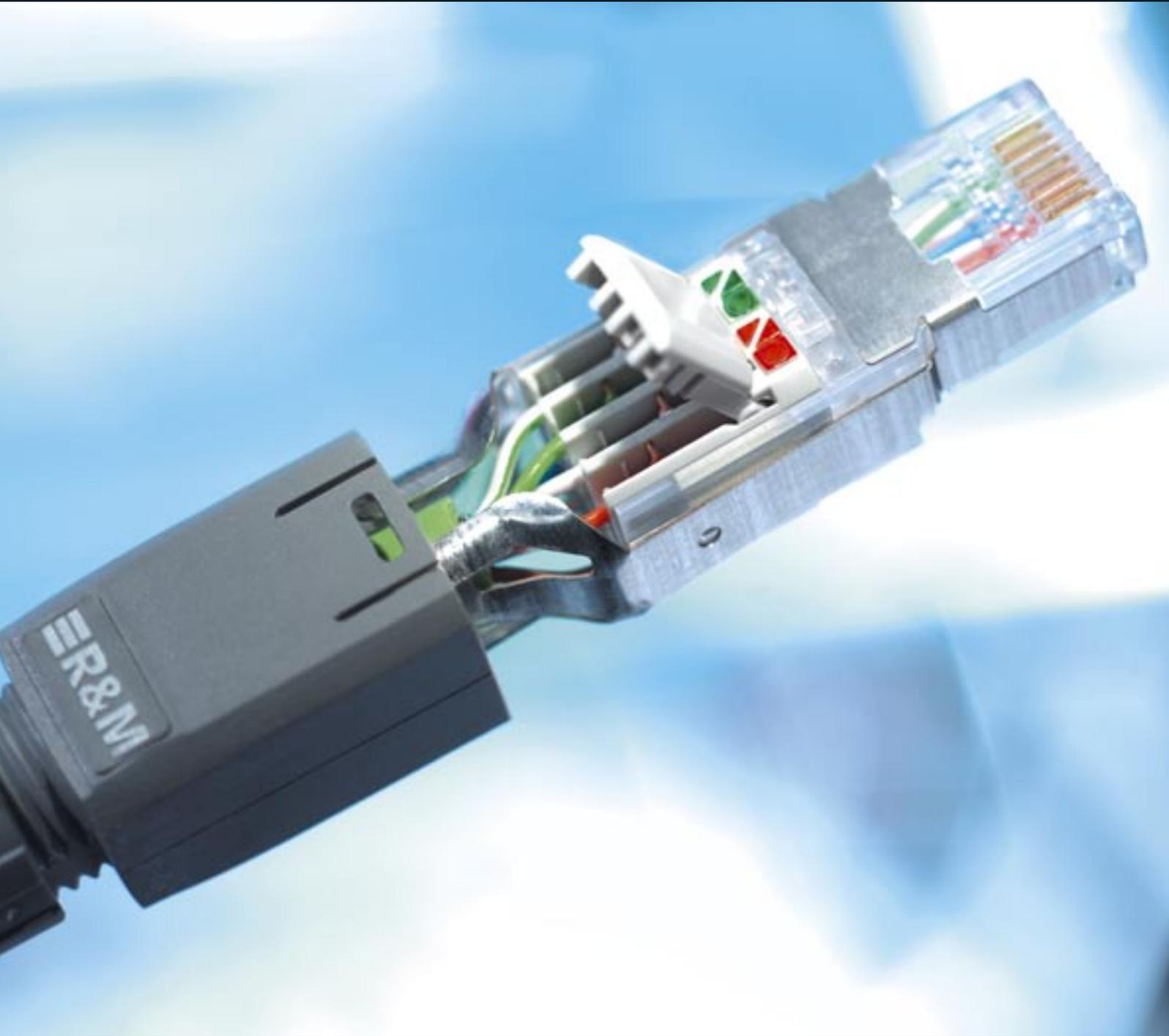


CONNECTIONS 29



International Success

What would you say? How far is it from Lisbon to Shanghai? It is a distance of 10,724 kilometers. Consider this number as a symbol. Meanwhile, the R&M marketing and sales activities extend over tens of thousand of kilometers. Our solutions are equally appreciated in Portugal, in the heart of Europe or in the Middle East and the Far East. You will find a number of striking examples in this new edition of our customer magazine Connections.



We have reached this point with the slogan "International Success". R&M continues to expand its strengths consistently to provide convincing cabling solutions to customers around the world. However, solid marketing and strong sales alone are not sufficient. What's being sold must be of lasting use to the customer. He must derive more competitive advantages, more reliability and success in the data and telecommunications market.

In this regard, R&M is superbly positioned because we are very concerned about continuously strengthening the high quality standard and convenience of our products and services. Inasmuch, we are an adaptive organization constantly accepting new ideas from the markets and customers and using them for technological and organizational enhancements – without neglecting the solid base, experience, core competences, motivation and independence.

You recognize this development, for example, in solutions such as the new mounting plate, in innovations such as the field-assembly FM45 connector or in our well-engineered perfect solution for 10 Gigabit Ethernets. The expanded Qualified Partner Program is on the same level because it takes into consideration the desires and developments of the market and supports our customers' own "adaptive organization". You can obtain information in the following pages and on the Internet: www.rdm.com

Today, our focus in production is also on "International Success", paired with concentration on core competences. The Switzerland and Poland sites are firmly anchored in our company strategy. Extensive technical know-how, the latest technologies and a high level of automation shape the production in Switzerland. In Poland, on the other hand, we rely on manual skills and classical production processes. Products, with greater vertical integration, are purchased on the market according to our specifications.

This strategy will allow us to deliver – worldwide, regardless of the distance – the most convincing cabling solutions now and in the future at the right time and at the right price-performance ratio.



Peter Reichle, COO
peter.reichle@rdm.com

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STAR Real10 – the perfect solution for 10 Gigabit Ethernet

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010.3345

Technology leader. R&M can also claim this distinction for 10 Gigabit Ethernet. A new solution for unshielded copper cabling (UTP) has emerged from an uncompromising development process. This solution completes the 10 Gigabit offering of the R&Mfreenet platform: whether shielded, unshielded or over fiber optics you can obtain real 10 Gbit/s in any application situation with full investment protection for existing installations. The new name for the copper 10 Gbit product line is STAR Real10.

Since 2000: Shielded and secure to real 10 Gigabit

Future-oriented product development with a view toward long-term technology trends and collaboration in ongoing standardization have shaped the development of the shielded STAR product line for Cat.6 copper cabling. Therefore, it is one hundred percent fit for 10 Gigabit Ethernet (10 GbE) – and has been since its market introduction in 2000. More than 3 million Cat. 6 channels have already been installed on this basis.

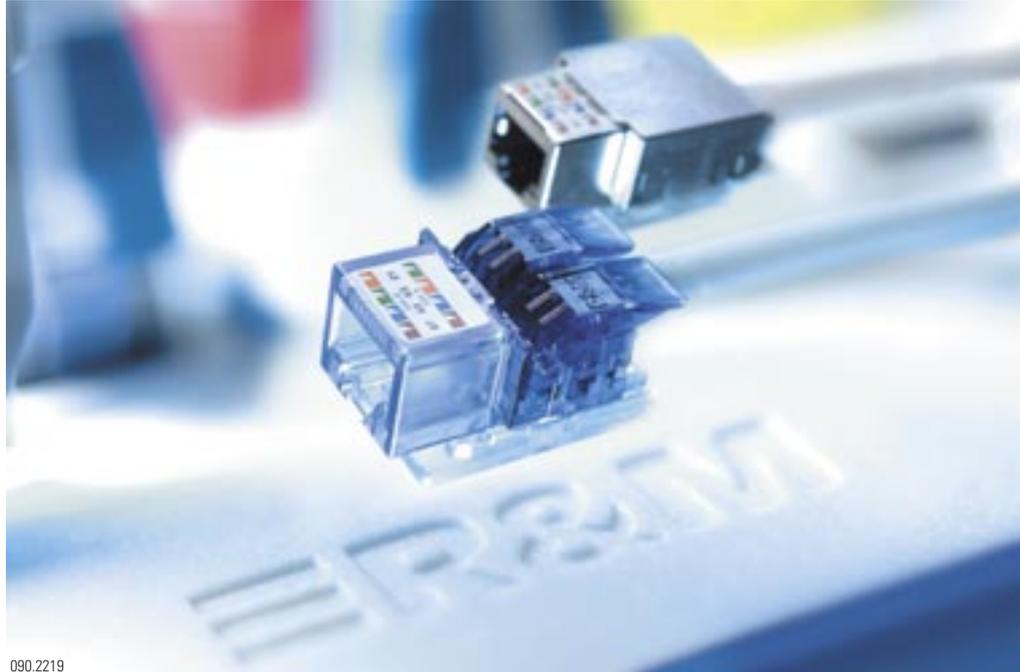
get more 10 Gigabit Ethernet with STAR Real10

More innovation

- Real 10 GbE performance
- Future-oriented design
- Investment protection
- Proven technology

More convenience

- Tool-free connection technique
- Easy and safe handling
- Automated shielding and ground contact
- Modular, scalable system



090.2219

With R&M STAR Real10 STP (previously STARsystem), planners, installers and customers obtain the clear calculable security that they will achieve full 10 GbE performance over 100 meters of horizontal, shielded copper cabling – according to the standards that are expected in 2006. We emphasize once more: if the shielded Cat. 6 STAR R&M product line has been installed to upgrade to 10 GbE.

The shielded STAR palette owes its suitability for 10 GbE to the built-in system reserves and the excellent protection against crosstalk from adjacent lines. Disturbances from adjacent connections are also prevented since every Cat. 6 module has a full 360-degree shield. Independent laboratories have also certified the performance. The 4-connector channels have been tested up to 600 MHz – that is in excess of the 500 MHz required in the IEEE draft standard 802.3an (Status March 2005) for 10 GbE applications. R&M produces its Cat. 6 modules in Switzerland, not just anywhere. In the production run, the modules are subject to automatic individual testing; other manufacturers are satisfied with random samples. This means: every module that is shipped from R&M is 100 percent tested.

Wiring of the shielded cables to the modules is quick, easy and does not require special tools. Practical tests have shown that to connect a shielded module takes roughly 10 seconds longer than to con-

nect an unshielded module. The clever design assures that all components are automatically grounded during the installation process.

Available immediately: unshielded with WARP technology

If unshielded copper cabling (UTP) is preferred for the start in the 10 Gigabit era, a new complementing R&M solution makes this possible immediately. R&M, the leading provider of shielded solutions, is bringing its shielded know-how into the unshielded world. STAR Real10 UTP uses the advantages of WARP technology and thus achieves unique reliability and quality in high-speed transmission. As the name implies: you reach real 10 Gigabit Ethernet under real conditions with unshielded cabling.

The Real10 UTP connection modules include a partial shielding which guarantees that disturbances from adjacent connections do not compromise the performance. An added benefit is that existing outlets and panel systems can also be used.

The installation cable for STAR Real10 UTP is also based on the innovative WARP technology, which in this case is implemented with a foil solution. The big difference compared to STP solutions: the foil shield is not continuous and therefore, it doesn't need to be connected and grounded. Measurements have shown



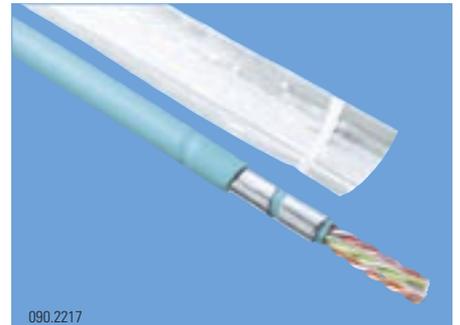
090.2212

Cat. 6 STP connection module in the STAR range – all-round shielding.



090.2213

UTP connection module: WARP housing deflects disturbances, instead of letting them through.



090.2217

UTP cables: Wave reduction patterns prevent ANEXT coupling.

that this solution guarantees a sufficient reserve between the ANEXT or AFEXT values and the limits according to the draft standard.

Special attention should still be paid to a clean grounding system in the building since UTP installations are significantly more susceptible to disturbances and interferences with 10 Gigabit Ethernet operation. These risks should not be disregarded.

The three innovative UTP components – installation cable, connector module and the enhanced patch cords – form, in combination with the R&M distribution panels and outlets, a channel with optimal performance for 10 Gigabit Ethernet via unshielded cabling up to 100 meters. The principle of investment protection applies to the UTP solution as well: existing R&M distribution panels and outlets can continue to be used for 10 GbE.

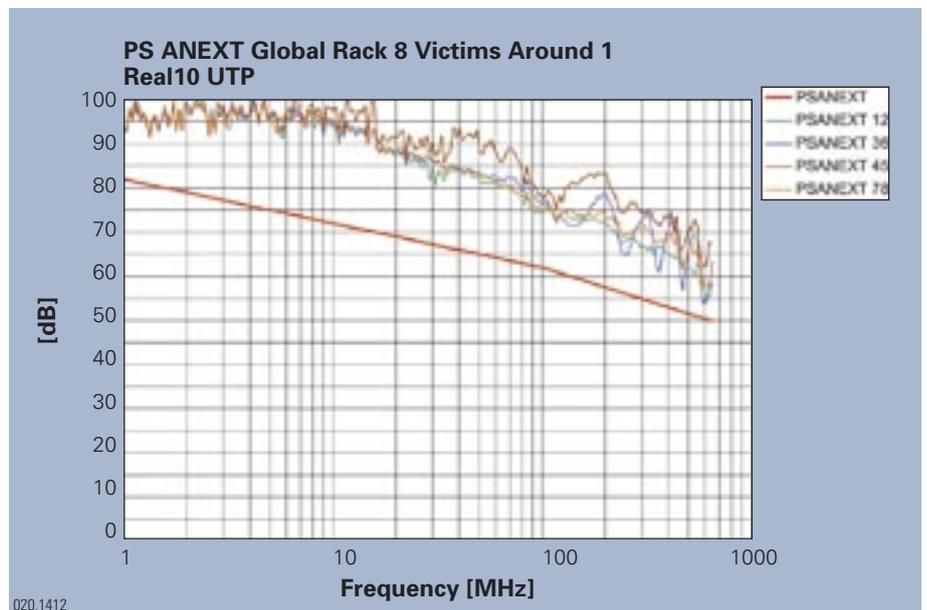
Thus, R&M pursues its tradition and its obligation to top quality, groundbreaking product development and easy installation. The expansion of the R&Mfreenet system around the modularly designed STAR Real10 – whether shielded or unshielded – presents customers with a real 10 Gigabit solution, which delivers what it promises.

