SIEMENS

Ingenuity for life

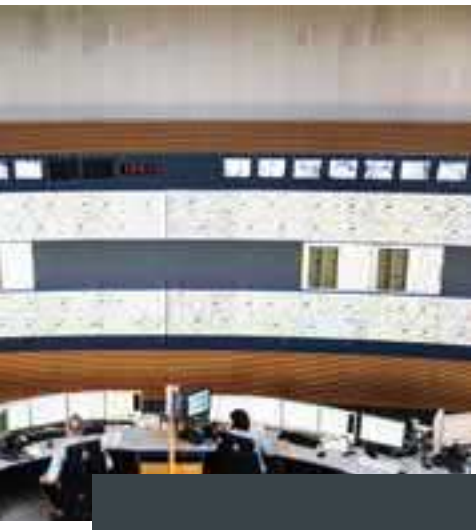
Rugged communications for intelligent transportation systems

Complete connectivity solutions for today and tomorrow

siemens.com/communications-for-its

Rugged communications that keep you moving

Growing populations mean more vehicles on the road. More vehicles mean greater congestion, longer commutes, and an even more pressing need for timely traffic data. From large cities to smaller communities – the challenges continue to increase.

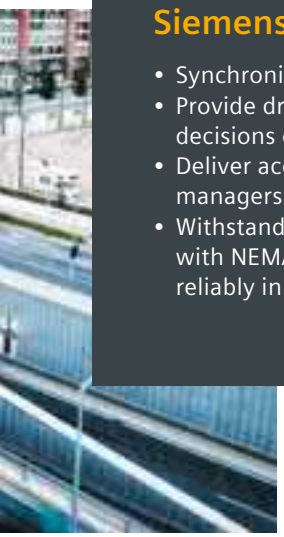


A constant stream of up-to-the-minute data can help transportation system operators stay one step ahead of traffic issues. However, with limited budgets and compressed time frames, implementing a state-of-the-art communications infrastructure can present additional challenges. So can finding network solutions that can survive the harsh conditions faced by 24/7 intelligent transportation systems including extreme temperatures, vibration and electromagnetic interference.

Designed with these specific factors in mind, Siemens' leading-edge communication solutions can support everything from the world's most complex transportation systems in sprawling urban centers to the traffic control systems in smaller communities.

Siemens solutions can:

- Synchronize traffic lights to keep vehicles moving
- Provide drivers with information to help them make smarter decisions on the road
- Deliver accurate and timely information to transportation managers so they can prevent bottlenecks before they happen
- Withstand harsh environments – with products that comply with NEMA TS 2 environmental requirements and operate reliably in extreme temperatures



Traffic – constant, ever-growing

On highways, down innercity streets, through tunnels and railway crossings. An endless stream of cars, trains, buses. Traffic is a complex, nonstop challenge for major city centers and small communities alike. Coordinating traffic, staying on top of its ebbs and flows, is a complex, demanding task for emergency support personnel, city planners and transportation system operators everywhere.

Timely information – stay one step ahead

Reliable network communications are a critical necessity for monitoring and managing increasingly complex transportation infrastructures. Knowing what is happening and where, from tracking buses and trains on their routes, to locating and addressing stalled vehicles, to connecting drivers with important information about road and traffic conditions – effective traffic management demands intelligent transportation systems.

With a combined portfolio of RUGGEDCOM and SCALANCE, Siemens is taking a leading role in the transformation of modern transportation networks around the world.

Siemens provides best-in-class, end-to-end networking solutions, able to withstand the harshest conditions and purpose-built for road and rail. Customers that demand mobility, efficiency, safety and sustainability – select Siemens.

Urban communications systems

Pedestrians, cyclists, cars, trucks, light rail, transit vehicles – urban transportation networks present city planners with unique challenges.

With aging infrastructure and shoestring budgets, many agencies at different levels, creating intelligent transportation can be complex and challenging.

Siemens provides a broad array of networking solutions that help cities address these challenges and achieve their goals – quickly and cost-effectively.

