SIEMENS

siemens.com/ruggedcom

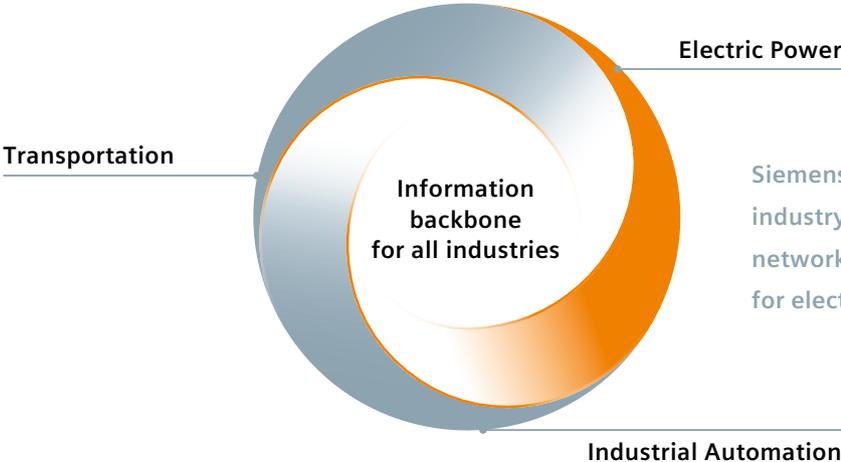# Reliable data networks for electric power systems

Robust industrial communication – from generation to distribution

Answers for industry.

How can reliable communications help improve the stable flow of electricity?

Modern electric power generation, transmission, and distribution systems require intelligent devices that can communicate quickly and reliably, around the clock and under the harshest conditions.

Generation intertie systems, protection and control systems in substations, and widely dispersed distribution automation equipment must be in continuous contact. A low-latency redundant communications network plays a crucial role.