Fiber Optic: highest demands and versatile applications

The highest demands are met by VISION, the fiber optic solution of the R&Mfreenet system. With this system users enter an absolute future-proof and risk-free path to 10 Gigabit Ethernet. VISION solutions definitely meet the 10 GbE standards. These solutions can be used for customer premises cabling via backbone networks

to the point of horizontal cabling. Two powerful R&M connector concepts, SC-RJ and E2000™ Compact belong to the VISION line of products, in addition to the SC-Duplex connector.

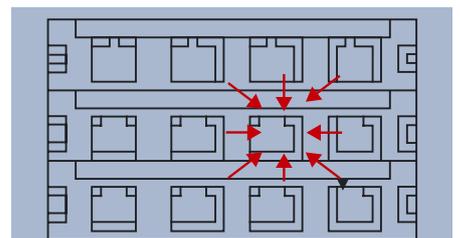
(E-2000™ manufactured under license from Diamond SA, CHE-6612 Losone.)



020.1412

WARP technology: shielding for unshielded cables

WARP is an innovation in cabling technology. Developed in collaboration with Draka Cable, this convincing technology is implemented in R&M's Real10 unshielded copper solution and enables it to reach guaranteed 10 Gigabit Ethernet performance. WARP stands for WAve Reduction Patterns, which take the form of non-continuous shielding for unshielded cabling components. On the cable this is achieved with short shielding surfaces insulated from each other. The most important aspect with 10 Gigabit Ethernet cabling is the protection against crosstalk between adjacent cabling (Alien NEXT). With WARP technology unshielded twisted pair copper cables are reliably protected from these disturbances.



020.1413

The worst case configuration for ANEXT in a panel is 8 modules around 1.

IT follows process optimization



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010.3357

Companies, desiring success in international markets, need a comprehensive software solution. However, the implementation of such a solution requires clear structures and business processes. The motto is: first the processes – then IT. To respond even more efficiently and more quickly to customer needs, R&M has reorganized its international structure to implement a group-wide IT system and infrastructure.

In principle, every company consists of organizational elements (structures, functions, processes), systems (software, hardware, IT structure) and people. An organizational analysis is a prerequisite for the installation of a new software system. Only after the processes and structures in the company have been optimally organized can the installation of a new software system provide the desired success. Thus, the implementation of a new software solution also has the immediate possibility to improve efficiency in the company.

First the processes, then IT

Particularly in internationally active companies, such as R&M, with numerous foreign subsidiaries, the information and product flow must be efficiently organized. The selection of the right corporate software is then the result of clear structuring of the business processes as well

R&M IT system project Facts & Figures:

- Restructuring of the entire company organization to create a basis for the installation of the new company software
- Creation of clear company units
- Precise division of tasks and functions
- Gradual implementation of the new organizational software, proAlpha, in all company units
- Project duration: 06/2004 to 12/2007

as the efficient collaboration between local market organizations and the central office.

Target definition was the starting point

Improved transparency, simplicity and flexibility were established as objectives for the restructuring process. In addition, the data management was to be improved, the system costs reduced and collaboration simplified within the company.

The result of restructuring was three overlapping organizational units with clearly defined targets, competencies and responsibilities:

- Suppliers (internal/external)
- Corporate Organization
- and Market Organization

Internal purchasing makes available the necessary material for the assembly and the production of semi-finished and finished products. The central office controls strategy, development as well as logistics and coordinates the proposal chain within the company. The individual market organizations are principally responsible for sales functions and are available to the customers as the contact for all requirements (single point of contact). Thus, the subsidiaries are today in a position to concentrate fully on the customers' needs. Modern CRM and B2B applications are available to support the customer and market development.

Efficiency and transparency

Thanks to the consistent division of the total organization into units, loosely linked to each other (purchasing, central office, market organization), it has become possible to assign tasks and responsibilities clearly. The units are now interacting in a customer-supplier relationship, which makes the cooperation among them more efficient and transparent. In addition, the product flows were focused in one direction: from purchasing, to the central office, to the market organization and finally to the customer. Thus, efficiency and transparency increase, and costs simultaneously decrease.

Clear guidelines for the IT system

It became clear that the software to be installed had to correspond to the restructuring and advantages achieved regarding transparency, simplicity and flexibility. The task for the new IT system was in particular in the reduction of expenditures and costs. Inventories, maintenance costs, order and information management as well as infrastructure costs had to be reduced. Furthermore, the expenditures had to be lowered for externally purchased services. Another condition was scalability: the system had to be easily expandable to allow continued dynamic growth for R&M. Therefore, a VPN solution as IT backbone was chosen. The subsequent installation of interfaces (XML technology), made it possible to link the individual "stand alone" organizations with each other worldwide according to the information flow. This link allows optimal communication among them and a gradual implementation of the new organizational software solution, proAlpha, in the market organizations. Thus, for implementation, expansion and maintenance in the individual countries, internally available know-how can be accessed. To make the desired worldwide scalability possible, approximately 80% of the processes have been standardized and implemented in the individual market organizations and 20% are adapted to local market requirements. A virtual standard organization (Kernel) was created as the starting point of the implementation and as a reference model in which the initial implementation of proAlpha was carried out. The Kernel is also available for the installation of new releases prior to implementation in the market organization.

Thanks to the optimization of the processes, which R&M performed prior to the system implementation, the entire group is now internationally better coordinated. Thanks to the high R&M product quality in combination with the increased quality in the organization, customer requirements can now be met more efficiently and faster.

FM45: Can be assembled anywhere – tool-free

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The new FM45 connector from R&M, which can be wired tool-free and field assembled provides more leeway for planners, installers and users in set up, modifications and repairs of data and communications networks.

To install connectors has just become easier and more flexible. R&M releases the FM45. The universally usable RJ45 8-wire connector with Cat. 5e performance can be wired and assembled tool-free with few manipulations anywhere: insert wires (without stripping), press cover shut, connect housing parts, the end (see picture series below). Any experienced installer can carry out error-free wiring.

Minimum time and effort, applicable without limit

The time and effort for cabling is greatly reduced. The installer only needs the cable drum and the required number of connectors. He cuts the cable to the required length on site and installs the connector in less than one minute. One of the many advantages: gaining flexibility, (e.g. with modifications at short notice of the cabling link, when work preparation parts become obsolete, repairs are simpler, many outlets and cable overlengths are omitted).

There are no limits to the applications of the FM45. The sturdy and compact RJ45 connector is industry fit and therefore,



FM45 – assembled in seconds without additional tools.

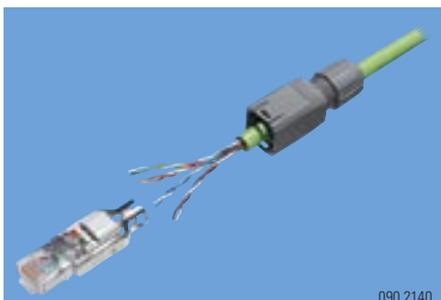
meant for industrial Ethernet installations. This connector is equally suited for the structured cabling systems, enterprise networks and homewiring as well as for many bus installations where the connectors must be flexibly placed on site. Modifications of the workplace accessibility occur often in the office world – with the FM45 such modifications can be implemented immediately.

Flexible: up to 8 mm cable, eight-wire, STP and UTP

The 8-wire FM45 complies with all required properties of the ISO/IEC 11801 and EN 50173-1 standards for Cat. 5e and provides shielding against electromag-

netic interferences. The IDC* wire contacting with a quick connection technique is particularly stable long term, vibration resistant, guarantees tensile strength and can be repeatedly rewired. The contacts are gas, water and dustproof and as a result are protected against corrosion, dampness and contamination. Unshielded (UTP) and shielded (STP) copper cables up to 8 mm in diameter and wire or stranded wire from 23 to 26 AWG can be wired.

(*IDC = Insulation Displacement Contact)



Cutting and removing of cable sheath and positioning of wires (stripping not necessary).

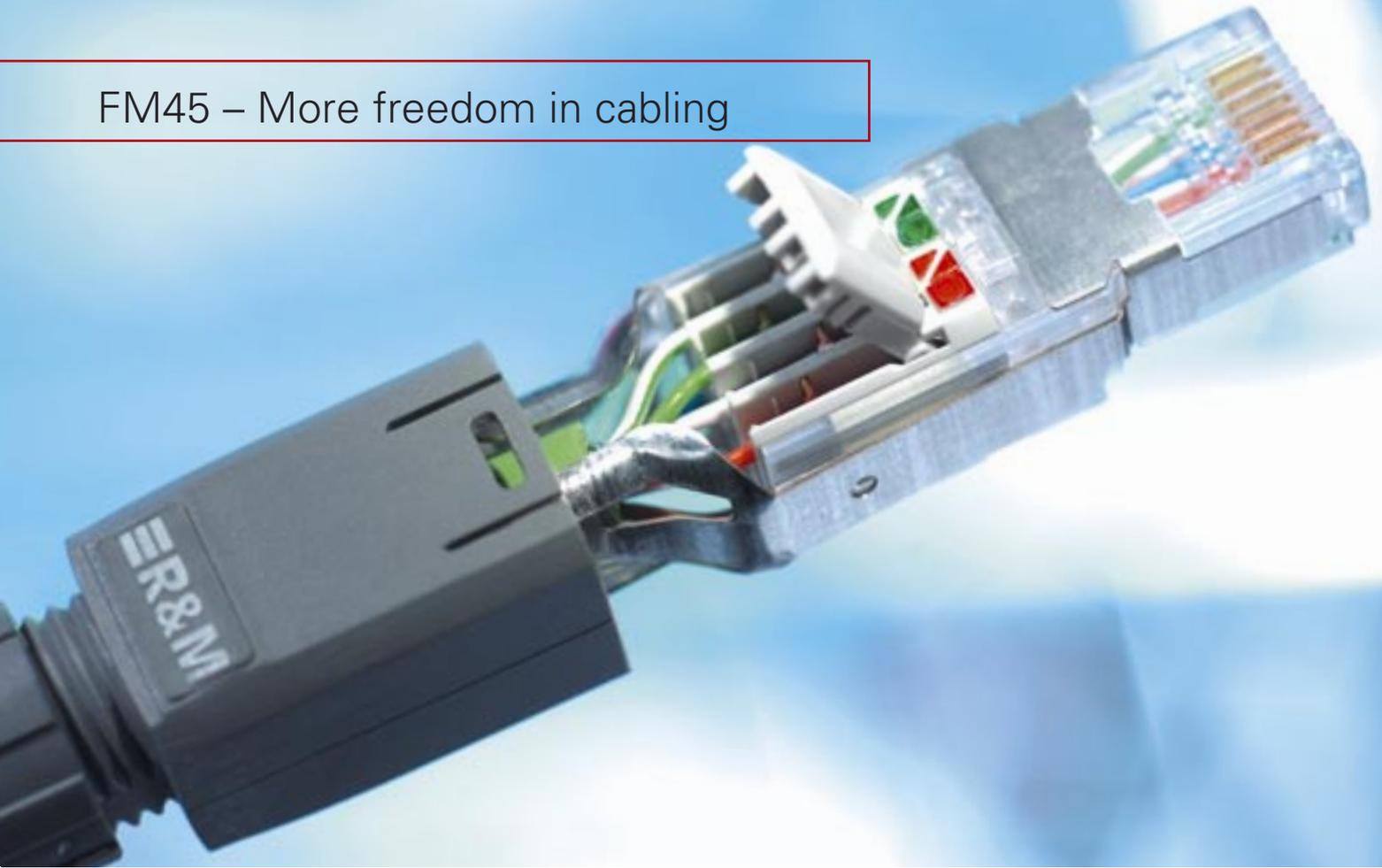


Inserting of cable into connection block.



Press cover shut. This will wire the conductor in the IDC.

FM45 – More freedom in cabling



TOOL-FREE INSTALLATION – ASSEMBLE ANYWHERE

Every second, every movement counts in the field, on location or on the construction site. Gain time, leeway and flexibility in planning, installation and maintenance of networks. The FM45 is the first tool-free, field-terminable Cat. 5e RJ45 connector for 8-wire connections. It is universally applicable in the building and industrial cabling according to ISO/IEC 11801 and EN 50173.

Convenience:	Can be wired tool-free, easy handling
Reliability:	IDC contacting, vibration resistant, guaranteed tensile strength, can be color coded
Flexibility:	8-wire Cat. 5e connection, suitable for stranded wire and solid wire, can also be rewired

Test the FM45 now and gain more leeway in planning, installation and maintenance of communications networks.



FM45 – can be assembled in seconds without additional tools.

Get More @ R&M


Convincing cabling solutions

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Winterthur: City network as a location factor

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Winterthur is strengthening its position as a competitive location with the development of an fiber-optic network. The northern Swiss business center has an advantage: during the times of the "New Economy", other cities made costly mistakes, Winterthur learned from these mistakes. Winterthur banks on modular, efficient and adaptable solutions from R&M.

