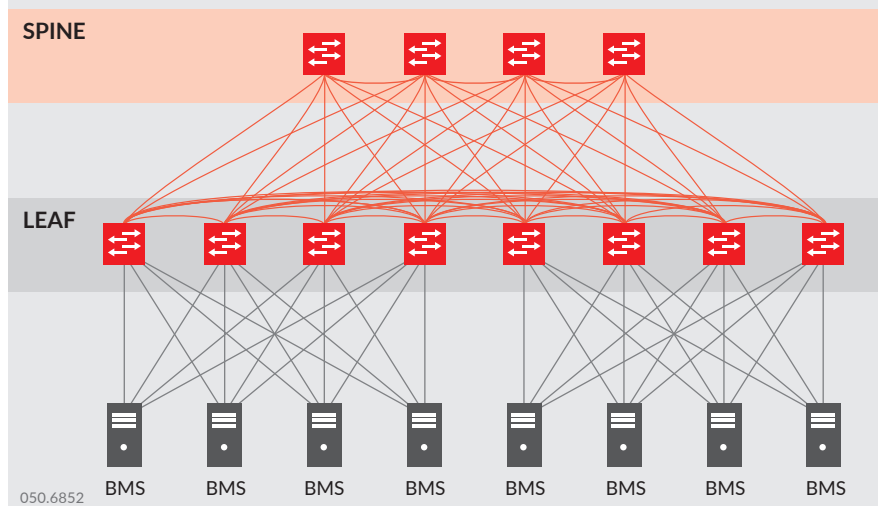
Focus

Vision: the jumbo data center in the north of Norway. Planned area: approx. 0.6 million square meters. It will be the fifth largest data center in the world and will be operated entirely with renewable energy.
Graph: HDR Architects

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Leaf spine reduces latency

SPINE

LEAF

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BMS BMS BMS BMS BMS BMS BMS BMS

The network architecture of large data centers is changing. Leaf spine is the name of the new concept of meshed infrastructure. It reduces latency. Graphic: R&M

40G/100G/400G market evolution

Switch port forecast

Volume

40G

100G

400G

2016   2017   2018   2019   2020   2021

400G port connections contain 8x50G and 4x100G implementations
Source: Dell'Oro

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Ever faster. 400 Gbit/s (400G) is now moving into the data center world. The graphic shows the forecast for sales of faster switches or switch ports. That includes breakout cabling with 8x50G and 4x100G.
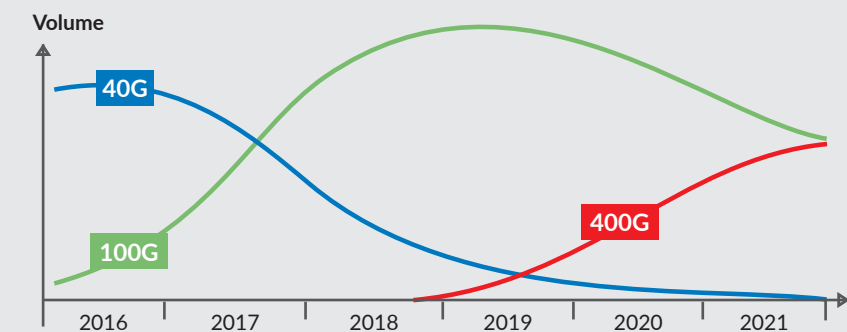
The hyperscale data centers are now flying on 200 and 400 Gbit/s. Peeping over the horizon are FO solutions for 800 Gbit/s and 1.6 Tbit/s. Optical fiber is the only solution for connectivity – depending on the requirement and architecture, as singlemode or multimode fiber.

New traffic routes

In mega data centers, more data is passing to and fro than in and out. The traditional hierarchical network topology with core, aggregation and access level simply cannot cope. The data congests on its traffic routes. Meshed leaf spine architectures reduce the latency. A network mesh with crisscrossing cabling now guarantees that the switches at access level are no longer more than a hop away from each other.

Potential of optical fibers

At the transport level, the number of fibers is on the increase. For 40 and 100 Gbit/s, data centers require eight fibers in parallel pairs. Higher speeds require 16 or 32 fiber pairs. Cabling density must therefore be increased. Precision is more crucial than ever before with fiber optics. For example, the current Pulse Amplitude Modulation 4 (PAM4) requires the best possible noise suppression. Wavelength division multiplexing (WDM) requires extremely precise signal transmission and particularly suitable cable types. Wavelength division multiplexing technology requires energy for lasers and cooling.

Passive parallel optics on the other hand relies on the scalability and compression of the infrastructure. It utilizes the racks better, saves space, does not need energy. On the basis of parallel optics, data centers can quickly migrate to the next level of data transmission. Effectively all that has to be done is plug them in and unplug them.

Expertise required

Conclusion: The data center market is currently offering cabling specialists a range of opportunities to share in this boom. Experts should be willing to work in close collaboration with flexible providers and expect to have to make fast decisions re investments. More than ever before, the market is expecting a sound qualification, particularly in the area of fiber optics. Experts should be extremely well versed in topics such as cloud and edge computing.

R&M supports operators, managers and technicians in data centers as well as planners, project managers and installers with product development and decades of experience. Whether in planning and product select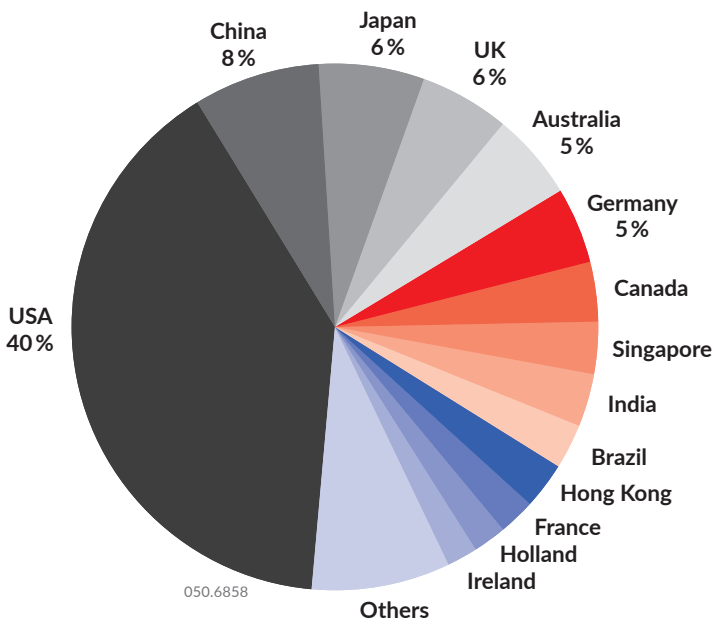ion, the provision of complete cabling solutions, the logistics or even in formal acceptance and maintenance tasks. Innovations for cabling such as Netscale and QuickRelease by R&M help save costs, space and time.

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R&M solutions for efficient data centers

– High density: The FO patch panel Netscale can accommodate up to 120 ports per unit in a 19" rack. That is the world's highest packing density in this segment.
– Free migration: Netscale 72 paves the way to free migration. The platform supports both BASE8 and BASE12 cabling.
– Automation: With R&M TAP modules, port monitoring cables and the infrastructure management system R&M*inteliPhy*, data centers monitor every network connection centrally, remotely, end-to-end, automatically and in real time.

Recommendations

– Plan the data center cabling holistically, extremely precisely and with a view to future upgrades.
– Network technology must be able to quickly adapt to new requirements: more capacity, higher bandwidths etc.
– Take top requirements into consideration: high density, latency, redundancy, automation, simple maintenance.
– Pre-terminated, modular systems can be implemented quickly and logically without any errors or complications.
– Guaranteed operational reliability is a necessity for network technology. Data centers must not fail.
– Automated cabling monitoring must be an integral part of it. No fiber should be left unmonitored.

Hyperscale data center operators

Data center sites by country - December 2018

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- China 8%
- Japan 6%
- UK 6%
- Australia 5%
- Germany 5%
- Canada
- Singapore
- India
- Brazil
- Hong Kong
- France
- Holland
- Ireland
- Others
- USA 40%

Market share of hyperscale data center operators by country.
Source: Synergy Research, Cisco Global Cloud Index

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Networked Hospital
on Lake Geneva

HÔPITAL RIVIERA CHABLAIS

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Patients going to hospital on the Swiss Riviera will experience a leap in time. The new Hôpital Riviera-Chablais in Rennaz offers digitally-aided patient care. The quality of care from person to person and of the atmosphere within the hospital has also reached a new level.

Looking out of their rooms, patients see green, noise-protected courtyards. The four-part building has a lightweight look about it and lets in a lot of light. The backdrop: the Alps of the cantons of Vaud and Valais. Outside the attractions include a sequoia, the Chablais wine region and the eastern shore of Lake Geneva – the Swiss Riviera – with the festival town of Montreux.

This is how patients experience the new Hôpital Riviera-Chablais in Rennaz. The joint project of the cantons of Vaud and Valais is opening its doors in the fall of 2019 after a
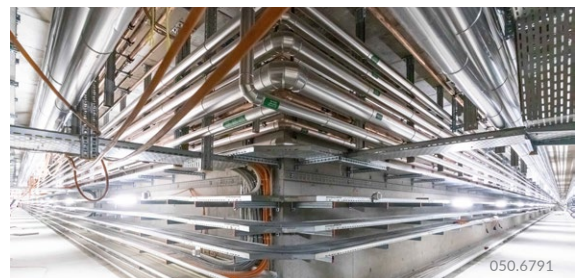
construction period of three years. And with it the region is taking primary healthcare to a whole new level for 180,000 people. The hospital has 360 beds and ten operating rooms.

But this new start has a lot more to offer than what you would normally expect of an acute-care clinic. The patients' rooms have a comfortable, hotel-like ambience. Most of these are single-bed rooms with a bathroom. This ensures privacy and keeps the risk of infection to a minimum.

Patients have the entire world of communication at their disposal with terminals from Ascom. Every room features this ultra-convenient digital interface.

Helpful patient management
With the aim of avoiding waiting times and bottlenecks, the hospital has taken a new slant on admissions and simplified the whole setup in a revolutionary way. A central reception makes life easier for everyone involved. The people there have an overview, provide information, take care of data and help people get to where they need to be going. A committed team is available to customers every day from 6.45 am to 10 pm.

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From left to right: Walter Kurzen, R&M Switzerland; Raphaël Petit-Jean, responsible for planning at Bouygues Schweiz AG; Marion Adijman, intern in supervision of works at Steiner AG; Philippe Vuagniaux, infrastructure project lead at FHVI (Fédération des Hôpitaux Vaudois Informatique)

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An online portal has been created for all services concerning inquiries, admissions, patients' stay in hospital and their recovery. It is based on the latest digital technologies and has a multifunctional purpose. For example, it is the center of all communica-

HÔPITAL RIVIERA-CHABLAIS
VAUD-VALAIS

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Samuel Maillardet, site supervisor, responsible for electrical engineering, Steiner AG

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Alexia Tournier, site supervisor, Steiner AG

tion on the entire medical process. All the hospital's applications run on the Internet protocol (All over IP).

The aim of the portal is to bring patients as close as possible to the hospital. They can be taken up in the care system immediately and digitally in a convenient way. The online portal makes it possible to schedule appointments, manage data, contact doctors and the management, and much more. The hospital refers to it as a «privileged communications channel» for the time before, during and after medical care.

The human touch plus All over IP
The idea of being close to the patients plays a major role. The technology is to be used for the good of the patients and not to the detriment of the personal touch in hospital care.

The Hôpital Riviera-Chablais emphasizes the human and caring side in all things. One example: Two qualified mediators are available for dialogue between patients, relatives and internal hospital specialists. A mediating room is available for the immediate discussion and resolution of conflicts.

The name of the game in the ten operating rooms is also: All over IP. Numerous connections in the walls make it possible to access the network. Medical devices work on the basis of digital technology. The staff use a multimedia system with touchscreens on the walls to operate all applications as well as room technology.

A state-of-the-art data network is the basis of digitalization. The hospital has to be able to fulfill the highest technical requirements. This is why the only solution was to implement a correspondingly high-grade and secure infrastructure. Two redundant data centers host the large quantities of data. They control

20 computer rooms which make the local network nodes accessible via 65 cabinets.

