

A black, rack-mountable Ethernet switch is shown from a top-down perspective. The front panel features a USB console port, a terminal block with labels for P1, P2, P3, P4, and P5, and a terminal block with labels for L+, GND, and N-. The switch is partially open, revealing a green printed circuit board (PCB) with various electronic components and connectors. The PCB is labeled with 'RUGGEDCOM RST2228' and '25T-85832'. The switch is mounted on a black metal rack.

**SIEMENS**

Rugged Communication

# RUGGEDCOM 19" Layer 2 Ethernet Switches

Rack Mountable

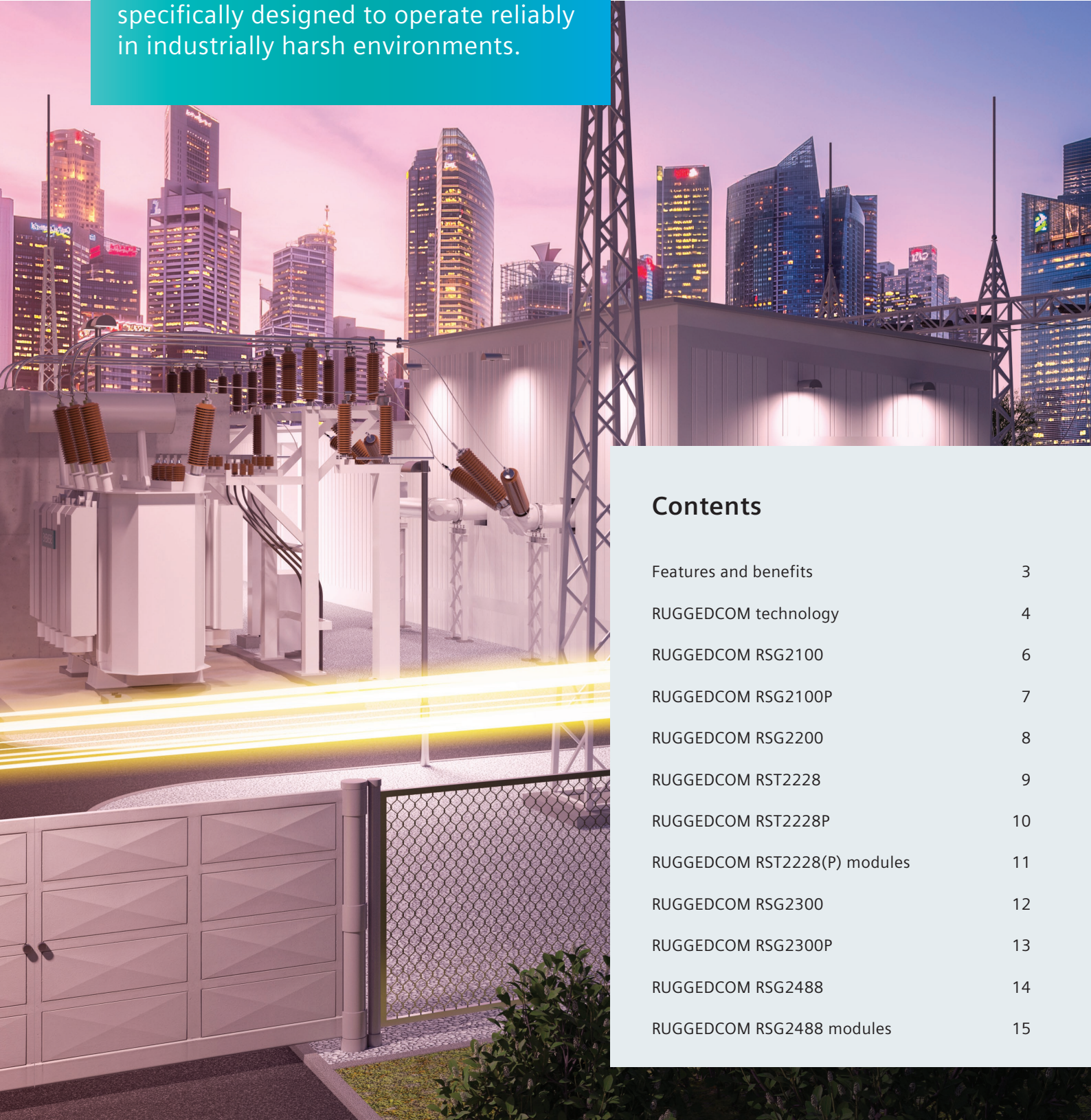
Brochure

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[siemens.com/ruggedcom](https://www.siemens.com/ruggedcom)



RUGGEDCOM Ethernet switches are specifically designed to operate reliably in industrially harsh environments.



