CONNECTIONS 51

Smart Networks

UBS:
Masterpiece in the City of London

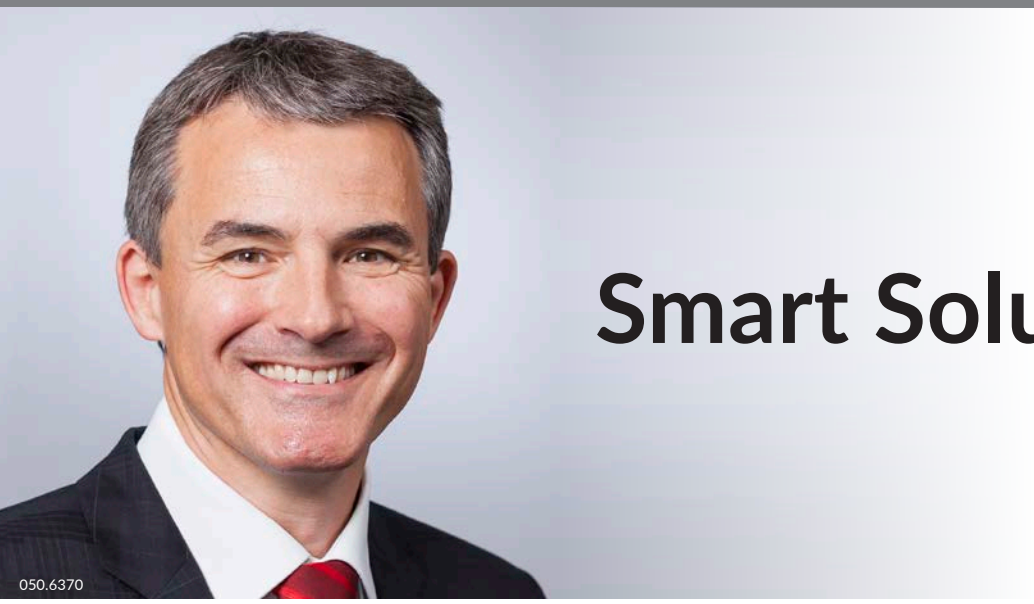
R&M*healthLine*:
Cabling Solutions for Healthcare

The End of Moore's Law

R&M

Photographer: John Madden, johnmaddenphoto.com

Editorial



Smart Solutions

Dear Business Partners,

Things are happening at R&M. You'll be able to feel it when you read the current edition of our customer magazine CONNECTIONS. Find out all about the new products and solutions R&M is developing, and about the trends and background information we have been observing in the world of connectivity.

Scale the net

This edition focuses on smart networks. A pretty general and broadly-based term that is accompanied by a large number of creative ideas. In the long term, applications that can lead to a profitable business model or satisfy a social need will come out on top.

A smart network requires intelligence. Networks play a role in creating a completely digital image of the real world that can be put to smart use. The keys to success are: clear planning, easily scalable systems, reliable and efficient operation, as well as simple use. Smart networks must support the necessary transmission and computing performance everywhere – using high-density platforms and automated management of the complex infrastructures. Whether in a remote, cramped edge data center or in a central, gigantic cloud data center.

R&M is working on the front line to drive on current trends with advanced developments. R&M*inteliPhy*, the growing system for automated infrastructure management, is constantly undergoing further development to come up with new application possibilities. The recently launched Ultra High Density platform Netscale is setting unsurpassed standards for FO infrastructures in terms of port density, scalability, handling as well as automated monitoring – in data centers of all sizes.

New definition of Moore's law

In an interview, scientist Lars Jäger describes the end of Moore's law on the increase in the performance of microchips that has been applicable for decades. He shows how chip manufacturers will have to take more differentiated paths in future to fulfill the requirements of the digital revolution and lots of new, smart applications.

Such forecasts are also incorporated in product development at R&M. One of the Trends articles describes how lens technology is going to lead to greater performance and more robust optical data transmission. The new R&M FO adapter is also moving in the direction of long-term, unlimited communication. With the antibacterial R&M*healthLine* range, we are launching safe and patient-friendly network infrastructures in hospitals.

Smart on all continents

We are proud to be once again showing you select customer projects from all parts of the world, including the new London head office of financial services company UBS in a building of outstanding architecture with R&M connectivity. It is a logistical masterpiece successfully managed by our partners, together with the international R&M teams.

R&M's global presence and efficient processes enable optimal, individual service in close proximity to the customer. This can be seen in the features on projects at Kraków Airport, the SAIB Bank in Egypt, Swisscom and Portugal Telecom. We are a company that, together with our partners, attaches great importance to local customer requirements.

"Connectivity that matters" is R&M's new credo. Based on this, we have further defined our corporate values as "values for success". This is the focus for everyone on our international team so they can all impress you – our customers and partners – with smart and innovative solutions.

Sincerely,

Roger Keller
General Manager Europe & Latin America (excl. GAS)

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Smart Networks
- Valuable and Useful

There is a lot more going on behind network connections than you might be led to believe with familiar keywords such as Big Data and Internet of Things. Behind the scenes, a comprehensive digital image of the real world is being created step by step. The copy of the physical objects and real environments can be used efficiently in a number of different ways.

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Digitalization is advancing inexorably. And the signs can be seen in factories, offices, apartments, and businesses, in traffic and health companies, as well as in education, social and leisure time facilities. All kinds of interfaces connect the visible world with the Internet and remote data centers. And the numbers are increasing all the time. Experts call them ubiquitous (omnipresent) systems.

And there is a parallel increase in the number of application cases and scenarios. Electricity meters in apartments are networked and talk digitally to the provider. The smart power grid powers the washing machine on or off as required. A smartphone can remotely control heating, lighting and security systems in buildings. Sensors in the water pipes indicate where there is a leak and how it can be repaired quickly. This means that even a water pipe system is now a smart network.

Digitalization is becoming ever more prevalent in retail, too. Displays in the shop of the future will know a customer's demands and preferences from his / her digital profile. They will lead customers to all the latest offers.

And digitalization promises potential for industry, too. Regardless of location, production networks can be configured at the click of a mouse. Machines can communicate with other machines independently. Virtual product development and construction save both time and material. Data just has to be created once to be used for production planning and other purposes. The digital copies can then communicate with the real machines. This is how companies can find out how production systems are doing and when they should be serviced.

Digital copy of reality

Due to technical progress, manufacturers can now create ever more efficient electronic network-capable components at an ever lower price. Tiny computers, actuators and sensors (embedded systems) can now

Figure 1

be accommodated in virtually every object in the physical world and be connected to the Internet using a proprietary IP address. This is how cyber physical systems, smart networks and the Internet of Things, IoT, come into being.

And this is how incredible quantities of information, knowledge and business processes end up in an apparently anonymous cloud. Gradually, an extensive digital copy of the real world is built up in this cloud. Copies are made of objects, items and processes from bits and bytes that are stored in data centers. The data networks also acquire and process their current status and the environment impacting on them.

Great value, practical use

The pros and cons of this mega trend are the focus of many an argument. Health, safety, data protection and market freedom have to be guaranteed at all times. But the great value and practical use of the digital image of reality are clear. The digital image can be used multiple times.

A few examples: The data gained from smart networks can be analyzed centrally, fast and in a standard form. Service providers can better simulate, automatically detect and more easily examine complex risks, trends and contexts. The basis for making decisions is more precise for forecasts, marketing and service – an important aspect of value creation.

Many causes of disasters, delays, loss or high consumption values can be determined online at short notice from the digital copy of a procedure. Authorities, insurance companies and managers share their knowledge with other parties at the click of a mouse. There are many things that no longer have to be examined "on site".

Algorithms and semantic technologies enable meaningful, specific analyses of the digital images. What used to be decided as a "gut reaction" is now given a quantifiable basis. This alleviates, optimizes and accelerates business processes, administration and controlling tasks.

Smart networks and digital images enable new business models. This includes, for example, remote monitoring.

Turbine manufacturer Rolls Royce is leading the way in an exemplary manner. It is installing sensors in airplane turbines that constantly send digital information on use and status. Rolls Royce sells operational hours as opposed to naked engines. The digital image is the basis for tailor-made services and consulting. Value added for airlines: Airplanes are used to capacity, fuel consumption is optimized and costs reduced.

Experts are expecting major benefits from Building Information Modeling (BIM). In the future, a digital image will be made of every type of building from the very first architectural sketch to operational expenses. The software enables virtual tours and precise

Faster innovations

"We are currently in a revolutionary process of enormous speed that is making the real world merge with the digital one at an ever faster pace."

Business data processing specialist Dr. Uwe Gross, partner in the business consultancy firm IBM Global Business Services and Head of Application Innovation Services in Europe.

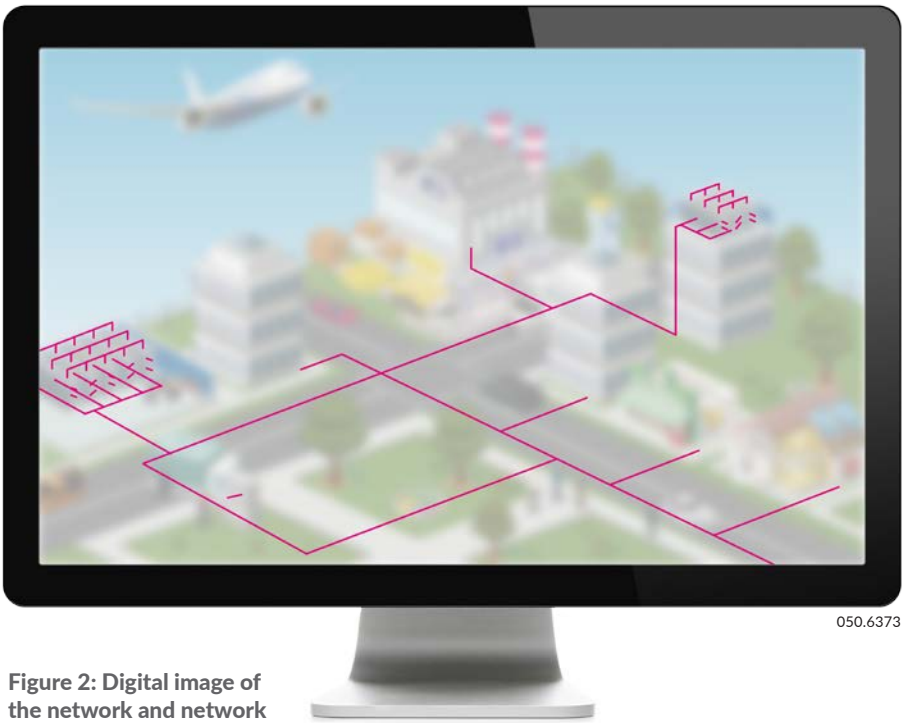

Figure 2: Digital image of the network and network infrastructure limited to the representation of connectivity.

Figure 3: Digital image with the addition of IT hardware.

detailed planning. And this means not a meter of cable is wasted.

With the help of mature DCIM systems (Data Center Infrastructure Management), data centers create a digital image of their operation. For this purpose, they also need smart networks which integrate and monitor the power supply, ventilators, temperature sensors, access control, cameras, IT hardware and lots more. This makes it possible to optimize energy consumption and profitability, increase operational reliability and automate documentation and inventory management.

Monitoring cabling too

Complete and powerful networking is a decisive criterion for the successful application of the Internet of Things and the efficient use of digital images. If there is not sufficient cabling in the background, antennas, sensors, controls and servers simply cannot communicate.

This means that comprehensive real-time information has to be collected about the infrastructure, too. What use is top-layer monitoring of the network if a network connector has been pulled out or plugged in incorrectly without anybody noticing? This is why ideally the passive infrastructure, cabling, should have a digital image and be monitored by smart solutions.

Creating natural images

"Future smart networks have to be autonomous, adaptive, cognitive – just like a natural image. Otherwise they will not master the complexity and sheer volume of data of the Internet of Things."

Theory put forward by Prof. Antonio Liotta, Eindhoven University of Technology

R&M*inteliPhy* is such a system. It comprises:
- Connectivity monitoring in real time;
- Data acquisition at connectors using sensors;
- Data transmission to a server and a digital image.

In turn, the image is the basis for monitoring, planning and controlling, independent of both time and place. In a way R&M*inteliPhy* gives the ports and cables a seventh sense.

As important as the monitoring of the cabling infrastructure is, it is in fact just a first step. Figure 1 shows a picture of the real world. Figure 2 shows a digital network limited to the cabling. This image is very valuable in itself because it can be used for planning, repairs etc. But it is obviously just a part of the whole.

Figure 3 shows a natural expansion of the digital image. It has been extended by an image of the hardware connected with the connectivity. Figure 4 shows a further step on the way to completing the digital image of the relevant reality. This comprises the environmental influences (in this case the influence on a splitter as an example).

R&M is convinced that a complete image offers comprehensive value added extending beyond the individual advantages.

The complete image would not just show the cabling but also what is connected and the environment that has an influence on it. This is why the R&M "Smart Networks" innovation group at the head office in Wetzikon is developing further advanced solutions for

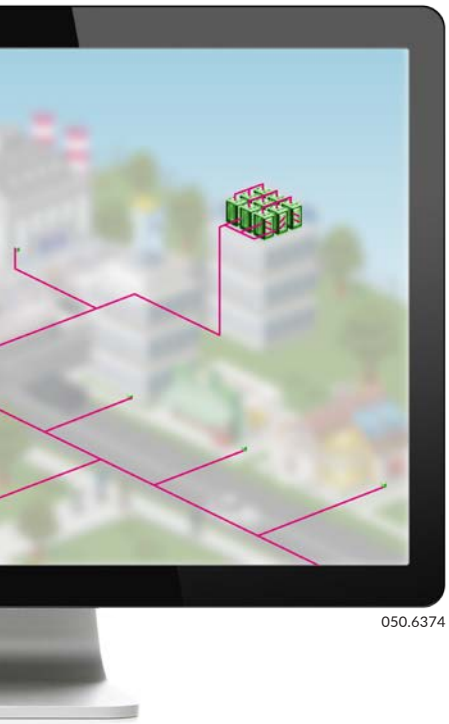

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Figure 4: Digital image with the addition of the acquisition of environmental influences.

the monitoring and digital representation of network infrastructures. This will provide opportunities for new business models which users can deploy to increase the profitability of infrastructures.