Electric Power

Transportation

Information backbone for all industries

Siemens is your best source of industry-leading communication network products, tailor-made for electric power applications.
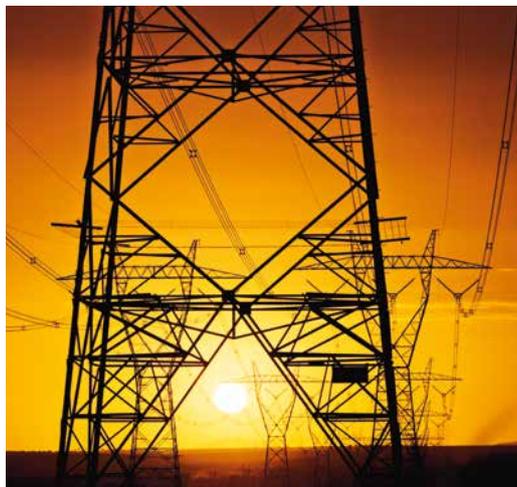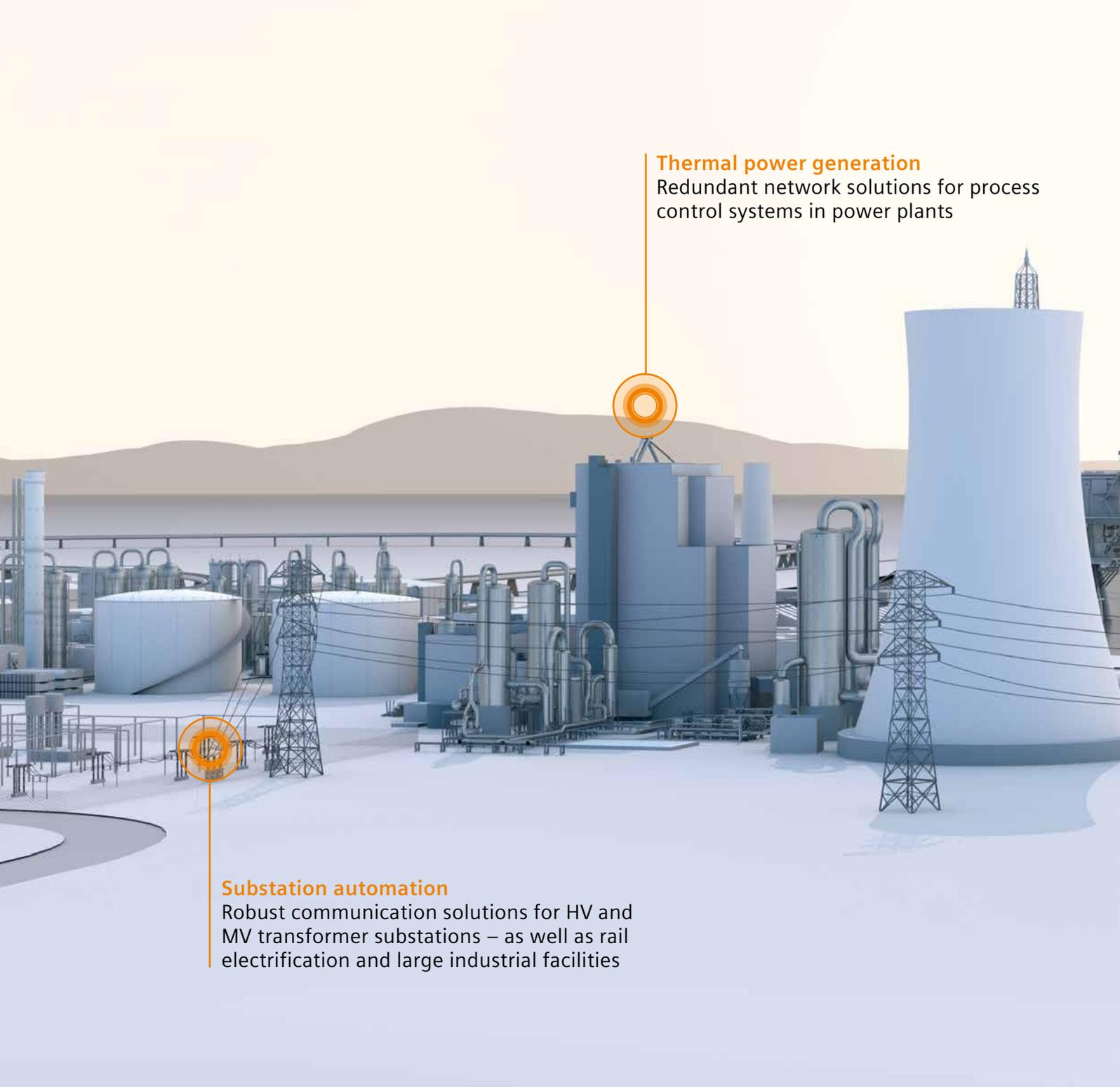
Industrial Automation

Go Rugged.
With Siemens!

Siemens brings you the world's most reliable communication solutions for any electric power installation, field-proven to last, compliant with the latest standards and with an uncompromising commitment to reliability:

+ IEC 62439 for redundant "always-on" communications through parallel data transmission, which ensures zero-second recovery times in case of network failures

+ Full compliance to IEC 61850-3 and IEEE 1613 for installation in electric substations

+ Cold start and continuous operation from minus 40 °C to plus 85 °C

+ IEEE-1588-compliant clock source for IEC 61850-9-2 process bus requirements

+ 2G, 3G and Industrial Wireless LAN (IWLAN) solutions

+ RUGGEDCOM WIN 4G wireless systems for private networks with low latency for GOOSE messages

+ Modular design for flexibility and low total cost of ownership

Harsh environments
Mission-critical applications
Very long operating lifetime
Electromagnetic interference
Extreme temperature

Thermal power generation
Redundant network solutions for process control systems in power plants

Substation automation
Robust communication solutions for HV and MV transformer substations – as well as rail electrification and large industrial facilities

RUGGEDCOM perfectly covers every aspect of robust industrial communication in the field of electric power.

