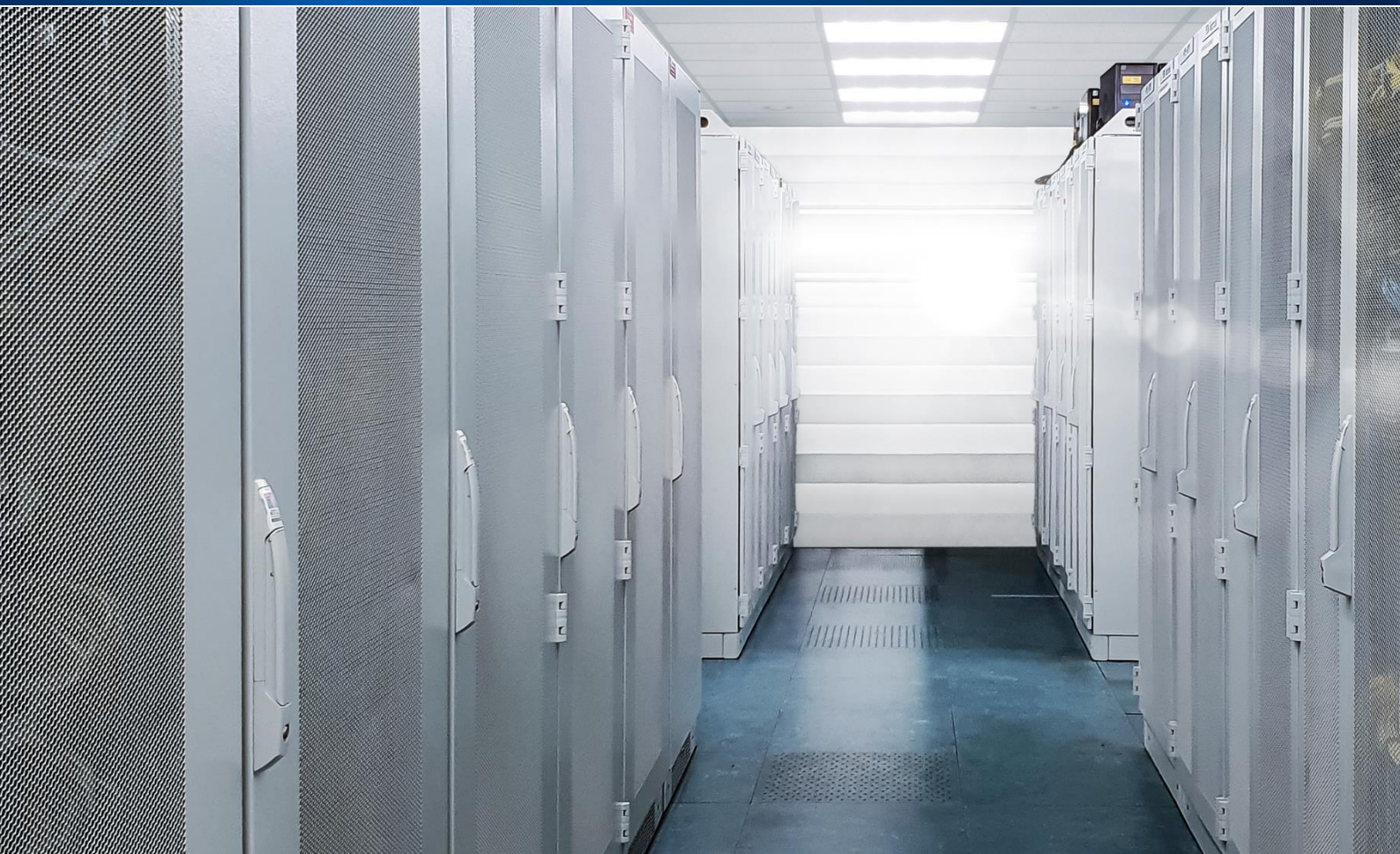


Future-oriented cabling secures the supply network at TenneT

Energy supply around the clock

SUCCESS STORY



The energy sector is undergoing dynamic change. This is true in political and technological terms as well as in social, ecological and economic terms. Network operators must adapt to this development. TenneT is one of the leading transmission system operators (TSOs) for electricity in Europe. The network operator relies on modern control centers to monitor its grids and interact with the data center. The cabling for the system is based on future-oriented solutions from Rosenberger OSI.