Completely reliable
After a complex evaluation of possible suppliers, the general contractor Steiner AG decided to work with R&M. Samuel Maillardet from Steiner AG says: «Various suppliers were evaluated for the network area. R&M was chosen because of its good reputation. Our installation partner Bouygues had recommended the company.»

Raphaël Petit-Jean, chief planner at Bouygues, says: «With such a large project, I need partners that I can rely on one hundred percent. I have come to know R&M as exactly that kind of partner and thus would not hesitate to recommend the company to others.» Due to the magnitude of the project, the planner was faced with immense coordination tasks. «If even the smallest of problems recurs, that can soon turn into a large problem,» says Raphaël Petit-Jean.

Constant support on site
Construction work started in the spring of 2015. Installation was carried out between the middle of 2017 and the end of 2018, taking longer than initially planned. Delays in project planning, changes to the architecture of the FO network and the special design of the data centers had to be taken into consideration.

Those involved in the project confirm: R&M provided the best possible support throughout the entire installation. The R&M experts were always on site when decisions were to be made concerning unexpected challenges. Delivery took place in sections. This ensured an optimal use of the installation capacities. The goods did not have to be stored on site in the dusty environment of the new construction.

Samuel Maillardet is satisfied: «All work was simply outstanding. We now have a perfectly installed, future-proof communication network.» Project lead Alexia Tournier concludes: «I would particularly like to thank R&M for their fast reaction to our needs as well as for the high quality of delivery.»

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The R&M solution

R&M delivered the entire infrastructure for the fiber optic and copper network. This includes:
– Cabinets
– Outlets
– RJ45 connection modules of the type Cat. 6_A EL
– OM3 FO cable
– 700 km copper cable
– Power distributors (PDU)
– Cable termination (CT)

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Walter Kurzen | R&M Switzerland
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«All work was simply outstanding. We now have a perfectly installed, future-proof communication network.»

Samuel Maillardet, site supervisor, responsible for electrical engineering, Steiner AG

Netscale 72:
More Selection for Perfectionists

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Another change of generation in the network. There's no stopping Ethernet.
100 Gigabit/s Ethernet is following on from 10 and 40. Are data centers going to have
to change their fiber optic distribution platforms again? Not with Netscale 72.

The new member to the Netscale family simplifies migration in a number of ways. First of all, Netscale 72 supports both cabling philosophies: BASE8 (3x4 ports) and BASE12 (2x6 ports). The corresponding modules both fit in the same housing. This means data centers can use Netscale 72 cross-generationally and independently of the applications. It offers RFID-based automated port documentation and the visual management of work orders. A far-sighted investment.

Full capacity usage
Netscale presents the highest port density in the industry. The new member of the family provides 72 ports in one height unit. The distribution area can be used optimally and in fact longer with successive compression.

No fiber stays dark. Data centers can utilize all trunk cables completely in every Ethernet generation. This is how to build massive spine-leaf architectures efficiently at no great expense.

The drawers can be opened half way and equipped. The split-tray design makes it possible. Technicians can work on individual links and divide their project into manageable steps. The divided drawer minimizes the risk of having to unplug individual connections during installation and damaging fibers in the process.

Large selection
The modular design of the Netscale trays is used to be able to retrofit the cabling at any time and adapt it to new business requirements. The plug & play procedure is used to migrate LC connections for 10 to MPO connections for 40 and 100 Gigabit/s Ethernet.

Netscale 72 frees data centers of the worry of cabling. Users can freely select the cable type and number of fibers. R&M provides all typical connection solutions: MPO and LC trays, MPO and LC splice trays, MPO-to-LC modules. Multifiber loose tubes, micro ducts, mini-core and ribbon cables can be attached to the splice trays.

Naturally the sensors of the infrastructure management system R&M*inteliPhy* fit on the trays. Data centers use these to monitor every port centrally, automatically and in real time. R&M*inteliPhy* supports documentation and planning. It helps technicians with patching.

R&M has developed TAP modules for the high density distribution platform Netscale 120. The high density Traffic Access Points facilitate the monitoring of the FO networks for example in edge and tele-com data centers.

Netscale 120:
now with TAP

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The new monitoring instrument can be completely integrated in the structured MPO and LC Duplex cabling. The TAP modules are situated like standard distribution trays directly in the Netscale housing and do not take up any space in the rack. Trays and ports can be integrated, exchanged as well as patched on the front and back in a flash during operation.

High density

Netscale 120 TAP modules work with passive splitters. They monitor the incoming and outgoing data streams in parallel in real time without influencing network performance. There is no need for additional switch port analyzers. The splitters are fixed in the TAP trays. When fully assembled, Netscale 120 TAP modules monitor up to 240 LC ports on three height units – currently the best you can ask for in density in monitoring.

The configuration possibilities range from three to twelve tapped (monitored) LC Duplex ports on the front. When fully assembled, there are four MPO adapters on the back for trunk cabling, two of which are tapped. The split ratio between the tapped and the live spatial stream is 30:70. The R&M range also includes a variant for Cisco BiDi operation. It has a split ratio of 50:50 and three monitored ports.

Complete control

With the help of the TAP modules, those responsible for networks gain complete control over the operation of the fiber optic infrastructures. They gain insight into the performance, workloads and availability of the networks. It is easier for them to prove, both within the company and to customers, that they adhere to the agreed service quality and that company-critical applications can run smoothly.

Traffic Access Points

A Traffic Access Point consists of a passive FO splitter. In a fully bi-directional network, it takes an identical copy of the optical signals from the fiber without causing additional latency or packet loss. One of the two data streams flows on with the data traffic; the other is used for tapping. Using the tapped data traffic, measuring equipment can illustrate data on failure, performance and use in real time.

TAPs support data protection and network security. The splitter technology prevents any hacking attacks from outside. Only authorized people get anywhere near the TAP modules. The spatial streams can be monitored in compliance with data protection regulations.

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Netscale 120 TAP modules from R&M help those responsible for networks to monitor the performance of FO infrastructures in entirety in real time.

R&M recommends installing TAP modules proactively and initially using them as a standard module for structured cabling. Assembling in new property is less expensive than installing at a later date which in some cases could cause critical failures. If necessary, the monitoring equipment can be inserted into the tapped ports during operation.

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Advantage for All-over-IP

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Which technology offers the best and most sustainable options for building automation? Investors, building owners, planners and system integrators ask themselves this question on a daily basis. Some significant criteria would suggest that the continuous use of the Internet Protocol will also blaze a trail in this sector.

R&M is convinced that, unlike field bus systems available to date, All-over-IP opens up better possibilities of development for buildings. All-over-IP will unfurl its advantages particularly in large, extensive functional buildings and factories.

All-over-IP means: All devices involved in building technology and building management communicate in the same way, without barriers, over Ethernet/Internet Protocol (Ethernet/IP), over the local data network (LAN), over Internet and cloud. Power over Ethernet (PoE) takes care of the power supply problem. It reliably and efficiently powers end devices using the data cable.

The strengths

Investment: Devices and systems which work with Ethernet/IP technology are favorably priced. Competition, uncomplicated standards and mass production reduce the manufacturing costs. Open standards and license-free software which is free of charge simplify the engineering of All-over-IP solutions.

Connectivity: IP devices and networks speak the same language «end to end». They do not need any «translation» between the server, operating systems (e.g. with gateways), cable and end device. They are easy to connect to each other with a standardized RJ45 interface. This simplifies installation, commissioning and maintenance.

Performance: Ethernet/IP transmits large quantities of data faster than field bus systems. This makes it possible to collect and distribute data from the entire network. The availability of a fast data connection allows new applications to be used.

Scalability: Buildings can be connected and controlled digitally throughout. The current Internet Protocol Version 6 (IPv6) can theoretically allocate 1,500 IP addresses per square meter. In the practical implementation, there is no limit to the number of devices which can be addressed.
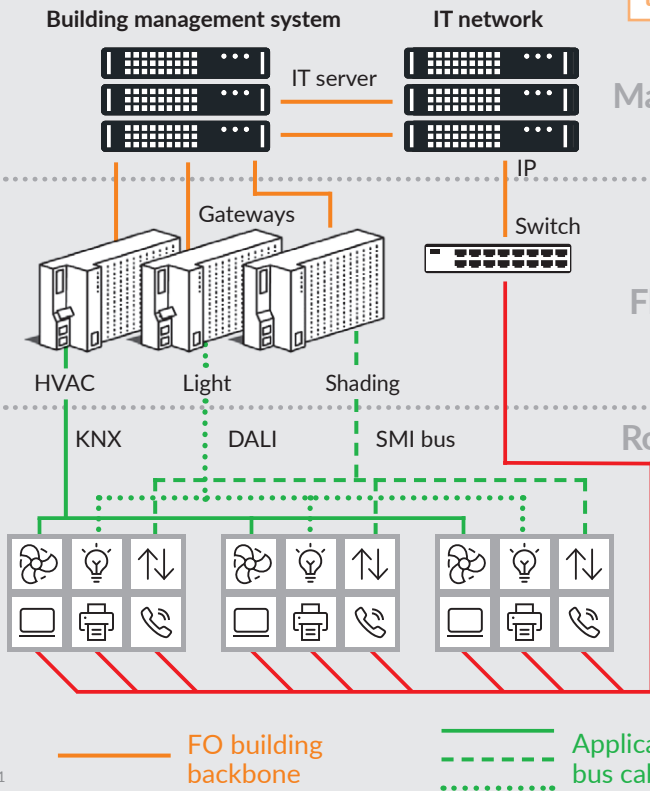
Security: The star-shaped topology reduces the number of connection points and gives IP networks more operational reliability. The access controls and authentication measures incorporated in the IP improve the security of building automation.

Add-ons: Thanks to the total availability of data from different components, new applications and technical solutions can be developed. An administrator can integrate these with the click of a mouse.

Future-proof: IEEE is already working on the next generation of transmission technology with the new Single Pair Ethernet (SPE). SPE will reduce the costs of connectivity even further and decrease the size too.
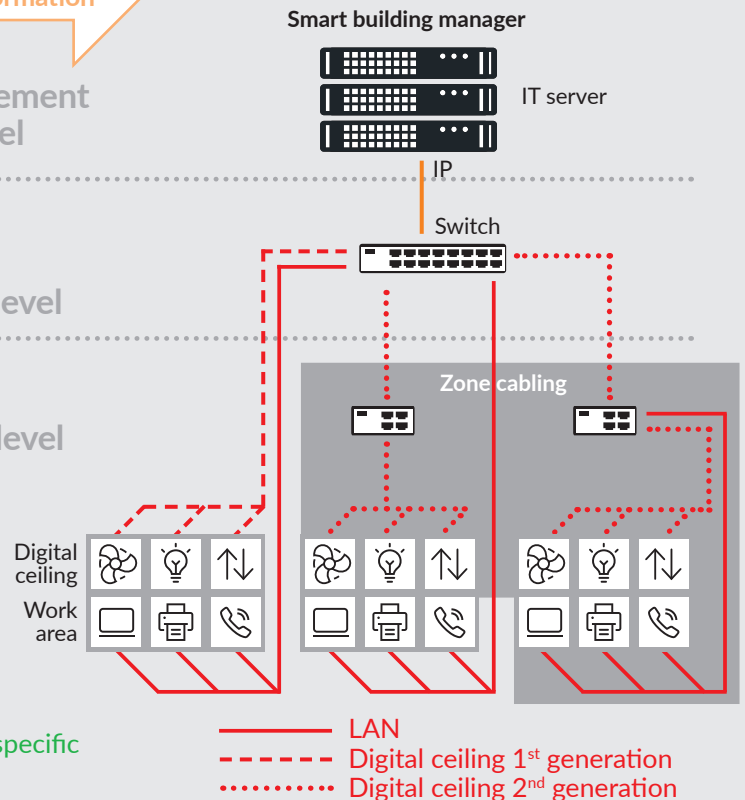
Building automation concepts