Planning in a differentiated manner

Experiments by R&M have shown that interfaces have to be planned in a differentiated manner between the physical and digital world to be able to establish a complete and functioning digital image. From one project to the next, there are different requirements and solutions for the sensor networks and connection technique. Media discontinuities should be avoided. The digital chain and the interoperability have to be designed continuously.

New developments or product adaptations may be necessary.

Detailed consultation and evaluation should take place before planning starts. This is why we recommend planning relevant projects with an experienced partner such as R&M.

The way to a digital image

Using maps as an example, it is easy to see how a digital image of the physical world is created. People used physical maps for a long time to plan their journeys. These maps were out of date very quickly and cannot provide information about the current situation on the roads.

The digital image of a map provides a whole range of useful information:

- Digital maps naturally know all roads and the entire geography.
- They feed navigation devices, smartphones, computers etc.
- They show construction work, traffic jams etc. in real time.
- They can provide alternative routes and tell you about a range of options using different public transport services.
- They enable the forecast of traffic jams, repairs etc.
- They can support individual interests, such as looking for shops and restaurants.
- They can work together with other cyber physical systems, with sensors, controls, machines, databases etc.
- They support business processes, administrative and organizational tasks etc.

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Masterpiece
in the City of London

This impressive stainless steel block is writing architectural history. 5 Broadgate in the City of London sets new standards in terms of bold design, sustainability and functionality. The project partners – including the cabling experts from Redstone and R&M – created a unique building for the new London headquarters of the financial services company UBS.

Photographer: John Madden, johnmaddenphoto.com

The IT infrastructure required to accommodate 6000 workstations and a state-of-the-art building management system (BMS) is as impressive as the twelve-story building itself. Working together, R&M and installation partner Redstone Converged Solutions Ltd ensured that the design criteria specified by UBS were implemented to meet the current and future needs of the business.

The structured cabling system at 5 Broadgate includes more than 63000 Class EA links, 126000 shielded Cat. 6_A EL connection modules and 3000 km of cable from R&M. R&M and Redstone worked closely together to ensure the specification required by UBS was not only 10Gb Ethernet compliant throughout but also met the growing demands of Power over Ethernet (PoE).

Speed of installation was paramount for a project of this size and R&M was well placed to develop and customize products to assist in this process. UBS had very specific requirements with respect to the longevity, aesthetics and functionality of the desired GOP. R&M, Redstone and UBS designed a GOP that is tool free, robust and allows color identification for the associated equipment room at outlet level. These purpose-designed Grid Outlet Points (GOPs) make it possible to pre-terminate and Redstone seized the opportunity to construct over 11000 pre-terminated GOP boxes for both high and low level positions. Each GOP box was fitted with six or four RJ45 connections using an angled LJU6C shutter to eliminate any bend radius considerations. The removable mounting plate was pre-installed by the furniture supplier which ensured all GOPs were in the same position and allowed the pre-terminated GOP to snap into position. This method enables easy relocation for Moves, Adds & Changes (MACs).

A logistical tour de force

One of the greatest challenges was seen in logistics. Space in the City of London is at a premium, with hardly any storage areas on site for building and installation materials. The construction work had to have no impact on the neighborhood and environment, while the companies at work had to minimize journeys and waste as far as possible. With pre-termination works commencing in April 2015 and practical completion scheduled for July

"The development of such an impressive new office signals the continuation of UBS's long and successful relationship with the UK, the City of London and Broadgate."

Ulrich Koerner, CEO UBS Group EMEA

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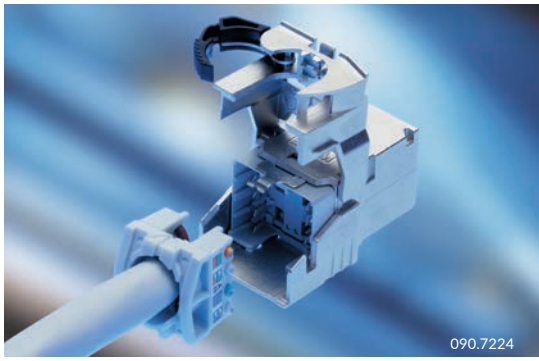
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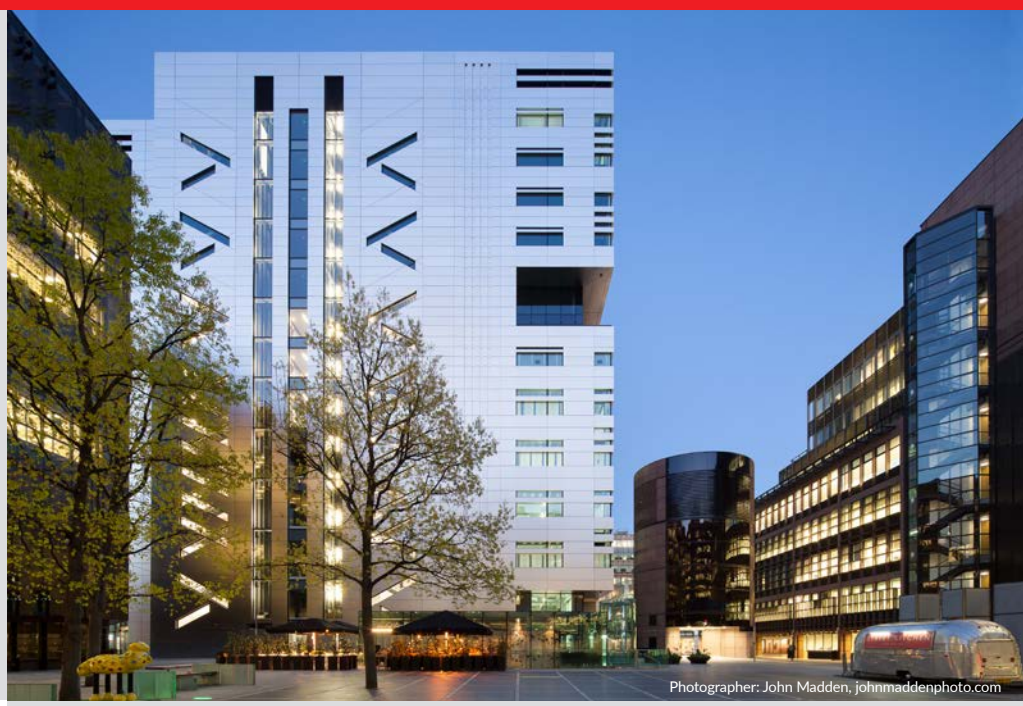
Added value

5 Broadgate in the City of London demonstrates the following:
- R&M's expertise and ability to meet the demands of major projects
- R&M's ability in providing and coordinating multinational teams
- R&M's commitment to provide high-end technical support to the client
- R&M's customer-specific range of services

The R&M solution for 5 Broadgate

Structured LAN cabling with 31 800 Class EA links, comprised of:
- 340 km shielded Cat. 6_A loomed 6-fold cables
- 179 km shielded Cat. 6_A loomed 4-fold cables
- 324 km shielded Cat. 6_A cables
- More than 3000 km Cat 6_A cables
- More than 125000 shielded Cat. 6_A EL modules


Photographer: John Madden, johnmaddenphoto.com

A huge engine made from a single block

The £500 million building 5 Broadgate in the City of London is the work of star architect Ken Shuttleworth and his team from Make Architects in London. It is the largest office building of its kind in London and one of the world's largest buildings with stainless steel cladding.

The goal of the architects was to build a perfect "machine" for the financial sector. The idea was for the building to look like a high-precision steel engine made from a single piece of cast metal – with an aura of reliability and solidity. The result is an ambitious, highly functional, world-class office building. For Ken Shuttleworth, this project marks the beginning of a new era of sustainable architecture and workplace design – and a quantum leap for the global financial hub of the City of London.

In 5 Broadgate, UBS is amalgamating all of its trading activities in London and other business areas for the first time. It shows a clear commitment to the City of London as a financial hub with a major future.

The intensive use of the building required an appropriate data network provided by a trusted manufacturer. The cabling had to meet the extremely high quality and security standards set by the financial services company. The LAN had to be both sustainable and future-proof, meaning it can be used for years to come with current and future transmission parameters. Due to these challenging requirements, R&M was chosen as project partner.

2016 it was essential that the processes and close contact between R&M and Redstone were strong to guarantee the constant flow of materials to the project ran as precisely as a Swiss watch.

This logistical tour de force succeeded thanks to the outstanding, seamless cooperation between R&M and Redstone. Moreover, R&M put together a multinational team which dealt exclusively with the project at 5 Broadgate which included Global Key Account Management, R&M Market Organizations in Western Europe and the United Kingdom, Customer Project Management and Product Development at R&M headquarters.

The team at the Redstone facility in Beckton worked closely with their design team to pre-terminate the GOPs in the required lengths and to a pre-defined schedule to meet the demands of the project program. Supported by R&M local technical personnel as well as the technical support and training team from Switzerland, UBS was assured of the quality and performance of the pre-terminated assemblies.

Solution for long distances

The enormous scale of the UBS headquarters posed further challenges for the design of the cabling system. Due to the building ensemble at Broadgate Circle, the architects at Make were not able to plan a skyscraper. Instead, the idea was to build a "groundscraper" limited to twelve floors and stretching out over a huge area. 5 Broadgate has a usable space of 65000 square meters (700000 square feet).

By its nature, the implementation of a groundscraper means that Redstone had to plan some overlength cables. Every effort was made to ensure cable lengths met standards. However, in the rare case that a cable was over length, R&M was happy to certify and cover under its system warranty. Support of overlength runs and the effects of temperature increases as a result of Power over Ethernet were a key consideration during the tendering process and the ability for R&M to support both these requirements was one of the decision factors for UBS choosing R&M. Even so it was necessary to work closely with UBS and Redstone to form a well thought-out design of the cable runs to ensure ultimate performance.


050.5753

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Netscale:
New Benchmark in the Data Center

Data centers are wanting to pack more and more FO ports into their network cabinets. And that is why R&M has developed a new Ultra High Density (UHD) platform: Netscale. With 120 ports per unit, the system is setting a new benchmark.

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The R&M development team has once again achieved a quantum leap in fiber optic cabling technology. Netscale offers the highest port density of all patch panels available on the market with up to 120 ports per height unit in a 19" rack. The Ultra High Density (UHD) system is setting a new benchmark for data centers.

Netscale launch at DataCentre World in London, April 2016.

More than 5000 ports can now be accommodated in one cabinet. For example, up to 67 percent more LC ports fit into Netscale patch panels than with conventional platforms. That beats the best solutions known to date by 14 percent. The platform is available as a version for one and for three rack height units.

Migration-capable solution

The modular construction of Netscale and the intuitive operation of the housing's tray technique make it possible to retrofit cabling fast and adapt it to new requirements. For example, the migration of LC connections for 10 Gigabit Ethernet (10G) to MPO connections for 40G and 100G can take place in a comparatively short time.

The Rear-Cabling Manager allows pre-installation of the FO connections outside the cabinet. This is particularly interesting when setting up efficient edge data centers, for example, because some installations have to take place in tight spaces.

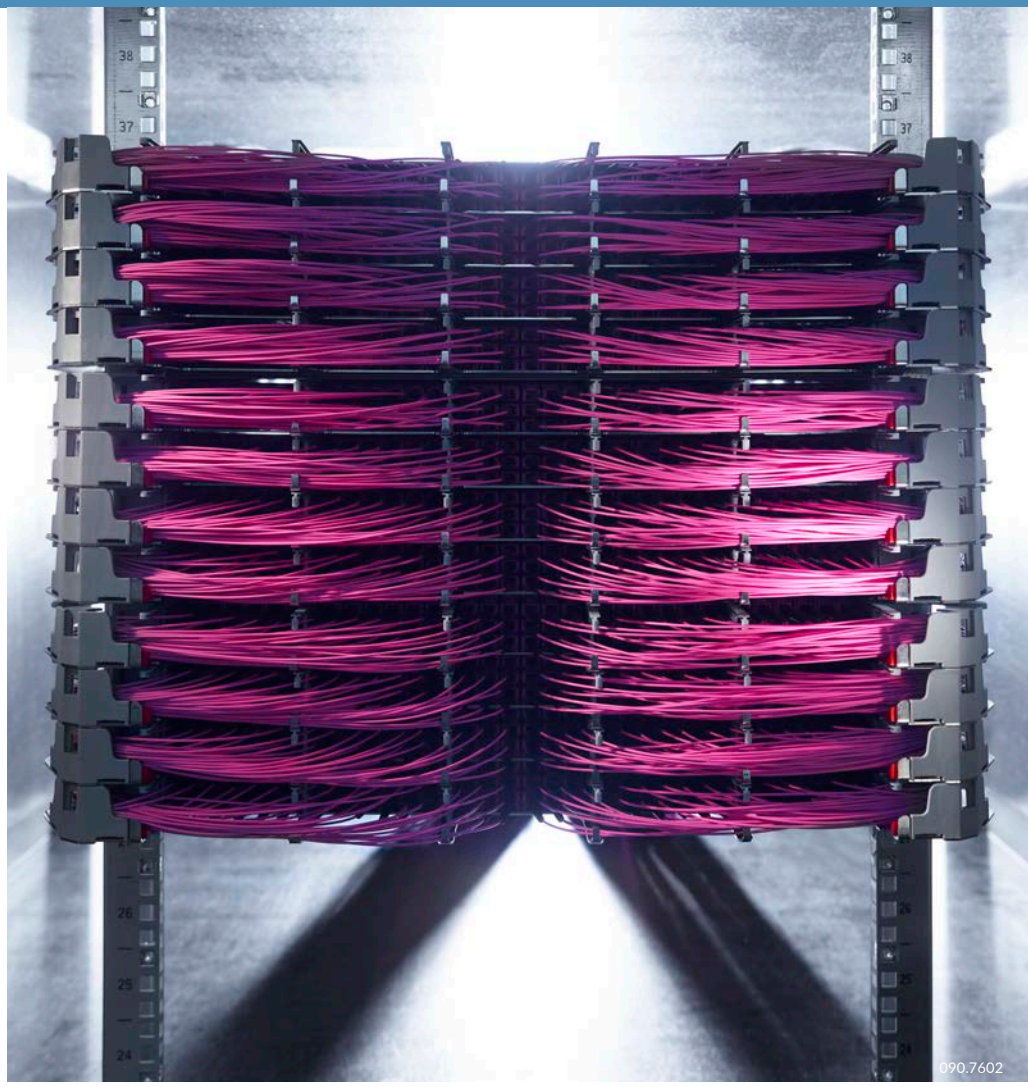
An operational test with edge data center operator Cloud&Heat Technologies GmbH in Dresden, Germany, confirmed that Netscale fulfills the specific requirements (see page 21). In the edge data center, Netscale makes it possible in most cases to consolidate all servers of a point of presence in a 1U housing. This leaves more space for switches and routers. The high density makes it possible to minimize the meet-me-room area and thus gain space for further racks and switches. Software Defined Network (SDN) architectures can be planned more sensibly.