By 2030, the EU wants to feed 30% of its electricity from renewable sources. The German government even plans 65%. In order to achieve these goals, integrate the new energy sources and cover the growing demand for electricity in society, TenneT must continuously improve and expand its network. The utility company employs more than 4,500 people and operates about 23,000 kilometers of high-voltage lines and cables. The grid supplies electricity to around 41 million

households and companies in Germany and the Netherlands. TenneT provides its customers with 99.9988 percent grid availability. In order to guarantee secure network operation around the clock, the company has established monitoring control centers at locations in northern and southern Germany. Here, the operating status is monitored day and night in every phase in order to ensure the seamless supply of energy to the electricity consumers.

Security through redundant monitoring system

In order to guarantee network availability and security in the future, TenneT has launched the "KVM Matrix" project. KVM stands for Keyboard, Video, Mouse and is the basic requirement for seamless monitoring of the operating status with high-calibre monitoring and control systems. These enable dedicated data visualization directly at the workstations of the control centers.

Due to the steady growth of power grids, more and more computers are required in the TenneT network. This is the only way to complete all tasks promptly. Before the KVM system went into planning, new computers were constantly installed in the control rooms for expansion purposes. In the end, lack of space made this procedure no longer possible.

The KVM system, with which a connection is established between the control stations and the data center, was intended to remedy this situation and contribute to an efficient use of the premises.

The clear advantage here is that computers can be implemented at a different location, but the necessary monitoring solutions can still be provided at the workstations in the control room. A highly available and redundant environment could be realized by the KVM system. In this way, it is now possible to expand the workstations with different computers as required.

The previous rigid monitoring solution could thus be replaced by a flexible and decentralized solution. The most important thing is the trouble-free operation of the power grids and the monitoring of the network load. The redundant structure of the KVM solution is an additional safeguard in the event of failures for TenneT, as the monitoring stations are always ready for operation even in the event of a malfunction, a stable feed into the power grid is therefore guaranteed.

Planning with scope for future growth

The contract for the planning and implementation of the new solution was awarded to Rosenberger OSI. Together with those responsible at TenneT, a complete survey of the spatial conditions was carried out on site as part of the preliminary planning. In the course of this, the necessary products were pre-selected.

For the new solution, new routes for fiber optic cables were initially laid because the existing

structures no longer allowed clean installation. In order to ensure problem-free expansion later on, the cable routes also had to be enlarged. Additional core drillings ensure that the installed routes can also be used optimally. At the same time, this also ensured that all regulations for laying cables in different fire areas were complied with.

Qualified preliminary planning was convincing

Patrick Bernasch-Mellech, responsible for Data & Application Management at TenneT, cites several reasons for working with Rosenberger OSI: "In addition to the products, we were also convinced by the qualified pre-planning. In addition, Rosenberger OSI was able to promise us fast response times and thus on-schedule implementation of the project".

An important requirement from TenneT was that the system must not carry any electrical charge. This is necessary because the two computer rooms each have their own equipotential bonding, via which all cabinets and components are earthed. Should one of these devices have an electrical problem that is discharged via the ground, it could be carried to the next room via a cat cable and the shield.

This potential transfer could lead to far-reaching problems. This would also affect the UPS systems in the computer rooms, up to a total failure. Separation with non-conductive materials ensures that the rooms have no electrical connection. Electrical problems cannot be transferred to the other room. TenneT has imposed this requirement on itself in order to generate a higher degree of reliability. Copper cabling across rooms was out of the question because the distance between the two computer rooms was too great. This would then not comply with the standard. For this reason, Rosenberger OSI has proposed fiber optic products in its concept that fully meet all security and shielding requirements.