Today: Application-specific bus systems

Building management system

IT network

IT server

IP

Digital
transformation

Gateways

Switch

HVAC   Light   Shading

KNX   DALI   SMI bus

Future: Consolidated «All-IP» system

Smart building manager

IT server

IP

Switch

Zone cabling

Digital
ceiling

Work
area

————— **FO building
backbone**

– – – – – **Application-specific
bus cabling**
· · · · · ·

————— **LAN**

– – – – – **Digital ceiling 1st generation**

· · · · · · **Digital ceiling 2nd generation**

050.6861
Graph: R&M

It is not, however, supposed to replace the existing solutions but build on and extend them. SPE will be perfect for connecting a large number of small sensors and actuators.
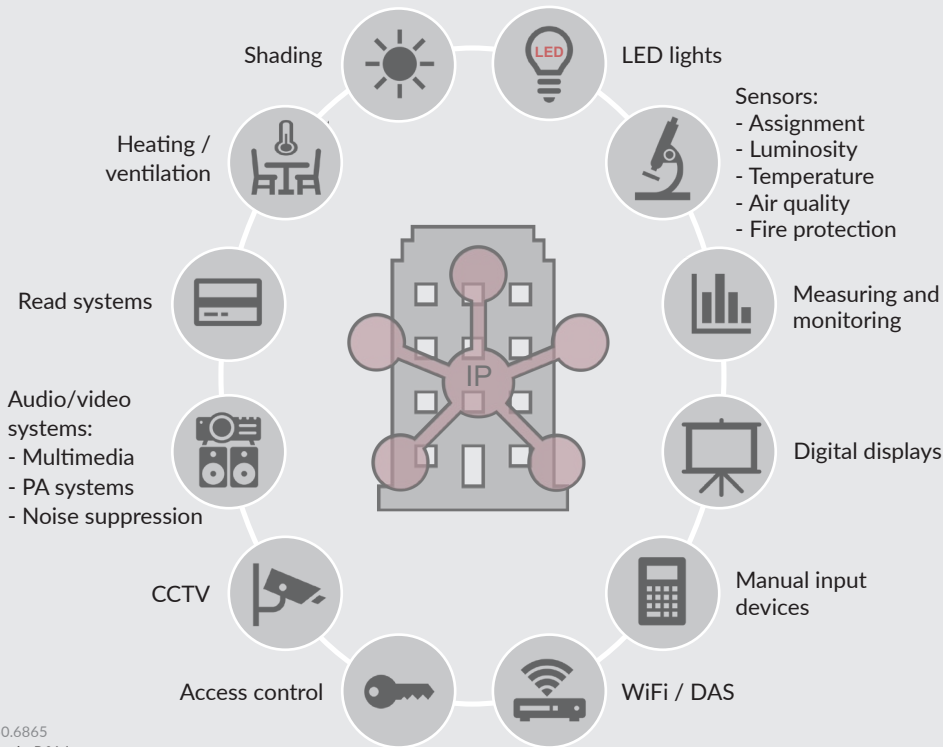
The vision

With All-over-IP solutions, the realization of smart buildings will become less expensive. They will thus become more flexible and will be implemented more frequently. This means

we are coming closer and closer to the vision of an ecological, economical, convenient and secure building. In the longer term, building automation will become an integral part of the Internet of Things (IoT).

## Digital Building ecosystem
Possible applications (compiled)

Shading

LED lights

Heating /
ventilation

Sensors:
- Assignment
- Luminosity
- Temperature
- Air quality
- Fire protection

Read systems

IP

Measuring and
monitoring

Audio/video
systems:
- Multimedia
- PA systems
- Noise suppression

Digital displays

CCTV

Manual input
devices

Access control

WiFi / DAS

050.6865
Graph: R&M

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High Density in an Angled Form
Angled Panel with 48 Ports
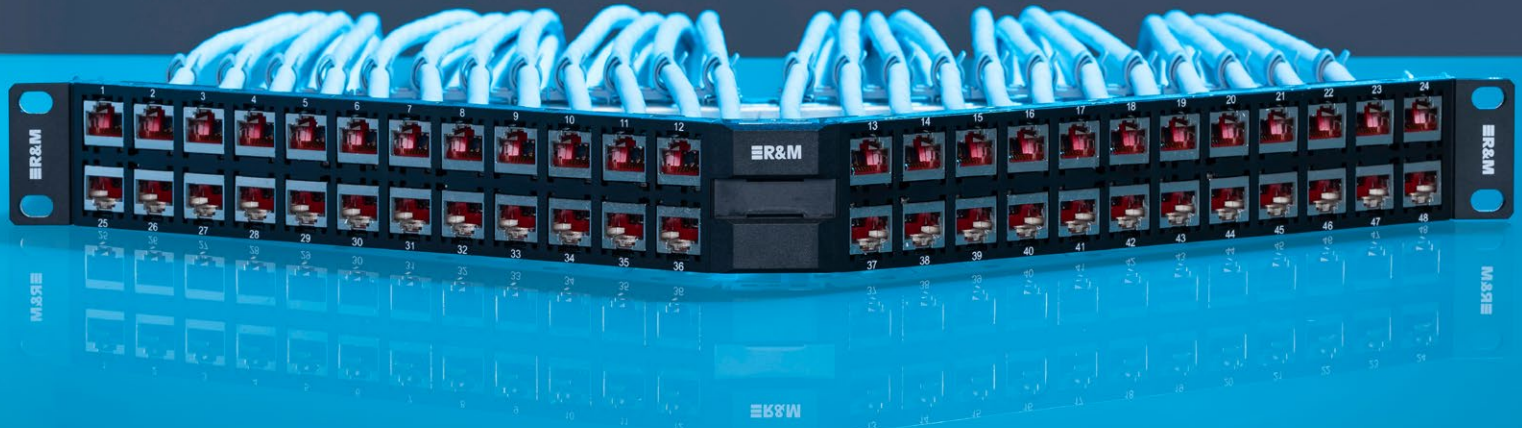
050.6804

Angled patch panels can simplify cable management on the front of the rack considerably. And that is also true in the case of maximum port density – something demonstrated by the new 48 port HD ELISO patch panel from R&M.

R&M is extending the ELISO family with an angled patch panel for data center and office networks. It can be equipped with 48 connection modules – shielded and unshielded Cat. 6_A EL and Cat. 6_A ISO «special» modules.

Modules of this type independently lock into the module holders of the ELISO patch panel. All installers have to do is push the modules into place as there is no need for additional mechanical aids.

030.6672

Flat angle
The angular shape simplifies horizontal cable management on the front of the rack and shortens the path to the lateral cable guide. The 48 port model has a flatter angle than comparable patch panels in the R&M range. The overhang is now just 100 millimeters. This means the patch panels require less storage space in the rack.

The tried and tested cable guides of the straight ELISO patch panels are also used here. R&M now offers cable guides which are closer together and have been optimized for this patch panel so that the outer cables can be routed without any kinks.

Green light for R&M*inteliPhy*
Contrasting port number colors support technicians in their work as these make it possible to identify the links from the outset. The angled patch panels also support digitized infrastructure management with R&M*inteliPhy*. The relevant sensors can be installed at a later date.

The 48 port HD ELISO patch panels come in either black or gray. They consist of a steel construction with plastic inserts. An optional, upper sheet steel cover can be used anywhere and needs just a single screw to be fixed.

The integrated cable tie shelf supports orderly cable assembly and guarantees stable strain relief. R&M has fitted additional cable tie hooks on each side of the cable deposit. These help installers fix cables at a flat angle. This prevents output losses which can be caused by narrow radii, kinks and cable movements.
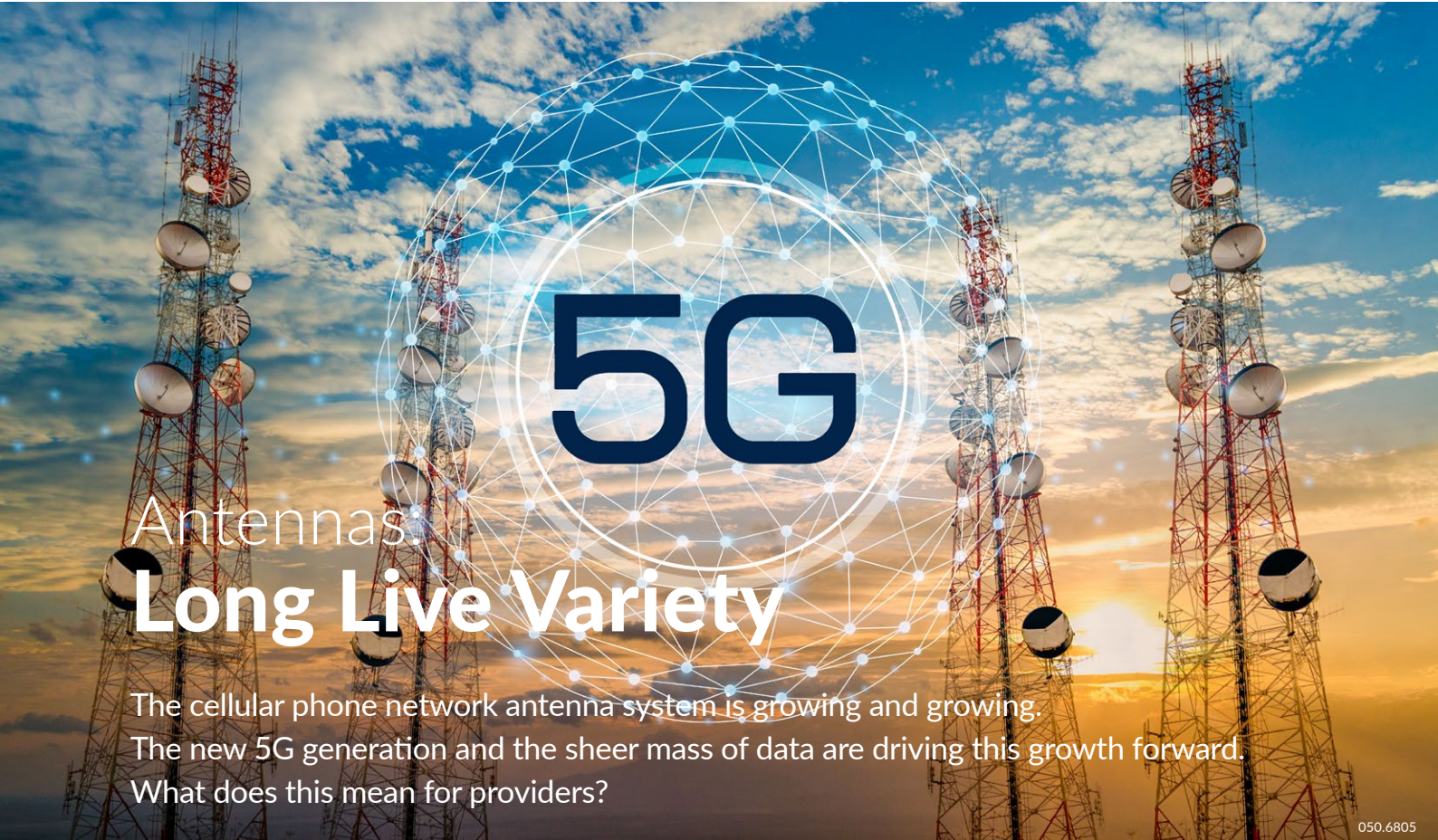
090.7783

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5G

Antennas: Long Live Variety

The cellular phone network antenna system is growing and growing.
The new 5G generation and the sheer mass of data are driving this growth forward.
What does this mean for providers?

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Full provision with high frequency mobile data traffic requires a dense antenna network. Base stations and large antennas continue to form the network for macro cells. Simultaneously a denser structure of what are referred to as small cells is growing underneath this network.