Further areas of implementation for Netscale are hyperscale, co-location and enterprise data centers.

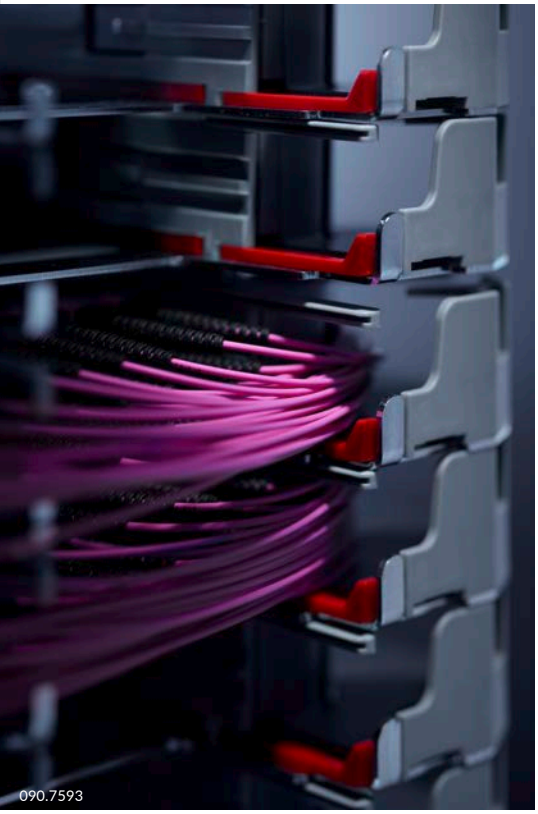
Fiber-protecting assembly

The tray technique and the Rear-Cabling Manager are just two of the innovative system features. Whereas to date tray inserts typically with a depth of 10 to 15 centimeters stress patch cords, Netscale only requires a depth of 5.5 centimeters.

Tray technique and cable management are organized to ensure a gentle radius for FO cables. This avoids performance limitations and damage, and thus downtime. The distribution modules with their 0.35 dB insertion loss are also setting a new benchmark. Due to the signal quality, bi-directional links now work over longer distances. R&M also has corresponding trunk cables with parallel optical connections in its portfolio.



Netscale from R&M – the fiber optic solution with the greatest 10/40/100GbE density.



Netscale patch cords with push-pull technology reduce cable volume by 30 to 56 %.

User-friendly connectors

Part of the Netscale solution is the new fiber optic connector LC-Quick Release (LC-QR) combined with a lean Uniboot patch cord. R&M supplies the Netscale patch cord with a diameter of 1.4 millimeters. The LC-QR is plugged in and unplugged using an integrated push-pull mechanism.

Operation takes place via the Uniboot and boot so fingers have sufficient space to move in. A technician does not have to reach forward to unlock the connector. This solution permits immense packing density.

Furthermore, the Netscale solution comprises a transparent front cover, distribution modules in tray form with MTP® connections, fan-out boxes and guides for cable management on the front and back.

RFID components for automatic port monitoring with the network monitoring system R&M*inteliPhy* are also available. Netscale allows automated infrastructure management (AIM) to be retrofitted. The functions can be extended on a step-by-step basis. R&M*inteliPhy* makes it possible for administrators to monitor and document the increasingly complex FO infrastructures in real time.

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Long-term Project: Kraków Airport

Reliable Technology – Reliable Partner

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Concepts fit for the future, long-lived products and long-term, trustworthy cooperation throughout several periods of expansion: R&M was able to make use of all the advantages of the R&M*freenet* program in the expansion of Kraków Airport.

The airport is currently undergoing the biggest construction process in its history targeted for a doubling of the annual capacity. It bears the name of the "Polish Pope", John Paul II, and is viewed as the gateway of southern Poland to the world. The goal of the operating company, John Paul II International Airport Kraków-Balice Ltd., is to become a leader among the European regional airports in terms of quality of service. Customer satisfaction and business success depend on its achieving this goal.

Farsighted planning

The first stage involved expanding the passenger terminal and setting up the internal transportation system as well as enlarging the airfield, modernizing the taxiways and constructing a hotel. The next task is to renovate the old terminal area. It will be connected to the new part to allow the convenient processing of as many as 6.5 million passengers a year. In addition, provisions are being made for possible ways of expanding to a capacity of eight million passengers. The airport operator is planning for the long term.

The growth rates substantiate these plans. In June 2016, for instance, the airport recorded a 13 % increase year on year: About 460 000 passengers landed in Kraków or took off from Kraków for a major European city.

When the initiators began the long-term project in March 2012, they were guided by sober, realistically based planning rather

Kraków Airport

Kraków Airport is situated 11 km from the city center and has a catchment area of 11 million inhabitants within a two-hour drive. In 2015 the airport welcomed over 4.2 million passengers and provided connection to almost 70 destinations such as Frankfurt, Amsterdam, London, Paris and Rome, operated by 18 airlines.

€120 million have been invested at Kraków Airport in a vast modernization, including extension of the passenger terminal, new taxiways and apron expansion.

In May 2016, at a general meeting of shareholders, plans were approved to build a new runway. The estimated PLN 250 million (€60m) investment in the new runway is planned to be completed by 2021.

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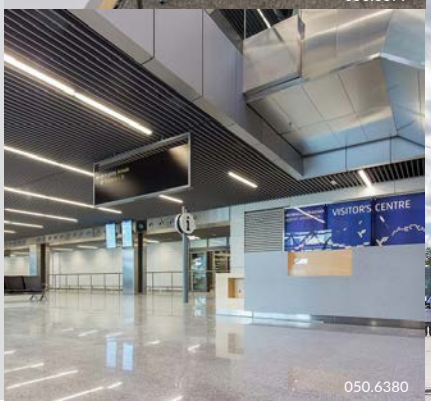

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than grandiose ideas. R&M and qualified installation partners were contracted to do the cabling for the communication networks. These networks include the local area network (LAN), closed-circuit television (CCTV), the wireless local area network (WiFi) and the flight information display system (FIDS).

There are two reasons why R&M landed the contract: The first reason is the long-standing, trustworthy collaboration between R&M and the airport operator. The second is the positive experience that the operator has had with the existing R&M*freenet* installation – it too is designed for longevity. Large parts of the existing cabling can continue to be used and integrated seamlessly into new structures in the modernized or newly built areas. This advantage had a considerable effect on costs.


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R&M*freenet* as a long-term solution

The tool-free connection technique also has to be kept in mind: This feature was a major time and cost factor given the 66 km of Cat. 5e cabling and 95 km of Cat. 6 cabling involving 1800 and 2000 connections (drops), respectively. And finally, the longevity and flexibility of the modular R&M*freenet* product line supported the farsighted planning. The airport operator can change, migrate and expand the networks at any time. They can be adapted to meet future requirements quickly and without any trouble.

The Kraków-based company DYSKRET POLSKA Spółka z ograniczoną odpowiedzialnością was commissioned to carry out the installation as a subcontractor. With more than 25 years of experience in the installation of security management solutions and in system integration, Dyskret is a very competent partner. In this smooth collaboration, the Dyskret installers mastered all difficulties associated with the project at all levels. They effectively tackled the logistical challenges together with R&M.

After the successful completion of Kraków Airport 2015, R&M had already landed the contract for the next project, which entailed equipping the flight control tower with Cat. 6_A/s ISO cabling. The intelligent R&M*inteliPhy* infrastructure management system will be employed in this context.

THE R&M SOLUTION

- Copper cables: F/UTP Cat. 5e, F/UTP Cat. 6
- Optical fiber cables: OS2, OM3
- Patch panels: Global 2U and 3U
- Fiber modules: OS2, OM3


050.6382

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Fiber Optics:
Testing, Cleaning, Inserting

Contamination can be a death sentence for fiber optic connections. If you are not careful with fiber optic connections, you are not just risking signal and performance loss, but in certain circumstances total destruction. Therefore: Make sure checking is your first step!

050.6357

The performance of an optical fiber system depends very much on the purity of the interfaces. Small particles of dirt, grease, dust etc. can negatively impact transmission characteristics and even destroy a fiber optic connection depending on the circumstances. The connector can "burn" as they say in the trade. If the connector is plugged in without first testing, it could well be too late. The high pressure in the connection means that particles are immediately pressed in and this causes irreversible damage.

It is particularly the constant increase of data rates that is making transmission quality more sensitive to dirty connections – even with multimode! This is why it is becoming increasingly important to test all connectors and adapters, and, if necessary, to clean them before they are mated. In this case, both sides of a connection including the guide sleeve should be cleaned. The standard IEC 62627-01/TR describes the cleaning methods for fiber stub areas.

Faults often occur on site

New connectors should also be tested and, if necessary, cleaned. This is the best guarantee for a reliable optical network. Because various studies have shown that up to 85 % of local faults are caused by connectors that either have not been cleaned carefully or have not been cleaned at all.

However, it is an erroneous belief that every connector should always be cleaned before being plugged in. Most connectors actually arrive at their place of deployment in the pristine state in which they left the production facility of conscientious manufacturers such as R&M. In such cases, the installer can actually only make the quality worse by cleaning the connector. The rule should be not "always clean before you plug in" but in fact "always test before you clean".

For this reason a microscope or a similar test tool should always be available when carrying out installation work. A minimum 200-fold enlargement is required for the visual surface test. Use a lower resolution for a simple dirt check in the field.

A recent whitepaper by R&M explains why the purity of the fiber stubs is of such great importance for signal transmission. The document provides information on test criteria and cleaning methods. It can be downloaded from the company's website www.rdm.com.

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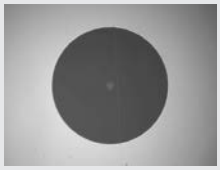
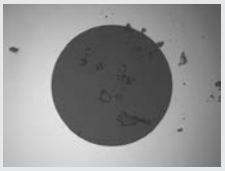
Sample results of a surface check

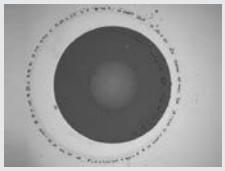
Perfect



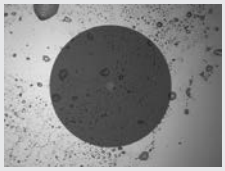
Scratch in area „A"



Dirt particles



Traces of water



Grease (e.g. fingerprint)

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WARP Cables
Keep Cool

How much do R&M's unshielded WARP cables heat up when using Power over Ethernet? R&M wanted to know more about this. The result of the test: WARP cables keep cool. And that brings a number of advantages for network planning.

Cat. 6_A U/UTP WARP cables supplied by R&M dissipate heat more effectively than conventional unshielded cables when using Power over Ethernet (PoE). They behave just as well as shielded cables. The comparison showed: In large installations involving massive cable bundles and PoE operation, a WARP cable can heat up as much as 14° C less than unshielded U/UTP cables. The link can therefore be up to 11 % longer.

IEEE, the standards organization, is currently working on markedly increasing the transmittable power supply of PoE. The new 4PPoE protocol will make two new levels of power available: 55 W (level 3) and 90 to 100 W (level 4). Up to one ampere can flow via each twisted pair. This means that network planners will have to pay even closer attention to potential cable heating through PoE in future.

Temperature rise in bundles of data cables when using Power over Ethernet

Parameter	Value
Bundle size	37
PoE power	0.45 A
Cable types, AWG, category	**Factor**
U/UTP 23	4.09
F/UTP 23	3.31
U/UTP WARP 23	3.13
S/FTP 23 Cat. 6_A	2.69
S/FTP 23 Cat. 7_A	2.56

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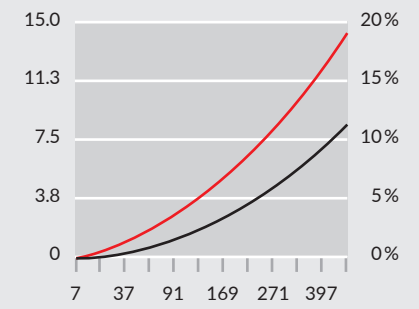
The comparison shows that when Power over Ethernet is used in the local data network, R&M WARP cables behave just the same as shielded cables. They experience a smaller rise in temperature than conventional unshielded cables.