The need for bandwidth is growing. In the future, Winterthur's economy will depend more and more on direct connections to fiber-optic cables for data transmission and telecommunications. The management of the city works of Winterthur (StWW) is convinced of it. Therefore, in 2004, after having provided public services and waste management, the municipal utility company also started to offer telecommunications and data transmission publicly and to develop their own fiber-optic network.

The city network is operated as a profit center with Peter Wälchli, Manager Telekom StWW, as head of the one-man business. His installation partners must meet very demanding criteria and must be specifically qualified. Wälchli has the following philosophy: "I want to build a simple, but reliable network." According



to him that also simplifies the operation and later tasks.

Reliability has priority

From the experiences of other locations with the Internet and carrier boom of the nineties, Winterthur has come to the right conclusion. Nothing is done too hastily. Reliability, resistance and gradual procedure determine the strategy. Existing structures, such as the 24-hour stand-by service, power lines or StWW locations are being integrated organically from the beginning making the costs manageable.

Great adaptability of the installation solution is a condition since the spaces are tight and often subject to environmental industrial load. Peter Wälchli reported: "We decided on the fiber-optic management system from R&M because the first prototype already convinced us".

The FOM system fits

The FOM system is ideal with a depth of only 40 cm. It can be easily equipped and modularly equipped with racks allowing the distributors to gradually grow as the customer connections increase. Wälchli particularly appreciates the quality, stability, cable reserve and the important protection at many locations against dust, moisture and environmental stress.

At many access points in the urban area, StWW uses the splice closure system from R&M with convenient and modularly expandable fiber-optic small distributors. The head of StWW Telekom says: "We are saving a lot of money thanks to the easy handling of these splice closures; they lower personnel expenditures. A technician can work alone".

to more
9

Municipal utility company of Winterthur

- Solution for tight spaces
- Modularly expandable
- Stable and protected
- Customer-specific adaptation
- Proven quality
- Customer orientation, consulting
- Price/performance ratio



Municipal utility company of Winterthur: soon 150 years of service

The history of the municipal utility company of Winterthur (StWW) goes back to the year 1860 when the development of gas supply was started in the industrial region. In 1873 water supply was added, in 1904, electricity and in 1982 district heating. The StWW is also responsible for the disposal of wastewater and waste. The 314 employee-strong service company is in charge of a location with just under 100,000 residents and produces income of more than CHF 193 Millions. As of late, the company has positioned itself as an efficient provider of a fiber-optic city network of 64 km in length. The telecommunications products of StWW are:

- Dark fiber, leased lines for major customers for customer premises networking
- Fiber network, appropriation of network capacities including terminal devices
- Telehousing, appropriation of ready-to-operate rooms for installation of data transmission equipment supplied by customer
- Point to point connections for SAN and LAN
- 24/7 helpdesk and stand-by service

Kabel BW: Triple Play with high speed



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Kabel BW presses ahead at breathtaking speed with the roll out of a new infrastructure. Within a few months, new hubs for the cable television network of the future were developed and many other building projects were implemented. Kabel BW selected the Fiber Optic Management system (FOM) and E-2000™ connector from R&M for the connection of local distribution networks.

Kabel BW is considered a pioneer among the German cable network operators and sets its sight on an extensive upgrading of the networks in Baden-Württemberg. In some metropolitan areas one of Europe's most powerful multimedia cable networks is already present. Significant factors are quality improvement of television transmission, digitalization of programs, availability of several hundred channels and new interactive services. Furthermore, Kabel BW is developing the telecommunications market with Triple Play services.

New infrastructures are emerging nationwide

Since 2004, the carrier has replaced the 20-year old infrastructure, disconnected radio links and made regional distribution networks feedback capable in more parts of the country within the scope of the Neptun IV project. Five large backbone rings are being developed nationwide. They connect the two master headends in Stuttgart and Mannheim and an addi-

tional 13 regional hubs redundant with each other and with the Internet hub DE-CIX in Frankfurt.

Since the fall 2004, completely new hubs have been installed in six locations with the support of R&M. Here is an example of the ambitious upgrading project: Kabel BW is using technology with a worldwide pilot character in the Böblingen hub. The potential of the redundant signal feeding is being exploited to guarantee selectively the best transmission for every television channel.

Factors: quality, flexibility, delivery time

Andreas Löffler, Dipl.-Ing. (FH), Network Level 2 Planning Director at Kabel BW emphasizes: "We require high quality connectors in the hubs to achieve the targeted transmission quality and range". Any attenuation even if very minor should be avoided. Fiber stubs with 8°-angled polish are indispensable. R&M offered the best solution, qualitatively and economically, with the E-2000™ compact high-performance connector. The outstanding features of the connector – for example mechanical plug-out protection, completely protected ceramic ferrules, self-closing dust protection – provide operational reliability.

In addition, Kabel BW was looking for a system to connect local distribution networks, a system that would be quickly and flexibly adapted to the operational

structures. The Fiber Optic Management System (FOM) from R&M met the criteria and immediately convinced the customer. Philipp Wicki, R&M Product Manager reported: "We were able to adapt the distribution cabinets quickly to the conditions of Kabel BW and deliver the first cabinet 4 weeks after the project started". Andreas Löffler confirms: "R&M fully supported us at the speed set by us".

The strong point of the FOM is not in the quick adaptability alone. The system incorporates an entire convergence of economic and safety related advantages supporting the objective of absolute network availability: convenient

Kabel BW supplies 2.3 million households

Kabel BW (Kabel Baden-Württemberg GmbH & KG), the modern and innovative service provider, operates the TV cable network in Baden-Württemberg. The company supplies approximately 2.3 million households with television and radio programs. In addition, broadband Internet with up to 10 Mbit/s transmission rate and IP telephony are offered via the TV cable in the cities and regions with an upgraded infrastructure. Meanwhile, Kabel BW makes the reception of more than 350 digital TV and radio programs possible. The company employs approximately 500 employees in the Heidelberg, Ludwigsburg, Stuttgart and Rottweil locations.



020.1431



020.1430

Speed and creative solutions. Kabel BW energetically expands the fiber-optic infrastructure in Baden-Württemberg exhaustively. A new cable was laid along a 70 km long railroad track in 2 weeks. Small local gateway centers are put up where no other possibility exists.

positioning of the wire overlengths, reliable draglines for protected cable guide, innovative patch panels with solid and easily operable sliding tray technique for easy and safe handling of the cables as well as a high quality splice tray with a fiber preserving 40 mm bending radius. The viability for the future is an additional plus for Kabel BW. With a few manipulations – depending on the development of demand – additional patch panels can be used.

Creative cable tracks

Andreas Löffler says: "To expand the multimedia cable network as much as possible via fiber optics, we

are proceeding in a creative manner". The company laid their own numerous new routes – 240 km in total. In part, older copper cables were replaced or depending on need, partnerships with energy suppliers, municipal utility companies and other carriers were sought.

At the beginning of 2005 a German record was set by Kabel BW and the participating installation firms, highlighting the speed of the project: 70 km of new fiber optic route was laid along a railroad track within two weeks.

Half of the customers are already being served

Shortly, 1.1 million Kabel BW customers – representing 50% of the market – can use the new feedback capable, digital infrastructure. The company is the German market leader in telephony via broadband television cable.

The business manager Georg Hofer considers fully adequate telephony via cable "a quantum leap for the customers, but also for the cable market". The broadband cable has never been so attractive as now.

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



020.1435

f.l.t.r.: The Kabel BW experts, Andreas Löffler, Dipl.-Ing. (FH), Network Level 2 Planning Manager; Rainer Hollaender, Cable Construction and Service Team Leader present the powerful infrastructure in the new Böblingen hub; Andreas Wenzel, Carrier Sales R&M Germany, presents his compliments for the successful start-up of the operation.



020.1434

Economical and maintenance-friendly: Fiber management in the FOM cabinet for Kabel BW in the Böblingen hub. Draglines provide reliable, protected cable guide. A sliding tray technique facilitates handling during patching.



020.1437

Expandable and individually adapted to the organizational structure of Kabel BW: Distribution cabinet for FO-Management in the new Villingen hub.

Technology leader thanks to E-2000™

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To be a technology leader! Portugal Telecom (PT Group) asserts its excellent position with this strategy on the highly competitive national telecommunications market. Fiber-optic cabling systems and the E-2000™ technology from R&M play a key role in this strategy and in the upgrading of networks. This important customer of Arestel, an R&M partner, is sold on the quality and the price performance ratio.

At present, the PT Group secures its leading position on the Portuguese market with the continuous upgrading of the telecommunications networks. The PT Group decided on the preferred use of fiber-optic technology based on the following priorities: quality, security, bandwidth, future viability and cost benefit ratio.

Antonio Vinagre, Head of Arestel Componentes e Equipamentos Electrónicos, SA states: "Portugal is a high-end market with high demands focusing entirely on fiber". His company is a certified R&M partner and has been supporting the PT Group for several years with installation solutions and specific services.

The quality advantage opens doors

The quality advantage of cabling systems and the E-2000™ from R&M opens doors. "I perceived very quickly that the people in charge at the PT Group were inspired by our products", reports Luis Miguel, an Arestel employee, about one of the decisive phases in 2003. He adds:

The customer: Portugal Telecom

Portugal Telecom (PT Group) is an internationally active carrier, servicing 90 percent of its home market with fixed networks, cellular phone, IT and multimedia choices. It already has 41.6 million customers and has achieved Operating Revenues of 6.1 billion Euro. The PT Group considers itself a company consistently committed to innovation and development of new



Explanations on the UniRack between engineer Rute Godinho (PT) and Luis Miguel (Arestel).

"Once they saw the test results proving the outstanding quality of the R&M products, the first order was in the bag."

The R&M solution also passed the in-house tests in the PT Standard and Test Department with flying colors. The responsible fiber-optic engineers, Nidia Gomes and Rute Godinho confirm: "The R&M products lived up to the promises. R&M is setting standards. Furthermore, R&M and Arestel offered the best price performance ratio".

Today, the PT Group and their installation partners are using, in addition to the E-2000™ connector itself, pigtailed, patch cords, adapters, vertical modules and UniRacks from the R&M fiber-optic product line for carriers. What's more, Arestel has recommended the use of fiber-optic slice closures for outside plant cabling (OSP). Field tests are under way. Antonio Vinagre emphasizes: "Here too, R&M has recognized the requirements of the market and has delivered a persuasive product".



Nidia Gomes, Rute Godinho.



020.1425

services, solutions and products to fulfill customer requirements in any market. Evolution is a daily occurrence at PT Group. Research and development is positioned as an independent and value-added business segment and organized under the name of PT Inovação, SA. The group was an international pioneer upon the introduction of cellular phones. The group wants to protect its outstanding

market position through leadership in technology. The PT Group covers the totality of Portugal including the islands of Madeira and the Azores. In addition, the Holding company has investments in Brazil, some African countries and in the Far East. Extraordinary characteristics of the PT Group include corporate citizenship, training and personnel policies.

Successful partnership in Portugal

David Lopez
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International success, the current R&M motto could not be more to the point. Partners and market organizations in many countries are on a successful course. In Portugal, for example, the R&M partner Arestel has developed a leading role as value added reseller and supplier in the telecommunications market and has created enthusiasm throughout the country for fiber-optic solutions from R&M.

It was a long way from the first contact between Arestel and R&M ten years ago to the largest joint project so far with Portugal Telecom (PT Group) in 2003. But, it was worth the wait for both parties.

Arestel Head Antonio Vinagre remembers: "In 1995 we looked for a partner for the WAN sector". The company wanted to tap the growing long-distance traffic and telecommunications market for itself. Antonio Vinagre muses: "It was not easy to convince the then consultant that



Arestel, an R&M partner

The Portuguese R&M partner Arestel Componentes e Equipamentos Electrónicos, SA with its head office in Lisbon serves the national market as a value added reseller with its own product management. António Romão and Armando Dias founded the company in 1998. At the beginning, Arestel successfully participated in the booming market of indus-



Luis Miguel, Antonio Vinagre of Arestel and David Lopez of R&M.

we were the right partner for R&M in the WAN market"! After initial joint customer visits, Arestel completed the certification program and finally became the certified R&M partner for Portugal.

More convinced than ever

Today, Arestel is more convinced than ever. Luis Miguel, the Product Manager for R&M in Arestel emphasizes: "The partnership improved constantly. R&M became more and more customer oriented and responded with flair to the market. Today, our contacts at R&M know our market very well". Antonio Vinagre adds: "R&M has the right approach to understand our customers, which increases name recognition and the positive image".

Portugal is a high-end market with high demands focusing on fiber-optic technology. Arestel encounters enthusiastic customers everywhere with the E-2000™ connector system. Currently, many promising projects are under way, such as the subway construction in Almada, where Arestel lines up with Siemens and Meci.

Together with Alcatel the railroad sector is served and together with REN the energy sector is served with cabling systems.

A pioneer in fiber-optic cabling

Arestel, with the support of R&M was able to attain the position of pioneer for fiber-optic cabling on the Portuguese market. The good reputation of the leading specialist with the reliable, high quality and innovative products precedes Arestel. Antonio Vinagre says: "There is still much to do on the fiber-optic market".

Based on a future-oriented strategy of the government, he sees good opportunities for a further growing telecommunications market. At present, Portugal Telecom is upgrading its entire network (see accompanying report).

E-2000™ manufactured under License from Diamond SA, CHE Losone.

trial electronics and cabling and in the mid 90s opened itself up to the long-distance traffic and telecommunications market as well as audio/video applications. For Arestel, customer satisfaction and good partnerships are the key to success. High ability to deliver, focused consulting as well as the fulfilling of individual requirements are among additional success factors. The team ensures a qualitatively

leading, constantly upgraded and diversified product line. Included in the special range of services is concentrated monitoring during all project phases to make sure that the customer is always reliably informed on the development of his building project.