Providers will have to increase the number of large antennas fivefold for 5G services. The range of macro cells is around two kilometers, depending on the frequency used. The antennas send and receive – depending on the regulations in a particular country – with frequencies of 3.4 to 3.8 GHz, as well as at times 2 GHz. The transmission rate is around 1.5 Gbit/s, in the lab around 4.5 Gbit/s.
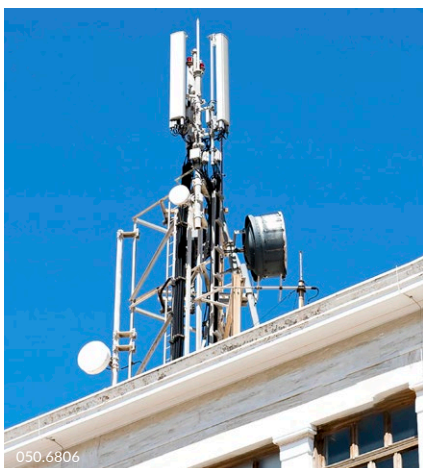
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In the planning and setup of macro cells, providers see themselves confronted with a range of challenges. They have to ensure sufficient capacities. Investments and operating expenses must not be allowed to get out of hand. They have to agree with competitors and at times authorities on the density of antennas, levels of radiation and the common use of particular sites. The question of national roaming has to be clarified. There has to be a guarantee that customers are transferred interruption-free from one cell to the next. Macro cells also have to be integrated in FO networks. This is the only way the data volume can be moved virtually in real time between mobile devices and online services.

Small cells for short distances

But even that will not be enough for short distances. This is why providers are additionally setting up small cells in cities, buildings, campus and industrial facilities. Small, diversely constructed antennas extend the capacities and range of possible applications of mobile broadband services. Ideal locations: lamp posts, bus stops, above-ground street cabinets, billboards, digital signage and LED systems, mini base stations etc.

In a radius of 10 to 200 meters, small cell antennas can transmit at 24 to 80 GHz. The World Radio Communication Conference in the fall of 2019 is due to specify the frequency range. On the one hand, condensation, walls, machines and interference attenuate the high frequency signals. On the other, special antennas can transmit down to the cellar.

Advantages

Small cell antennas have several advantages for providers and their local partners:
– They require very little energy. In buildings, some can be powered with Power over Ethernet (PoE).
– They can be combined with local data networks (LAN) and WLAN.
– They fill dead zones in and between macro cells and extend their capacities.
– They support new applications hungry for broadband: virtual and augmented reality, Internet of Things, autonomous driving, smart buildings, robot factories etc.
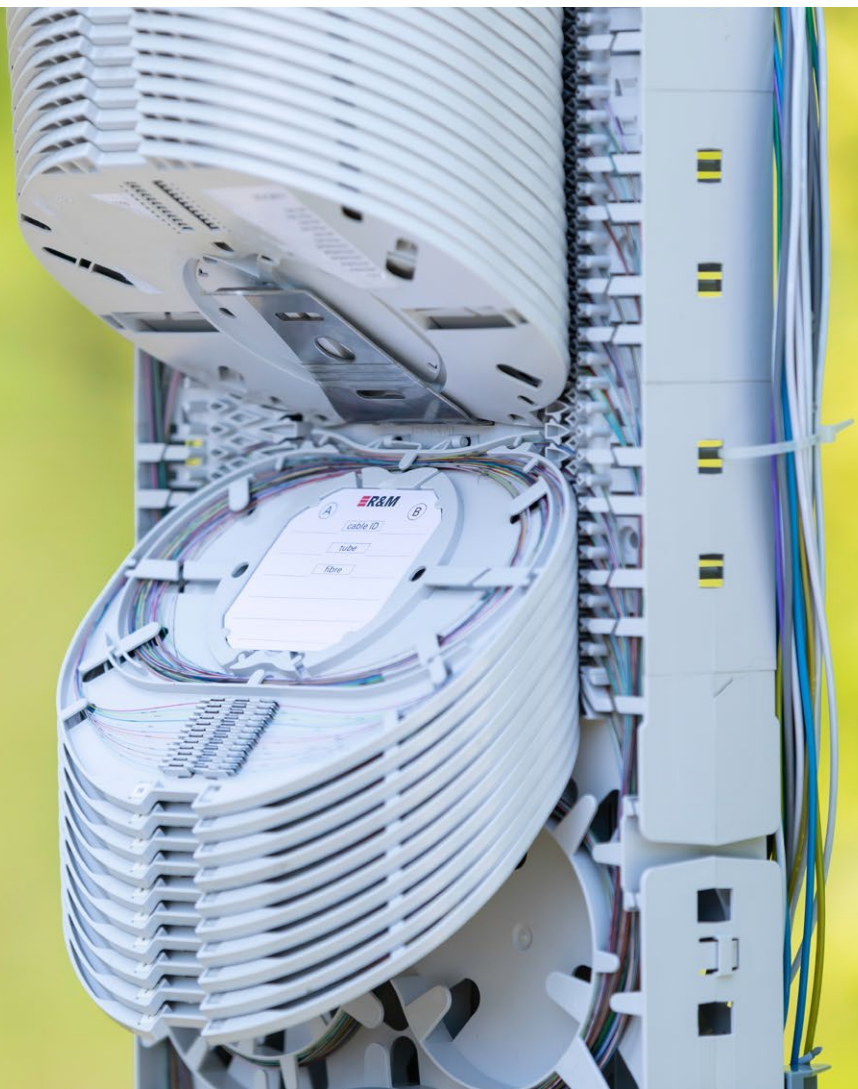
050.6544

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Success

Exemplary
Cooperation

«We are looking for a special multimedia outlet. Can R&M send someone round to help us?» This question from Instakom CEO Roman Frank eleven years ago saw the start of an exemplary, sustainable cooperation. And all R&M customers on the FTTH market are benefiting from this today.
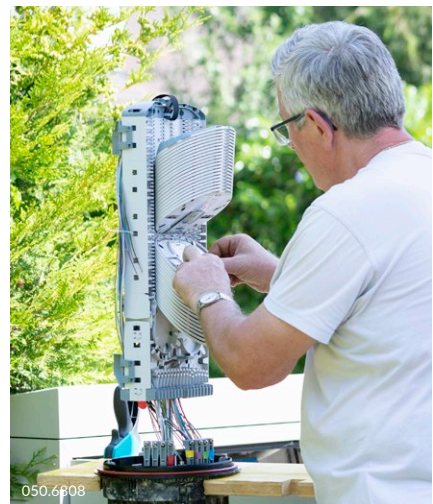
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The suitable multimedia outlet was quickly found. Shortly afterward, R&M launched the first new Optical Distribution Frame (ODF) on the market. The distribution frame for FO networks also caught the eye of the planning and installation experts from Instakom. From these very first meetings, Instakom and R&M have successfully worked together on a trusting basis on lots of FO projects.

Powerful presence with the ODF

Instakom immediately scored with numerous customers with the ODF from R&M. But the resources of the ODF were over the top for some projects. By default, R&M provides patch inserts with 24 ports for the splitters

in the ODF. But Instakom also needs mini splitters with one to two ports. A suitable solution was quickly developed and realized.

The modified patch inserts take up less space than the standard type and are attractive in terms of price. The Instakom technicians can put them together themselves. «And what's more, this efficient solution simplifies the work of our network planners,» says a happy Felix Neukom, Head of FO at Instakom.

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R&M fulfills special wishes

«Nowadays things always have to be faster. We are permanently under considerable pressure in terms of time, price and competition,» says Felix Neukom. And R&M is the ideal partner in this situation. «I feel happy and well looked after with R&M. All I need to do is call and I get specific help and advice. The cooperation is efficient, fast, flexible and service-oriented. R&M knows what the customer needs and can put this into place

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050.6810

«R&M products are stable, user-friendly and of premium quality. The price/performance ratio is right and the service is all-embracing.»

Felix Neukom, Head of FO, Instakom AG

050.6811

immediately.» The support in customer-specific requirements is also seen as a major success factor of the collaboration.

Instakom as a pilot user

Over the course of time, the collaboration was intensified to such an extent that Instakom took on the role of a pilot user. The long-term partner is always one of the first to test R&M products for FO networks. Feedback from planners and installers has often helped R&M optimize its products. Felix Neukom: «The training sessions and the proactive positioning of new products are very important to us. They give us a head start in terms of knowledge and we feel involved and informed.»

Just recently a delegation of Cuban R&M customers benefited from this. The guests were able to view the inside of above-ground street cabinets on site in an Instakom project. The perfectly installed solutions were compelling.
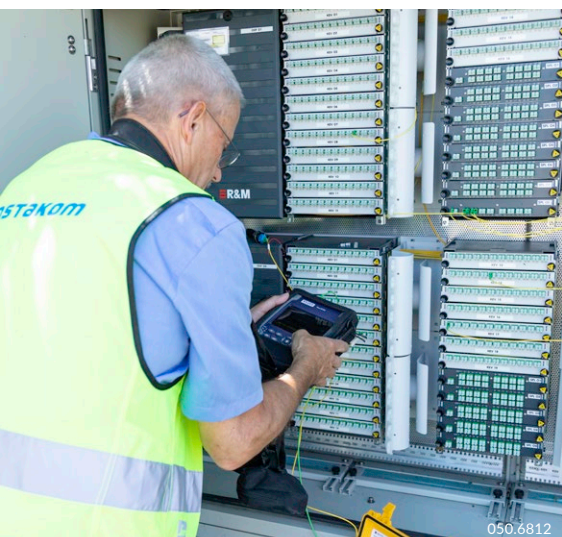
Instakom AG

Instakom AG, domiciled in Zollikerberg near Zurich, plans, installs and maintains custom-made cable, broadband and Fiber to the Home networks. As a service provider, Instakom also takes care of the local communication network, Zollikonline. A further branch of business comprises complex IT systems for monitoring, surveillance, TV and WiFi.

Clients include Swiss municipalities, utilities, hospitals, the ETH Zurich as well as Zurich Airport. Within the region, Instakom is

>> **INSTAKOM**

one of the established experts for fast and above all special cabling solutions. Instakom always tries to realize a full package from cable planning to installation and commissioning.

Instakom prefers to use the scalable R&M*foxs* range for public FO networks. This includes the ODF, SYNO dome closures as well as Venus- and Polaris-boxes.

Constant dialog

R&M enjoys involving customers in product development, as is the case with the specialists from Instakom. For example: the Optical Termination Outlet (OTO). «Peter Meier turned up with a sample of the new outlet and we had time to study the product. He even came round with CAD designers from the R&M development department to examine a planned product in advance. The installation experts from Instakom showed the design engineers what they would modi-

fy. The design engineers explained what was feasible. Both sides learn from one another,» explains Felix Neukom. «The products have to be simple, logical and easy to use. Users have to be able to recognize immediately how the installation works.»

The next step is heading toward digitalization. Instakom is already involved in the new R&M webshop. Apart from the catalog, shopping cart and ordering system, it also has a well thought out tracking function. «This tool helps us keep a closer eye on stocks,» says Felix Neukom.
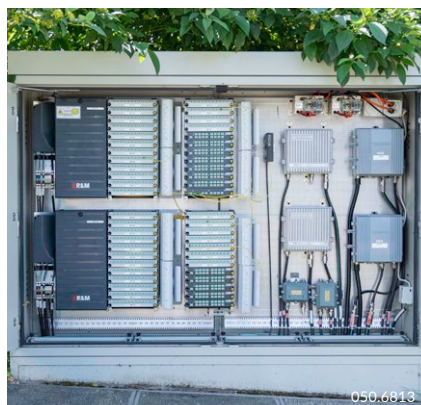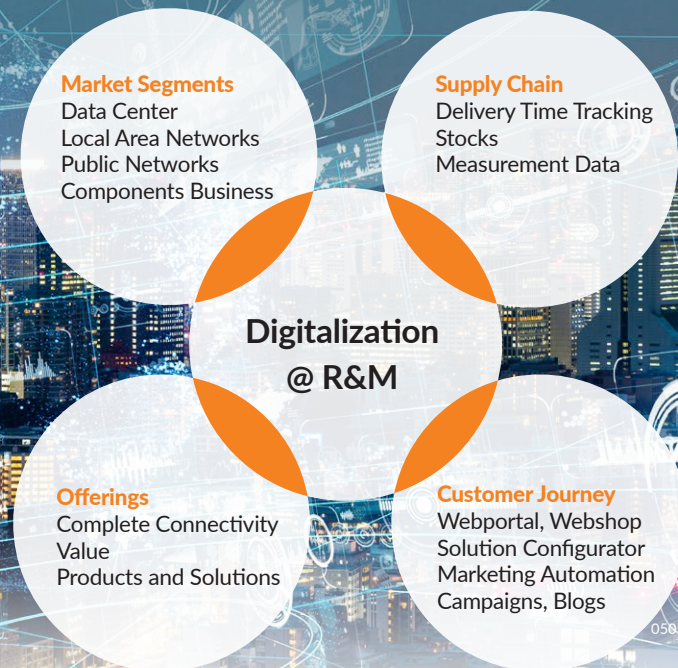

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Recognizing and Capitalizing
on the Advantages
of Digitalization

Market Segments
Data Center
Local Area Networks
Public Networks
Components Business

Supply Chain
Delivery Time Tracking
Stocks
Measurement Data

Digitalization @ R&M

Offerings
Complete Connectivity
Value
Products and Solutions

Customer Journey
Webportal, Webshop
Solution Configurator
Marketing Automation
Campaigns, Blogs

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In the beginning was the e-mail. Today we communicate synchronously and in real time on a whole range of electronic channels. Will we be taking care of things tomorrow virtually? What is certain is that we are currently in the middle of digitalization. With its solutions, R&M offers the best infrastructure basis for this and is also busy professionalizing its own digitalization offers for all stakeholders.