Difference between U/UTP and WARP



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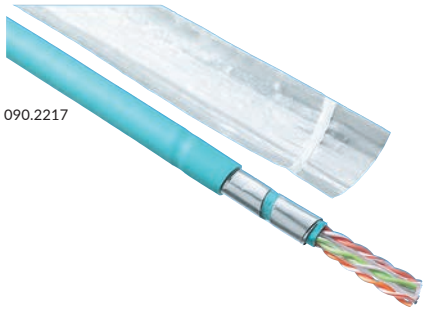
The curve in the comparative test underscores the favorable thermal behavior of R&M WARP cables when Power over Ethernet is used in the local data network with larger cable bundles. In this case, WARP cables allow a transmission distance that is 11 % longer than conventional U/UTP cables.

The relevant draft standards ISO/IEC TR 29125 and Cenelec EN 50174-99-1 already describe the cable bundle temperature rise to be expected when using 4PPoE. In a cable bundle consisting of U/UTP cables, the temperature rises by up to twice as much as in a comparable bundle consisting of S/FTP cables. In shielded cables, the metal in the shield helps to transport the heat out of the bundle to the outside.

WARP cables are indeed classified as unshielded UTP cables, but their jacket contains non-continuous shielding sections. These short metal foil segments (wave reduction pattern, WARP) suppress crosstalk between adjacent copper cables (Alien NEXT) very effectively. This is why WARP technology is suitable for manufacturing particularly thin installation cables for high-performance data transmission with 10 Gigabit Ethernet (10 GbE). The WARP shield does not have to be grounded, which saves on installation costs.

With an R&M WARP cable, you have not only the ideal solution for Alien NEXT, but the cable also offers decisive advantages with respect to conventional U/UTP cables when using PoE. Under certain circumstances, the temperature difference and the longer link which can be achieved may decide whether a specific installation functions or not. This has a role to play, especially when the local data network is intended to carry both the higher, sensitive bandwidth with 10GBaseT and PoE over longer link lengths.



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R&M's WARP cable is an unshielded data cable with foil segments in the jacket that are designed as a non-continuous shield and attenuate alien crosstalk. A test has now shown that the temperature behavior of the WARP cables can also be evaluated favorably when using Power over Ethernet. They behave just like shielded cables.

050.5749

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Special Cabling Solutions
for Healthcare

R&M is extending its portfolio of special solutions in the healthcare sector to ensure safe networks in clinics and protection for patients, staff and data. Its latest development is the antibacterial R&M*healthLine* range for patients' rooms.

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According to the World Health Organization (WHO) around 16 million people die every year from infections contracted in hospitals. An enormous number that has to be reduced with appropriate measures. In a modern hospital room, data connections for connecting computers, medical devices, telephones and multimedia devices are standard. Due to where they are used, these connections are positioned near the patient's bed. Whereas the patients change, these cables stay where they are. To reduce the risk of a possible cross contamination with germs from one patient to the next with patients touching cables and outlets, R&M has developed an antibacterial cabling solution for clinics. The new R&M*healthLine* range is the first complete and consistent cabling solution comprising all components that can be touched by the patient. The materials used for the outlets and patch cords feature additives which are harmless for the patients and which prevent bacteria and germs from settling on them. The efficacy of the products was successfully proved with the help of the bacterial strains Staphylococcus aureus and Escheria coli in laboratory tests complying with ISO 22196.

The R&M*healthLine* range offers the same installation and user friendliness as well as transmission performance as standard products. It is compatible with the modular cabling system R&M*freenet* that covers all areas of structured building cabling. The following in particular are part of the antibacterial network equipment for patients' rooms:

- Outlets with RJ45 jacks;
- Shielded Cat. 6 and unshielded Cat. 6 patch cords;
- Shutters for unused data ports.

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Galvanic isolation

The relevant standards (IEC 60601-1-1) require a different protection for operating theaters and treatment rooms. Medical devices and data networks have to be galvanically isolated at such places of use to protect patients from any possible overvoltages. R&M has developed a solution for this, too: the maintenance-free R&M*safeLine* network isolation module.

It can be installed in existing LAN outlets and takes care of the galvanic isolation of the data lines. That saves costly solutions on the side of the medical equipment and ensures uninterrupted data transmission. R&M*safeLine* is not dependent on a particular device, does not require any software or its own power supply, and is also compatible with the cabling system R&M*freenet*.

Maximum safety required

Reliable data and communication networks are absolutely vital for any institution in the healthcare sector. The IT cabling system supports many applications at the same time: clinic information systems (CIS), electronic patient records (EPR), image-based digital archives (PACS), HD video transmission for training sessions and remote consultations, telemedicine, alarms, office programs, file and print services, Voice over IP, WLAN, IP-based monitoring and security systems, as well as energy, climate and building management, etc. The applications generate many gigabytes of data material every day. In turn, data has to be reliably accessible in milliseconds, from any computer on the clinic campus.

In addition, there are requirements for compliance, risk and quality management in accordance with ISO 80001 or ISO 27001. These standards demand failsafe IT infrastructures. For example, clinics have to ensure that the operation of medical, administrative and multimedia applications is clearly separated. The R&M security system supports this goal with color coding, shutters and labels to mark the different connections.

With mechanical locks for LAN connectors, the highest level of the security system prevents misuse or errors when cables are unplugged or plugged. Only authorized people can open the locks. This means clinics can take steps to physically ensure that data connections are not interrupted unintentionally or negligently.

The highly reliable R&M*freenet* system with its special solutions which address specific problems during operation makes R&M the ideal partner for healthcare projects.

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The FTTx Recipe for Success at Swisscom

Network operator Swisscom is catapulting Switzerland into the future of broadband at great speed. For decades now, Swisscom has placed its trust in cabling systems from R&M when it comes to network expansion. In the current FTTx technology mix, custom solutions developed by R&M are playing a major role.

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Switzerland has one of the best telecommunications and broadband infrastructures in the world, something proved by countless studies. But that is no reason for Swisscom, the leading national Swiss network operator, to sit back and "put its feet up": Instead the network operator is driving network expansion forward. Because needs are increasing. Every 16 months, the volume of data transmitted in the fixed network doubles.

Strategy: everything from a single source

Every community in Switzerland should have access to a virtually full-coverage ultra-broadband service. That is the goal. This is why Swisscom invests more than 1.7 billion Swiss francs every year in its IT and infrastructure. This means customers benefit from bandwidths of up to 1 Gbit/s in the fastest FO network in Switzerland. By the end of 2020, 85 % of all Swiss households will have a fixed network connection of at least 100 Mbit/s.

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Future-proof technology mix

Swisscom is relying on a unique technology mix to ensure a fast, full-coverage ultra-broadband service. In large urban areas on FTTH for example. Together with cooperation partners, Swisscom had already reached its long-term goal of one million FTTH connections at the end of 2015.

Outside the agglomerations, Swisscom has been relying on Fiber to the Curb (FTTC) and vectoring since 2014. The vectoring technology makes it possible to reduce signal crosstalk on copper cables. This enables bandwidths of up to 100 Mbit/s.

G.fast is also used. This makes bandwidths of up to 500 Mbit/s possible on existing copper cabling. The ITU-T standard G.fast is based on vectoring and enables data transmission over existing copper cabling. Since G.fast only works on short lines, Swisscom combines this solution with the Fiber to the Street and Fiber to the Building network architecture (FTTS

The Swisscom technology mix

Today there are already over one million Swiss apartments and businesses equipped with fiber optics from Swisscom right down to their basements. Swisscom's technology mix for broadband provision in the country comprises the following sectors:

Fiber to the Curb (FTTC) – fiber optics with around 750 meters to the properties.
On the market since 2006. With up to 100 Mbit/s (vectoring) since 2014.

Fiber to the Street (FTTS) – fiber optics with around 220 meters to the properties.
With up to 100 Mbit/s since 2013. With up to 500 Mbit/s (G.fast) from the end of 2016.

Fiber to the Building (FTTB) – fiber optics to the basements of properties.
With up to 100 Mbit/s since 2013. With up to 500 Mbit/s (G.fast) from the end of 2016.

Fiber to the Home (FTTH) – fiber optics right into residential properties.
Since 2008. Up to 1 Gbit/s.

Fiber to the Office (FTTO) – fiber optics to the workstation.
Since 2008. Up to 1 Gbit/s.

Photo: swisscom 050.6352

and FTTB). In the spring of 2015, Swisscom tested the world's first customer connections with G.fast. The implementation of G.fast in the mass market should be in place by the end of 2016. In this process, Swisscom is the international leader.

With its continuous investments in its own network and in the latest technologies, Swisscom guarantees a secure solution for home connections long term. Thanks to the extensive technology mix, 97 % of all apartments and businesses throughout the country have broadband Internet. More than 93 % can use digital TV (e.g. Swisscom TV 2.0) with around 91 % being able to use digital TV in HD quality.

Long-term customer relations

Swisscom has been relying on solutions from R&M for several decades now when it comes to passive infrastructure. The successful collaboration centers on the operative business as well as strategic projects. Multiple products were developed in close collaboration with those in charge at Swisscom. The focus was always on optimally satisfying the needs of Swisscom with custom-made products and solutions.

Currently R&M is developing new fiber optic solutions for the FTTx expansion as part of the collaboration. "In the entire technology mix with FTTH, FTTC, FTTS, FTTB and FTTO, products from R&M are an important component of Swisscom infrastructure," says Maurizio Della Mura, Head of New Building Marketing at Swisscom.

Space for innovation

In summer 2016, Swisscom opened a workshop for creative developments in the town of Biel. The interdisciplinary co-space project is intended to bring forth ideas for a networked, digital world. R&M provides the passive system solutions for this exemplary and pioneering project.

"La Werkstadt" is the name given to the innovative center. This term, created from the German words Werkstatt (workshop) and Stadt (town/city) shows just what happens in this building: People and companies with all kinds of interests meet here to bundle their experience and knowledge. Freelancers, students, lateral thinkers and people interested in technology find their workshop at La Werkstadt to work on their ideas for the future.

To enable new forms of collaboration, you need an efficient network based on state-of-the-art technologies. The LAN in La Werkstadt is available to project members, partners and Swisscom employees for much more than just work purposes. An exploratory tour around the basement reveals innovations from the worlds of cell phones and fixed networks, all made physically accessible. You will also find project teams from Swisscom and external partners here. Here too, R&M solutions are in evidence.

In the spacious co-space, Swisscom provides project members with a meeting zone. This is where there is an exchange of visions, ideas and capabilities. "You'll see a graphic designer swap ideas with a network specialist, or a Swisscom project lead with students from the University of Bern," explains Heinz Herren, CIO and CTO of Swisscom. "This is how we make space for innovative projects and as yet undreamed of synergies in collaboration."


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Keystone Adapter
Optimized for Cat. 6_A Modules

An optimized Keystone adapter now enables even better integration of R&M's Cat. 6_A top-performance modules into outlets and panels with Keystone cut-outs.

R&M has revised the Keystone adapter for RJ45 connection modules Cat. 6_A EL and Cat. 6_A. The design made of plastic, clamping springs, and shield springs has been even more precisely tailored to the needs of installers. The development had two objectives:
– universal compatibility and
– a secure hold with a perfect fit
had to be ensured in all outlets and patch panels with cut-outs in the European Keystone format in accordance with the IEC 60603-7 standard.


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The solution to the development objective comprises small, strong clamping springs. They are permanently integrated into the adapter and fix the component in place when it is pushed into the outlet box. The clamping springs compensate for any differences in size that may occur with different manufacturers. This means the R&M modules have a firm grip even in any Keystone outlets that may be supplied by third parties. This gives planners, installers, and their customers two advantages:
– Greater freedom of choice in designing LANs, offices, and business premises;
– One-hundred percent certainty that the network connections are stable.

The innovative shaping of the adapter's snap mechanism holds the RJ45 module particularly securely in the outlet and, if required, can also be provided with additional protection effective against dust.

The Keystone adapter's shield spring was also optimized. Cat. 6_A EL and Cat. 6_A ISO modules are now easier to install in 19" panels in combination with the adapters. Disassembly is also as easy as can be, simply activate the snap element.

The shield spring in the adapter means one-hundred percent shield termination and earthing of the RJ45 modules are permanently ensured in accordance with the standard. This means the Keystone adapter is ideally suited for combination with R&M's sophisticated shielding technology.