Highlights:

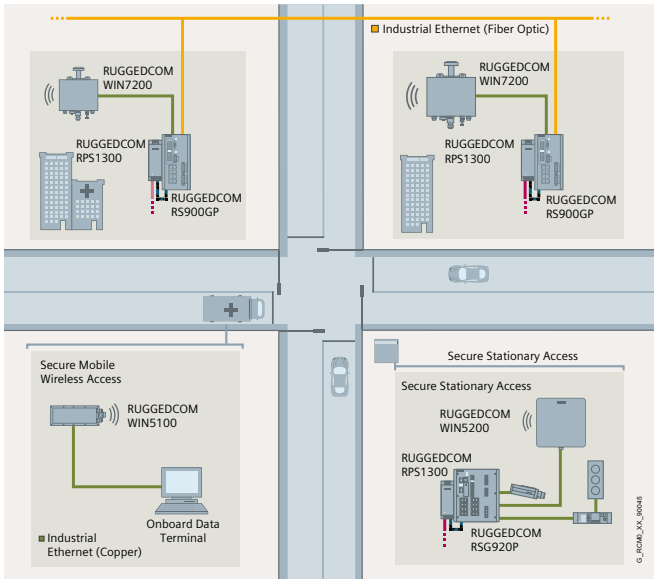
- Ethernet over VDSL (EoVDSL), a cost-effective solution for transmitting Ethernet data over existing copper wiring, enables you to reuse legacy infrastructure to deliver broadband speeds
- RUGGEDCOM WIN and SCALANCE W products enhance network coverage for mobile and stationary applications
- High bandwidth, multiservice backbones with 10 GigE uplinks, advanced layer 3, MPLS and PIM-SM multicast routing services for managing video traffic
- Compact, fiber optic switches with Power over Ethernet (PoE) for simplified device connectivity

Urban traffic control – benefits:

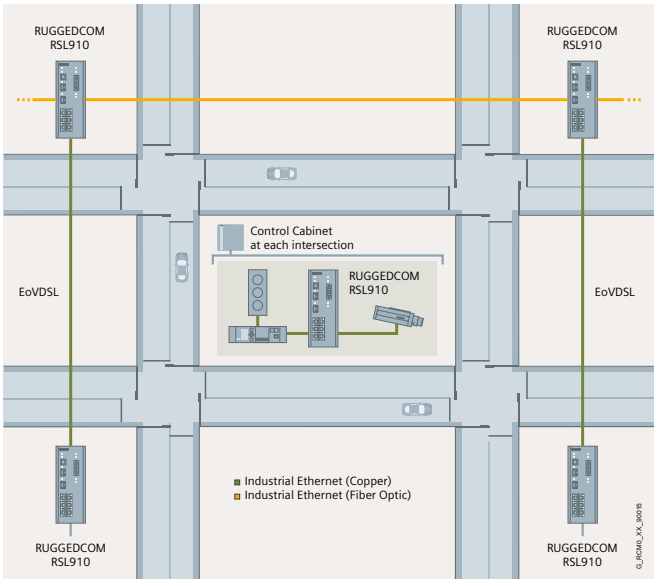
- Whether in small interchanges or highly complex traffic control systems, Siemens provides solutions that control traffic flexibly and enable the rapid, dynamic management of traffic situations
- Influence the traffic flow measurably through predefined strategies such as a green wave or public transportation priority to reduce congestion

Corridor optimization – benefits:

- Seamlessly integrate road and transit operations on a single network, providing passenger information, traffic signal prioritization, and level crossing monitoring
- Provide secure, ubiquitous citywide connectivity to all stationary and mobile assets using RUGGEDCOM WIN and SCALANCE W
- Support present and future application needs through advanced network and routing features