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Features and benefits

RUGGEDCOM Ethernet switches are specifically designed to operate reliably in industrially harsh environments. All RUGGEDCOM switches meet and exceed recognized industry standards, especially IEC 61850-3, IEEE 1613 and NEMA TS 2 for ruggedness and reliable communications performance. They are ideal for mission-critical control applications requiring superlative reliability and availability of network devices.

Overall benefits

- **Rugged rated:** Reliable performance even in harsh environments, with a high immunity to EMI and heavy electrical surges, and an operating temperature of -40° C to +85° C with no fans
- **Modular design:** Enjoy maximum flexibility to meet ever changing network demands with minimal downtime
- **Long haul fiber support:** Save on CAPEX and OPEX
- **Zero Packet Loss™:** Build robust redundant network topologies such as RSTP, MSTP, PRP/HSR etc. for mission critical applications
- **Power supply:** Extract maximum performance from your device with a fully integrated power supply that doesn't need any external adapters and supports universal high voltage range as well as dual low voltage DC inputs
- **Built-in security:** ROS features such as port security (IP and MAC), password-based authentication (802.1Q VLAN), RADIUS/TACACS+ authentication, communication integrity through SSH, SSL and SNMP v3, device authentication with 802.1x, and ability to audit any security event to ensure secure networks



# RUGGEDCOM technology

RUGGEDCOM products have been specifically designed and tested to withstand the demands of harsh environments.

## Rugged Rated

Highly Accelerated Life Testing (HALT) is used in the early stages of product development to detect any design and performance issues. Siemens performs Highly Accelerated Stress Screening (HASS) on all RUGGEDCOM products, in order to ensure that customers get their orders free of manufacturing errors and random defects.

RUGGEDCOM products provide reliable and error-free operation in harsh electrical installations with high EMI.

**Operation in industrial temperature range**

- -40 °C to +85 °C normal operation
- Passive cooling – no fans

**High availability**

- Integrated single or redundant power supplies
- Universal high-voltage range: 88–300 VDC or 85–264 VAC
- Low voltage: 12 VDC, 24 VDC or 48 VDC

**Durable installations**

- Full metal enclosure
- Heavy duty mounting
- Industrial terminal blocks for power and I/O connection

## Zero Packet Loss™

The proliferation of IP networking technology from the office to industrial environments, for use in real-time, mission critical control applications requires a level of immunity to electromagnetic interference (EMI) well beyond what is currently delivered by commercial grade networking products. In fact, even the EMI immunity requirements prescribed by IEC 61000-6-2 (generic standards – immunity for industrial environments) are inadequate for many environments.

One such environment is the electric utility substation, where EMI levels can be significantly higher than those of the generic industrial environment defined in IEC 61000-6-2. In order to address this risk, both the IEC and IEEE have developed and issued standards addressing EMI immunity requirements for communications networking equipment in electric utility substations.

In response to these requirements, RUGGEDCOM technology withstands all of the EMI type tests required by IEC 61850-3 without experiencing any communications loss or delays. Products featuring this technology also qualify as IEEE 1613 class 2 error-free devices. This innovation is known as Zero Packet Loss technology and it is designed to provide the same level of EMI immunity and reliability as protective relays.

## IEC 61850

IEC 61850 standard for communications in substations is composed of ten parts, which outlines a complete framework for substation automation, including EMI (electromagnetic interference), immunity and environmental requirements (IEC 61850-3) for communications networks in substations.

The EMI immunity requirements of IEC 61850-3 are derived from IEC 61000-6-5 (Immunity for Power Station and Substation Environments), which defines a set of potentially destructive EMI type tests designed to simulate both continuous and transient EMI phenomena in the substation.