SCALANCE supplements the portfolio for process automation and control applications.
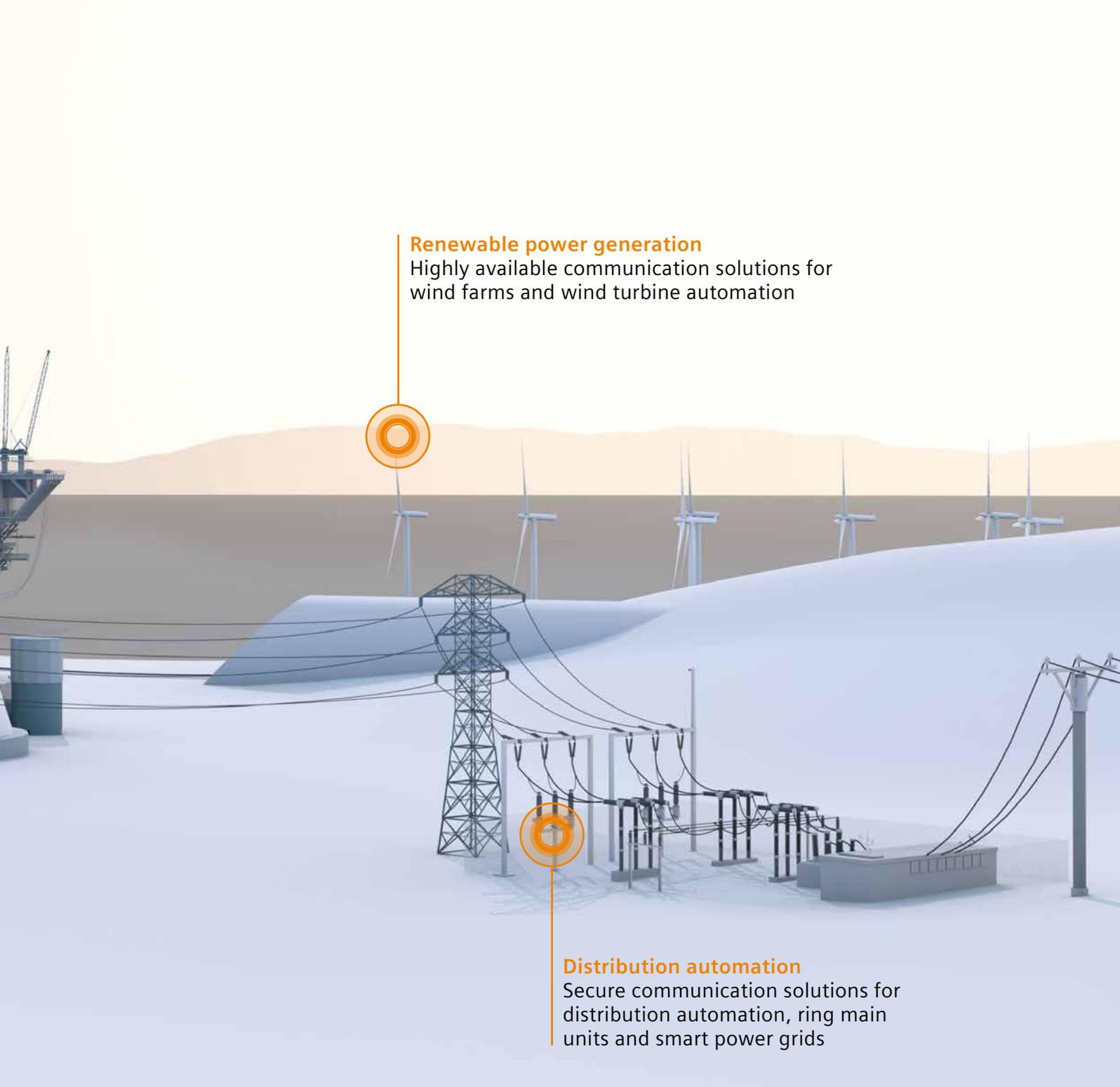
Renewable power generation
Highly available communication solutions for
wind farms and wind turbine automation

Distribution automation
Secure communication solutions for
distribution automation, ring main
units and smart power grids

Siemens offers networking solutions that can handle the communication needs everywhere that electricity flows. For all applications where switching transients and extreme EMI conditions are a possibility, we recommend the RUGGEDCOM product line. RUGGEDCOM products are IEC-61850-3- and IEEE-1613-compliant, have demonstrated MTBF of over 100 years (HALT, HASS, MILSPEC* ruggedness) and can handle extreme temperatures. For process automation and control applications in conventional (e.g. thermal) and renewable power plants including wind turbines, Siemens recommends the SCALANCE product line.