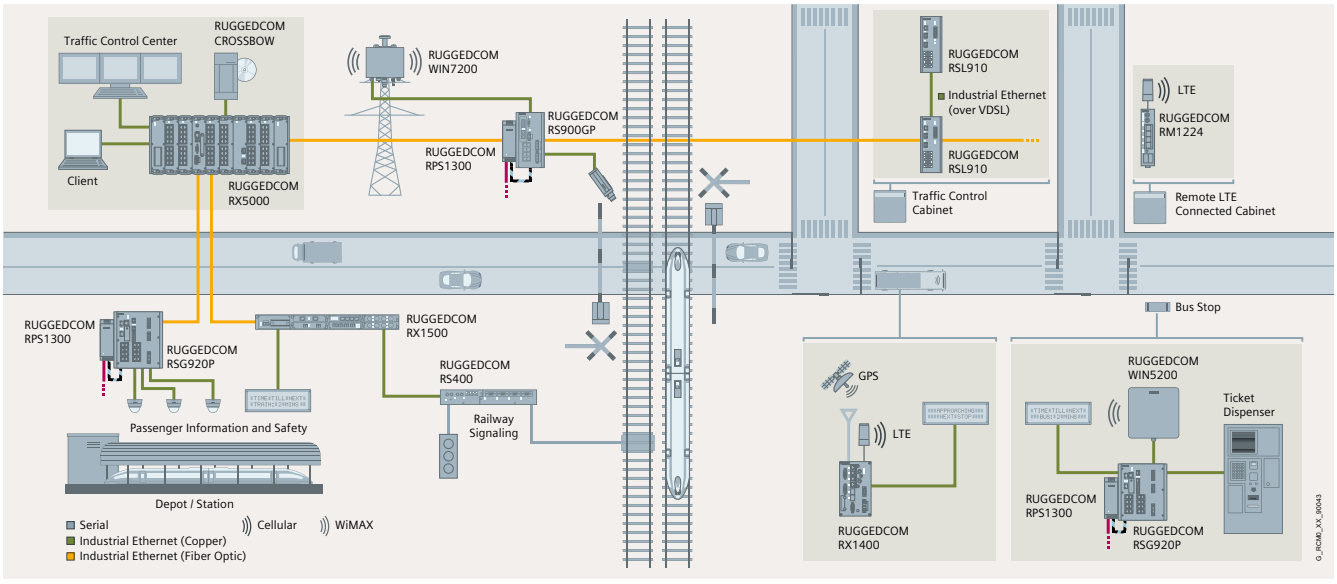
Secure wireless broadband coverage for mobile and stationary applications



Efficient connection of traffic signals in real time with fiber-optic backhaul

Siemens offers:

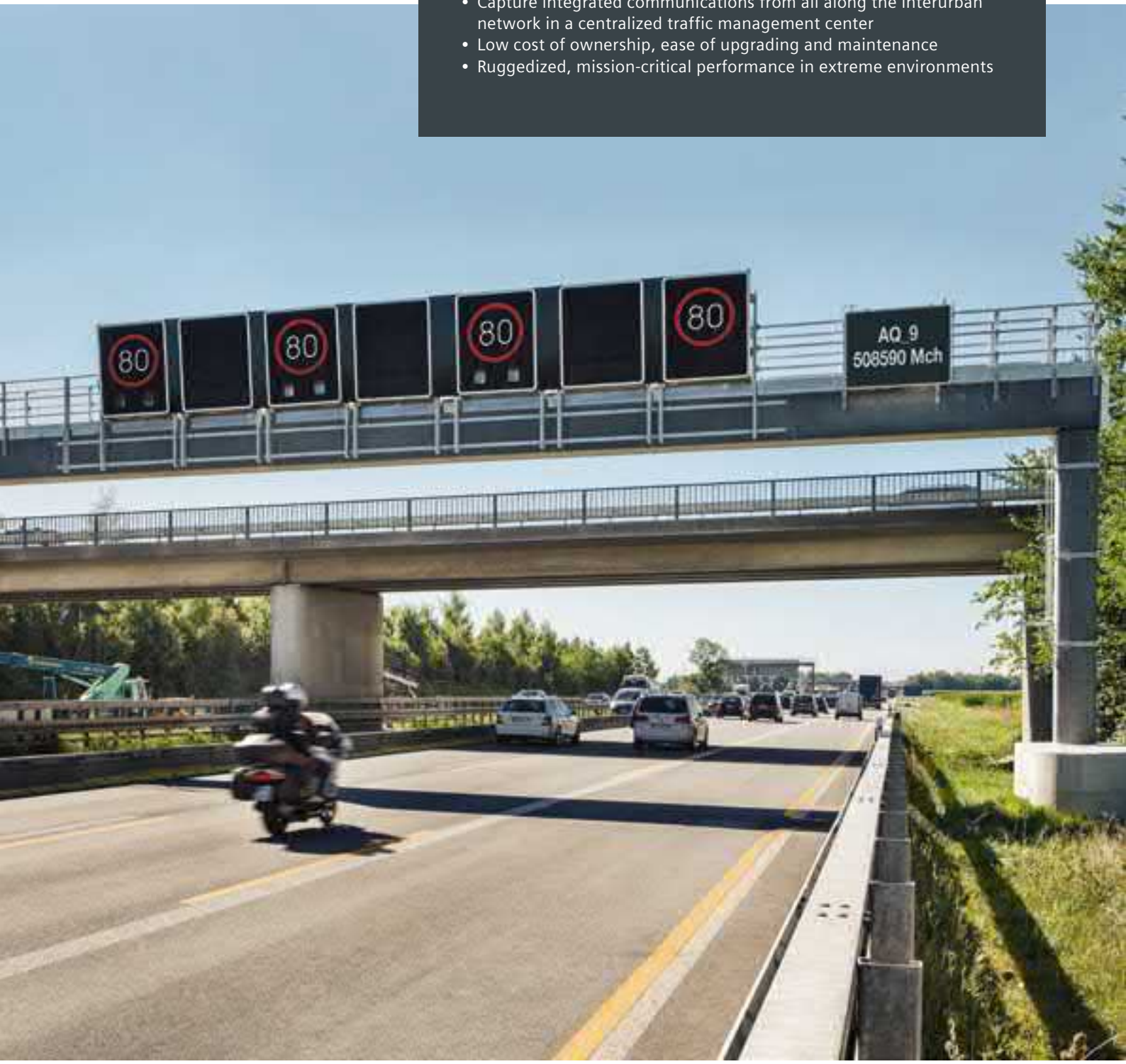
- Lower total cost of ownership
- Maintenance-free solutions
- Scalable solution for future expansion of the traffic signal network
- Integration with the existing infrastructure to optimize investments
- Use of licensed or unlicensed frequency spectrums



Integrated multi-service communications for corridor optimization

Siemens offers:

- Seamless connectivity to message boards, CCTV and roadway sensors with highcapacity, long-haul fiber optics
- Capture integrated communications from all along the interurban network in a centralized traffic management center
- Low cost of ownership, ease of upgrading and maintenance
- Ruggedized, mission-critical performance in extreme environments



Interurban communications systems

Geographically dispersed, covering many hundreds of miles or kilometers of roadway, interurban networks are a unique challenge to manage. These interurban networks serve as a critical information backbone for the entire transportation infrastructure. Ensuring there is the significant bandwidth required to connect thousands of devices and support hundreds of real-time video feeds, along with data gathered from roadway sensors, is critical.

The impact of a network outage is significant. Without a reliable network, operators are unable to effectively manage and respond to an event. High reliability and operational uptime in extreme environments is key.

Siemens solutions have been purpose-built to create wide-area networks that supply reliable, high-bandwidth connectivity in some of the world's most demanding environments.