As far as our customers are concerned – whether they are operators of data centers, public networks or local data networks – everything they do now also revolves around digitalization. Our customers are busy creating the decisive connectivity for the digital economy era.

How is R&M going to become digital?
For R&M digitalization means creating a reasonable business model geared to actual needs alongside a perfect infrastructure. The owners, Board of Directors and Board of Managers all want to proceed in a considered, forward-looking and holistic manner. After all, we want to gradually make life easier both for the stakeholders and for ourselves. The aims are to ensure greater value creation for everyone as well as a palpable, sustainable transformation.

Globally active industrial corporations such as R&M cannot introduce digitalization generally at the click of a mouse. R&M requires tailor-made, organic developments for complex situations. For example, the digital offers have to be tailored to the diverse requirements of the market segments with the special requirements of the fiber optic component business also having to be taken into consideration. The digitized processes shall work efficiently and safely in all areas. They should mesh in a logical cycle in a useful way and sensibly facilitate interaction.

The planned cycle shall include all internal areas, partners, processes and projects. The services shall be equally helpful for planners, distributors, system integrators, project managers, installers and users. Market niches can be addressed more specifically with new digital platforms. Innovative marketing automation tools help pinpoint and contact potential clients quickly and according to their needs.

A state-of-the-art webshop will help customers to configure and calculate networks with decision aids and possible solutions for their cabling plans. In future, customers will be able to define digitally, plan and calculate precisely as well as order in time entire systems on R&M platforms. They will be able to follow how R&M is processing the orders online. Stocks and conditions will be immediately transparent.

The staggered launch of this complex offer is currently being tested in select markets.

Digitalization is changing the world in a way we never thought possible. It is important to responsibly take part in this process in the best possible way and make a valuable contribution to it. Future issues of our customer magazine will feature background information and updates from the digital world of R&M.

050.6816

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Plan Cabling
as Early as Possible

Make specific commitments in terms of topology. Plan resources generously. Take upgrades and migrations into consideration at an early stage. And guarantee maximum availability. These are important factors when planning data center cabling. It is also helpful to take a look at the R&M Data Center Handbook.

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Physical network infrastructure planning cannot be started too soon. The most important decisions should be made within the first weeks of project development.

Typical questions at this stage are: What does the data center business model look like? Which EN 50600 availability class – 1 (low) to 4 (very high) – must it guarantee? The answers have a direct effect on the cabling. Availability class 4V requires extensive redundancy and correspondingly comprehensive cabling.

Important standards for planning data center cabling
- DIN EN 50600-2-4: Among other things, defines requirements for cabling architectures, cross-connects, cable runs, availability.
- ISO/IEC 24764: Based on TIA-942, EN 50173-5 with specifications for the cabling. Referenced to cabling standard ISO 11801.
- ANSI/TIA-942-B: Focuses on functional requirements. Minimum recommendations for the cabling.
- ANSI/BICSI 002-2014: Guide for data center planning and operation including cabling infrastructure.
- CPR: Safety and fire regulations of the European Construction Products Regulation.

Avoiding surprises
From the outset, further aspects of the physical network infrastructure should be defined: e.g. network hierarchy, cabling architecture, connecting technology, quality, material as well as transmission performance, links, media and protocols. Operators and planners should define the performance requirements as precisely as possible to avoid surprises and bottlenecks later.

For example, it should be taken into account that network performance develops in fast steps from 100 through 400 to 800 Gigabit/s. This represents a doubling and quadrupling of the number of fiber pairs. Distributors, cable ducts and management should be planned accordingly.

It is a good idea to plan the passive infrastructure independently from switch and server selection. This separation means that operators avoid having to adapt the cabling if a device is exchanged. It is expensive and risky to exchange cabling during operation. It is a much better idea to install future-proof, generously dimensioned cabling that is open to a range of technologies from the very beginning.

Using the latest standards
As far as possible several standards should be consulted as none of the known standards covers all parameters of data center planning.

The best idea is to select the most up-to-date and most progressive variant for each component.

For further valuable tips on planning data center cabling, take a look at the R&M Data Center Handbook. It is available free of charge on the R&M website.

050.6593

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Market Manager Data Center
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050.6817

041.0526

Pragmatic Direct Attach Outlet

Fiber Optic Cables:
Made-to-Measure

Within 24 hours, Swiss R&M customers can have FO cables delivered in exactly the lengths they require. R&M is initially establishing this express service for its domestic market. Also new at R&M Switzerland: a pragmatic outlet at which connection modules and adapters attach themselves independently.

R&M Switzerland has launched an overnight service for fiber optic cables. Installers and project managers receive the cables at short notice and in the required lengths. R&M delivers cables by the meter directly to the construction site.

R&M is thus fulfilling customer wishes for greater flexibility in project management. Installers can be more specific in their purchases and require fewer supplies on hand. They save time because there is virtually no need for logistics or work preparation.

R&M Switzerland receives the wish list in the morning either by phone or by e-mail. The cable drums ready for implementation are already on the road in the evening. The range comprises standardized multifiber loose tube and installation cables. They fulfill CPR fire classification.

Full service for projects

Alongside express delivery, R&M is also extending its FO services. The cabling specialist supports planners, installers and users in assembly, splicing and measuring. R&M assembles trunk cables, breakout cables, harness cables and CP cables to specifically suit project plans and customer specifications. Cable types, lengths, batch sizes and connections can be specified individually. The factory-tested goods are delivered on time directly to the construction site. If required,

R&M sends specialists who can advise in planning, splice fibers, and test installations. This is how installers can be sure that their specialist work satisfies top quality demands.

New assembly technology

The Direct Attach (DA) outlet is also a further aid for installers. The new development does without standard mechanical attachments for the RJ45 and LC Duplex connection modules. The modules attach themselves independently. All installers have to do is snap the adapters into the module holders which is why the assembly technology is called Direct Attach.

Furthermore, the outlet can be operated entirely from the front. A single screw opens the screen and thus the front access to the housing, two slots, the wiring and the cables. This facilitates later modifications to the installation and also means uninstalling before any painting work is no longer necessary. The format and design of the outlet correspond to the Feller / EDIZIOdue program widely used in Switzerland.

050.6818

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Success

Alleviating Congestion
with R&M

050.6819

The Westin Building Exchange is a major telecommunications hub facility located in downtown Seattle, Washington. The building got its name from the Westin Hotel corporate office that made its home there when the building was first completed 38 years ago. It is also home to the Seattle Internet Exchange (SIX) and Pacific Northwest Gigapop's Pacific Wave Exchange.

050.6820

The facility has a number of meet-me rooms on the 19th floor, which are used by telecommunication carriers and Internet service providers to cross-connect their individual networks. These carriers situate their POPs within racks spread throughout the building, connecting back to the meet-me room via fiber cabling, facilitating interconnection with other carriers' infrastructure within the building. The Westin Building's meet-me room is the heart of the facility, where buyers and sellers of broadband services offer interconnectivity to their backbones and diverse services without the need to utilize interconnections provided by telephone companies.

History

It was back in 1980 that four equal partners representing the distinct roles of land owner, builder, financier, and anchor tenant came together to build a 34-story office building just on the outskirts of Seattle's central business district. On move-in day, 70 % of the building was leased: That included floors 4 through 15 for the Westin Hotels' global Headquarters.

Later, the Westin Hotels' global headquarters relocated elsewhere, but the name remained with the building. Their relocation and resulting vacancy were fortuitous, as a number of telecom companies in the west of the US wanted to install their equipment in the Westin Building next to GCI, Sprint, Western Telecom and meet them in the new 19th floor meet-me room.

In 2013, The Westin Building was rebranded as the Westin Building Exchange. Now, with over two hundred telecom, Internet, and service provider companies located in the building, Westin has become a natural and desirable location for those industries that require hyperconnectivity as part of their service delivery requirement, such as gaming, video streaming, social networking and, as of late, a wide variety of cloud service providers. The cloud-based services model is now mainstream covering a wide variety of consumer options and extending well beyond the initial storage and compute entrées that birthed the cloud concept.

R&M USA and Westin Building Exchange

Since 2018, R&M products and solutions have served Westin Building Exchange IT infrastructure with the ability to provide cost-effective and customized offerings, high quality products along with top-notch technical and customer support services.

R&M provides fiber and copper connectivity products for colo clients and facility infrastructures with pre-terminated fiber patch panels, trunks, splice cartridges, connectors, cassettes, jumpers, copper cables and connectivity. Westin appreciates R&M's versatile and high-performance connectivity product lines, such as the 4RU universal housing having 288 high density ports equipped with singlemode

fiber LC/SC bulkheads, preterminated with ribbon pigtails and customized trunks.

Like other hyperscale data center users, Westin needed a solution for over-crowded ducts and cable tray systems. R&M introduced the ribbon technology to help alleviate their congestion issues. Having ribbon-specific platforms and high-density connectivity solutions has given them a significant advantage over the competition.

Out of many features, the robust aluminum construction of R&M's panels is very much appreciated by Westin's technical staff. The dark fiber availability over R&M's fiber and copper cables makes it a premier fiber and copper meet-me room.

R&M's products and solutions will continue to be installed in Westin Building Exchange serving regional carriers including but not limited to: AT&T, NTT America, Comcast, GTI Corporation, Level 3 Communications, XO Communications, Zayo Group, Integra Telecom, Verizon Business, Global Telecom & Technology, Alaska Communications, World Communications, Wave Broadband, BCE Nexxia and many more to land in the future.

050.6821

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LC-QR now as Simplex

The LC-QR Simplex is R&M's most compact LC connector.
It increases the port density in patch panels by 60 %.

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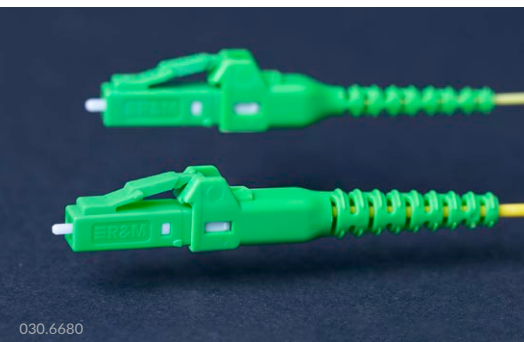
R&M has freed the connector from the conventional unlocking mechanism. With LC-QuickRelease (LC-QR), the operation functions move to the rear. The only thing necessary on the front is the slip-in window.

Now, the LC adapters can snuggle up close together. With the LC-QR, packing density increases to up to 96 connections per ¾ rack unit.

New push-pull mechanism

A push-pull mechanism encases the plug housing like a shoe. It can be moved in an axial direction at the strain relief sleeve from the back. At the front, it takes care of the locking and unlocking work.

The non-slip guard made of durable thermoplastic material and the stable mechanism made of fiber-glass reinforced plastic form a unit. This facilitates fast plugging and unplugging: hence the name QuickRelease.

The solution is easy on patch cords, ferrules and housing. Unlocking is gentler than with conventional connectors. The even, axial build-up of strength prevents any jerky movements.

050.6822

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MPO – now with an Extra QR
Perfect Patching

R&M is launching push-pull operation for MPO connectors. MPO-QR is the name of the new product for FO patch panels. This connector with a push-pull mechanism allows an increase in panel packing density.