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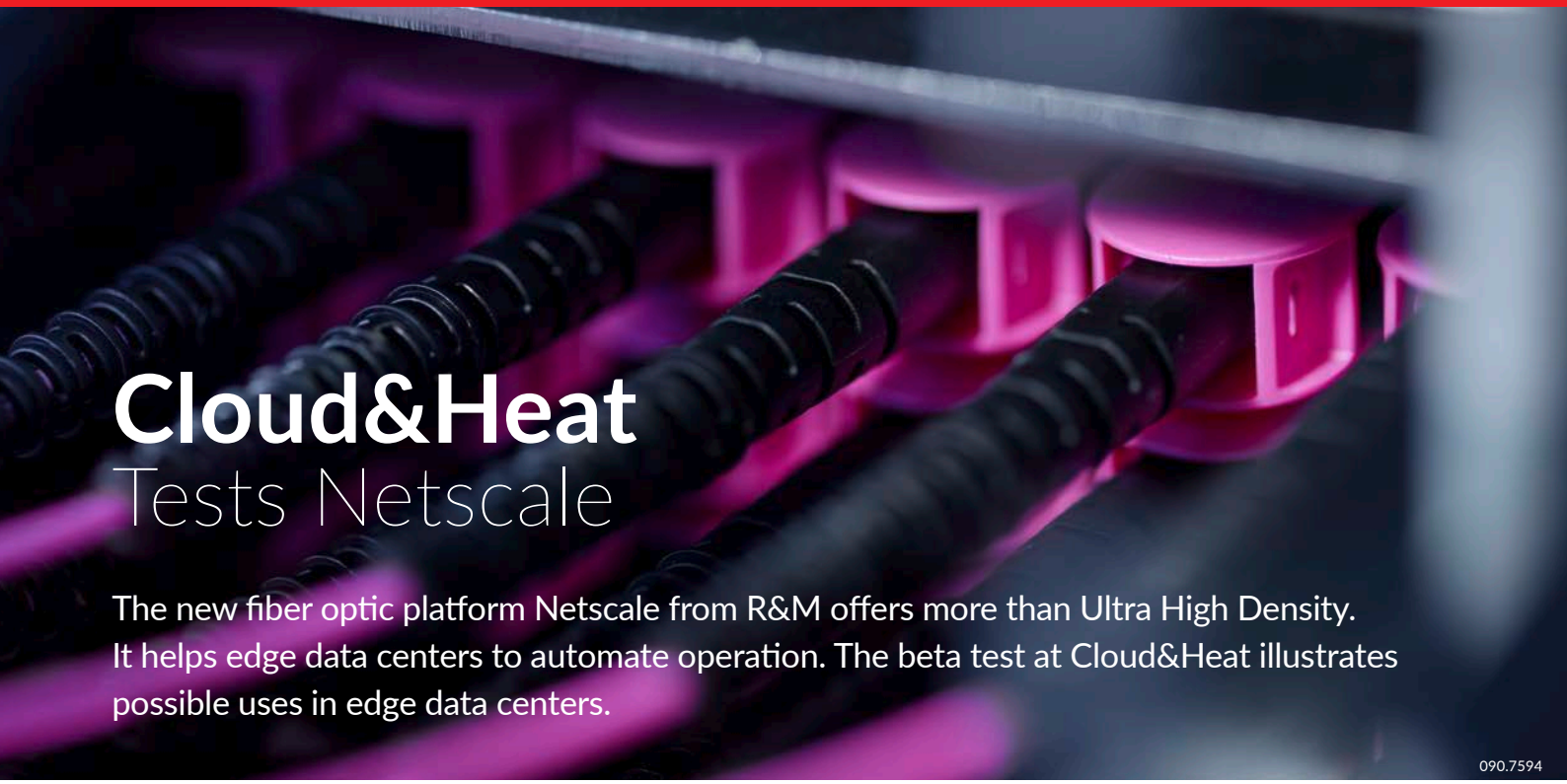

Cloud&Heat
Tests Netscale

The new fiber optic platform Netscale from R&M offers more than Ultra High Density. It helps edge data centers to automate operation. The beta test at Cloud&Heat illustrates possible uses in edge data centers.

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The multi-award-winning business idea of Cloud&Heat Technologies GmbH in Dresden, Germany, proposes an unusual approach to the future of data centers. Cloud&Heat specializes in the setup and operation of efficient edge data centers that provide computer capacity decentrally and at the same time heat buildings. The company is aiming to realize the most efficient distributed data center in the world in terms of energy and costs as well as the first real-time-optimized edge cloud in Germany.

Because edge locations in the basements of residential and non-residential buildings are usually limited in terms of space, Cloud&Heat was looking for innovative infrastructure concepts. The company is experimenting with compressed, centralized and automated architectures. This is why the new cabling system Netscale from R&M was tested in practice in the spring of 2016.

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Netscale fulfilled three important criteria for Cloud&Heat: The platform is compact, and both easy to scale and install. "As an innovative company with challenging data center projects, we are dependent on scalable fiber solutions that can be deployed in confined spaces," says Dr. Marius Feldmann, COO at Cloud&Heat Technologies.

R&M*inteliPhy* in the edge data center

For Netscale R&M also provides RFID components for port monitoring with the network monitoring system R&M*inteliPhy*. It is the first Ultra High Density platform with integrated functions for intelligent, automated infrastructure management. "Netscale can support us in fully automated operation of our cloud," said Dr. Marius Feldmann of the results of the beta test in Dresden.

This is also why Netscale fit into the Cloud&Heat architectural concept because Top of Rack (ToR) switches can be consolidated in the network cabinet and servers directly patched in the network cabinet.

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R&M*inteliPhy*: Versatile Reporting and Mobile Data Recording

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The R&M*inteliPhy* Automated Infrastructure Management system offers versatile reporting. It provides comprehensive support for data centers in terms of controlling resources and capacity planning. A reader for mobile data recording is the latest addition.

Automated Infrastructure Management (AIM) in the data center needs a lot of information in real time. The only way to achieve the required efficiency and reliability is through total visibility of the networks. However, the R&M development team also thought of many practical requirements of day-to-day data center operations when planning the R&M*inteliPhy* AIM system. The report generator integrated into R&M*inteliPhy* is designed to support the greatest possible number of network administration work processes and to be capable of use in a completely individual way.

This means that users can create individual reports with a few clicks of the mouse which present the status of their data center in just the way they need to. Some examples of applications are as follows:
– Inventories of network cabinets;
– Cabling lists;
– Reports on resource utilization.

The reports enable targeted searching for available resources. They answer questions like these: "Where do I have enough space to install a 13U high router?" The results are available in table format or as a graphic.

R&M*inteliPhy* can create trendlines to track data center development over a defined period of time. These trendlines provide valuable information about future bottlenecks and help management tackle appropriate extensions in good time.

RFID reader

R&M has launched an RFID reader to facilitate data recording in data centers. The pen-shaped reader enables RFID tags to be read on R&M*inteliPhy* patch cables for control purposes, without having to remove the cables from the patch panel.

The integrated Bluetooth interface connects the reader to a PC, smartphone or tablet. This means that information contained on RFID tags, such as serial numbers, can be read quickly and accurately on site. This information is then available on the R&M*inteliPhy* server and can for instance be transferred to reports.

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Arguments
for Passive Optical LAN

Cabling systems with Passive Optical LAN (POL) have a number of advantages. But often discussions about POL focus simply on the potential savings in comparison to the costs of traditional structured copper cabling. And that does not describe the full extent of the potential of this FO solution.

Comparative calculations from R&M based on reference projects show that potential savings are actually often lower than expected when everything is looked at from a realistic point of view. The time and effort involved in ensuring the reserves, redundancies and ease of comfort usually desired in the office environment increase the level of investment required for POL cabling. The focus should therefore not primarily center on cost. The advantages of POL cabling are to be found in other areas.

Five arguments for POL:

Large distances
POL is outstanding on extensive premises with a relatively low connection density because of the greater transmission distances. Typical examples include campus networks for universities, clinics, hotels, canteens, halls of residence, trade show complexes, conference buildings and shopping malls.

Easy planning
Fiber optic cables are lighter and more slimline than copper cables. Smaller minimum bending radii facilitate the laying and routing of cable around obstacles. And electromagnetic compatibility does not have to be taken into consideration. That simplifies routing and does away with shielding.

High bandwidth
User behavior means that it will be necessary to provide ever greater bandwidths in the future. Singlemode fiber optics makes the network future-proof per se. There is no other medium which can transmit higher bandwidths. The cabling can cope with any upgrade; it is only the electronics that has to be renewed.

No floor distributor
Telecommunication rooms and distributor halls can be made smaller. And at times they are not even necessary. That leaves more space on the individual floors for working and/or production areas.

More security and reliability
POL has been used in telecommunications as PON for decades now. It is a reliable and field-tested technology. The PON protocol features automatic encryption procedures which create inherent data security. And fiber optics offers greater eavesdrop protection in any case. There are proven and tested tools for network management available on the market.


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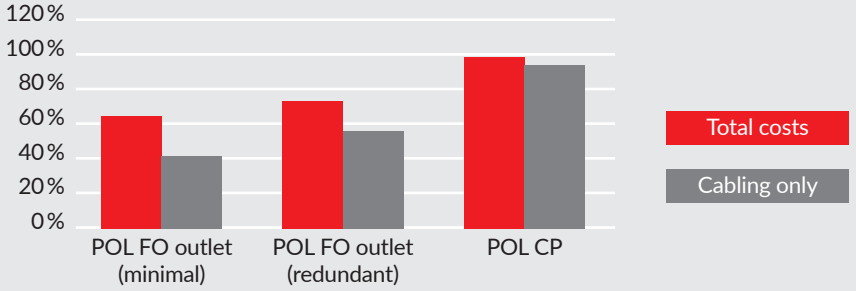
The bottom line:

If the general conditions defined in a project are right, POL is an attractive solution to be able to meet customer requirements in an inexpensive way. All you need to do is ensure that the active and passive elements match each other in terms of configuration and are planned with experienced partners. With its decades of experience and its various partnerships, R&M can play a key role in the POL rollout.

Comparison of costs POL / CU (Ethernet)



Comparison of the typical costs of an IT system with POL and structured building cabling / Ethernet (=100 %). Comparison with and without consideration of active devices.

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ABB and its Success
on the Subcontinent

ABB, the Swiss multinational corporation headquartered in Zurich, Switzerland, operates mainly in robotics and the power and automation technology areas.

The large industrial group has expanded its manufacturing, engineering and R&D footprint. Today, ABB employs over 10 000 people across more than 40 locations in India, Sri Lanka and Bangladesh. In addition ABB has 12 manufacturing sites, and one of its seven corporate research centers around the world is based in India.

ABB's success is driven by a strong focus on research and development. The result is a long track record of innovation. Technologies such as high-voltage DC power transmission as well as a revolutionary approach to ship propulsion were developed or commercialized by ABB. Today, ABB is the largest supplier of industrial motors, power grids and generators to the wind industry.

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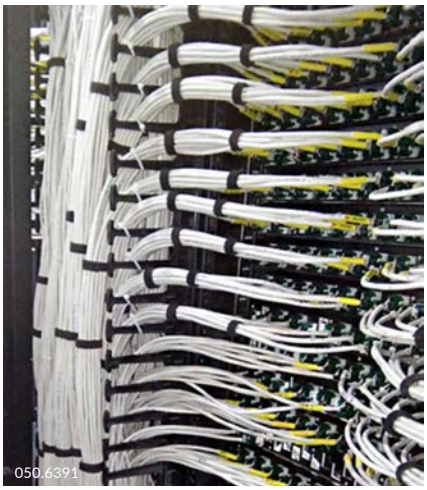
"The quality of all the components for copper and fiber optic cabling was an important criterion. R&M turned out to be the most advantageous for our requirements as the quality of the products and the ability to provide a future-proof solution impressed us. The operational support throughout the project also enabled us to have a great working relationship."

Satish Balakrishnan, Information Systems Country Manager, ABB India.

The Indian subcontinent has witnessed an unprecedented level of economic expansion in recent years. ABB helps its customers to use electrical power efficiently, to increase industrial productivity and lower environmental impact in a sustainable way. Today, ABB is an integral part of the growth story of the region.

ABB decided to set up a global back-end operations support system in Bangalore: ABB Global Business Services (GBS). The expansion demonstrates ABB's confidence in the local talent pool to fuel growth and future opportunities in the country. When fully established in 2017, the center is expected to employ over 1000 people. This is the first of its kind for the organization, with six similar facilities to be set up across the globe.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Tailored solution

R&M's solution for ABB's requirements, comprising Cat. 6 cables and components, can be used throughout the site to achieve optimal channel performance and minimal downtime.

In addition, OM3 installation cables were supplied for the backbone. These can achieve 10 GbE performance which today has become a basic requirement for most customers. High bandwidth cables and R&M's tool-free connection modules made sure that the project timelines were met by minimizing the time required for termination. From a security perspective, R&M had recommended that the client use external color coding: This can be adapted to any system and helps in cable management and organization, thereby simplifying maintenance. In other projects, unused ports are often left exposed to dust and other foreign particles. For ABB's GBS project this was counteracted by using hinged dust covers. These covers protect the RJ45 jacks at the outlet as well as patch panels when unused.


090.6622

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Lensed Multi-fiber Connectors

Connectors based on lens technology are gaining attention. They are proving to bring additional benefits while their losses are approaching the realms of conventional physical contact connectors.

In regular optical fiber links, the fiber cores are aligned with each other and placed into physical contact with enough force to planarize the front ends as well as eliminate any air gaps and the corresponding transitions into different index media. In the ideal case this creates a continuous propagating media where light can travel as if inside a single optical glass fiber. The drawbacks of physical contact are the high requirements to achieve optical performance: The cores must be perfectly aligned, the fiber ends must have a smooth optical polish and be cleaned before each connection. This intensive cleaning is to prevent dirt or debris from getting trapped between the fiber end faces, obstructing the passage of light or permanently damaging the surface of the fibers when pressed during mating. In the case of multi-fiber connectors the problems are compounded by the laws of probability. Additionally, scaling to highly integrated connectors with 32 or more fibers becomes a mechanical challenge for the connector design as the force required to mate them is proportional to the number of fibers.

Using a lens to expand and collimate the beam and imaging this into the input lens of the mating fiber can alleviate the problems considerably. The sensitivity to dirt and contamination is highly reduced since the active transmitting area can be easily increased by about 20 times in the case of multimode fibers and in the order of 400 times for singlemode fibers.

When transmitting through a lens, it is not necessary to have physical contact between the two systems, only proximity; this means that it is no longer necessary to increase the mating force proportionally to the number of fibers. The sensitivity to misalignment of the system is also reduced by an order of magnitude. The tradeoff is an insertion loss penalty that can arise from an imperfect index match in the fiber-lens transition and non-ideal or lack of use of antireflection (AR) coatings at the lens exit.