CERN: Optical fibers for mega data streams

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In 2007, the new particle accelerator LHC of the CERN Research Center will begin operation. A lean fiber optic network for maximum performance will gather 0.5-1Tbyte of data every second and channel it to the connected computing centers. Fiber optic components from R&M contribute to the proper flow of the information stream without interruption.

First-rate physics for the smallest components in the world. The European Research Center for particle physics, CERN near Geneva, has been known for this specialty for more than 50 years. Behind it all, are the efforts of many thousands of highly motivated scientists and an immense technology put together from a gigantic accumulation of small and large top performance components.

This also applies to the new particle accelerator Large Hadron Collider (LHC) – a 27-kilometer long machine in a 100-meter deep tunnel consisting of huge detectors, magnets, pumps, ducts, infinite numbers of cables, instruments and the smallest of sensors. The LHC ring is the most powerful accelerator that has ever been built. As of 2007, this accelerator will enhance the view into matter, explore new



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First magnets for the LHC accelerator installed, but unconnected, in the 27 km tunnel.

elementary particles and simulate conditions and forces as they reigned at the birth of the universe.

LHC will send the smallest particles on a collision course, store and observe them and at the same time determine a wealth of data. According to CERN's plans, 0,5 to 1 TByte of information will be gathered every second during continuous operation and subsequently distributed to computing centers in European and worldwide research centers for further investigation. CERN is having one of the largest local fiber optic networks in the world installed to optimally manage the data volume right at the source.

The redundantly configured network has a total length of 1,500 kilometers. It runs through the tunnel, connects the eight

research stations along the 27-kilometer long ring system with each other and with the above ground CERN locations in the region. The optical fibers – each individual fiber can transmit up to 1,000 Gigabit per second – play a critical role for the real-time transmission of measurements and for the synchronization of particle acceleration. The synchronization alone may vary by only a few billionths of a second. Accordingly, the demands imposed by CERN on the suppliers and installers of optical fibers were high.

Mini-tubes in the conduit

A new mini-tube technology was used, among others, for the installation. Instead of a large cable with hundreds of fibers, three to ten small tubes at a time are pulled into protective conduit. A thin fiber optic cable, having up to 24 individual fibers, can be blown into each of the small tubes.

Largest research center in particle physics

In 1954, the European research center for particle physics, CERN, had been established. Twenty European countries are financing the center, which is located on the border between France and Switzerland west of Geneva. CERN portrays an excellent example of international collaboration. With just under 3,000 employees, it is the largest research center in particle physics. Approximately 6,500 guest scientists from 500 universities and institutes from more than 80 nations use the facilities – among which are two below ground storage rings. This number represents half of all particle physicists worldwide. Approximately 14 years ago, the idea of the World Wide Web from Tim Berners-Lee was launched at the CERN.

At present, work is under way in one of the existing LHC (Large Hadron Collider) storage rings. Its task is to store protons and to send them on collision course. Detectors in the LHC will reconstruct the trajectories of the particles generated in the collision. The properties of the collided and newly generated particles are determined in this manner. At the same time, heavy supersymmetric particles and the controversial Higgs-Boson as well as the Quark-Gluon-Plasma are being searched for.

get more
for CERN

- Quality
- Flexibility
- Operational reliability
- Dependability





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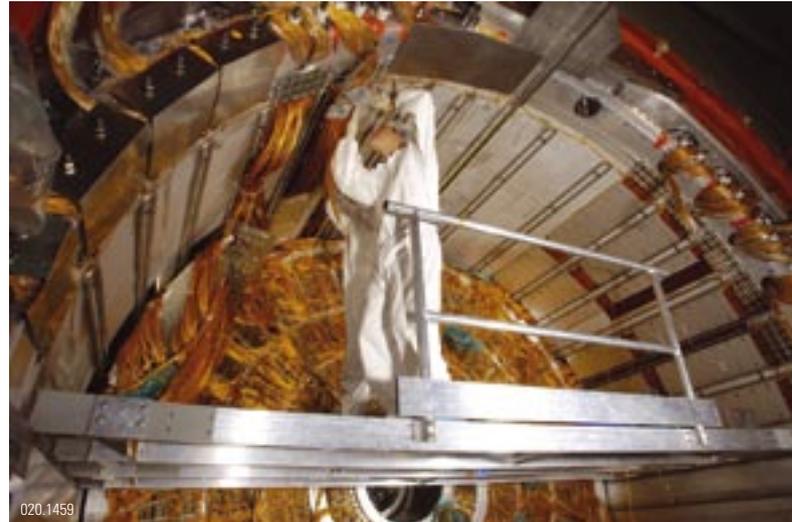
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CERN considers this solution more flexible and more economical. If anywhere along the cabling link a new user has to be connected only, a single mini-tube has to be opened for the branch. Replacements are limited to individual mini-tubes in case of a breakdown. In case of a network expansion, additional mini-tubes are simply pulled into the channel.

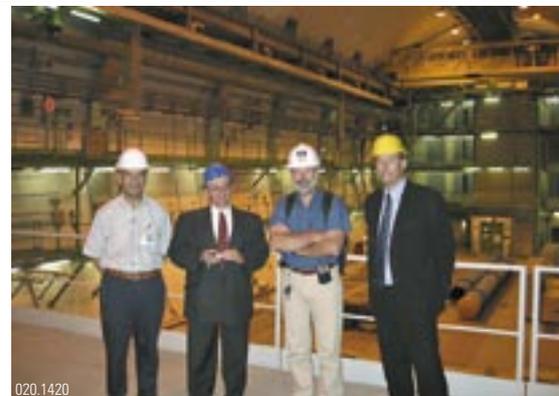
After two years of intensive investigations and tests, CERN decided on this solution and awarded the contract to the general contractor Draka Comteq Telecom B.V. from Gouda. The installation work has been under way for approximately two years. The Dutch supplier performs this work in collaboration with Mauerhofer & Zuber Entreprises Electriques SA from Renens near Lausanne. Mauerhofer & Zuber is an Atel group company. At the beginning of the installation phase, the Draka experts established a world record by blowing in the fiber optic cables. They positioned 3,100 meters of cable in the mini-tubes within one hour.

Quality and security

Mauerhofer & Zuber and Trans Data Elektronik GmbH supply cable terminations and distribution hardware components. They chose R&M as an additional project partner, in particular for supplying the E-2000™ fiber optic connector. The deciding factor was the quality and adaptability of the R&M components, which provide maximum operational reliability and dependability in the handling and management of fiber optic connections. EISA and TDE once more are testing the components individually for their quality and are compiling specific modules, splice trays and patch panels for the LHC project.



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Picture 1: The prototype LHC full cell during test.

Picture 2: Assembly of the Hadron Calorimeter for the CMS experiment.

Picture 3: After the insertion of the first endcap into this cryostat, the team proceeds to the wiring operations.

Picture 4: from left to right: Rabah Khair, Mauerhofer & Zuber; Christian Moser, Mauerhofer & Zuber; Luit Koert De Jonge, CERN; Kai Lederer, R&M.

Shared computing for particle research

Operation and research in the LHC ring are linked with enormous technical complexity and computing power, which can only be managed jointly by several computing centers. The focus at CERN is at present on the development of the World Wide Grid, a system for shared computing. The data volumes accumulating as of 2007 should be managed with this system.

In a test phase in April 2005, CERN and the participating computing centers maintained a continuous data stream of 600 megabytes per second (Mb/s) for ten days. 500 terabytes were transmitted in this period of time. It would take approximately 250 years to download this data volume via a normal DSL Internet connection (512 kbps).

(E-2000™ manufactured under License from Diamond SA, CHE-6612 Losone.)

Secure connections in the brown coal region

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An impressive backdrop. When approaching the surface mining of Garzweiler on the old Bundesstrasse 1, one plunges into a territory where apparently the titans are working. In the foreground, bucket-wheel excavators the size of dinosaurs are digging into the soil. In the background giant power plants are steaming. R&M is the partner for secure data and telecommunications in the heart of the West German brown coal region.

To drive into the surface mining zone is only possible with an off-road vehicle. Quickly one is faced with meter-high brown coal beds devoured by the teeth of the enormous bucket-wheel excavators. No. 288 is the largest excavator in the world. Its height almost matches the height of the Cathedral in Cologne. Its bucket-wheel is as high as a seven-floor building.

Fuel for generations

Eight of these gigantic machines haul 30 to 40 million tons of brown coal annually from the earth in the mining area of Garzweiler I – fuel for the adjacent power plants that supply the urban area around Cologne and Dusseldorf with electricity. In the region west of Cologne, within a surface area of 2,500 square kilometers there are 55 million tons of brown coal from 12 to 20 million years old, which have been mined since the 18th century. This energy potential corresponds to the crude oil deposit of Iran and Irak.

Kilometer-long conveyor belt systems pass through the entire surface mine and transport tailings and coal to the storage sites and power plants. Alongside the conveyor tracks run the energy and control cables for the excavators. The cables meet in the control room from which RWE Power employees control the coal mining.

Behind the scenes High-tech communication

The surface mining, appearing outwardly very gigantic and sluggish, emerges here as a very complex and dynamic computer-

controlled process with up-to-date data and telecommunications cabling. In the future, the bucket-wheel excavators will be remote controlled via GPS signals and the conveyor technology will be automatically updated. Heavy fiber-optic cables are used for the data transmission to the units.

RWE Power has relied on the R&M know-how and solutions for years. Due to the extreme loads in surface mining, the robustness of all connection technologies has top priority.

Cabling must be flexible, robust and future proof

The operator selected connection module systems of the VS modular type for the telephone connections in the surface mine, a system that stands out by virtue of its reliability and flexibility (wire cross-section of up to 2.5 mm, double contacts). The data network in the control room was set up with the Cat. 6 R&Mfreenet STAR products. In the connected halls and work spaces, products of the SplashLine series are used because splash protection according to IP54 protection class is required for the connection technique.

Due to the fact that in the control centers many computers are needed in the smallest of spaces, the connection technique was carried out via connection points. RWE Power attached importance to friendly service and downstream compatible RJ11 capability. Besides, with the R&M solution there are sufficient reserves available for the introduction of



R&M splice closures in brown coal surface mining.

future protocols on demand. R&M splice closures and Venus small distributors are used for cabling in the conveyor technology. Their use was in particular advocated thanks to their easy access in harsh working conditions as well as easy installation.

Brown coal, the only national primary energy source, is competitive with oil, coal and gas imports and will be around for generations to come. Therefore, the mining region of Garzweiler II will become operational next year. At the moment, the necessary infrastructure is being developed. RWE Power trusts R&M as one of the main suppliers for telephone and data connection technique for this project. Proven and tested products and collaboration – also for Garzweiler II.



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Coal extraction is not done in one's Sunday best.



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The biggest excavator in the world at work...

Garzweiler I and II

Germany's largest brown coal resource area with a total surface of 56-square kilometers extends from the Rhenish Grevenbroich in the Neuss Township to expressway A44. In 2002 just under 38 million tons of brown coal were mined.

In order to maintain the present output level, the Garzweiler II mine to the west

will become operational next year. In this 48-square kilometer coal resource area, which extends almost to Erkelenz, there are an additional 1.3 billion tons of brown coal available for exploration.

get more for RWE Power AG

- Partnership of many years
- Extremely robust components
- Maximum reliability
- Flexibility and easy accessibility
- Installation and service friendly
- Resources for future applications

RWE Power

RWE Power AG is one of Europe's largest electricity producers. 18,000 employees work at the one-hundred-percent subsidiary of the RWE energy group and produce annual sales of approximately three billion Euros. This makes RWE Power one of the central pillars of the Rhenish energy giant.

R&M products used

RWE Power relies on a multitude of R&M components for telephony and data systems as well as conveyor technology:

- VS modular distribution systems for telephone connections
- R&Mfreenet STAR Cat. 6 in the data network, RJ11 compatible
- Connection components with SplashLine for IP54 protection class
- Splice closures and Venus small distributors for conveyor technique
- LWL UniRacks in 19-inch distribution installations



Volksbank steps into the future

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Structural change. This means more for the Hannover Volksbank eG than a mere rearrangement of the banking landscape through alliances and mergers. The updating includes all "nerve cords" of the bank. On the basis of a meticulous plan, a new data network was introduced while operations were running – by committed installers and with R&M solutions.

In the summer of 2005, the Hannover Volksbank eG completed its migration to Fast and Gigabit Ethernet. Parallel to the organizational structural change due to a series of mergers, the bank had dramatically updated its extensive IT infrastructure since November 2003. Two principal buildings and more than 70 additional locations with subsidiaries and self-service stations in the city and region received Cat. 6 or Cat. 7 cabling, fulfilling maximum security demands and launching the bank into the future.

How does this future look? This was a focal question at a meeting for the initial consulting of the participants two years ago: Project manager Stefan Betenstedt, the engineering team of the Bank, Peter Marowsky and Maik Jewski, Andreas Kosanke, business manager of the R&M partner Görke Elektrotechnik GmbH from Seelze with its network specialist Thomas Rasche and another installation company.

A plus: flexibility and standardization

Stefan Betenstedt mentions some of the factors: "Greater efficiency, absolute availability and consistent standardization hold prominent significance for us". Efficiency is decisive in competition, and availability is vital for the bank. Standardization facilitates administration. At this time every distributor is configured in the same way at every location and every workplace connection is logically numbered. "In case of disruptions – if they still occur – telephone support suffices", reports Peter Marowsky on the positive results of the new cabling.