050.6823

The MPO-QR combines maximum packing density with simple handling. QR stands for Quick Release. The non-slip guard made of durable thermoplastic material and the mechanism made of fiber-glass reinforced plastic are a unit. This facilitates fast plugging and unplugging. Hence the name Quick Release.

The push-pull mechanism connects the boot with the locking system via the connector housing. The MPO-QR is designed so it can only be operated at the end of the connector, the boot. The distance between the connectors required to date for access is now no longer necessary.

Fifty percent more

MPO adapters can now be packed more tightly. The packing density increases by 50 % to up to 120 ports per height unit. The efficient solution uses the entire front of the patch panels – progress for all those seeking to pack more ports into the rack.

There is plenty of space at the boot for the network technician's fingers. You can get a good grip at the boot intuitively and comfortably. The unlocking procedure is gentler than with conventional connectors. The even, axial build-up of strength prevents any jerky movements.

R&M provides the MPO-QR with 2.0 mm patch cords. The space required for cables drops by 33 % in comparison to previous solutions.

The polarity can easily be identified with the color of the boot: gray means polarity B, black means polarity A.

With RFID tags of the monitoring system R&M*inteliPhy*, the MPO-QR can be integrated in automated infrastructure management from the outset.

Patch cords with MPO-QR connectors are now available in the FO range.

050.6591

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inteliPhy net
How Easy Network Management Can Be

050.6824

Managing cables, links and ports – something which can now be completely digitized too. Instrumental in the process is inteliPhy net, the R&M network management software. Users can work with the program after minimal training.

Less work for network managers, better control over networks. The newly developed software inteliPhy net fulfills this mission. It extends the R&M portfolio for infrastructure management in buildings and data centers. inteliPhy net replaces generic tables and CAD programs.

The software was developed to create an extremely user-friendly and self-explanatory interface. Even inexperienced users will be able to work efficiently with it after a short training spell. inteliPhy net is a completely web-based application. A modern browser is all that is needed to use all functions.

Documenting, planning, monitoring
inteliPhy net covers five functional areas:
– Connection management
– Device management
– Change management
– Reporting
– Capacity management

inteliPhy net is particularly used for managing cabling in as simple a way as possible. Alongside the copper and FO cables for the data network, the program can also document power supply cabling. inteliPhy net is compatible with R&M's AIM system R&M*inteliPhy* Monitor, which automatically detects and monitors patch cables and connections.

The devices in a data center can also be documented with inteliPhy net. For this purpose, there is an extensive template library for standard rack types, active devices and patch panels. The templates already contain data such as performance, consumption, weight and size. They also contain information about slot cards, modules, network and feed connections.

Changes to the network can also be monitored with inteliPhy net. The program generates assignments, distributes them to the responsible positions and monitors their correct execution.

With the freely configurable reports from inteliPhy net, users have up-to-date information at all times on the operating state of a data center, whether in table form or in the form of clear and meaningful graphics.

The capacity management from inteliPhy net supports the user during the extension of a data center. Based on current capacity usage, the software creates lists of racks which are suitable for accommodating new devices, taking into consideration criteria such as space, power consumption, weight and existing network connections.
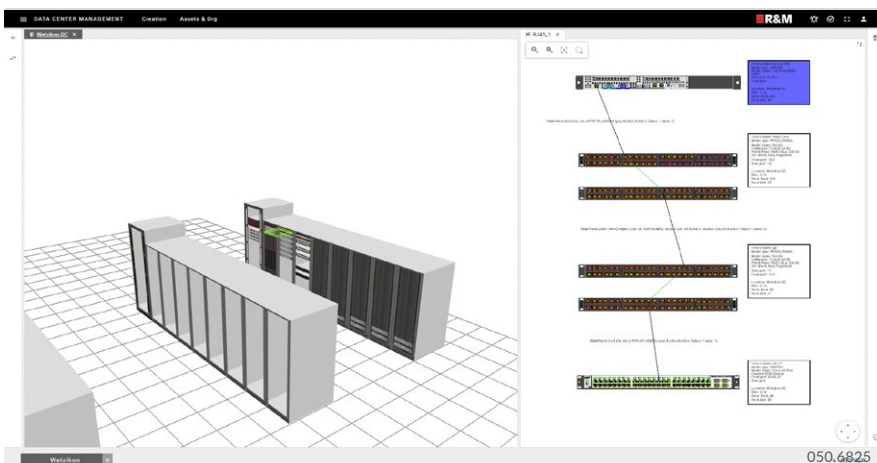
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Police in Poznan
Automate Network Monitoring

Safe data and safe networks: of paramount importance in the everyday work of police. The police in Poznan, a city in the west of Poland, are now taking care of some of these duties automatically. In the police station «Poznan Old Town», R&M*inteliPhy* is monitoring the IT network.

It would be virtually impossible for a modern police organization to work without safe data networks and data centers. But in many cases, administrators are still monitoring network operations «manually». Experience shows that not all connections can be monitored one hundred percent 24/7. Over the course of time, ports get forgotten about and then errors can start to occur during patching. Risks increase and could lead to security forces not being fully operational when it comes to the crunch.

Long-term planning
The police in Poznan have left this risk behind them. They took advantage of the modernization of their important site in the significant old town to install state-of-the-art network

technologies. The police headquarters of the western Polish region of the Greater Poland Voivodeship had been pursuing this project for some years.

The aim is to prepare the precincts in Poznan, and in fact in the entire region, for the security tasks of the future. The modernization program has been running since 2017 and is due to be completed in 2020. Together with the city administration, the police invested 6.2 million euros in the precinct in the old town of Poznan alone. Mariusz Wiśniewski, Deputy Mayor of Poznan, justifies the city's financial investment as follows: «We want the police to have the best working conditions possible. That is also important for the safety and security of the town.»

The police commissioned their new data network in June 2019, when the renovated building was re-opened. Since then they have enjoyed the advantages of the automated infrastructure management system (AIM).

Monitoring with R&M*inteliPhy*
The sensors of the AIM system R&M*inteliPhy* monitor the physical infrastructure with 30 distribution cabinets and 500 ports. They recognize the RFID chips on the copper and FO connectors and communicate in real time with the analyzer and the central server. This is how R&M*inteliPhy* always knows which ports are occupied, whether cables have been connected correctly or whether someone has manipulated the link. When service technicians have to patch, R&M*inteliPhy* leads

them to the right port. The sensor strips indicate where cables have to be plugged in.

But R&M*inteliPhy* can do even more. It provides a uniform database for network administration. Nobody has to maintain tables or write notes. R&M*inteliPhy* visualizes the entire infrastructure, supports plans for extension or changes to the network.

The modernization of the precinct started in the fall of 2016. The neoclassical building on the Aleje Marcinkowskiego Unit in the shade of the Karol Marcinkowski monument is under a preservation order. It was built between 1882 and 1884 based on plans by Heinrich Koch under the direction of master builder Otto Hirt. After its renovation, it was restored to its former glory and is now the pride and joy of the old town police.

Pioneer in Poland

Polish media reported with great interest on the new infrastructure and the «safe and efficient» data network consisting of OS2 fiber optic and shielded Cat. 6_A copper cabling. The news agency WTK wrote: «This building

was equipped with a system for automatically managing and monitoring the entire network infrastructure. All copper and FO connections of the horizontal and vertical cabling are monitored for security, analysis, documentation and any changes made during network use. It is the first police institution of this kind in Poland to have an AIM system installed.»

The Police Headquarters in Poznan already defined the general requirements for the structured cabling system at the design stage. R&M Poland has supported the planning agency since 2015 as a technical consultant for structured cabling. The R&M certified installation partner of IT company Helpdesk Sp. Z o.o. carried out the work with great expertise. The 25-year system warranty issued by R&M underlines that the installation fulfills all standards and quality guidelines.

Future ready

Over the past few years, R&M Poland has provided structured cabling solutions for several buildings of the police in western Poland. The first joint installation project started in 2013. That was when the police station in Komorniki was given a new network. It is based on R&M*freenet* cabling of category Cat. 6_A ISO. The AIM sensors can be retrofitted at any time. Everything is prepared for the use of R&M*inteliPhy*.

Installations followed every year after. The precincts in Jarocin, Pleszew, Kłodawa, Lubon, Pniewy, Dopiewo, Grodzisk Wlkp and Kalisz were all fitted with new networks which can be retrofitted with R&M*inteliPhy* at any time. In the future, the police authority in the region of the Greater Poland Voivodeship will be able to manage its network infrastructures from a central site.
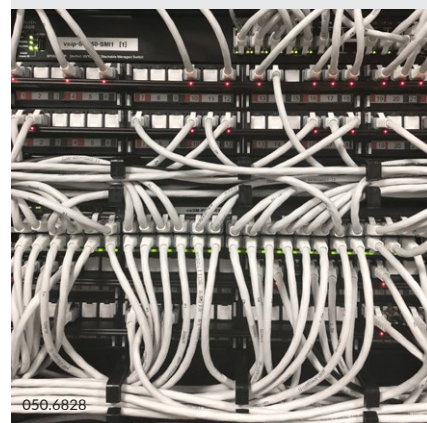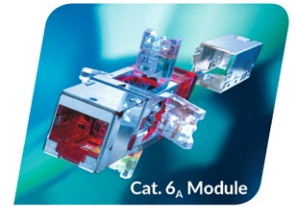
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R&M provides technical trainings for the IT experts of the police stations on a regular basis. With their specialist knowledge of R&M products, they are fully familiar with network operations and automated infrastructure management. This means the police in the region of the Greater Poland Voivodeship are perfectly prepared for the future of secure data transmission.

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The Repertoire
of RJ45 Modules

Cat. 6ᴀ Module

+

Cat. 5e unshielded
1G

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For the time being, the RJ45 gamut is complete.
R&M defines the perfect connection module for every
desired beat and tempo. Including the new intermediate
and high tones. The advantage for planners and users:
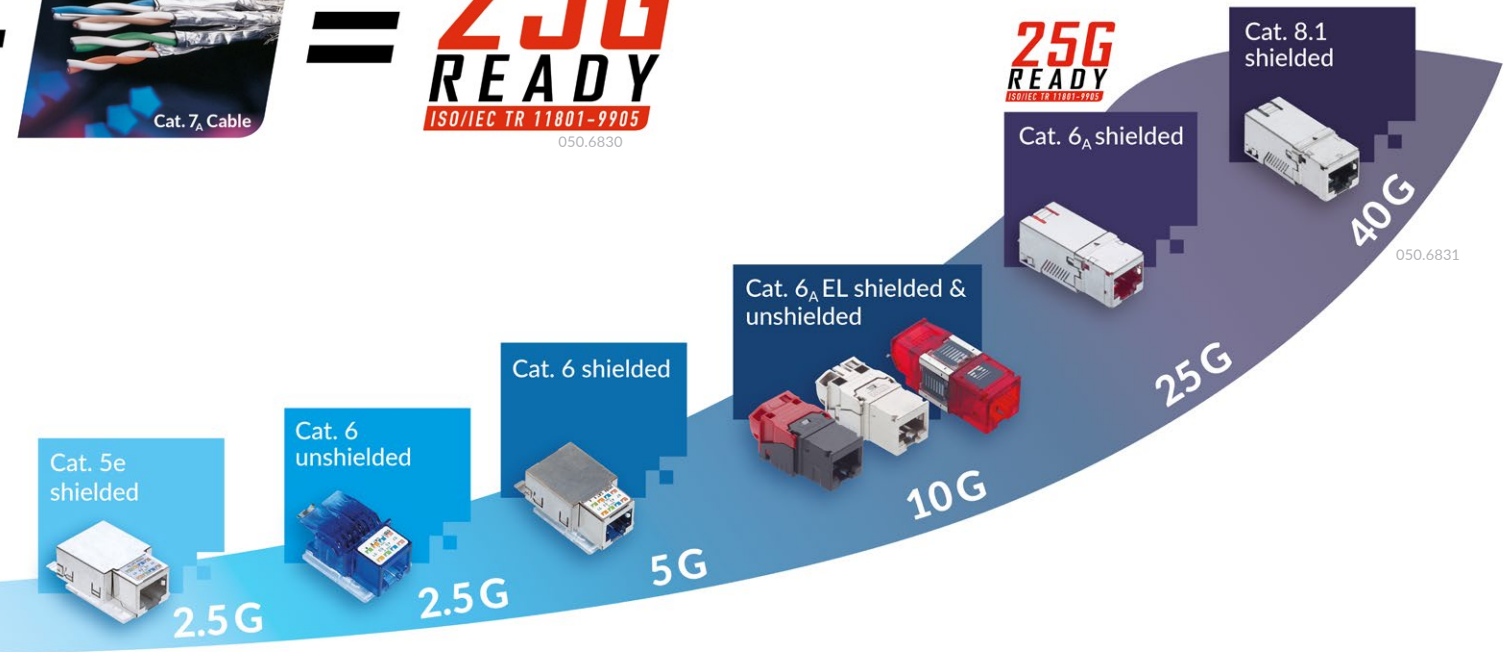They compose monolithic networks.