*HALT: Highly Accelerated Life Testing
 HASS: Highly Accelerated Stress Screening
 MILSPEC: United States military standard

Renewable power generation

The scalable Industrial Ethernet solutions for turbine automation and wind farm communication allow the reliable, redundant, and end-to-end networking of onshore and offshore wind farms.

Highlights:
+ Secure and reliable communication
+ Communications redundancy
+ Robust network design
+ Optimal for extremely harsh outdoor conditions

End-to-end network technology from Siemens ensures smooth condition monitoring and transmission of measured data when it comes to wind turbine automation. Communications are based on TIA and PROFINET, the open Industrial Ethernet standard for automation. This enables high-performance, real-time communication with comprehensive diagnostic functions for central evaluation of every device. This enables faults to be detected and remedied in a timely manner. The optional wireless communication between the nacelle and hub via Industrial Wireless LAN (IWLAN) also substantially reduces your maintenance costs.

Siemens offers scalable and cost-optimized network solutions for efficient management of wind farms of any size. Integrated redundancy mechanisms (HSR, MRP, PRP*) maximize the availability of your communication network. Thanks to an optical bypass relay, downtimes can be reduced to a minimum during maintenance. For convenient management of individual wind turbines and small wind farms without their own control center, Siemens offers reliable remote-access solutions via 2G, 3G and RUGGEDCOM WIN 4G broadband wireless technology.

The efficient control of wind farms and turbines is possible only when performance and condition data is available in real time. With Siemens, wind farm operators can count on state-of-the-art communication technology and maximum reliability.

*HSR: High-availability Seamless Redundancy Protocol
MRP: Media Redundancy Protocol
PRP: Parallel Redundancy Protocol

Thermal power generation

Availability and reliability are key factors in conventional power generation, especially for networking the process control systems in power stations. Reliable products and long-term spare parts availability extend the lifecycle of your plants.

With our Industrial Ethernet solutions, you are optimally equipped for all requirements of power station control systems. State-of-the-art redundancy mechanisms ensure continuous communication. The use of the Parallel Redundancy Protocol (PRP) and the High-availability Seamless Redundancy Protocol (HSR) – standardized as IEC 62439-3 – prevents data loss.

Comprehensive diagnostic options enable simple integration of the network components into the power station control systems. This secured, consistent, end-to-end diagnosis via the control system maximizes availability and minimizes downtime.

High data rates boost the efficiency and performance of your communication networks, which is why Siemens offers layer-3 solutions with high data rates within gigabit range. The comprehensive, modular product design supports copper and fiber links, ensuring that the network can be optimized for your power station.

The industrial communication solutions from Siemens boost the reliability and performance of your network – for higher efficiency.

Highlights:
+ Standardized per IEC 62439-3
+ Layer-3 solutions with high data rates
+ High performance of the communications network
+ Consistent, end-to-end diagnostic options

Substation automation

Transformer substations and substations in the high-voltage and medium-voltage range require robust communication solutions for mission-critical applications in order to achieve maximum availability.

Highlights:
+ Compact devices up to network components with high port densities (up to 28 gigabit ports)
+ Large number of electrical and optical interfaces
+ Data rates up to 1 gigabit
+ Robust network architecture for extremely harsh environmental conditions

Siemens brings global experience in high-voltage and medium-voltage substations and enables reliable operation of your plants for mission-critical applications as well. In meeting all specifications of the IEC 61850-3 and IEEE 1613 standards, the RUGGEDCOM portfolio satisfies even the highest requirements for strong EMC, antishock and antivibration – at operating temperatures between minus 40 °C and plus 85 °C.

In our broad range of products, you will always find the optimal communication solution, individually adapted to your needs. Using serial interfaces, you can also integrate existing plant sections into the new Ethernet network very simply. Modern redundancy mechanisms ensure network reliability. For instance, the Parallel Redundancy Protocol (PRP) and the High-availability Seamless Redundancy Protocol (HSR) ensures that there are no data losses in time-critical applications resulting from a reconfiguration of the communication network.