Andreas Kosanke emphasizes: "Future-capable also means: maximum flexibility". Therefore, the bank decided on the consistent use of R&M solutions. The installation-friendly, modular principle guarantees the customer not only the best transmission quality, according to Kosanke, but also an enormous adaptability in future structural or organizational changes or with the use of new applications, such as IP telephony.

getmore
for the Hannover
Volksbank eG

- Future proof
- Modularity
- Great flexibility
- Continuity and partnership



The customer: Hannover Volksbank eG

Since the beginning of 2005 the Hannover Volksbank eG is among the top ten of the German Cooperative Sector with total assets of approximately 3.7 billion Euros, 1,000 employees, 250,000 customers and more than 100,000 members. After a series of mergers of neighboring Volksbanks, the institution today serves the entire economic region of Hannover and Celle – a diameter of 60 kilometers – with branches in more than 80 locations. As a "bank for the middle class" the Hannover Volksbank eG meets the current challenges such as restructuring, grouping of strengths and increasing efficiency.

The installation partner: Görke Elektrotechnik GmbH

Customer loyalty grown over decades. Clear concepts and exact planning. The readiness to completely adapt to customer needs as well as to current market requirements. These are the strengths the installation and service company Görke Elektrotechnik GmbH from Seelze near Hannover uses to serve the North German Region from Kassel to the coast. More than 100 banks trust the performance of the 30-employee team of Andreas Kosanke and Dieter Görke. In addition, approximately 200 industrial and trade customers and even the Hannover Zoo rely on them. Electronic, IT and communications technology is managed as a profit center at Görke.



The center of excellence in Hannover-City.



Peter Marowsky and Andreas Kosanke.



Cabling system for the highest demands.

Success factor – bandwidth



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The Ukrainian telecommunications carrier, Ukrtelecom, formerly held a monopoly and now finds itself struggling against increased competition. For the first time, the company now offers its customers broadband Internet with ADSL technology from R&M.

The history of Ukrtelecom goes back to the times of the former USSR, when the company was the only telecommunications carrier in the Ukraine. Even today, 80% of the entire telephony and ISDN



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Broadband Internet over ADSL: VS Compact Modules make it possible.



traffic passes through the lines of Ukrtel. During the time of the telecommunications monopoly, long decision making processes and red tape had marked the company. However, the collapse of the Soviet Union and the dramatic changes resulting from it forced the company to adjust to the new general conditions of the liberalized market. One of the biggest challenges was the open competition.

Competitive challenge

Approximately ten years ago the first private telecommunications operators came into being focusing in particular on the high volume sales market segments. They successfully established themselves in the market with aggressive marketing and attractive additional services. In subsequent years, numerous companies as well as private customers with a modern lifestyle changed from the former monopoly holder to one of the new, dynamic and favorably priced alternative operators. Ukrtelecom was faced with a changed customer structure composed, for the most part, of a rural population and other low profit customer groups.

To remain competitive, Ukrtelecom changed its business model and implemented some drastic modifications. To adjust to the new market conditions, the next logical step is to offer broadband Internet via ADSL. For this project, started in 2004, Ukrtelecom selected Monis as its general contractor.

Broadband, the competitive edge

R&M had been able to collaborate with Monis in the months leading up to this, and prove the quality of its products. 14,000 ADSL splitters will be delivered by R&M within the scope of the project. Ukrtelecom plans to equip 4,000 exchanges overall with ADSL to offer broadband service to 97% of its customers. The former monopoly holder will present a greatly improved infrastructure and thus, significantly increase its attractiveness to the customers.

R&M is looking back to a long business relationship with the Ukraine telecommunications company. The first order concerned the equipping of the old exchanges with overvoltage and overcurrent

protection. R&M supplied 0.3 Million pieces of VS Standard modules. The second large project is still in the implementation phase and concerns the equipping of exchanges with VS Compact technology. Ukrtelecom will purchase 60% of its copper distribution systems from R&M. In addition, R&M supplied 14,000 VS Compact modules for the DWDM backbone of the Ukrtelecom. This created an important prerequisite to facilitate ADSL in the last mile.

Ukrtelecom ADSL project Facts & Figures:

- Introduction of broadband Internet via ADSL on the Ukrtelecom network
- 14,000 ADSL splitters
- 14,000 VS Compact modules for DWDM backbone

VarioLine: Baptism of fire in the snow

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Baptism of fire in the snow. Last winter, the VarioLine and SC-RJ team from R&M appeared in top form at the World Cup Ski Race. While Anja Pärson, Hermann Maier and Co. chased after their hundredth of a second, the fiber optic cabling system played an important role. AlgeTiming, an Austrian provider of chronometric systems and timepieces for sports, used the Plug and Play solutions for the first time and was enthused about the experience.

Time measurement technology and score boards at sports events must provide quick and precise information – regardless how cold or wet it is. AlgeTiming is among the top providers worldwide for this application in electronics and transmission technology. The following motto applies to devices from AlgeTiming: “easy to operate, robust like no other, universally applicable!”

Solution for broadband data transmission

The latest generations of score boards require quick, broadband data transmission.

VarioLine – ready for installation

VarioLine from R&M is a cabling system for multi-fiber optic connections in backbone structures, building and field cabling as well as for special applications. With this solution, fiber optic solutions can be implemented without special knowledge or tools. The fiber stubs on the loose tube cable are extended with a Simplex like patch cord without splicing. A plant-assembled connector, labeled and measured, is installed on both sides. The connector protection, with additional feeder aid, guarantees damage-free delivery and handling during installation.

AlgeTiming – the name for time measurement in sports

For decades, AlgeTiming GmbH & Co. with its head office in Lustenau (Vorarlberg, Austria) has been internationally well known in electronic sports time measurement. The workforce of 25 people constantly develops new products, which are sold via a network of sales agents in more than 40 countries. The company originally developed yarn stop motions for knitting machines as well as electronic master clocks and finally ended up in the market of sports time measurement.

Today, time measurement computers of every size and for practically any type of sport are in their portfolio as well as accessories such as starting gates or radio installations as well as an up-to-date array of electronic score boards and systems for stadiums, halls and open-air events.



Often the challenge is to bridge greater distances of several hundred meters. This led AlgeTiming to the decision to use fiber optic instead of copper cabling. Due to the fact that AlgeTiming was fascinated with the convenience, the robustness and the application possibilities of the SC-RJ IP 67 industrial and outdoor connector from R&M, they ended up asking for an overall solution. This solution had to be of high quality, implementable immediately and as simple as possible to use.

VarioLine and SC-RJ – the team for heavy-duty use

R&M replied with VarioLine – a loose tube cable used as field cable – delivered complete with assembled connectors. During the 2004/2005 winter, three VarioLine systems were in action at Alpine and Nordic World Cup Ski Races and passed their initiation with flying colors. Roman



After defrosting the ice-coated coil with a hair dryer, the LWL link functioned perfectly.

Merhar, responsible for the project at AlgeTiming stated: “We had to deal with the harshest possible conditions”. Once the coil was filled with ice and the connection had to be defrosted with a hair dryer. Another time, a third party treated the cable in a most improper manner. The VarioLine cables got through all that without any problem.

get more
for AlgeTiming

- Mobile fiber optic cabling for outdoor use
- Plug & Play solution for immediate use
- Maximum robustness and reliability



Networking and enjoyment

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Somerfield PLC, one of the UK's leading high street food retailers has selected Reichle & De-Massari AG (R&M) cabling solutions as part of a major program to renew its stores nationwide.

The Somerfield Group incorporates the Somerfield and Kwik Save super-

tractive alternative to the large supermarkets located at the periphery of the city.

Nationwide, Somerfield PLC has approximately 1,275 stores in total and more than 56,000 employees. It has generated annual sales of £ 4.6 billion (CHF 10.55 billion / Euro 6.86 billion) and, on average welcomes some 12.4 million customers every week.

Close by and fresh

One of the recipes for success of the Somerfield group is to meet the consumers' needs for regionally and locally produced products. Somerfield not only wants to sell foods but would also like to raise the customers' consciousness that they are supporting the farmers and other food producers in the region. More than 2,000 local products are found in the product

Rod Davidge, IT-Manager at Somerfield, globally evaluates the collaboration with R&M as positive:

"The updating and standardization of the store data infrastructure is a very important part of the upgrading program. While evaluating product suppliers we looked beyond the key requirement of a high quality system. Two critical requirements are the capability to match supply to our project needs plus to work closely with our contractors to ensure that the systems will be installed smoothly as part of the overall upgrading program. R&M, in association with their UK distributor, Computabyte, have demonstrated they can provide us with the complete range of services we require to support our program".



market business units which together operate over 1,300 stores nationwide. Somerfield's focus is on its key strength as the UK's biggest neighborhood supermarket offering easy to access convenience shopping in smaller high street stores with a focus on fresh food, modern ready meals, premium own brand lines and a quality range of wines.

Kwik Save operates as a distinct value brand building on its heritage as the nation's number one discount supermarket offering the biggest brands at the lowest prices.

By selecting an R&M network, the company has also demonstrated a taste for technological quality as well as value for money!

Over the last 10 years English cuisine has shed its negative image. A number of high profile celebrity chefs such as Garry Rhodes and Rick Stein have led the way in evangelizing quality dishes prepared from fresh, wholesome ingredients. The success of these initiatives has proven beyond doubt that the English love good food too! Another example is the success of Somerfield, the largest British fresh food supermarket chain. Product quality and freshness are the company's top priorities as well as collaboration with local producers and suppliers. The neighborhood stores are centrally located and easily accessible. Somerfield offers an at-

range of Somerfield and the company has established numerous new regional food product labels.

In November 2002, the group introduced a project called "Local Life" with the purpose of developing stronger relationships with small producers and local farmers. The wine selection featured by the supermarket chain is no small feat either by comprising approximately 380 wines from all over the world. At the International Wine Challenge 2002, the company received awards for 194 wines including six gold, 33 silver and 67 bronze medals.

In addition to its Somerfield Stores, the Somerfield group also operates the Kwik Save discount chain with just under 690 stores. Overall, the company has more stores than any other full-service grocery store chain in the United Kingdom.

Efficient and flexible

To secure and develop its leading market position, the Somerfield group required an efficient, quick and secure network infrastructure. Therefore, after an extensive evaluation of the available systems, they chose R&M for all new installations from June 2005. The total project will see approximately 1000 stores renewed or refurbished with Phase 1 being 200 stores this year.



Somerfield Group UK Project Facts & Figures:

- Updating and standardization of the overall data infrastructure
- Cat. 5e new cabling of the entire store chain (approx. 1,300 stores)
- in total approx. 32,500 data outlets
- 1.2 to 2.4 km copper wire cables per store (in total 1,560-3,120 km of cable)

Connecting Nokia



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020.1398

According to its slogan, Nokia connects people; which requires that Nokia itself be well networked. Therefore, the Finnish group had an R&M network installed for one of its most important production facilities.

Innovative products are one of the features of the Finnish Nokia concern. Models, such as the "Communicator" or the "N-Gage" set trends and reinforce the image of this industrial company, which, upon a time, manufactured rubber boots. Today, the technological group of Nokia not only embodies the economic power but the self-esteem of an entire nation.

Excellent location

To meet the ever-growing demand for cellular phones, Nokia had to establish time and again new production capacities. Therefore, in 1999, a large production facility was built in the Hungarian countryside for the first time. In Komárom, 90 km west of Budapest, Nokia's tenth cell phone factory in the world was built with an investment sum of approximately 100 million Euros (CHF 153 million). CEO Jorma Ollila emphasized in his inaugural address the importance of the location as well as the importance of the Hungarian market for his company: "In the rapidly growing cell phone industry, efficient, flexible logistic processes and production capacities are important success factors. Therefore, the new factory in Komárom is ranked very highly within Nokia's global logistics structure." Further reasons for the investment

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were the favorable geographic locations of the country, the positive investment climate, the well-trained skilled personnel and the importance of Hungary as a sales market.

Great capacities

Already in 2004, the decision was made, to enlarge the Komárom production site. The capacity was increased to approximately 300,000 cell phones daily with an investment sum of more than 50 million Euros (approximately CHF 76.5 million). Now the factory premises comprise approximately 50,000 square meters and the factory is overall among the most modern of the group. Innovative production methods allow a particularly flexible and rapid production, presenting an important competitive edge in times of consumer trends that change rapidly. Today, with the Komárom site, Nokia is among the largest investors in the Hungarian telecommunications market and employs approximately 3,000 employees locally.



Reliable partner

R&M was already contracted for structured building cabling during the first

expansion of the plant in Komárom. In 1999, 900 shielded Cat. 5e modules and approximately 900 SC-RJ fiber optic modules were installed. The customer was completely satisfied with the high modularity, quality and reliability of the R&M products. Therefore, R&M Hungary carried out all current expansions and modifications of the network. Since 2001, Fer-vill Ltd. is the certified R&M partner for all installations. The expansion of the factory in 2004 was the highlight of the previous collaboration by culminating in one of the largest cabling projects in Hungary. Overall 3,500 modules were installed and networked with each other with more than 160 km of Cat. 5e cable and 26 km of fiber optics (backbone). R&M, therefore, has a hand in Nokia's future ability to live up to its motto: "Connecting People".

Nokia Komárom factory project Facts & Figures:

- Network installation for Nokia cell phone production
- 50,000 m² of factory premises
- 3,500 links
- 160 km of Cat. 5e cable
- 26 km of fiber optics



020.1419

A residential technology park

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Currently, a residential park of the highest class is being developed near Budapest. The residents enjoy maximum convenience, preferred location and comfortable amenities. A fiber optic network from R&M provides first-class data and voice communication.

Lifestyle for the highest demands: A project, currently being developed in the Hungarian Fótiglet fulfills this desire. The residential park of more than 450,000 square meters in its completed state will comprise 250 single-family houses as well as several townhouses, of which some are planned and equipped appropriately for seniors. The park-like property located in calm surroundings is a gated community, a gatekeeper and a video monitoring system see to the safety of the residents. Additional services are a Kindergarten and a separate watering system for the gardens.