For some time now, new Ethernet standards have been enriching the spectrum of transmission possibilities on twisted-pair copper cabling. After decades of tried and tested 1 Gigabit/s (1G) and 10G, 2.5G and 5G have been placed between them. Topping the list in the repertoire: 25G and 40G.

These six tempi known today operate at transmission frequencies between 66 and 1,600 MHz. The signals should be able to overcome the defined links and arrive brilliantly at the receiver. RJ45 modules usually establish the connection at the start and end of the link. They are divided into four categories from Cat. 5e to Cat. 8.1.

Quantum leap to 10GBase-T

For a long time, the 1000Base-T protocol with 1 Gigabit Ethernet per second (1 GbE or 1G) was the measure of all things. The category 5e was defined to support this speed. The Ethernet technology experienced a small quantum leap in 2006 when IEEE ratified 10GBase-T (10G). Category 6_A was created to be able to transmit this protocol.

The transmission protocol of 10GBase-T is also the basis for further IEEE transmission protocols: 2.5G and 5G introduced ten years later as well as the very fast 25G and 40G ratified in 2017. In the R&M*freenet* cabling system, these applications can be assigned to specific RJ45 types.

Time for a precise overview

Positioning is essential in this technological variety. R&M helps planners, installers and users to specify their networks to suit requirements at all times with unique assignments. If it is clear which cabling is supporting which application, misdirected investments can be avoided.

In the unshielded variant, the classic category 5e (Cat. 5e) handles a frequency of 100 MHz and a clock rate of max. 1 Gigabit Ethernet per second (1 GbE or 1G). The range of the permanent link (PL) with Cat. 5e is 90 meters. The shielded variant of this category delivers 2.5G with 100 MHz (NBASE-T) over 90 meters thanks to good alien crosstalk (ANEXT). This makes it possible to set up structured cabling for buildings with limited data traffic.

Graph: R&M

Another classic, Cat. 6, is also available as a shielded or unshielded version. Unshielded, Cat. 6 connection modules handle 2.5G/100 MHz thanks to better crosstalk characteristics and, as a shielded version, 5G/200 MHz (MBASE-T) thanks to good ANEXT over a distance of 90 meters.

Unshielded Cat. 5e and Cat. 6 modules can support the next highest speed with optimal cable properties and installation conditions. The cable must reliably ensure that ANEXT does not drown out the signals. R&M naturally always assumes a standard-compliant installation is in place.

For the operational area 10G/400 MHz, R&M specified the innovative module Cat. 6_A EL as an unshielded and shielded version. Cat. 6_A EL systems are the best choice for creating data networks in buildings with several hundred workplaces and challenging communication requirements.

R&M also approves the shielded, premium Cat. 6_A module up to 24 meters for 25G/1000 MHz in compliance with TR11801-9905 due to its extraordinary reserves. In this case, Cat. 7_A cables have to be installed.

Users require 25G particularly for connecting next-generation WLAN access points or for realizing 5G services in picocells within buildings.

All R&M RJ45 modules are suitable for using Power over Ethernet (PoE) of the latest generation (4PPoE).

Peak performance with Cat. 8.1

On top, there is Cat. 8.1 for 40G/1600 MHz (40GBase-T). R&M has developed a shielded RJ45 connection module with brilliant transmission characteristics for this operational area too. R&M combines this new high-end copper system with an S/FTP installation cable of Cat. 8.2/8.1. Its characteristics in terms of universal use and backwards compatibility are the same as the modules of categories 5e to 6_A.

In accordance with the standard, the permanent link can be a maximum of 24 meters long and have two connectors.

The Cat. 8.1 cabling system is mostly used in data centers. An additional area of use is LAN cabling in buildings which require extremely fast data transmission. Here the Cat. 8.1 system from R&M provides additional support for the new performance level 25GBASE-T and link distances of up to 50 meters in compliance with DTR11801-9909. With suitable planning, this is how a large number of applications in the LAN can be covered with an even higher transmission rate.

Norms, Channels and Transmission Distances

	1G	2.5G	5G	10G	25G	40G
Cat.5e /u	90m	*				
Cat.5e /s	90m	90m				
Cat.6 /u	90m	90m	*			
Cat.6 /s	90m	90m	90m			
Cat.6_A EL /u	90m	90m	90m	90m		
Cat.6_A EL /s	90m	90m	90m	90m		
Cat.6_A /u	90m	90m	90m	90m		
Cat.6_A /s	90m	90m	90m	90m	24m **	
Cat.8.1 /s	90m	90m	90m	90m	50m ***	24m

*   90m may be possible, depending on the characteristics and installation conditions of the installation cables
**   compl. with TR11801-9905
***   compl. with DTR11801-9909

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Graph: R&M

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Photo: John Lewis Marshall, johnlewismarshall.com   050.6832

Creative Future
for Architectural Masterpiece

The WPP Campus Amsteldok, once Europe's largest office complex, had almost been condemned. But clever investors, architects and construction experts have revived it. Having been renovated, it has opened itself up to the urban surroundings and a creative future.

At the beginning of the 1970s, this mammoth building symbolized the era of modernity. Architect Hugh Maaskant designed the masterpiece back then. With an area of 30,000 square meters it was the largest building of its

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f.l.t.r.: John Vreem, Project Lead, BAM Infratelecom bv; Robert Post, R&M Netherlands; Michel Kortstra, Project Leader, WPP PLC

kind at that time in Europe. The WPP Campus Amsteldok – also known by its former name «Rivierstaete» – is attractively located on the banks of the Amstel in southern Amsterdam. The building consists of piled up, staggered white boxes.

Then there was a real estate crisis. Around 60 % of the building was empty and technically out of date. «Demolition and a new construction would have been the easiest option,» explains the project description. But the owner decided to opt for renovation. The Dutch company MVSA Architects won the pitch.

The modern architects wanted to retain as much as possible of the original design. They wanted to make the concrete construction

behind the facade visible. The monolith was to be converted into a transparent center for creativity with floor-to-ceiling glass frontages. The WPP Campus Amsteldok was to fit seamlessly into its urban surroundings and establish a lively relationship with the neighborhood. The architects feel that this interaction with its surroundings creates a pleasant working environment.

Logistic challenge

The neighborhood played a major role in this project. The WPP Campus Amsteldok building is surrounded by private houses and gardens. There was no space around the building for a material warehouse. The residents were not to be disturbed by noise outside working hours.

This created a number of logistic challenges for installation partners BAM Bouw & Techniek and BAM Infra Telecom. They could only deliver their material at strictly defined times and the material had to be transported to the right floor immediately with the building hoist. This task was perfectly coordinated in close collaboration with the Dutch R&M distributor Forehand. Forehand placed the material in storage in advance and scheduled deliveries individually to suit the plans of BAM.

Management by app

The experts from BAM also ensured precise coordination on the construction site itself. BAM works with the Building Information Modeling (BIM) method. All technical drawings are available in digital form, everything is interconnected. On site, the project managers download the floor plan updates onto their tablets. The program visualizes changes and additional installation requests. This way, the installers can carry out the work orders immediately. With their mobile devices, they confirm when the job has been finished.

The R&M solution

– 3,600 copper links based on Cat. 6$_A$: connection modules Cat. 6$_A$ EL shielded, Cat. 6$_A$ U/FTP cables
– Backbone on the basis of OM4 fiber optic cables connects the Main Equipment Room (MER) with 9 Satellite Equipment Rooms (SER) on the individual floors. A total of 39 network cabinets.
– Cabling in raised floors
– 150 PoE-powered wireless access points on the ceilings
– Measurements confirm the optimal performance of the BAM installers. All measured copper links have a 7 dB NEXT reserve over and above the standard. The new users of the WPP Campus Amsteldok have a robust network at their disposal.

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New campus for WPP

The international advertising and PR agency WPP plc. is turning the building into a creative campus and named it «WPP Campus Amsteldok». WPP unites all disciplines under one roof and moved in with 20 companies resulting in correspondingly varied use of the LAN.

It also requires high-performance Internet access as 80 % of the agency's applications run in the cloud. The WPP Campus Amsteldok is situated directly on Amsterdam's Fiber City Ring. Its transmission performance was to be available in full throughout the building. This necessitates permanently stable data transmission to all outlets and access points. The performance requirement was one of the reasons R&M was chosen.

Around 1,500 WPP employees apply their ideas for the benefit of customers in nine VPNs. The 150 wireless access points support the creative employees perfectly as they prefer to work on a mobile basis. And the cabling offers large reserves for data-hungry applications, such as video productions. Last but not least, WPP runs a call center for market and customer surveys in the Rivierstaete building which also requires diverse LAN functions.

Swiss quality is compelling

Due to previous good experience, BAM had recommended cabling from R&M. «The Cat. 6$_A$ EL modules from R&M are easy and fast to install. They always fit in correctly straight away,» confirms John Vreem, project lead at BAM Infra Telecom bv. The Swiss quality and the performance of the R&M cabling also cut a convincing figure. On top, R&M issued a 25-year warranty – a necessity for this project.

In spite of optimal preparation, the typical challenges of a renovation had to be overcome, and that included dealing with low raised floors. «We had to pay special attention to the bending radius of the cables at the floor outlets,» explains John Vreem.

The R&M partners

– BAM Bouw & Techniek: technical installations, such as air-conditioning, electricity, LED light.
– BAM Infra Telecom BV: LAN, wireless LAN, access control, CCTV cameras.

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BAM also used a self-developed metal bracket for RJ45 modules. It fits on every cable tray and facilitates overhead installations. Good news, since 150 PoE-powered wireless access points were to be installed on the ceilings and connected with consolidation points.