Freeway management – benefits:

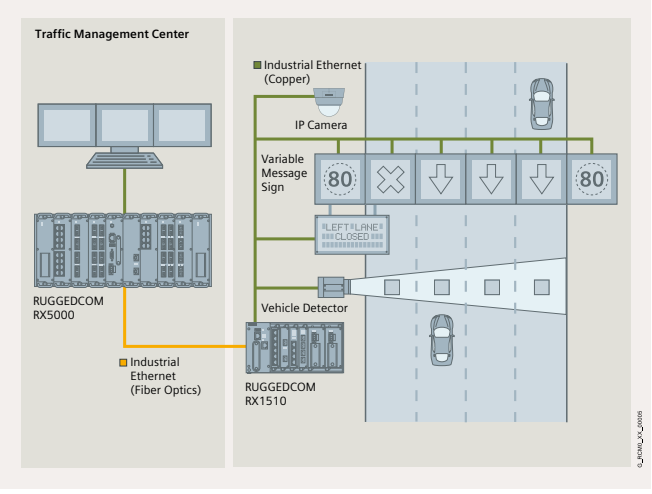
- Metering systems help prevent traffic jams on the freeway before they have a chance to form
- Analyzes the data provided by all connected sensors and systems and generates the appropriate measures for intervention
- Roadway section control: manual or automatic (e.g. congestion and incident alerts, weather warnings on fog or wet roadway; temporary opening of hard shoulders) crossings

Road tolling – benefits:

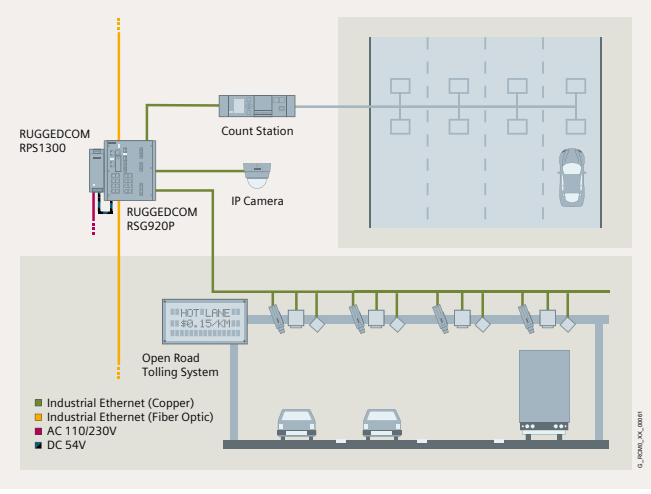
- Helps to maintain and refinance roadway infrastructure
- Enables the guidance of traffic to lower-density routes and ensures mobility in chronically congested urban areas
- Ensures the provision of value-added services to operators and transport companies
- Lowers the technical and administrative expense of implementing and maintaining tolls

Highlights:

- Highest level of network security keeping unwanted visitors out
- Outstanding reliability and scalability for future needs
- Exceeds environmental conditions as defined by the NEMA TS 2 industry standard
- Long-haul fiber optics that provide high-bandwidth connectivity even for remote locations
- Multiservice backbone with 10 GigE uplinks, advanced layer 3 and MPLS routing services
- Wireless RUGGEDCOM WIN and SCALANCE W complete the link by connecting locations that are too difficult or expensive to reach with fiber optics



Wide-area, high-bandwidth communications for managed motorways and freeways

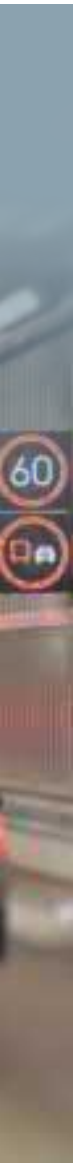


Integrated multi-service communication solution for ETC and border crossings

Siemens offers:

- Improved bridge and tunnel mobility while increasing safety and protecting the environment
- Communications over a robust Ethernet backbone network from field elements up to the control room
- Flexible configuration and robust operation
- Security against cyber attacks, ability to segregate different traffic types and users

Bridge and tunnel communications systems



Bridges and tunnels present unique safety challenges, including the risk of fast-moving fires, accelerated heating rates, the risk of structural collapse, and longer escape routes.

Accidents and closures can severely disrupt your city's transportation systems. To protect public safety, improve availability and lower operational costs, your network subsystems need to interact seamlessly. You must be able to detect incidents early, perform rapid mitigation and recovery inside tunnels, and protect critical systems – all within regulatory requirements.