High-tech living comfort

The residential park stands out technologically with a powerful communications network based on an FTTH structure (Fiber-to-the-home). The dimensions of the attainable bandwidth and the quality of the active components used, allow totally new functions. IP telephony, cable TV with up to 100 channels, rapid Internet access, video monitoring and video-on-demand are implemented via one and the same cable.

Successful young company

The developer, the IP-Park Kft., awarded the installation of the network to Watt 22. This company, established in 1996, specializes in installations for telecommunications networks and in addition successfully develops hard and software. This innovative company has been a certified R&M partner for several years with a focus on LWL products. In 2004, Watt 22 took on the order for planning and developing the telephone/cable TV/Internet network for the Fótiglet residential park. The first development phase began in September 2004 and the first houses were connected.



020.1426

The Fótiglet residential park near Budapest – a residential park of the highest class with high-tech living comfort.

New possibilities

Every residential unit is equipped with an Ethernet switch and a versatile Set-Top-Box. Internet, Telephony, and digital TV are made available via the switch. The digital head-end as well as the components necessary for the above-mentioned services were developed by Watt 22 and successfully introduced on the market. The integrated solution provides versatile possibilities for more convenience and flexibility in the household. For example, the user can receive information on incoming telephone calls and E-mails on the TV screen. Undesired calls can be re-directed to the answering machine with the remote control.

First-class products

R&M Hungary delivered the components for the passive network. Included are 15.5 km inside/outside cable with metal rodent protection and 50/125 HiCap fiber, 27 special LWL splice closures and finally a fiberliner switch with 500 SC-pigtails as well as supplementary elements. In addition to the cable entry guide of standard thickness, 12 thin cable outlets were required for the LWL splice closures, which R&M was able to implement with the Flexy construction used for the Cu splice closures. The delivered solution covered all the needs of the customer. A further expansion of the system is planned for 2005.



020.1417



020.1418

Project Fótiglet residential park Fact & Figures

- High-end fiber optic network (fiber-to-the-home) for luxury residential park
- A park of more than 450,000 m²
- Telephony/cable TV/Internet
- 15.5 km of inside/outside cable with metal rodent protection and 50/125 HiCap fiber
- 27 special LWL splice closures
- Fiberliner switch with 500 SC-pigtails
- Next expansion phase in 2005

Convent equipped for the future

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Equipped for the future! The sisters of the St. Elisabeth Convent in Schaan usually mean that in the spiritual sense. But now they are also technically ready for what's coming tomorrow. New cabling and multimedia outlets from R&M provide access, for the sisters and their guests, to the future and the world inside and outside.

New infrastructure for the sisters and their guests

The Order of the "Adorers of the Blood of Christ", reside above Schaan in the St. Elisabeth Convent overlooking the Rhine Valley in the Principality of Liechtenstein. In this convent, sisters, young and not so young, believers from the region and from many countries meet for seminars, studies, church services or for vacations in tranquility. Painting courses, giving an introduction into the deep spiritual meaning of traditional Christian icons, are a distinctive feature at the convent.

The stately building with 60 rooms – many are rented to guests – and a chapel, is 70 years old and has recently been refurbished. A sun-filled addition as a reception area and common room – as well as a new infrastructure for media, communication and EDP were added. All rooms, offices and a media room were equipped with multimedia outlets from R&M.



The Order of the "Adorers of the Blood of Christ" reside in the St. Elisabeth Convent high above Schaan with view of the Rhine Valley.

Day in and day out, the sisters concentrate with full devotion on their services to their fellow men. Up-to-date communications technology or even entertainment media play a minor role. During the first test the Provincial Secretary was convinced of the usefulness of the multimedia outlet: "Now I can access the entire EDP on a laptop from my room".

Future-proof and reasonably priced

The Order thinks and plans long-term and looks far into the future. Investments are only made if something has long-term usefulness. Accordingly, the convent expects that the new infrastructure is future-proof in every way.

The Liechtenstein SpeedCom AG was able to offer the above and more in the course of the upgrading planning. Contrary to a conventional proposal with separate EDP, telephone and TV/coaxial

cabling, the integral and modular R&M solution proved, after all, to be more cost effective. One of the objectives of the project was to provide long-term more convenience in the rooms for the vacation and seminar guests. This was efficiently achieved with the multimedia outlets and structured cabling.



R&M multimedia outlet

SpeedCom: Technologies merge

The SpeedCom AG, an R&M certified planning and installation partner with its head office in Schaan (FL) began in 1998 as a company with a revolutionary concept. SpeedCom latches on to the technology trend of convergence – the merging of computer science and telecommunications – and implements it in practical consulting projects, project planning and installation work in innovative overall solutions. The concept is carried out with 14 employees (50 percent in telecommunications and 50 percent in information technology or computer science), who are constantly networked with each other. The employees believe in the SpeedCom concept – none has left the company since its establishment. Every customer deals with a single contact person.

get more
for the St. Elisabeth Convent

- Integrated solution for IT, telephone and media
- More cost efficient than conventional installation
- Future-proof, long-term guarantee



Homewiring for every family

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The entire family benefits from multi-media cabling in the home. Erna and Thomas Baum and their three sons have experienced it. In their new home in Zug, they are intensely using the R&M homewiring system – each person according to his/her need or desire: for professional applications, to play games, to save time and money or for social commitments.

A family with teenagers has a manifold networking need. The Baum family is a perfect example. The R&M homewiring system was installed in their new apartment in the Herti 6 section of the suburbs of Zug.

The head of the family, Thomas Baum, an engineer in building services engineering and communications technology, had clear ideas. The cabling had to provide connections for all important media in every room, including children's rooms. He emphasizes: "I wanted a stable PC network and all communications options for the future".

Good partners

The electro-planners Hefti.Hess.Martignoni from Zug made a comparative calculation, which showed minimal added costs compared to the standard installation. Thomas Baum, the expert, examined the matter further: will the electrician understand the system? Thomas Gander, telematician at Stadler AG in Zug, accepted the challenge. He placed the multimedia outlets and set up the distributor. Approximately 500 meters of coaxial and Cat. 5e cable were laid in the 5.5-room apartment.

Subsequently, Thomas Baum took over. He bought an ADSL router with a switch from Swisscom. The PC equipment was upgraded and a network capable printer was acquired. The perception was: "One printer for all is more economical".

Good reviews from the "Heavy User"

The eldest son, Simon (13) has much homework, for which he uses the Internet. He has immediate access from his desk. Simon and Martin (12) are passionate Habbo players. They meet with virtual friends on the Habbo sites on the Internet.

Erna Baum adds: "I am not a PC freak, but I am grateful for the time-saving up-to-date online communication for my volunteer work in the church and at Pro Senectute".

Thomas Baum is pleased: "Whether I work in the home office, in the living room or on the balcony... I have network access everywhere" and he emphasizes: "Thanks to cabling I have a stable, guaranteed bandwidth in all rooms". It is expandable for new services such as video on demand. Thomas Baum declares: "Homewiring guarantees the necessary capability".



020.1406

Simon, 13: "I have to access the Internet frequently to prepare presentations and group assignments".



020.1404

Mother, Erna Baum: "In the future, why don't we cook with more recipes from the Internet?"



020.1405

Martin, 12: "I love Habbo because I can meet friends on the Internet".



020.1403

Father, Thomas Baum: "I wanted a stable PC network and all communications options for the future".

A powerful network for fast business



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The Austrian publisher ET Multimedia AG had a network installed with Cat. 6 Ethernet cabling from R&M, which meets high demands. One of the most significant conditions for a successful publishing and media business is speed and security in the data traffic.

ET Multimedia AG is the second largest magazine publisher in Austria. The relatively new enterprise, established in 1989, has risen to become one of the key players in the Austrian media landscape within a very short period of time. Today, approximately 500 employees produce annual sales of approximately 40 million Euro. The company publishes numerous monthly magazines for diversified interests and reader groups, such as the two lifestyle magazines "Wiener" and "Wienerin", which meanwhile have almost reached a type of cult status. However, the most important publication of the house is the daily "Wirtschaftsblatt". The company has a unique position in the Austrian media market with this product, the only daily up-to-date business newspaper in Austria.

High network demands

Speed is a significant success factor in bringing the latest daily business news on time to the paper. The editorial and graphics staff of the extensive business newspaper, therefore, works under great time pressure. Robert Pischinger, IT manager at the ET Multimedia AG states: "A network capable of transporting large data volumes in the shortest time possible is a must under these conditions". Up to

ET Multimedia AG Vienna Fact & Figures

- Gigabit Ethernet Cat. 6 cabling
- 1,040 RJ45 Cat. 6 UTP (unshielded twisted pair) double modules
- 1,040 double outlets for floor boxes
- 89 24-port patch panels
- 85 km of Cat. 6 UTP cable
- 20-year system guarantee



020.1407

Conduits for the preparation of workplaces with double data outlets.

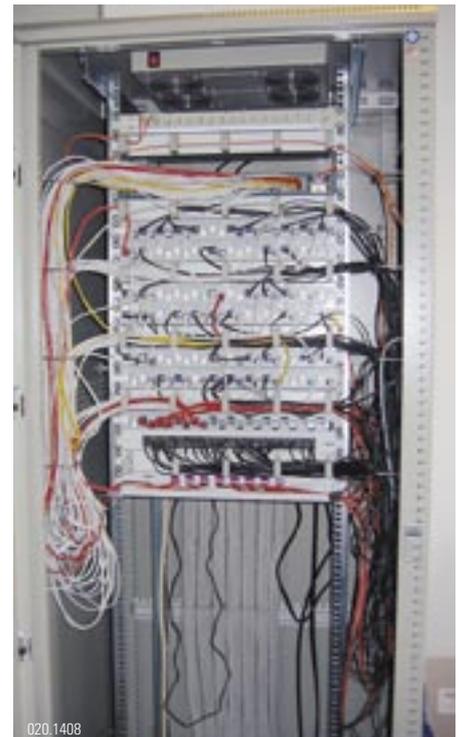


pre-press, the entire newspaper production takes place in-house. On the occasion of moving the company to new premises the opportunity arose to approach comprehensively the subject of the network. Therefore, the management of ETM AG selected a solution meeting the highest demands, not only for now, but also for the next five to seven years: structured cabling from R&M.

Speed and reliability

Starting from a fiber optic backbone, the Cat. 6 cabling extends horizontally to the individual floors. Robert Grischaney, authorized officer of R&M Austria GmbH knows that his customer is well served: "With a total of 1,040 double data outlets, all workplaces are adequately equipped to access the network trouble-free. IP telephony is used, as well as television via structured cabling, which can supply uninterrupted TV signals up to a distance of 90 meters. Large data volumes are transported trouble-free and fast."

R&M supplied the network components known for their high quality and the certified R&M partner, Technisches Büro Ing. Thomas Mann was the planner. Today, ET Multimedia AG has Cat. 6 cabling meeting all the speed and security demands of the dynamic company.



020.1408

Distribution cabinet for Cat. 6 cabling.

Miles and more

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To be competitive in the air traffic business of today, the market participants must provide flexibility, safety and reliability – in the air as well as on the ground. R&M networks are instrumental in achieving this.

For some years now, the civil aviation has been faced with stricter market conditions as well as a decrease in sales and income possibilities. This situation has resulted in significant changes for airlines even to the point of exiting the market. Companies providing supporting services, such as air traffic control have not been spared by the crisis.

Flexibility and quality

In spite of this unfavorable market environment, the Czech government enterprise, Air Navigation Services (RLP CR) has been able to retain its strong market position. The following factors make the Czech airspace interesting to international airlines: the favorable geographical location of the Czech Republic, its flexible reaction to fluctuations in demand as well as the quality and safety of air navigation at advantageous rates. In 2002, for example, the Czech Republic registered an 8% increase in traffic, one of the strongest increases among all European countries.

Know-how and technology

The extensive know-how of the employees and the sophisticated technology have already made it possible up to now to cover the increasing demand for the use of the Czech air space. However, to meet future demands, the construction of



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The main building of Integrated Air Navigation Control Centers (IATCC).

a new, significantly larger air traffic control center was necessary. For security reasons, as is the norm for all international airports, the building was constructed at a distance of five kilometers from the Prague airport.

Security and reliability

The new Integrated Air Navigation Control Center must satisfy an increased need for security in addition to accommodating the growing capacities. Therefore, the reliability and high availability of the data and telecommunication infrastructure was a particularly important criterion in the decision for a new network. In addition, the infrastructure must provide, to the extent possible, sufficient flexibility to facilitate later expansions. For these reasons and to provide a technically optimal environment for air-traffic controllers and for the future, the decision was made for structured Cat. 6 STP building cabling from R&M. Furthermore, R&M implemented the fiber-optic connection (backbone) at the Prague airport.

As usual, R&M counted on proven collaboration with certified partners. Krugel Exim CZ was responsible for the distribution and Sitel was the installer. The entire project was carried out between April 2004 and May 2005. Operation of the Integrated Air Navigation Control Center will start in 2007.



020.1397

From left to right: Ing. Pavel Krizan, Sitel; Pavel Nevesely, Krugel Exim CZ.



Prague Integrated Air Navigation Control Center network Facts & Figures:

- Cat. 6 STP structured cabling plus fiber-optic backbone
- 140 km copper cables and 7 km fiber-optic cables
- 1,400 outlets, 2,800 modules
- 20-year system warranty

The Alsace Gate uses RCO Power

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The biggest building in Basle, the Alsace Gate next to the main railroad station, was completed this year. It owes its resonant name to the neighboring railroad connection to France, in this sense in fact, the gateway to the Alsace. RCO Power from R&M provides power distribution in this modern building.

A shell of glass, small angle forms and courtyards make the new office and commercial building appear transparent and light. Flexibly arranged open-space offices give an optimal atmosphere for cooperative and creative working. SBB Cargo appreciates these features and, as a major tenant, has moved into four floors.