By adhering to the IEEE 1588 standard and the associated precise time synchronization via Ethernet, our communication solutions boost the efficiency of your network. This is the basis for smooth operation, which is also supported by simplified troubleshooting and fault clearance via integrated diagnostic, security, and remote-maintenance mechanisms.

Siemens offers robust, secure, and reliable communication solutions for your mission-critical applications.

Distribution automation

The increasing decentralization of power generation establishes completely new requirements for the associated communication infrastructure: To enable bidirectional energy flow in the power grid, networks must be future-proof, robust and insensitive to interference. Just like the solutions from Siemens.

Increasing numbers of power grid components – such as secondary substations, distributed energy sources, virtual power stations, microgrids, public charging stations, and private households – must be integrated into the smart-grid communication network. New energy applications, such as meter data management or demand response, lead to additional communication needs. Siemens supports you in finding the right solutions to meet any requirement. Our flexible and efficient communication solutions for smart grids enable optimal monitoring and control of smart power grids and thus an efficient and reliable power supply.

Our EoVDSL portfolio (Ethernet over VDSL) links ring main units via existing two-wire copper cables. Integrated serial interfaces facilitate the connection of existing components and reduce the cost and effort related to modernization.

With our wireless solutions, you transfer data securely in encrypted private networks (VPNs), even across wide areas – either via GPRS and UMTS via public communication networks or, for mission-critical applications with high data throughput needs, via RUGGEDCOM WIN 4G broadband wireless technology.

The communication solutions from Siemens increase the transparency of load flow and load distribution so that power production and power consumption can be coordinated – efficiently, reliably, and securely.
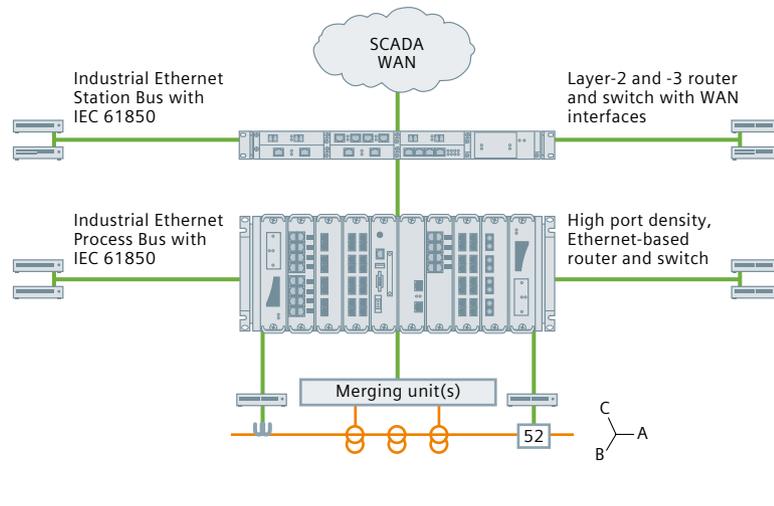
Highlights:
+ International communication standards such as IEC 61850
+ Reliable, fast communication infrastructure
+ Customized network solutions
+ High data rates

RUGGEDCOM products stand for reliable communication under extreme environmental conditions. They have proven themselves in a multitude of harsh applications especially in the field of substation and distribution automation – for example in substations, transformer stations, in recloser status monitoring, feeder isolation, fault location and all kinds of protection and control installations.
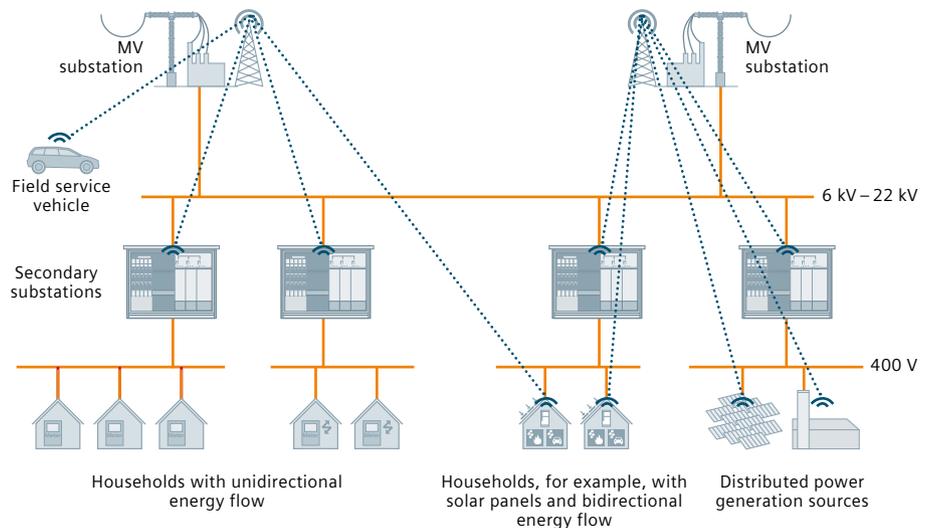