No limits – in the future

There is no fundamental physical limit that prevents a lensed system from achieving the transmissions realized by physical contact connectors, providing there is a well-designed

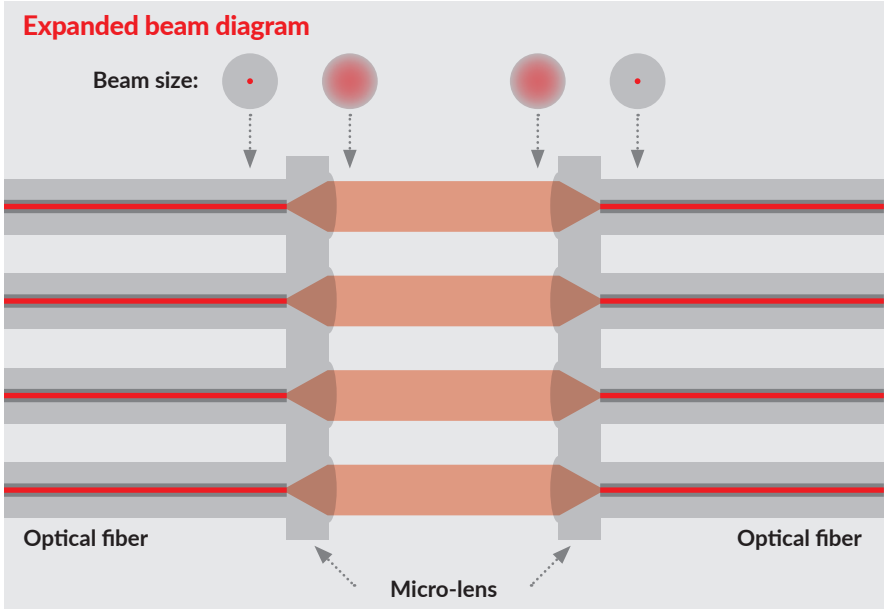

Diagram of a multi-fiber connector using expanded beam technology. The beam is expanded and collimated by the multi-lens array, it travels in free space for a short distance and is later coupled into the receiving fibers via a second micro-lens array.

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lens with antireflection coating at the lens-air interface and index match between the fiber and the lens. The examples of expanded beam based connectors currently available in the market have not reached the IL and RL values of their physical contact counterparts. However, the gap between physical contact and lensed systems' performance can be further reduced and a dust insensitive, robust solution for highly integrated parallel data transmission can be reached.

050.6231

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Corporate

Interface to FNT Command

Together with FNT GmbH, a leading supplier of software for IT organizations, R&M is simplifying infrastructure management in data centers.

The partners have developed an API interface which integrates the network monitoring system R&M*inteliPhy* into cable management with FNT Command. The new solution enables the monitoring of all ports and cables over the entire operating area of a data center in real time.

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The RFID sensors of the monitoring system R&M*inteliPhy* mounted on the connectors supply information on the patch cords and the status of the connections to the FNT Command program. Unauthorized changes to the ports are immediately displayed at a central point. This means data centers can react more quickly and ensure greater operational reliability. The integrated solution also allows a trend analysis of port capacity. And this means that data centers have complete control over their resources.

On the other hand, the order management tool in FNT Command can send current jobs to R&M*inteliPhy* and follow the progression of these jobs. Technicians are given a visual guide on site at the racks.

FNT
// when transparency matters.

050.6181

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SAIB Bank Egypt Builds Future-Ready Data Center

with Copper and Fiber Solutions from R&M

Société Arabe Internationale de Banque (SAIB) in Cairo, Egypt, has built its new data center using HD patch panels, raceway systems, and pre-terminated copper and fiber cabling solutions from R&M. The investment is future-proofed to be Automated Infrastructure Management (AIM) ready and, in its next phase, will involve the integration of the R&M*inteliPhy* system for full visibility and manageability.

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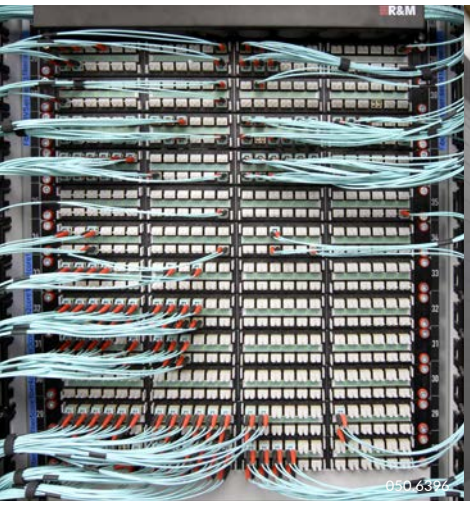

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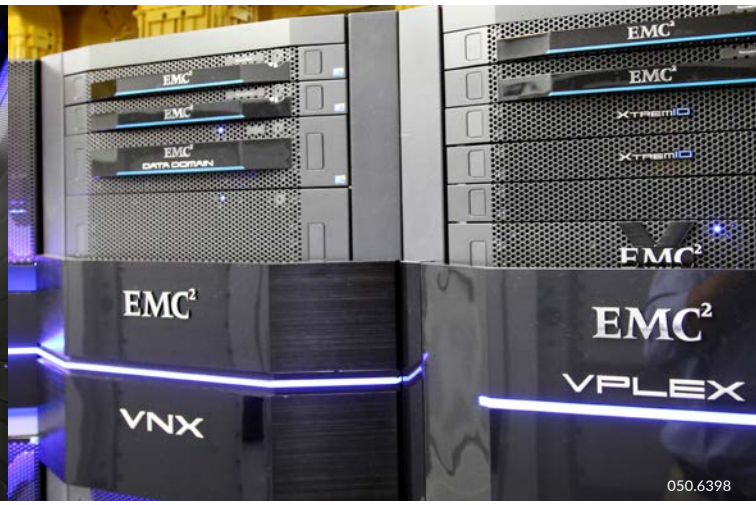

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"The use of R&M's pre-terminated cabling solutions enabled the bank to precisely match the needs of its data center architecture."

Karim M. Moharram, IT Head – Infrastructure, Network, and Security, SAIB Bank

SAIB, established in 1976, was keen to develop a new data center and its initial requirements called for eight server racks, six network racks, and four security racks along with six more racks for future use. When R&M began its discussions with the bank, it became clear that along with providing the physical infrastructure solutions, R&M would also have to add value through the R&M Network Advisory Service. Over a series of discussions, WebEx conference calls and presentations between the technical team in Dubai and the sales and partner teams in Cairo, R&M carefully laid out plans for the data center design and proposed an excellent design that incorporated best practices.

A total of forty R&M HD panels were housed in the racks to provide the required copper and fiber optic connectivity with full AIM retrofit-ability at later stages. One hundred and sixty Cat. 6_A trunk cables of various lengths were used for connectivity between these racks. For fiber optic connectivity, additional HD patch panels were used to house 200 R&M HD MPO modules. Two hundred MTP12 OM4 trunk cables were also used ranging from 10 to 25 meters to comply with data center design and rack arrangement. Additionally, FO Field OM4 connectors were used for fiber optic connectivity with external fiber optic connections.

To make sure moves, adds and changes to trunk cables between racks are easy, R&M utilized its raceway system complete with bend-radius controlled fittings such as tee-joints, horizontal elbows, as well as trumpet outlets for cable drops. The raceway helped match the containment design and fulfill the customer's requirements within schedule and budget.

Equinox International, R&M's certified partner, supported the vendor's efforts during the site surveys, technical exchanges, and BOQ preparation phases. The presence of this strong certified local partner proved essential to success due to the complexity of the project. The installation could be carried out directly thanks to the extensive surveys and preparation work done prior to the project.

SAIB's data center cabling is capable of supporting 10 Gbit/s over Cat. 6_A Copper (10GBASE-T) and 10 Gbit/s over OM4 Fiber Optic (10GBASE-SR) along with 40 Gbit/s over OM4 Fiber Cabling (10GBASE-SR-BiDi). The use of R&M's pre-terminated Cat. 6_A copper and OM4 fiber solutions, fully customizable in different lengths and with different wiring and configurations, enabled the bank to precisely match the needs of its data center architecture.

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SAIB has a secure investment that will meet its future requirements while also effortlessly supporting advanced features such as Automated Infrastructure Management with minimal additional investment.

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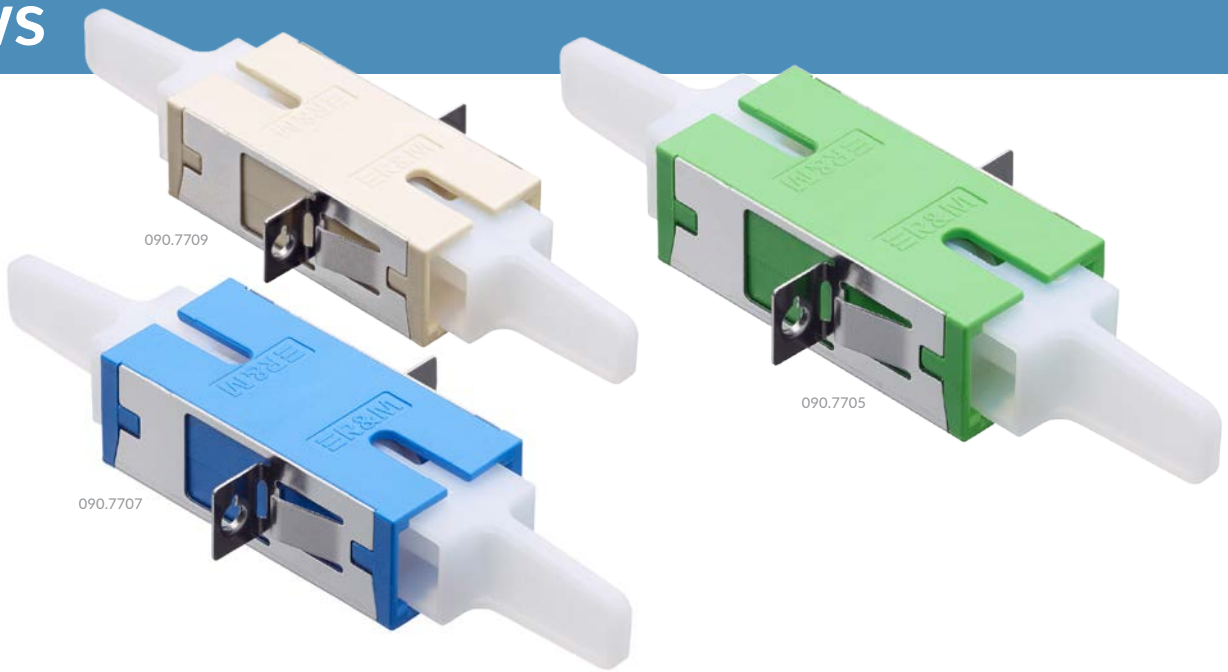

New FO Adapters:
Fast Assembly, Standardized Design, Familiar Quality

SC, LC, E-2000™*: With the new design it is clear to see that the FO adapters from R&M are a family. The increased mechanical precision leads to excellent optical characteristics; in many cases the simplified assembly saves an incredible amount of time.

R&M has completely revised its FO adapter range. Two important goals were achieved in the process. The pre-assembled adapters are now easier to assemble which in turn means time savings of up to 50%. The click-in variants have an improved hold so that even flange-free versions establish virtually back-lash-free connections. Furthermore, the new adapters are not just outstanding in terms of design, they are also very "R&M like" in terms of performance. The optical characteristics, which also permit high-power applications, are correspondingly excellent. Thanks to unsurpassed precision of the guide sleeves, the adapters are outstanding thanks to low insertion loss (IL) fluctuation over the entire life cycle of 25 years, or 500-1000 insertion cycles depending on the adapter type.

The FO adapter portfolio from R&M:

- E-2000™*, simplex and duplex
- SC simplex
- MPO
- LC duplex

The multimode variants LC duplex and E-2000™* are available on the market in all common colors: beige, heather violet (OM4) and turquoise (OM3).

Laser protection included

Standard for E-2000™, but unusual for other adapter systems: the laser protection that locks the light path on disconnection and thus protects personnel from injury. R&M also provides this protection for SC and LC duplex. This is particularly important for both these adapters because it is often the case that untrained personnel or even end users themselves are involved in this process.

Stable and reliable

First tests and installations at a leading Swiss network provider have already demonstrated the top quality of the new FO adapters. They are designed to last a long time with their high-grade material. The fixing mechanisms are fatigue-proof, the optical characteristics have long-term stability.

Appraisals from neutral bodies guarantee the customer security. The brand behavior has been certified by Underwriters Laboratories (UL) and Germanische Lloyd has approved the adapters in terms of mechanical stability for ship building.

Simpler handling

The dust protection cover is now more streamlined. This means it is easier to reach with your fingers – even in HD platforms. Its material is sufficiently light transmissive for infrared port identification. The obligatory coding has been dispensed with: It is now optional and can also be added at a later date.

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


090.6334

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Could it be any Faster?

How to deliver data faster and cheaper? This aspect was a focal point of the 2016 Optical Fiber Communication Conference (OFC). More than 13 000 participants were looking for answers – including engineers from R&M's Technology & Innovation Department.

The 2016 Optical Fiber Communication (OFC) conference took place in the Anaheim Convention Center, California (US). This huge conference hosted close to 580 exhibiting companies, 1160 peer reviewed papers and more than 13 000 participants. It is the largest conference of its kind in the optical communications and networking sector, and is thus typically used to show the latest and most exciting advances in the sector.

Currently there is a lot of research going on to improve the capacity of existing optical infrastructures. In particular, most of the efforts are oriented toward a development of its active part to use higher modulation formats or multiple wavelengths. The cleverest solution for the customer is to choose the right passive part of the infrastructure now, so that they are ready for changes whenever they occur.

The way to 400 Gbit/s and further

Parallel optics (multi fiber connectors like MPO) are still seen by many companies as the cheapest way of increasing transmission capacity in data centers. Many top companies are implementing the 400 Gbit/s links (i.e. 8x50 Gbit/s, 16x25 Gbit/s) over multimode and singlemode parallel fibers. Other companies go even further and focus on 1.6 Tbit/s technologies. For that they re-apply the same concept, namely they simply coordinate in parallel four of those 400 Gbit/s links.

Following the same data increment trend, the public networks also need to eventually be updated, redesigned, and optimized. Microsoft carried out a study showing how to optimize the data rates in its existing North American core backbone network. To do so, they propose the use of variable transreceivers so they can adapt to the most suitable modulation scheme in each link. In this way, they claim to be able to double their core network capacity. Other research consortiums are exploring the possibility of boosting the capacity of metro networks by means of the so called Software Defined Network, a technology that is slowly gaining momentum.