The renowned architects Herzog & de Meuron had taken on the overall planning of the project. The extensive electric installations were divided between K. Schweizer AG for the electrical planning and low current as well as HLK installations and Kriegel & Schaffer AG for the mains current installations. The installers and planners had to fulfill demanding requirements: short installation times, outstanding operational reliability, cost effectiveness, flexible connection expansion capabilities and allowance for the EMC difficulties. RCO Power from R&M was the appropriate answer to these challenges.

Cabling is quicker and made easier with the RCO Power installation process. The solution is cost efficient because it eliminates expensive distribution cabinets with starlike cable couplings to the user points. Thus, planning time is reduced, the cable guide simplified and the use of cable material is reduced. "I would recommend RCO Power any time because we have saved time, material and thus costs", confirms Wolfgang Wolter of Kriegel & Schaffer AG: "R&M convinces us through quality and reliability".

Reliable contacting with Insulation Displacement Contact

In addition to the cost effectiveness, the reliability of the connection technique plays a major role. IDC (Insulation Displacement Contact) guarantees reliable contacting without interrupting the power cable. If needed, additional adapters can be placed anywhere making the system – and therefore, the configuration in the open-space office – extremely flexible.

Since RCO Power, as the first IDC, can be wired to common 230/380 V round cables, no EMC (electromagnetic compatibility) difficulties arise.

Furthermore, the employees of Kriegel & Schaffer AG were able to complete the installation in record time due to the fact that R&M delivered the floor outlets pre-assembled and fully wired.

get more
RCO Power

- Reduced planning time
- Increased cost effectiveness
- Tool-free contacting
- Reduced material consumption
- Quicker installation
- Increased Security
- No EMC difficulties
- Error-free wiring



Alsace Gate Basle:

Building construction: March 2003 – 2005

Length: 145 m

Depth: 35 m

Height: 18 m

2 basements, 5 floors, total floor space: 15,466 m²

Project costs: CHF 66 million

Architects: Herzog & de Meuron AG and Proplaning AG, both in Basle

Kriegel + Schaffner AG, Wien-Strasse 2, 4002 Basle (www.kriegel.ch)

K. Schweizer AG, Hammerstrasse 121, 4005 Basle (www.ksag.ch)

SBB Cargo AG, Elsässertor, Centralbahnhofstrasse 4, 4065 Basel (www.sbbcargo.ch)



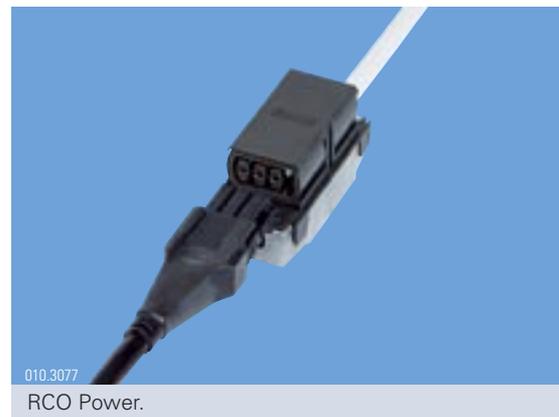
020.1439

The Alsace Gate – a building by the renowned architects Herzog & de Meuron AG.



020.1440

Construction of the double floor in the office space.



010.3077

RCO Power.

A multipurpose building



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020.1448

Today, the technological requirements for residential buildings are: multimedia in every room and various possible uses for the individual rooms. In Vienna a house provides both requirements through versatility and adaptability.

Singles who are moving into an apartment desire flexibility – regarding the use of various technologies as well as the future use of the rooms. For example, access to the Internet is as important in the living room as in the study; cable television is desired in the bedroom as well as in the kitchen. Where the desk is today may well be where the crib will be in a few years; today a single's apartment tomorrow a family home. A project has been implemented in Vienna fulfilling these requirements. The conditions were as follows:

- All residents are establishing their first independent household
- The future life plans of the residents are not yet firm.
- The residents are between 20 and 24 years of age.
- The use of the building is open for the financing period of 25 years.

Adaptable living space

The result of the planning was a modular residential building with remarkable adaptability: Four single units can be converted into two one-family apartments or two single apartments and one one-family apartment. The rooms were designed to serve any current and future use. A multimedia infrastructure with Ethernet and coaxial cables was implemented. Telecommunications, TV and EDP are available in every room. From a common computer room all analogous and digital TV and radio signals as well as Ethernet and ISDN signals are transmitted to four strategically planned circuits. The four single units can be supplied independently from one another with an EDP/TV network or be connected to a complete network.



020.1454

Here every room provides access to a multimedia infrastructure.

Universal outlet

The multimedia outlet from R&M was the very product meant for the connection of the individual rooms in the residential units. This outlet provides connections for all telecommunications and EDP applications through interchangeable modules. EDP and telecommunications devices (e.g. telephone) can be effortlessly connected to the outlet. Classical interface technologies, such as coaxial connectors can also be used. For example, a common TV receiver or an LCD screen can be connected to an outlet with Ethernet actuation. Digital and analogous signals are fully available to the residents depending on their needs and terminal equipment. Expensive connection equipment is not necessary thanks to the classical plug face.

The building has been occupied since January 2004. The residents have embraced the private multimedia networks with enthusiasm and are using them extensively. The next step is a common broadband Internet access, which will be advantageous for the participants through cost sharing.



020.1455

Workplace with R&M multimedia outlet.

Multimedia building in Vienna Facts & Figures

- Common terrestrial and digital antenna system
- Common computer room as the network center
- Multimedia Infrastructure with Ethernet and coaxial cable for TV/Radio, telecommunications and EDP functions
- R&M multimedia outlet in every room

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You think that there is a printing mistake? Don't worry we only encoded the message. You see: the A and O in the cryptography is the transfer of the secret key! What this possibly could have to do with optical fiber cables you will learn in this article.

Cryptography is the science of encoding and decoding of information. It is an ancient method to protect secret information from undesired access. Already Julius Cesar dreamt up various encoding forms to exchange secret messages with his governors, generals and consuls.

In the Middle Ages versatile cryptographies were used for the protection of diplomatic correspondence.

The key as crux of the matter

What is the weak point of every form of encrypted message exchange? It is undoubtedly the sharing of the key.

Let's assume two fictitious people would like to exchange secret information using telecommunication. Let's name these people Alice and Bob in compliance with the terminology in the international technical literature. These two people must absolutely prevent a third person, let's call her Eva, from eavesdropping on the message (Figure 1).

Therefore, Alice and Bob must use a key to the message known only to them and of which Eva must definitely not gain knowledge.

Herein lies the problem: how can Bob and Alice safely exchange the key? Until today the answer has been: "There is no way to exchange the key in a tamper-proof fashion. Therefore, the key must be so complicated that it would take a listening enemy too long to decrypt it with known methods. Thus, encryption processes usually function on a very high level of complexity. However this procedure does have a weakness: the rapid development of the chip technology has led to the fact that even the most complex codes can no longer be considered safe. An eavesdropper must simply wait until

a faster computer makes it possible for him to crack the code within an acceptable period of time.

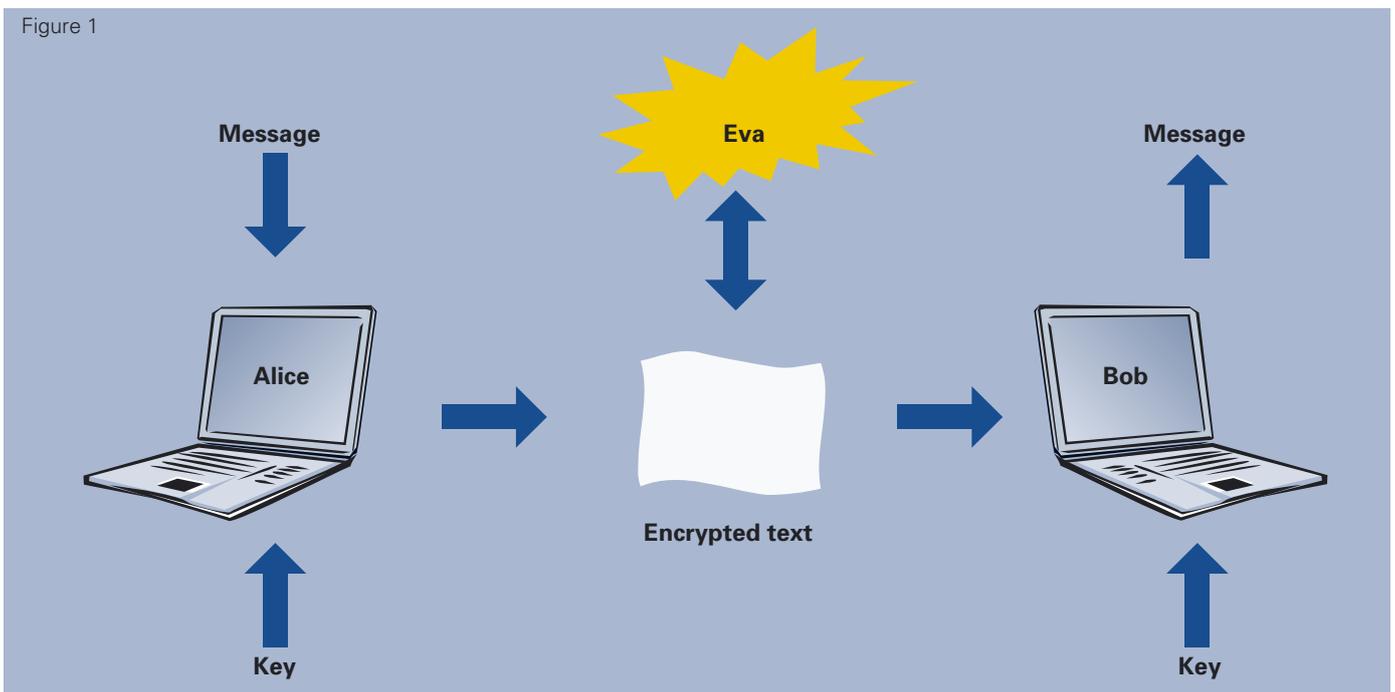
Consequently this puts information in danger, which is to remain secret for decades.

Therefore, the significant secret of success is not the complexity of the key but the knowledge of whether an unintended listener is on the line or not. However, this possibility is not available with the hitherto existing means of transmission.

Quantum leap to more security

It is here that the cryptographers benefit from the quantum nature of objects like photons (light particles). The microscopic world is in fact ruled by laws, which are different from those, which govern the macroscopic world, and which are usually known. When looking at a car, no one would think that the color of the car depends on whether someone looks at it or not. If one sees a red car, it is because the car has been painted red, and provided it is not painted in a different color, it remains red.

Figure 1



However, this concerns the world of classical physics. In the microscopic world, the laws of quantum physics rule, which in many ways give a paradoxical impression. Alice and Bob can use one of these paradoxes to exchange their key safely, viz. by applying the Heisenberg uncertainty principle. This principle states that the measurement of a photon alone already changes its condition. This means, that a photon upon observation has other characteristics than the identical particle as soon as it is being measured.

This is how quantum physics provides new possibilities for the safe transmission of encoded keys, i.e., with the help of photons, which are sent via fiber optic cables. Thus, the phenomenon described by Heisenberg in his uncertainty principle can be exploited. Based on the photon condition, Alice and Bob can at any time determine whether during the transmission of the secret key someone listened or not.

Alice sends a potential key to Bob for a secret message to be sent later in the form of differently polarized individual

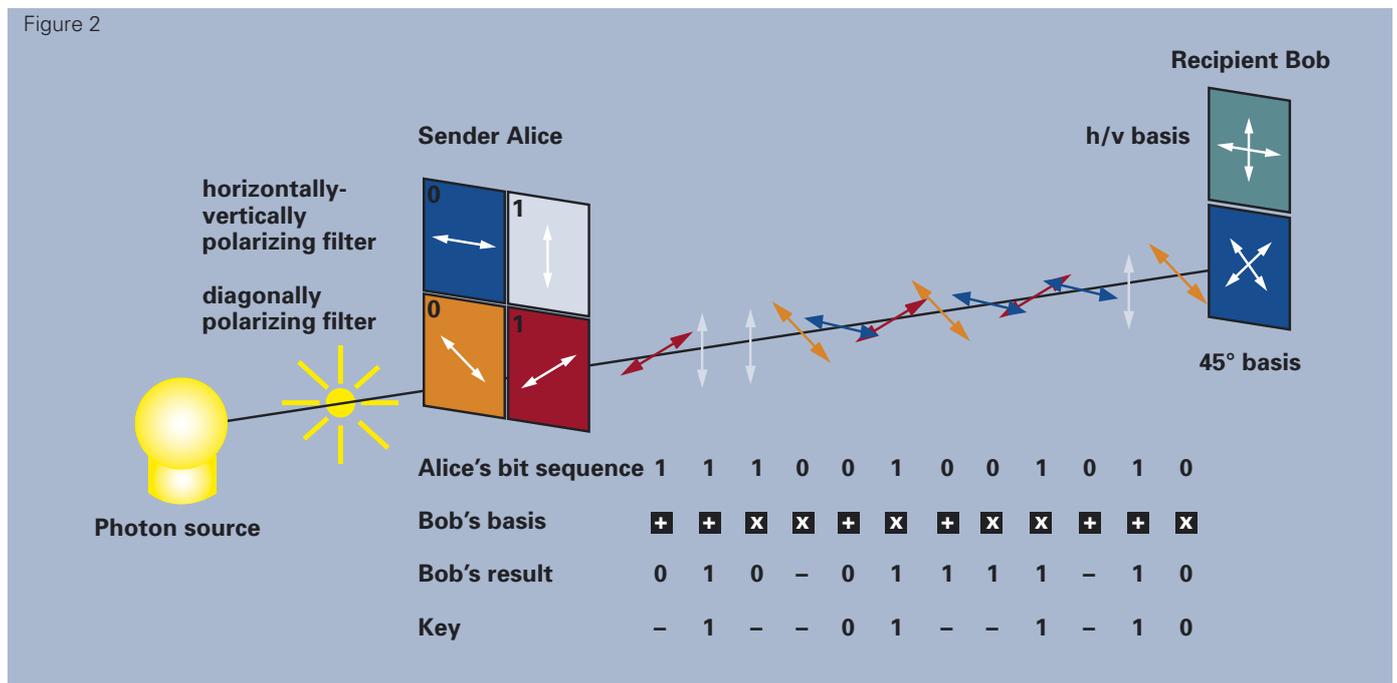
light particles. A light particle can be polarized in four different ways: horizontally/vertically or diagonally from top right to bottom left or from bottom right to top left. Bob verifies the polarization of the received light particles. Subsequently, Alice and Bob compare a random selection of bits openly, that is via a non-secured connection (Figure 2). If the polarization of these photons agrees, they can assume that the data line had not been spied on, in other words that the non-published bits are also identical. The latter then form the secret key. However, if bits were changed during the transmission, the presence of an unwanted observer must be assumed and the code that was just sent is discarded.