All RUGGEDCOM products will be offered step by step as part of the new Siemens RUGGEDCOM product line with a slightly adapted housing design*. The new Siemens RUGGEDCOM branding does not affect the product functionality in any way and all technical specifications and proven features of the RUGGEDCOM products – alongside the five-year product warranty – will remain unchanged.

For the harsh operating conditions you face in the substation sector our Siemens products support the IEC 61850 standard and are thus optimally equipped.

Industrial Ethernet Station Bus with IEC 61850

SCADA WAN

Layer-2 and -3 router and switch with WAN interfaces

Industrial Ethernet Process Bus with IEC 61850

High port density, Ethernet-based router and switch

Merging unit(s)

52

C
B — A

Intelligent electronic device
Industrial Ethernet
Power system

In the field of distribution automation the trend toward bidirectional energy flow increases the communication needs of smart power grids. With Siemens, you bridge your broadband and coverage gaps efficiently.

MV substation

MV substation

Field service vehicle

6 kV – 22 kV

Secondary substations

400 V

Broadband wireless technology
Power system
Medium-voltage distribution station MV

Households with unidirectional energy flow

Households, for example, with solar panels and bidirectional energy flow

Distributed power generation sources

* Final design in 10/2013

The right answer
to every question

With our Siemens solutions, you are prepared to meet any demands placed on your communications network. For robust substation or distribution automation as well as for industrial automation in wind turbines or power plant control systems.

The best of two worlds

With RUGGEDCOM Siemens has augmented its portfolio of network components for Industrial Ethernet networks to support mission-critical applications in the harshest environments. In the field of substation and distribution automation our highly specialized, robust switches of RUGGEDCOM create a high-performance communications infrastructure. For any other industrial control application, for example in wind turbine automation or power plant control systems, SCALANCE offers reliable network design.

One partner

+ For your entire industrial communication
+ For global service and support – around the clock
+ For your future – with the global experience and proven reliability of Siemens

One portfolio

+ For all requirements – even in the harshest environments
+ For coordinated industrial communication – from the field to the company's management level

+ For consistent, end-to-end solutions – from the bus system to engineering and diagnostic tools, including comprehensive protection against unauthorized access

Product highlights

+ Ideal for security-oriented and mission-critical applications
+ Designed in accordance with the IEC 61850-3 and IEEE 1613 standards
+ Robust for harsh environmental conditions and designed for a very long service life
+ Wireless communication for a high degree of mobility and flexibility
+ RUGGEDCOM WIN broadband wireless is capable of carrying Ethernet multicast messages such as GOOSE messages and enables direct peer-to-peer connectivity (at layer 2) between reclosers
+ IEC 62439-3 standarized redundancy mechanisms available, e.g. Parallel Redundancy Protocol (PRP) and High-availability Seamless Redundancy Protocol (HSR)

With RUGGEDCOM and SCALANCE, Siemens provides a comprehensive range of network products from a single source. With solutions based on this complementary, flexible portfolio, your communication network is also prepared for the most difficult conditions.

Further information

More about RUGGEDCOM:
siemens.com/ruggedcom

More about SCALANCE:
siemens.com/scalance

To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action and to integrate the automation and drive components into a state-of-the-art holistic industrial-security concept for the entire plant or machine.

Please find further information at:
http://www.siemens.com/industrialsecurity