Most of these approaches are still only applicable in the lab. They all boost the network capacity by modifying certain active elements and reusing the passive part of the network. For this reason R&M is already monitoring them in order to be able to offer the best future-ready products as well as to prepare them for their future scalability.

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VINCI Construction France
Involved in the EDF "Partner" Project, with R&M

General overhaul of French nuclear power plants: The objective of EDF's "Grand Carénage" program is to extend the service life of CNPE plants (centres nucléaires de production d'électricité, or nuclear power stations). In addition, EDF has started the "Partner" Project, an independent investment program to build and rehabilitate service and commercial buildings.

The Partner Program: eco-rehabilitation of tertiary buildings

The program is intended to last ten years and runs in parallel to the industrial project for French nuclear power plants. There are around 70 new builds planned, along with the rehabilitation of a further 200 buildings and the renovation of more than 700 tertiary facilities (offices, training facilities, company canteens, changing rooms, stores, etc.) which belong to the 19 CNPE sites.

In the context of the Partner Program, VINCI Construction France was commissioned to create more than 300 000 m² of floor space on 11 CPNE sites south of the Loire. The objectives of the Partner Program include the construction and rehabilitation of buildings according to detailed specifications based on a building concept that is applicable to all regions. This involves creating conditions that ensure optimum comfort, irrespective of the climate, with or without air conditioning. The scheme is subject to quality testing by VINCI Construction France. The work involves implementing the OXYGEN® concept, which guarantees adherence to energy and environmental values in the structures created.

VINCI Construction France was awarded the contract as a result of its high-quality, affordable solutions. The framework agreement runs for six years and can twice be extended by one further year. The Partner Program also pursues social objectives, such as the promotion of locally-based companies and firms. That is why the planning team is awarding the performance of the construction work to the regional subsidiaries of VINCI Construction France.

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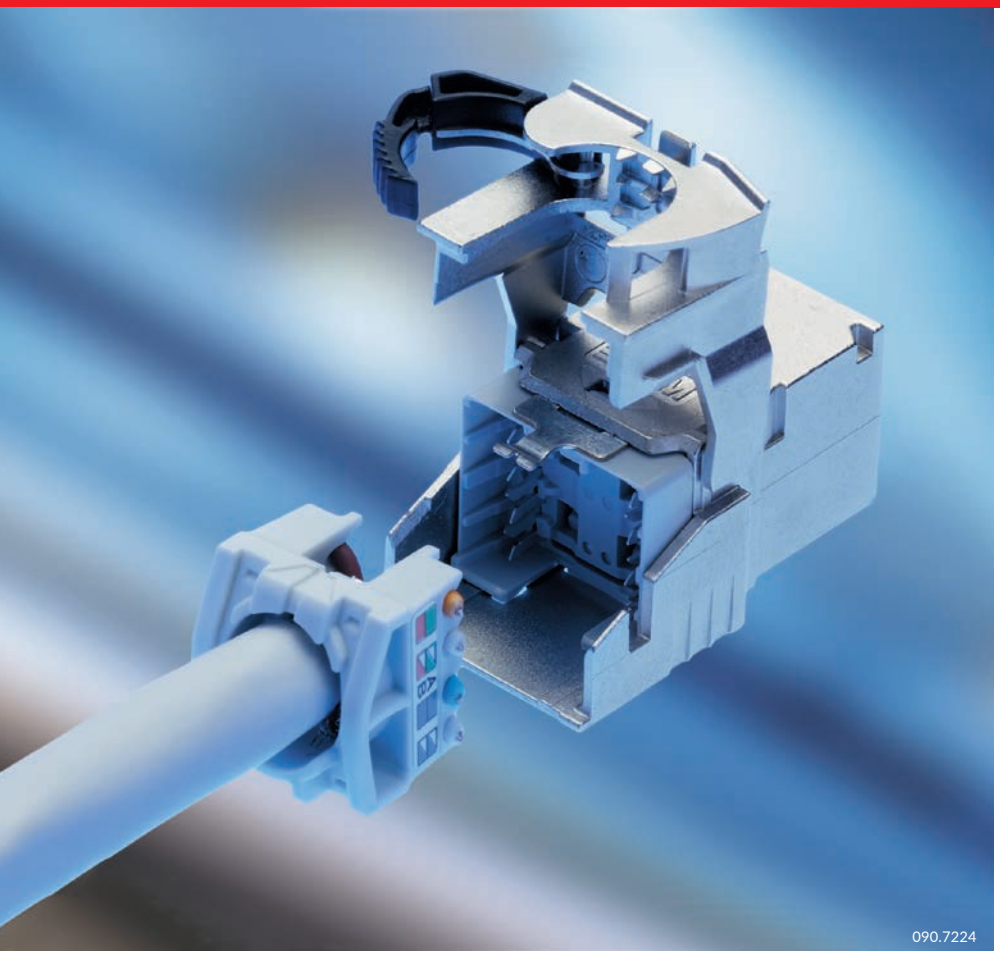

Success for R&M

VINCI Construction France and its project partner Alternet are relying on cabling solutions from R&M for the network infrastructure in the buildings.

These are being used for the construction, rehabilitation and renovation work at the 11 CNPE plants arising from the framework contract.

"We have been working with R&M for many years. When it came to the choice of infrastructures for the voice, data and image transmission networks, we selected R&M's proposal, because it exactly met our specifications in terms of technology, quality and sustainability," explained Didier Godefroy, Manager of the Partner Project at VINCI Construction France.

The R&M Solution

- SFTP Cat. 6_A
- Cat. 6_A EL connectivity
- 24-port PC 6_A panel, R&M*inteliPhy* ready

High-performance, future-proof network

For the IT part of the project program, EDF required particularly fire-resistant cables, which it was absolutely essential to set out in the supplier's offer. This meant that R&M was the right partner for VINCI Construction France. The decisive factors were the large solution portfolio, the high-quality products and not least the assurance of being able to supply large quantities of the fire-resistant C1 cable at short notice. The 25-year installation warranty for all solutions supplied by R&M also played an important role.

Cat. 6_A SFTP cabling with a C1 sheath is included in the scope of delivery. The fire-resistant cables have efficient shielding against electrosmog, which makes them particularly durable and reliable. In addition, the Cat. 6_A modules are easy to handle, offer high dielectric strength and are short-circuit proof.

"During the tests, we established very high tolerances, which indicates that the network is future-proofed and will have a very long service life. That is a perfect fit with our project philosophy," added Eric Corcessin, Electronics Project Manager in VINCI Construction France's Technical Management.

Project implementation

The Partner Program started in 2015 with the first construction and rehabilitation schemes. There are also numerous projects in the planning phase. Around 350 kilometers of SFTP 6_A cables and 14 000 Cat. 6_A EL connection modules have so far been installed.

VINCI CONSTRUCTION | FRANCE

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Into the Future with VS Compact

Current network operator broadband projects confirm: Vectoring technology can be implemented fast and flexibly with the tried and tested R&M product VS Compact. The distribution system for copper twisted pairs has proven to be a pragmatic solution for the last mile.

Millions of VS Compact distributors from R&M have now been in operation for many years. They connect the copper lines in classical telephone distribution centers of WAN and access networks as well as in distributor systems in buildings or local telephone networks. Today VS Compact is being used more and more as a universal platform for the creation of broadband networks with vectoring technology. Specific solutions are developed for key accounts.

Whereas FO cables are only laid up to the splitter, network operators are using vectoring to max out the potential of existing copper twisted pairs over the last 500 meters to the subscriber. Downstream they can offer data transmission of up to 100 Mbit/s. In the outdoor DSLAM the fiber-optic broadband signal is transmitted to the existing copper infrastructure and distributed.

Research and development are constantly driving DSL further and further. G.fast is following hot on the heels of VDSL and vectoring. This innovation can provide up to 500 Mbit/s over a few hundred meters. **Under very good conditions, data rates of 1 Gbit/s are possible.**

The challenge posed by vectoring is to efficiently, reliably and compactly connect the multiple copper conductors in the interconnection points with the DSLAM systems. Network operators master this challenge with the help of VS Compact.

This means carriers can tap additional market potential in many locations and expand the bandwidth of an existing infrastructure at an attractive price. Vectoring probably offers the most favorable cost/benefit ratio at the current time. Installation in the field and connection or reconnection of the existing copper twisted pairs must be able to be carried out in a time-saving, convenient and flawless manner. Further requirements: small footprint, uncomplicated retrofitting, high security and reliability. VS Compact fulfills these requirements from the very beginning. The modular system stands out because of its quick mounting technology, unsurpassed packing density, high transmission quality and adaptability. R&M provides solutions for distribution frames, patch panels, mounting profiles and inserts for 19'' racks. Even the smallest units for building entry points can be realized with VS Compact – for example in R&M Venus Boxes.

Tried and tested technology will play a key role in the future too.

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Honing the Edge

Edge data centers are providing ever more computer capacity on the periphery of large Internet hubs. But the efficient operation of small, widely distributed sites requires special infrastructure and management solutions.

Edge data centers usually consist of five to thirty racks. Due to the lack of space, servers are often connected directly with FO distributors in a central network cabinet. But this cabinet also has to accommodate the switches. To make sure everything fits in, Ultra High Density (UHD) FO solutions should be selected and attention should be paid to the fact that data traffic is growing all the time. The IT equipment has to be adjusted accordingly again and again. But cabling cannot be changed every time. This is why only cables with a high number of fibers should be used to ensure that plenty of resources are available. And the cables should also be as easy to handle as thin cables.

Port density is another crucial factor when planning for the future in edge data centers. Conventional UHD solutions with 72 ports per height unit simply cannot keep pace with the growth rates. Convergent network infrastructures result in massive amounts of cable. Future UHD platforms must therefore offer far more than 100 ports per height unit.

Neat and uncluttered

In complex environments of this kind, it is a question of how to store, monitor and manage the large number of cables. Network managers often complain about the lack of clarity. The cable guides are overflowing. In many UHD platforms, fibers suffer when the distribution modules are repeatedly pulled out and pushed in. This leads to signal errors, packet loss and network failure.

The solution would be constant, precise and efficient remote control. Only a comprehensive and specialized monitoring solution can save operators of edge data centers from chaos.

It monitors both all active devices and the passive infrastructure at the same time. It sees, documents and sends out an alarm when changes are made to the network or individual ports. It supports asset management as well as mapping, administration and processes, analysis and planning. Such systems improve the efficiency of operation and ultimately also simplify the management of the passive infrastructure. A central management software package bundles control and administration over whatever distances required. It offers uniform real-time information and consistent data for all connected edge data centers.

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The End of Moore's Law
What is Driving Progress now?

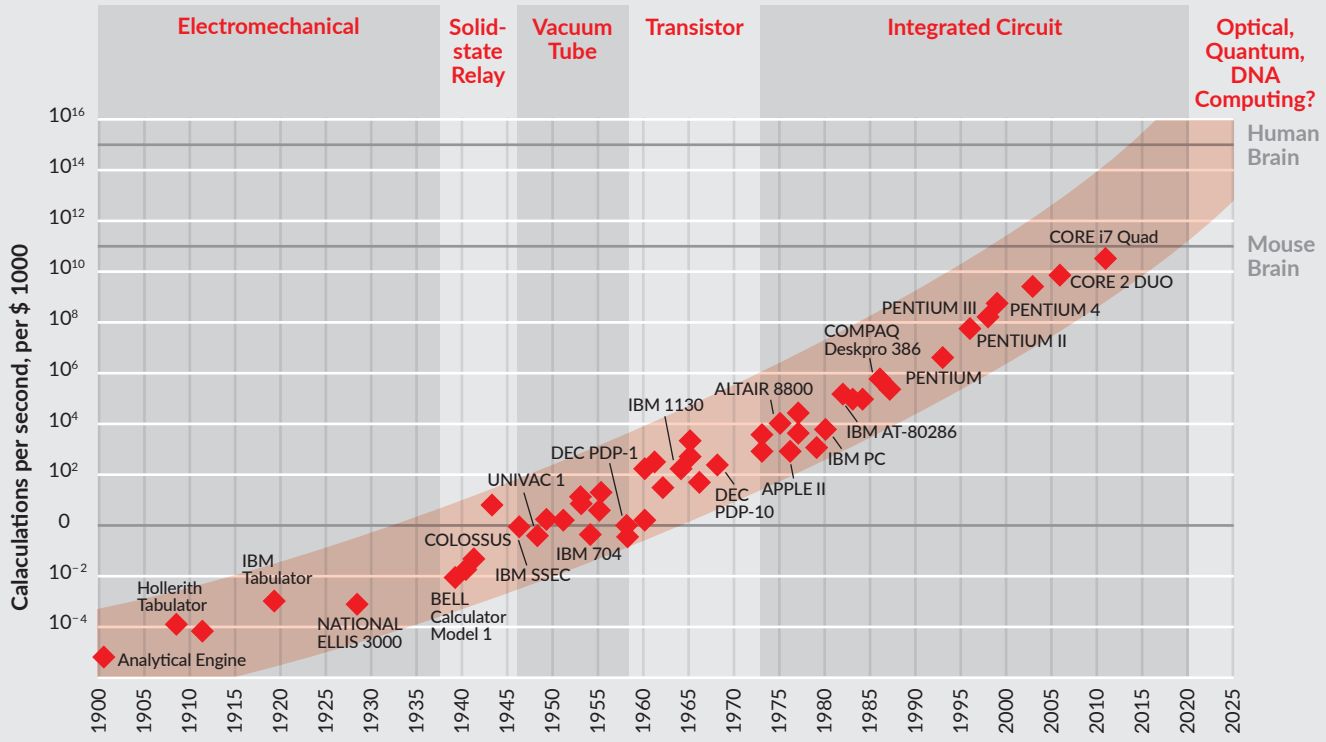
Moore's law is seen as the constitution and emblem of the digital revolution. In 1965, just a few years after the invention of the integrated electronic circuit, Gordon Moore, semiconductor pioneer and later co-founder of Intel, claimed that the number of components in an integrated circuit per unit area would double every year. He later revised his prediction to doubling every two years, before finally his Intel colleague David House redefined the law to give it its common current form: Chip performance doubles every 18 months.