Tight installation schedule

The project was implemented by Rosenberger OSI within 20 days. The conditions on site posed challenges for the team. On the one hand, it was to be expected that the installation work could be interrupted at any time for operational reasons. On the other hand, special safety regulations

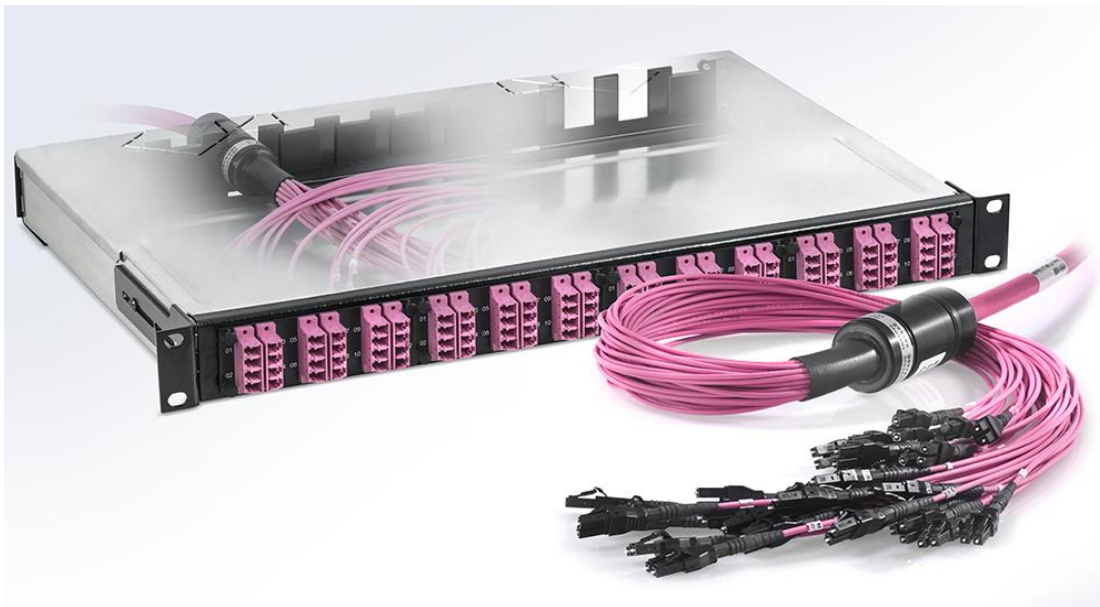
apply in the control room as the network is monitored there. In addition, it was necessary to keep calm at work so that the concentration of the TenneT employees was not disturbed and so that they could act quickly and clearly in the event of problems.

Different cable types in use

As part of the project, Rosenberger OSI implemented several workplaces and training stations in TenneT's control room, including additional workstations in the back office. The various cable types were subjected to the necessary measurements before acceptance. This included the factory measurement of the fiber optic cables as well as the OTDR measurement by the on-site service.

In order to connect the newly implemented KVM matrix system of the control room with the data center, TenneT today uses various solutions from Rosenberger OSI. The service team used 96-fiber OM4 PreCONNECT® STANDARD trunks to

connect the control room, the data center, the training rooms and the office area. PreCONNECT® SMAP-G2 1HE and 2HE as well as 1HE and 2HE splice panels were used for the installation of the trunks at the corresponding cord ends, for example in the control room. Additional splicing work was necessary in order to properly implement the trunk. The trunk is integrated into a PreCONNECT® SMAP-G2 distribution panel from Rosenberger OSI at the respective end points and placed on SMAP-G2 part front plates, which were also previously inserted into the PreCONNECT® SMAP-G2 splice and distributor panels.