Hands on success

For the first time it is possible with quantum cryptography, based on the laws of quantum physics, to guarantee tamper-proof data transmissions. Therefore, it is not surprising that the renowned US research institute, MIT (Massachusetts Institute of Technology), described quantum cryptography as one of the "ten technologies, which will change the

world". Science as well as technological enterprises get closer and closer to this prognosis. For the first time in April 2004, in Vienna, money was transferred secured with quantum cryptography. The fiber optic cable for the transmission of the entangled photons was approximately 1,500 m long and led from the Bank, Austria Creditanstalt, via Vienna's network to City Hall. Prof. Anton Zeilinger, world-renowned photon researcher and director of the Institute for Experimental Physics at the University of Vienna, was the director of the experiment. Industry deals successfully with this subject. Currently, some companies are in the process of developing devices for safe data transmission using quantum cryptography. The exhaustive use of tamper-proof data transmission no longer seems far away. This provides a new opportunity for fiber optic technology to develop unused potentials.

(Title: Replace every letter with the preceding letter in the alphabet (for example B by A, A by Z, X by W, etc.))



Industrial Ethernet: Quo vadis?



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Today, no-one anymore seriously doubts the important role Ethernet will play in automation. Only its form, intensity and penetration remain to be seen. As a guest contributor, the automation expert, Prof. Hans Scheitlin, presents a descriptive overview on the current discussion surrounding Industrial Ethernet.

Ethernet – the solution for integrated communication

Finally, there is a system that is putting an end to the old “bus war” and bringing a uniform solution to the automation sector. Ethernet is the network par excellence worldwide and is very widespread. This fact results in low prices and high software support. Ethernet makes integrated communication possible ranging from the “World-Wide-Web” to the most recently connected component.

Gateway problems and the multitude of field bus systems thus belong to the past. Transitions to analysis stations, databases etc. are becoming virtual “waste products”. There is also no end in sight regarding speed.

Unfortunately, Ethernet will not be capable of assuming the role of the “universal bus” in this absolute form. Ethernet in itself is in fact “only” an unsecured data connection between two devices. So far, in the network interconnection, Ethernet has functioned almost exclusively with the transport protocols IP and TCP, which provide a secured point-to-point connection. The most versatile client server applications are implemented with these protocols. This structure is often inappropriate for automation systems.

Restrictions due to protocol

The TCP/IP protocol provides merely secure data transport between two participants. None of the known protocols is concerned with which message has to be sent when and to whom. The control capability is virtually missing on how to couple an automation process to the network. Exactly herein lies the very vulnerable point. Such controls have long been

adopted for field buses. The “fourth bus war” emerges for Ethernet in automation. The most diverse interest groups and user organizations have chosen their own solution approaches among themselves and they are all incompatible (see summary on right-hand page).

Ethernet is by far the fastest system. In principle this determination is true, except that the transmission rate alone does not represent a very important parameter. The user, in principle, only wants to know how long it takes until his system reacts to a specific event. For this, information on the transmission rate is insufficient. It also depends on how much ballast (administration information in relation to user data) is dragged along. Unfortunately, Ethernet with TCP/IP is not very efficient in this regard.

Executing the TCP protocol is particularly complex and is practically out of the question for small devices. This is probably one of the reasons why this technology is not fed to the individual sensors/actuators. Ethernet takes on meaning for larger data volumes. Even if it is technically possible, the question must be asked whether it is still appropriate. The use is certainly appropriate for the networking of complex assembly units, i.e., when the data of entire IO fields have to be transferred.

Can real time be achieved?

Today, there are solutions with Ethernet available even for highly dynamic real time processes. However, these no longer work with TCP/IP! Either, special ASIC provide the required performance (ProfiNet, EtherCat and SercosIII) or a special time-slot process guarantees the data traffic without delay and jitter free (ETHERNET Powerlink). Thus, cycle times of 400 μ s with a jitter of below 1 μ s are possible. The real time behavior of Ethernet is be-

ing studied at our institute (Institute of Embedded Systems) and implemented in industrial research projects.

Summary: Ethernet will assume an important role in the industrial environment. The conventional field buses will most likely last longer in the sensor-actuator sector. In the area of open data communication, several competing methods are crowding the market. The user must be aware that deciding for Ethernet will not be an error but that at present this means a more or less proprietary solution is being purchased. The division in the Industrial Ethernet debate Apart from the standards panels, some interest groups, fieldbus and user organizations are trying to influence the future of Industrial Ethernet. The following principle rivals can be spotted:

etmore
R&M Industrial Cabling

- Top performance connector for copper and fiber optic cabling
- One hundred percent quality assurance
- Real, de-embedded, tested Cat. 6 performance
- Solutions with IP54 and IP67 protection
- Modular, flexible systems
- Tool-free installation



The conservatives:

Ethernet in IT standard version as a pure means of transport. The previously used bus protocol is filled into Ethernet packages and sent. The pragmatic and risk-free method is called "tunneling". The modbus protocol probably will be used the most. However, the disadvantages of Ethernet-TCP/IP remain.

PNO and ProfiNet:

Three models are available: V1 for non-time-critical data traffic in strict conformity with IT rules. V2 provides a very good deterministic behavior through time-stamp mechanisms and V3 sees to a guaranteed real-time bandwidth with a specific 4-port switch.

ODVA:

Acts on the assumption of an expansion of the device network. This has already proven itself in the industry and opens a real "publisher-subscriber" architecture. The new architecture is understood very quickly because essentially "only" one other transport medium is added, viz. Ethernet. As to development, the latter, apart from the "conservatives" is the most advanced.

IDA:

User group with the most consistent method. Ethernet is supposed to implement the real shared intelligence. A "shared operating system" manages the data traffic between the participants. The IDA concept is very interesting from a technical viewpoint and it is hoped that a practical application will be found. Since Schneider joined IDA group, IDA is using Modbus/TCP as communication channel.

IAONA:

This association does not develop any new concepts. It is rather trying to coordinate the many streams and to avoid the new "bus war". IAONA work groups are trying to develop guidelines and standards that guarantee a harmonization between the different manufacturers.

OPC Foundation:

Microsoft promotes the open standard OPC and OPC-DX as the data interface. Manufacturers can install OPC servers in their devices and determine what data is available to the outside. Components have access as OPC clients. Advantages: openness, use of perfected technology, control over data. Disadvantage: low real-time capability.



090.2032

The IP67 SC-RJ: Designed for use under the harshest conditions.



090.3001

R&M Splash Line: IP protection for RJ45 connector systems.

Organization	Method	Implementation	Evaluation
"Conservative" solution	Ethernet as means of transport only	Bus protocol is filled into Ethernet packages, "tunneling", application of IT standards	Secure, without risk, close to practical use, low efficiency
PNO and ProfiNet	Step solution with 3 methods that complement one another	Application of IT standards, common engineering tools, open interfaces, specific 4-port ASIC switch	Investment protection for existing infrastructure
ODVA	Expansion of existing bus technologies	Complementing ControNet and DeviceNet with Ethernet, Publisher-Subscriber architecture	Development from proven system, easy to integrate, very advanced
IDA	Consistent Ethernet application	Tunneling with modbus TCP, shared operating system manages data traffic	Conservative and proven but no real-time capability
IAONA			Develops no solution, strives for harmonization via guidelines and standards.
OPC Foundation	Open standards	OPC server in devices, OPC clients in components, OPC-DX as data interface	Advantageous openness, perfected technology, controlled data exchange, low efficiency, no real-time (Microsoft dependent)

Mutual success with R&Mfreenet QPP

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Quality represents more than just a product characteristic and qualification is more than technical knowledge. The new R&Mfreenet Qualified Partner Program, therefore, applies the technical knowledge to courses of action, operational structures and market development. There is a common goal: motivated employees, successful partners and satisfied end users.

Lifelong learning: those who have been properly laying cables for years and would like to continue to do so cannot be convinced with words. However, the facts might successfully convince them. The market is changing as never before and requires action.

R&M is taking action. With the new R&Mfreenet Qualified Partner Program (QPP), the Swiss Quality Leader meets the desires of its most progressive partners and anticipates their future requirements.



The new R&Mfreenet Qualified Partner Program. Depending on the certification level, the certificate holder can offer one of the three levels of the R&M warranty program: 5-year product warranty, 20-year system warranty or lifetime application warranty.

Staff encouragement through supplier

In large companies, the career advancement of employees has been the responsibility of the human resources department for years. Today, this task is delegated in most cases to smaller service companies, institutions or product suppliers – and thus, the expenses can be exactly calculated. However, it is rather shortsighted if only the cost factor is seen in this method. If competent, motivated employees are considered as company capital, employee career advancement becomes an investment with high yields, even if it cannot be exactly calculated.

R&M takes its task seriously and has restructured the Qualified Partner Program. Strict task sharing after installation, planning and distribution is out. Flexibility based on the knowledge and needs of the partners is in. The new concept even includes the end user (chart). If the end user can optimally service and administer his network, he also contributes to the overall quality.

Dividing Fiber and Copper

Basic training is divided into fiber and copper. In this manner, the participant

can improve his knowledge in the desired field without having to burden himself with information he may never use.

The installer level, too, is divided into copper and fiber. We want to be prepared for the challenges of the coming years and therefore, concentrate on new technologies such as fiber optics, polymer fibers and their use in the enterprise, industrial and residential environments.

Finally, on the designer level we are taking into consideration the various tasks of planners and distributors and value the strengthening of technical or commercial knowledge.

We not only want to consistently improve our products but increase the value of the R&Mfreenet partner certification. This helps you as a partner to get bids awarded to you. To you, as a customer, the certificate provides the security that you have chosen a qualified partner.

Do not consider the certification as a simple proof of participation in a training session, but as a confirmation of your competence and a key to your success.



090.2161, 090.2162

Your opinion and how R&M responds

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Direct information from the market is of enormous importance to allow us to adapt products optimally and to recognize trends early. R&M obtains such information from the questionnaires enclosed with the customer magazine Connections as well as from other sources. The participation of our readers is above average. We thank you sincerely for your superb participation. The results are immediately incorporated into the products and strategy. You will be interested in reading the following analysis.

We wanted to learn more about how you evaluate R&M and its performance in the home cabling sector with the Connections survey on that topic. The findings were able to be utilized directly for trend research and product development.

The survey showed that you as customer and user of home cabling consider the design of the outlets to be very important. This supports our strategy of modularity to be compatible with the most diverse covers and circuit system manufacturers and as a result to be able to offer you an as-broad-as-possible selection.

A great need for software aids and planning examples can be deduced from the survey. This encourages us to continue to invest in this service.



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R&M multimedia outlet in up-to-date design.



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The DeskBox from the R&M Extended Office Cabling program.

The survey confirms in several aspects our efforts in the direction of multiple-connection technique:

- approximately 90% of the participants have more than one PC at their disposal
- approximately 68% have more than one TV connection
- approximately 51% utilize a multimedia environment

The purpose of the survey on network connections in the office workplace was to learn about the situation on site and to become aware of your expectations and opinion about it. The response was above average.

The analysis showed that the DeskBox from the R&M Extended Office Cabling program is most appropriate for training classrooms and temporary and flexible workplaces. For permanent office workplaces, which should be given more weight according to your information, a new product is needed. R&M has taken immediate action. We are in the process of evaluating a desk installation outlet with

Cable Management. Of course, as desired, we will take into consideration the design of the new desk installation outlet during the development phase.

We also discerned that office workplaces are for the most part still outfitted with wall ducts. Therefore, R&M will expand the product line for this segment. On the basis of your input, we developed new decentralized cable connections for desk boxes, for connections from double floors with decentralized connections.

The feedback and survey results show that our 5-pole cable outlet must also be applicable for wires with a diameter of 1.5 mm. The product was adapted very quickly to accommodate for 1.5 to 2.5 mm wire diameters.

Thanks to your active participation in the Connections surveys, R&M was able to gain some insights and implement certain measures. We are looking forward to a continued mutually beneficial collaboration.

R&M trade fair appearances through March 2006:

ECOC 2005, Glasgow, Scotland

September 26–28, 2005

Elektrotechnik, Utrecht, Netherlands

September 26–30, 2005

Information Techn. & Communication, Kiev, Ukraine

October 11–14, 2005

Exponet, Cologne, Germany

November 8–10, 2005

El-, Tele y Belysning (ETB) Stockholm, Sweden

November 16–17, 2005

SPS/IPC/Drivers, Nurnberg, Germany

November 22–24, 2005

ITnT 2006, Vienna, Austria

February 14–16, 2006

CeBit 2006, Hanover, Germany

March 9–15, 2006

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Convincing cabling solutions