This topic was the subject of an interview conducted by the CONNECTIONS editorial team with Lars Jaeger, entrepreneur, scientist, writer, financial theorist and alternative investment manager. www.larsjaeger.ch

CONNECTIONS:
Mr Jaeger, what would the world look like today if this doubling had taken place at a slower pace?
Lars Jaeger:
If chip performance had only doubled every five years since 1965, today's chips would only be a 15 millionth part as fast, in other words around as fast as chips in 1981. The smartphone, which was launched in 2007, would not have appeared until 2104. Moore himself was very aware of the significance of "his law", which helped him predict marvelous things such as home computers, digital watches, self-steering vehicles as well as mobile phones and smartphones.

CONNECTIONS:
Is Moore's law a natural one?
Lars Jaeger:
No, for the simple reason that eternal exponential growth breaks every law of nature. It is actually far more an economic law. Once it had been stipulated and made popular, it became the framework of all development plans in the semiconductor industry, an industry which is of course to be thanked for the fact that the growth of computer performance did progress exponentially. Since the 1990s the semiconductor industry has been presenting an explicit timetable every two years to coordinate the work of hundreds of manufacturers and suppliers to ensure that Moore's law remains valid – which made it more of a self-fulfilling prophecy than a "law". The manufacturers benefited from the fact that chips have remained so versatile to this day that only very few different types were necessary and these could be sold in large quantities. This made it possible for companies to find the necessary capital to invest in the development of the next chip generation all the way.

As early as 1989 first warnings were to be heard that the components were too small – on the one hand because of the heat that is necessarily generated when ever greater numbers of circuits are applied on ever smaller spaces and, on the other, because the electronic structures are now reaching magnitudes of around 10 nanometers. And in around five years it is likely to be only two to three nanometers. That is when, at the latest, the laws of quantum mechanics will completely rule events and the uncertainty principle that dominates the quantum world will make the behavior of electrons and thus that of the transistors hopelessly unreliable. That is due mainly to the "quantum mechanical tunnel current" which will then come into force. In 2007 Moore predicted the end of his law and at the time gave it another 10 to 15 years before a fundamental physical



Source: Ray Kurzweil, "The Singularity is Near: When Humans Transcend Biology", P.67, The Viking Press, 2006. Datapoints between 2000 and 2012 represent BCA estimates. © BCA Research 2013

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barrier would be reached. And that is just about where we have gotten to. The timetable for chip development in the coming years presented by the semiconductor industry in March 2016 is thus for the first time no longer based on Moore's law, and, in its financial report, Intel stated that it will no longer be orienting itself along the lines of Moore's law in the future.

CONNECTIONS:
Is this the beginning of the end of electronic and digital progress?

Lars Jaeger:
What is coming to an end is the uniform and joint effort of an entire industry to maintain Moore's law. In the future, chip manufacturers are going to have to take much more differentiated and specific paths. They will develop specific chips for applications such as smartphones, computer game graphics, supercomputers, data centers and so on. With the development of mobile computers, such differentiations in chip design have already become an economic necessity. Because new mobile demands make the manufacture of many different processing units necessary of which, on the other hand, much fewer will be sold, thus limiting the available capital for their development and manufacture. Daniel Reed, Vice-President for Research and Economic Development at the University of Iowa, compares the future development in chip manufacture with the development of airplanes. A Boeing 787 is no faster than a 707 from the 1950s, but it is a totally different airplane with innovations such as completely electronic controls and a fuselage made of carbon fiber. We will see a similar development with computers. There will continue to be innovations, but they will be more nuanced and complex.

There is also the prospect of entirely new approaches which will allow constant technological progress for computers and which would even possibly help Moore's law to perpetual validity. These include alternative carrier materials for electronic circuits, such as graphs or carbon nanotubes; spintronic elements, that do not work like conventional electronic circuits with moving electrons but with the folding spins of electrons; neuromorphic systems, whose elements mimic the neural structure of the brain; the integration of memory and processor functionality in the same component (referred to as memcomputers); a three-dimensional chip architecture, in which – instead of having flat circuits on the surface of a silicon wafer – thin circuit-bearing silicon layers are stacked; and, last but not least, there is also the possible development of a quantum computer which could revolutionize the entire digital world.

Even though these alternatives are not yet really viable outside the lab, the chip and computer industry are not going to run out of ideas of how to extend digital possibilities. If you interpret Moore's law more generally, simply as the fact that the benefit of electronic basic modules for users and end consumers doubles every 18 months, you can safely say that the law will remain valid for a long time to come. Because human creativity knows virtually no bounds. The next digital revolution will start soon after the first revolution is over and, with Moore's law in its current form, it does seem to be coming to an end. We are certainly starting out on a new and undoubtedly exciting age of technological progress.

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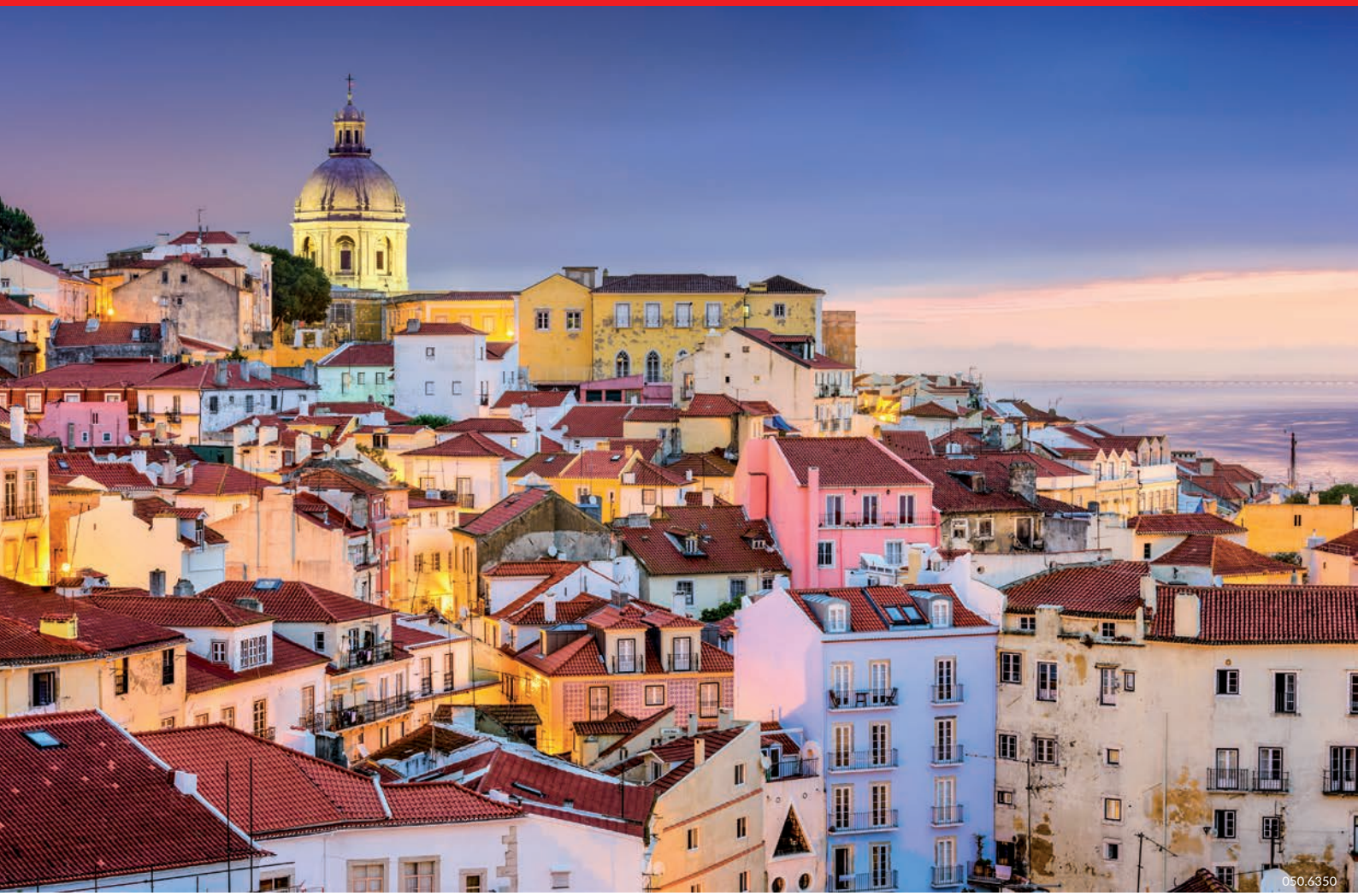

Portugal Telecom:
Innovation and Quality Solutions Take Top Services into Homes

Portugal has become one of the most active FTTH markets in Europe and operator Portugal Telecom is at the center of the action.

Portugal Telecom is a leading integrated service provider in the country: It is the number one broadband operator with a 55 % market share (residential), top mobile operator with a 51 % retail market share (mobile) and premium business services operator (B2B).

R&M has close relations with Portugal Telecom as there has been an alliance with one of its affiliate companies dedicated to R&D&I, PT Inovacão, now Altice Labs, since 2011. The two companies have worked together in several projects over the years.

Since June 2, 2015, Portugal Telecom has been a subsidiary wholly owned by the Altice Group, a leading multinational in the provision of telecommunication services operating in France, Israel, Belgium and Luxemburg, Portugal, French Antilles/Area of the Indian Ocean and the Dominican Republic ("Overseas Territory") and Switzerland.

There were several factors behind PT's decision to deploy FTTH. Firstly, cable connects a very high percentage of Portuguese households. According to a 2010 Q1 report from the Portuguese telecom regulation body ANACOM, around 4 of 5.59 million homes are connected with cable, of which 1.9 million are cable and DTH TV subscribers.

Strong competition and best services have now made PT market leader in terms of customers and voice services as well as TV and Internet access services. PT has moved into TV to supplement its access offerings. TV services are extremely popular in Portugal, and pay TV is effectively a must-have when a customer selects a telecom service provider.

"Today Altice Labs has the best products in their portfolio and are prepared to offer the best FO solutions in the construction of FTTx networks."

Gil Brito, Network Systems Director Altice Labs

The high capacity and high reliability of fiber optics enable PT to deliver a robust TV offering with a wide range of TV channels and on-demand, personalized video services across multiple platforms (PC, TV and mobile). More choice and a better customer experience are obvious benefits. Although perhaps less obvious, the widespread availability of fiber optics in urban areas will make it easier and cheaper to roll out next-generation mobile networks using LTE: These require fiber connectivity to base stations.

To implement all fiber deployment requirements, Portugal Telecom decided to start an FTTH project in 2015 focused on reaching an extra three million houses in Portugal. The process is scheduled for completion by 2020. For the execution, Portugal Telecom is counting on R&M products such as closures, splitters 1x4, 1x8, 1x32 and accessories. Altice Labs has been in charge of selecting the best quality solutions for this project. The good relationship over the past years, the quality of the products and the delivery deadline were key reasons why Altice Labs selected R&M FTTx solutions to fulfill service requirements in best technology terms.


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Altice Labs and R&M

Portugal Telecom aims to lead every market sector it works in. The company can also supplement its offer through Altice Labs (previously PT Inovação), a group company whose core business is the development of new solutions, technologies and information systems that create value both for companies in the Altice Group and its subsidiaries, as well as for the domestic and international markets. It thus promotes innovation processes in terms of services, technologies and operations.

Based in Aveiro, Altice Labs is the nerve center leading the innovation agenda for all the Altice Group operations. This is a clear sign of trust in PT's excellence and capability.

Altice Labs (previously PT Inovação) focuses on innovation and the development of new solutions, technologies and trends in the area of telecommunications. "Portugal has an exceptional culture of innovation and PT is an example to the world. We have deployed the best solutions for our customers to have the best voice and data services available at home," says Joao Figueiredo, Infrastructure Systems Production at Altice Labs.

Portugal Telecom is a symbol of innovation that serves the economy, the country and all Portuguese people. With the execution of the FTTH project, this innovation will be enhanced, multiplied and put to use around the country.

"Our main goal in Altice Labs is the research and development of innovative products. Today Altice Labs has the best products in its portfolio and is prepared to offer the best FO solutions in the construction of FTTx networks." says Gil Brito, Network Systems Director Altice Labs.

Portugal Telecom promises its customers that fiber will enhance their telecommunications experience. As an incumbent with both fixed and mobile operations, PT will continue to utilize fiber rollout to foster new and innovative services in a real converged world with R&M FTTx solutions.


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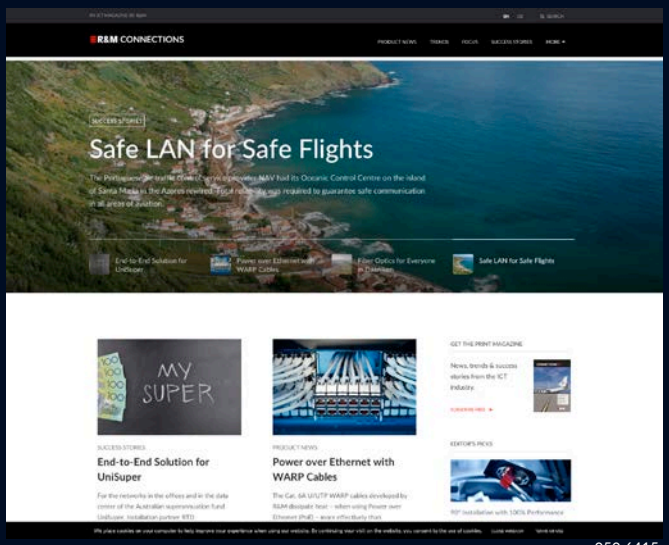

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