Siemens provides the transportation network solutions that our customers can depend on when they need them most. By combining offerings from other Siemens divisions, we deliver a totally integrated automation solution for bridge and tunnel communications.

Bridges and tunnels require highly available, integrated network communications. Addressing increasing regulatory and safety requirements, Siemens offers communications solutions designed specifically for the demanding bridge and tunnel system environments.

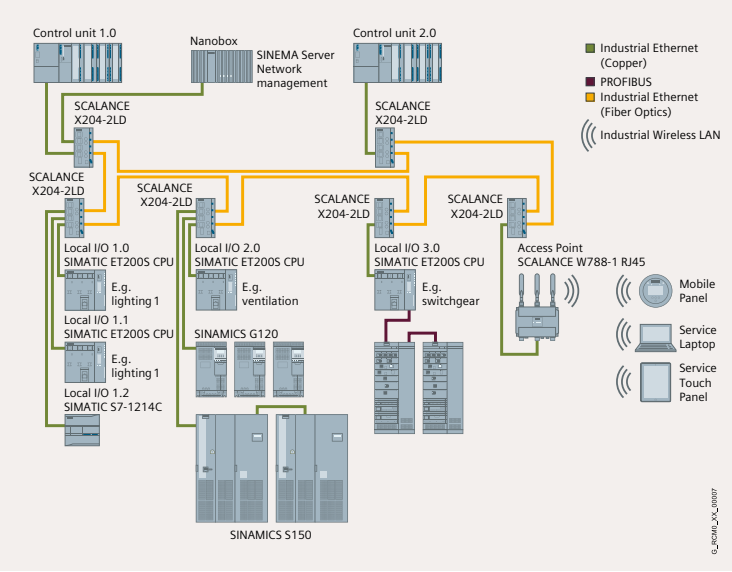
More information about the Siemens offering for tunnels: www.siemens.com/tunnelautomation

Siemens delivers a unique, integrated framework for the flexible implementation of communication solutions for bridges and tunnels, including:

- Fail-safe communication of operational and safety information
- Fast and secure data exchange
- Flexibility and integration of legacy and modern network components to ensure investment protection and low total cost of ownership
- Proven uptime performance and reliability even under the most extreme conditions

Highlights:

- Communication over a robust Ethernet backbone network from field elements up to the control room
- Redundant networking through HSR/PRP
- Integration of existing field bus installations (PROFIBUS) and Industrial Ethernet (PROFINET)
- 10 GigE to ensure high performance and minimize risk of technological obsolescence



Seamless integration of disparate network solutions for a unified bridge and tunnel communications system

Improved mobility, efficiency, safety and sustainability

RUGGEDCOM RX1400

Rugged, small form factor Ethernet switch, serial server and TCP/IP router with LTE and fiber optic WAN options, that enables secure, cost effective, large scale deployment of communications and processing power for harsh application environments. The device has IP40 degree of protection, does not use internal fans for cooling and supports −40° C to +85° C extended temperature range.

RUGGEDCOM RSG920P

A rugged, high density, small form factor layer 2 switch with Power-over-Ethernet (PoE) capability, designed for space limited cabinets with high bandwidth requirements. Tested and certified to withstand extreme temperature, vibration and shock, the RUGGEDCOM RSG920P offers exceptional reliability for industrial applications such as transportation systems.

RUGGEDCOM RX1500

Utility-grade, modular and field-replaceable layer 2 and layer 3 switch and router, ideally suited for traffic control systems, electric power utilities, rail and the industrial plant floor.

RUGGEDCOM RS900G

A 10-port utility-grade, fully managed Ethernet switch, providing dual fiber optical Gigabit Ethernet ports and eight fast Ethernet copper ports. Provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in curbside traffic control cabinets and in electric utility substations.