Courage rewarded

The architects' summary: «We were rewarded for the courageous investment and the far-sighted renovation approach. Our team has realized a wonderful, unique office complex which is of great interest.» Once work was completed, leasing partners immediately took over the entire building.
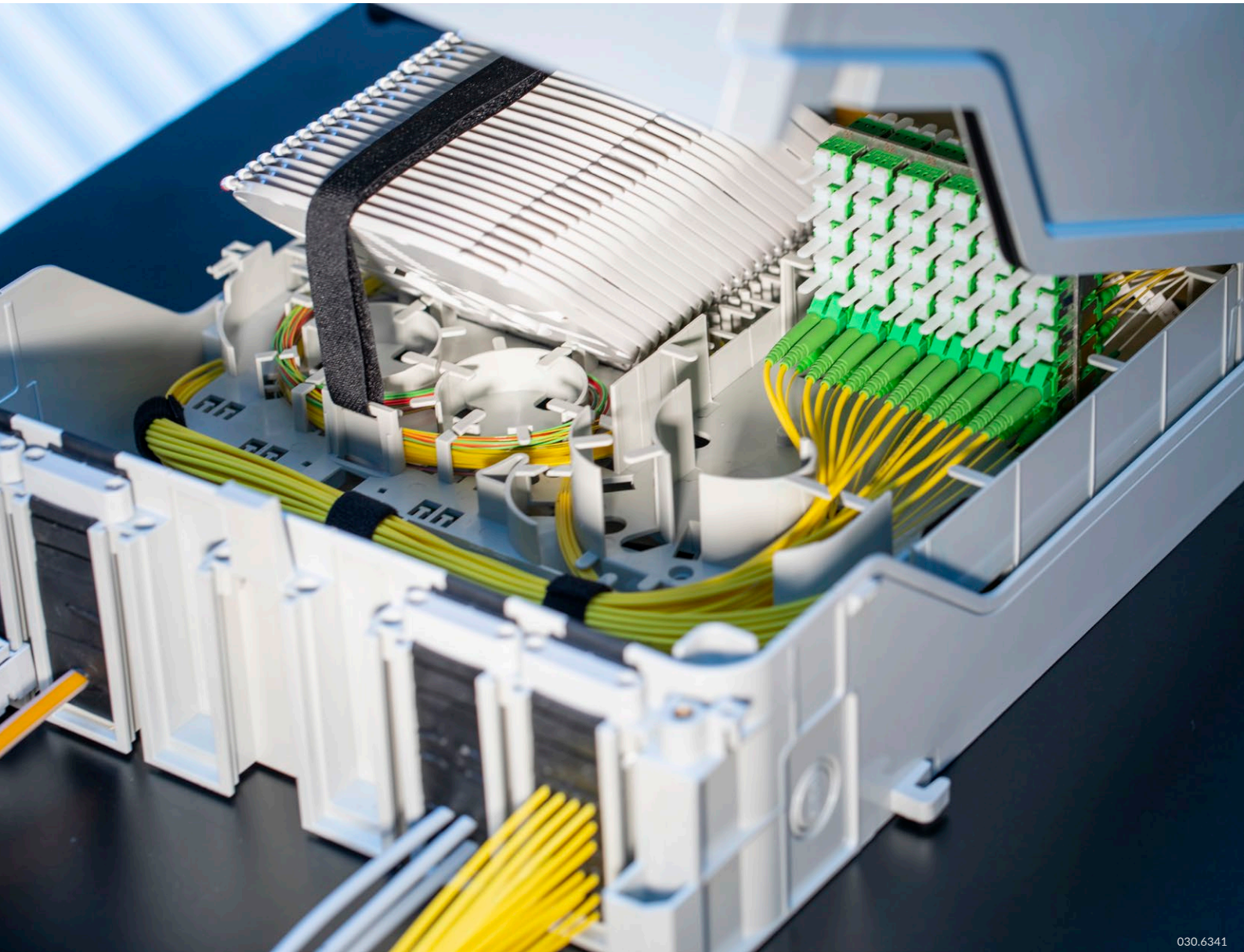

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Polaris:
FTTH in All Sizes

Whether a family home or a building complex – the Polaris range from R&M gets every size to the FO network. FTTH suppliers use the range to flexibly extend their offerings to suit local requirements. The new Polaris-box 4 fits in the smallest of spaces and fills the gap in the Polaris-box family.

Residents in rural areas are just as excited about Fiber to the Home (FTTH) as owners of villas and apartments and tenants in large building complexes in a city. FTTH suppliers are looking for market-oriented solutions to suit every size.

The serving area interface should be able to be extended so new subscribers, services and applications can be connected at a later date.

FO cabling for residential, office and industrial properties is increasing, something confirmed by every forecast for the next five years. And that means that the packing density of the fibers and ports in the serving area interfaces has to be increased.

Broadband technologies, applications and topologies may well change. In such cases, the installation must be able to be migrated. This

is why a compact and flexible FO termination for splice, patch and splitter applications is at the top of the wish list.

At the same time, network termination should not be over the top. Network operators only want to invest as much as a building or residential estate can actually accommodate. Surplus fibers and unused connectors do not result in operating revenue.

FTTH means being flexible

This list of requirements is in no way complete. It shows that cabling platforms for Fiber to the Home have to be fairly flexible. A fact which naturally prompts the question: Is there a multifunctional platform to cover all situations?

The answer from R&M is: Polaris. The Polaris range is pointing the way to the future of FTTH cabling.

The platform covers all typical access network topologies. It enables the future-proof connection of buildings of all sizes as it 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.

The range consists of five types. The smallest type, Polaris-box 4, supplies up to four subscribers with FTTH – the largest type, Polaris-box 36, up to 72 subscribers. Within buildings, the Polaris-boxes are suitable for use as building entry points, risers, floor distributors and optical fiber termination outlets in offices and apartments.

Everything that is needed for FTTH

Polaris-boxes accommodate everything network operators require on site: drop cables or subscriber and patch cords, fiber or loose tube storage, fiber modules for trays, splice, splitter and plug connectors. The modular principle of the boxes makes it possible to gradually adapt fiber optic supply to local requirements.

In the case of the three larger models, the functional components are situated on the front and back on a pivotable fiber tray. Adapters, splice trays and splitters are easy to assemble. The overlength storage for loose tubes and drop cables is in the base of the device.

The cables can quickly be inserted in sealing slots. They no longer have to be threaded through – as is the case with conventional boxes. The cable entries fulfill the requirements of protection class IP65.

For four to 72 subscribers

Polaris-box 4: 14.5 x 22.5 x 6.3 cm. Possible assembly: 2/4 adapters, 12/24 splices, 2 splitters (split ratio 1:4). Suitable for up to four subscribers. (as from Q4/2019)

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Polaris-box 6: 19.7 x 28.5 x 6.3 cm. Possible assembly: 6 adapters, 12/60 splices, 3 splitters (split ratio 1:8). Option for additional 48 splice connections with 4 FMTS trays. Suitable for six subscribers. (available)

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Polaris-box 16: 21.7 x 31 x 11 cm. Possible assembly: 16/24 adapters, 24 splices, 2 pre-terminated LGX splitter modules, 3 splitters (split ratio 1:8 or 2:8). Suitable for 16/24 subscribers. (as from Q1/2020)


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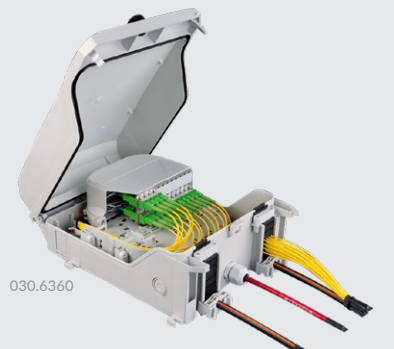
For the smallest niche

The Polaris-box 4 is now being launched as the smallest member of the family. Its dimensions enable it to fit in the smallest of spaces. Even this compact type is suitable for all kinds of applications.

The basic features comprise a fiber tray for twelve splice connections, regardless of whether these are ANT/crimp or HS/shrink splices. For plug connections you can choose from an adapter field for two or four SC, LC-D or E-2000 connectors.

What is surprising for a terminal box of this magnitude: There is sufficient space under the first tray for an additional fiber deposit. If

Polaris-box 24: 26.3 x 37.1 x 15 cm. Possible assembly: 24 adapters, 144 splices, 6 splitters (split ratio 1:8), 12 Tray Position Units (TPU) for splice or splitter trays and fiber tray. Cable entries for 8 round cables or drop cables for 48 subscribers. (as from Q4/2019)

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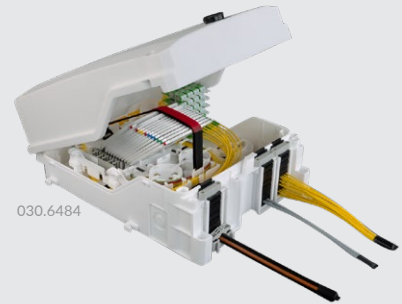
Polaris-box 36: 33 x 45 x 15 cm. Possible assembly: 36 adapters, 288 splices, 9 splitters (split ratio 1:8), 24 Tray Position Units (TPU) for splice or splitter trays and fiber tray. Cable entries for 12 round cables (16 mm diameter) or drop cables for 72 subscribers. (as from Q4/2019)

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required, a second fiber tray can be retrofitted in just a few easy steps. Even the adapter panels can optionally be retrofitted. The design grants direct access to all fibers making installation and migration easy.

The equipment includes the fiber deposit for the multifiber loose tubes and fiber protection provided by a tray cover. The separate routing of the 900 and 250 μm fibers in a gentle bending radius avoids fiber stress. The strain compensation secures conventional cables and micro ducts.

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FO Field 2.0
for Butterfly Cables

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The field-terminable FO connector FO Field 2.0 is taking another field of application by storm. R&M is launching a modified version for butterfly cables.

The practical experience and feedback from a large number of partners were once again the incentive for the R&M team to continue their further development. A modified FO Field 2.0 will be available from the fall of 2019. Initially taking the form of an SC connector, it can now safely grip both butterfly and drop cables.

The innovative clamping technology of the FO Field 2.0 not only fixes the cable jacket but also the optical fiber inside. A box nut secures the clamp. Furthermore the FO Field 2.0 can be rewired.

Application tests show that the connection is significantly more stable and resistant than comparable solutions. The transmission properties and attenuation values are retained completely and permanently.

Not just for FITH

Butterfly cables are easy to wire and are a much appreciated product in the Fiber in the Home (FITH) field. It was particularly for this area that R&M developed the modified FO Field 2.0 type. However, its mechanical stability also means it can be used in the uncontrolled area.
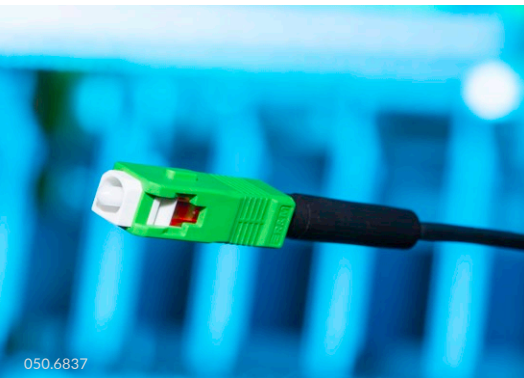
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R&M now
ISO 45001 Certified

After successful international recertification in quality and environmental management (Group certificates for ISO 9001 and ISO 14001), the R&M Head Office was certified in June 2019 in compliance with ISO 45001.

The new international standard ISO 45001, which covers the high demands placed on management for health and safety at work, will be introduced at all production plants in the R&M Group over the next two years.

The subject of health and safety at work is of central importance at R&M and is an integral part of the corporate policy. Furthermore, international key accounts increasingly expect the relevant standards to be guaranteed. Safe and healthy workplaces are important indicators of a sustainable, high-performance company. The focal points of the new ISO 45001 standard are:

– Managing risks for safety at work and the health of employees
– Avoiding accidents and occupational illnesses as well as offering safe and healthy workplaces
– Ensuring the adherence to legal regulations

– Optimizing performance for health and safety at work

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Corporate

Shanghai

Acquisition
in China

In April 2019, R&M announced its takeover of Durack Intelligent Electric Co. Ltd., a premium supplier of enclosures for the modular data center market, located in Shanghai, China.

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Durack Intelligent Electric Co. Ltd. is a premium supplier of enclosures for the modular Data Center market in China as well as for other countries across Southeast Asia.

With full speed, a specialized team started evaluating new premises for the business in the Jinshan District, Shanghai. The opening ceremony that took place in mid-June was graced by business partners and the Swiss Consul General. With this milestone, R&M will further strengthen its approach to offer tailor-made solutions to the growing and demanding DC market in China as well as other countries in Southeast Asia.

Successful cooperation led to takeover

Durack was founded in 2004 by Yunhui HE. The premium manufacturer of enclosures for modular data centers for leading customers in the financial, governmental, educational and colocation data center sectors has developed a strong position in the domestic market thanks to its high quality and its flexibility, as well as its ability to provide customized solutions.

R&M has enjoyed a successful partnership with Durack over the last few years. The integration into the Reichle & De-Massari group of companies will further strengthen the approach to the demanding Data Center

market in the region. China is the second largest market for structural cabling in the world and the DC market will be extremely dynamic in the years to come. Offering comprehensive solutions with local manufacturing capabilities will create significant growth opportunities for R&M.

R&M will make further investments in the next 24 months to strengthen its presence in the Chinese market.

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Opening ceremony June 2019: f.l.t.r.: Yunhui HE, Founder Durack Intelligent Co. Ltd.; Laurent Amestoy, EVP R&M APAC; Mr. Olivier Zehnder, Swiss Consul General; Michel Riva, CEO R&M; Sam Ho, MD R&M China

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