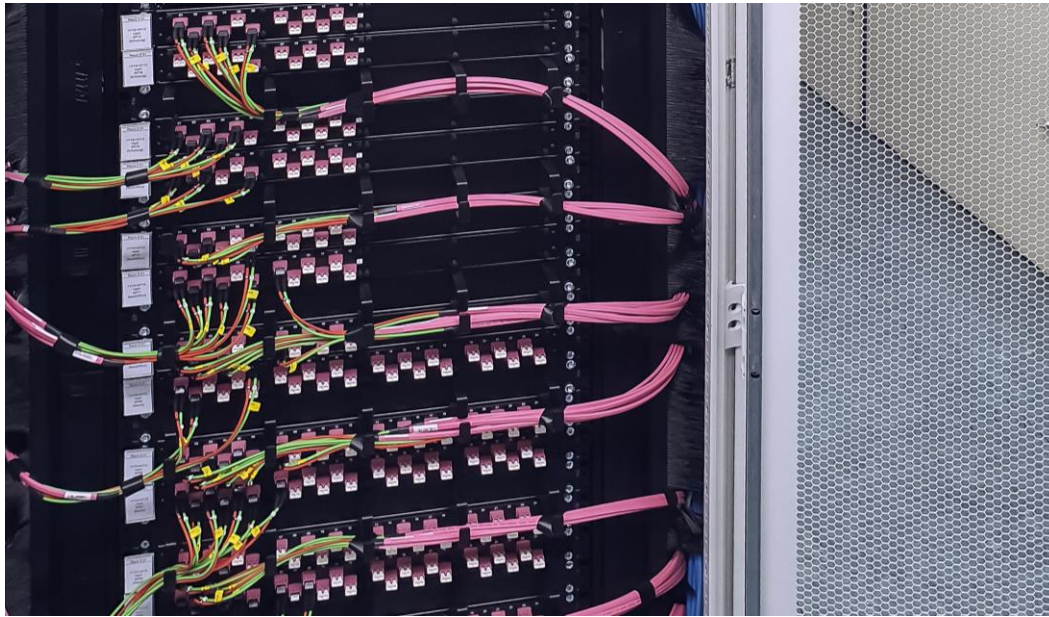
For the control room and the training rooms Rosenberger OSI used the 19" double floor holder 4HE, which serves as holder for the PreCONNECT® SMAP-G2 panels. The required copper connections were realized with RJ45 Keystone Cat6A copper cables and the corresponding 1HE 19" Copper Panel from Rosenberger OSI.

The copper cabling allows the connection between the control room and the training area as well as the data center to be established. This connection option is used for applications that require only a small bandwidth and can only be connected via RJ45 connectors.

Prepared for the future

"Despite the sometimes somewhat critical conditions in the installation environment, the Rosenberger OSI team has implemented our specifications in an exemplary manner," says Patrick Bernasch-Mellech happily after completion of the work. "The individual installation steps were carried out according to our specifications within the promised time frame. The ongoing operation was not interrupted during this time".

Today TenneT benefits from a modern monitoring solution that can grow with the requirements of the dynamic energy market. The workplaces in the control stations are based on state-of-the-art cabling and IT technology and their sophisticated applications ensure seamless control of the supply network.



Rosenberger OSI:

Since 1991, Rosenberger Optical Solutions & Infrastructure (Rosenberger OSI) has been an expert in innovative fiber optic cabling infrastructure and service solutions for Data Centers, Local Networks, Telecom and Industrial. The products and services can be found wherever largest amounts of data have to be transferred quickly and securely. In addition to the development and production of a broad portfolio of fiber optic and copper cabling systems, Rosenberger OSI also offers a variety of services such as planning, installation and maintenance of cabling infrastructure. Rosenberger OSI employs about 740 people and has been a part of the globally operating Rosenberger Group since 1998, a worldwide leading provider of high-frequency-, high-voltage-, and fiber-optic-connection solutions headquartered in Germany.

For further information, please visit: www.rosenberger.com/osi

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