RUGGEDCOM RS900GP

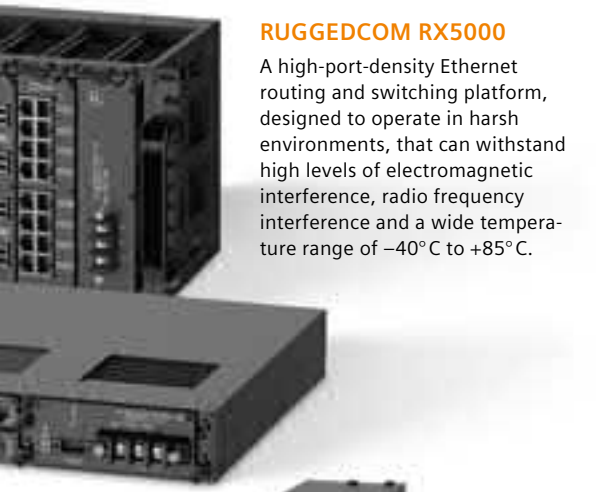
Utility-grade, fully managed Ethernet switch, designed to operate reliably in harsh environments. Operating temperature range of −40° C to +85° C, combined with hazardous-location certification, optional conformal coating and an aluminum enclosure allow the RS900GP to be placed in almost any location.

RUGGEDCOM RPS1300

The RUGGEDCOM RPS1300 is a rugged power supply intended to serve as the power source for our Power over Ethernet (PoE) products. The RPS1300 can provide up to 140 watts of DC power to support up to four 802.3at ports (30W each) or eight 802.3af ports (15W each) at temperatures up to +74° C.

We don't just offer a single one-size-fits-all-solution. Our arsenal of intelligent communication technology – RUGGEDCOM and SCALANCE – includes long-haul optics for maximum interurban connectivity, Ethernet over VDSL to help you reuse existing copper infrastructure, layer 3 switching in the field with 10 GigE uplinks so you can handle large amounts of video traffic and secure WLAN, RUGGEDCOM WIN and cellular technologies to help you enhance and extend your total network coverage.

Siemens has developed a wide array of communication products and technologies specifically designed to enable ITS (intelligent transportation systems) applications and provide operators with the tools they need to keep their systems running smoothly. From integration into legacy devices to long-haul fiber backbones and widespread wireless connectivity for mobile and stationary applications, Siemens has the knowledge and experience to be your complete end-to-end solution provider for intelligent transportation solutions.



RUGGEDCOM RX5000

A high-port-density Ethernet routing and switching platform, designed to operate in harsh environments, that can withstand high levels of electromagnetic interference, radio frequency interference and a wide temperature range of –40° C to +85° C.

SCALANCE W

The SCALANCE W products offer reliable and secure wireless communication even in the harshest industrial environments. Following the IEEE 802.11n standard, SCALANCE W products can offer data rates of up to 450 Mbps to serve even the most demanding applications such as streaming high-definition video. Use SCALANCE W to extend your network coverage when conventional cables simply will not cut it.

RUGGEDCOM RSL910

The RUGGEDCOM RSL910 enables agencies to reuse existing legacy infrastructure delivering broadband speeds capable of supporting CCTV, adaptive signalling and other transportation-related applications. Using standard communication-grade copper cabling, EoVDSL links up to three kilometers can be established with additional serial, Ethernet and fiber connectivity options to meet all application needs.

RUGGEDCOM WIN

The first broadband wireless product portfolio designed for private networks, delivering the benefits of carrier-grade 4G technology to critical infrastructure applications in harsh environments.

RUGGEDCOM RM1224

Mobile wireless router with 4G LTE connectivity and automatic fallback to 3G UMTS or EVDO cellular networks. It is ideally suited for providing data communication to and from remote locations. The wireless router comes with an integrated 4 port Fast Ethernet switch, one digital input and one digital output.

Siemens offers:

- Maintenance-free solutions with lower total cost of ownership
- Easy integration with existing infrastructure to optimize investments
- Mission-critical performance in extreme environments
- Scalability to meet the needs of today and tomorrow

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Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit http://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends to apply product updates as soon as available and to always use the latest product versions. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under http://www.siemens.com/industrialsecurity.