This standard has a minimum requirement that the networking equipment operates without any physical damage, reset or latch-up during the application of a variety of destructive EMI immunity type tests.

## IEEE 1613

IEEE 1613 specifies ratings, environmental performance and testing requirements for communications networking devices installed in electric power substations.

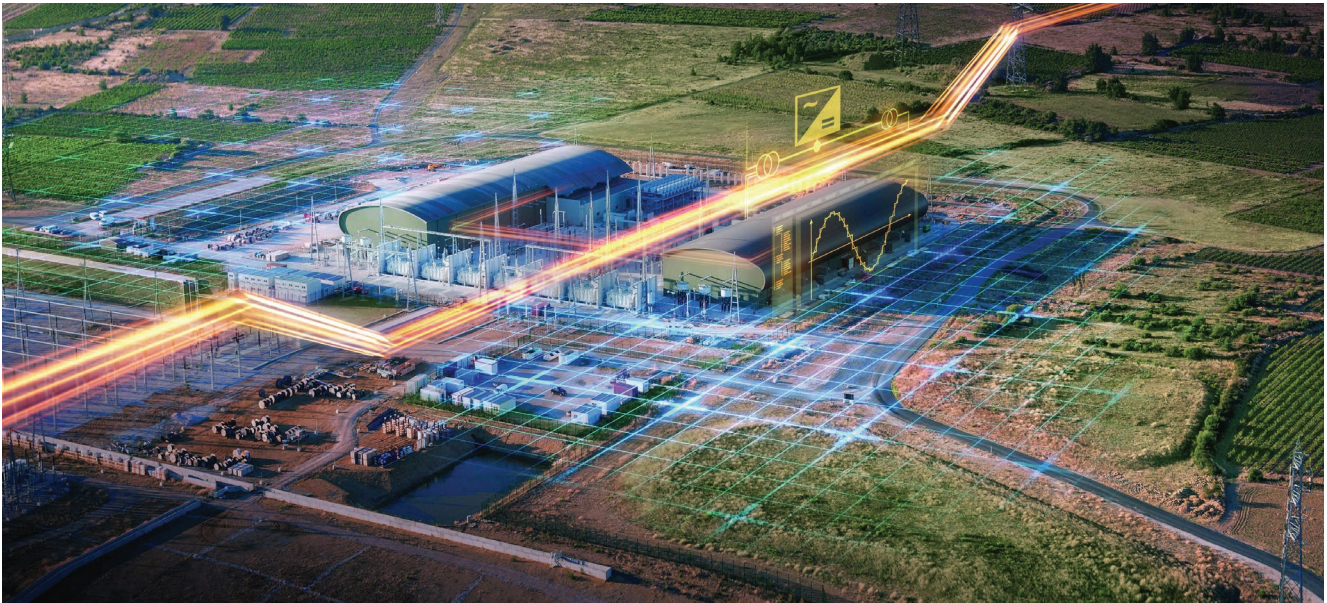
Within the standard, two classes of devices are defined, based on the outcome of a specific set of potentially destructive EMI type tests (EMI stress) designed to simulate EMI phenomena in the substation. These type tests are derived from the same type tests applied to mission critical protective relays (i.e. C37.90.).

Class 1 — these devices are allowed to experience data errors, loss, or delays when exposed to EMI stress.

Class 2 — these devices must provide error-free (i.e. no data errors, delays or loss) operation when exposed to EMI stress.

Neither class of device must experience any permanent damage under EMI stress.

The RUGGEDCOM family qualifies as IEEE 1613 Class 2 error-free devices.





RUGGEDCOM RSG2100



The RUGGEDCOM RSG2100 is a utility-grade, fully managed, 19-port modular Ethernet switch with Gigabit uplinks specifically designed to operate reliably in electrically harsh and climatically demanding environments.

- Ethernet ports**
- Up to 19 ports:
    - 3 x 10/100/1000BASE-X ports
    - 16 x 10/100BASE-X ports
    - 2 port modules for added flexibility
  - Industry standard fiber optic connectors: ST, MTRJ, LC, SC, RJ45, micro-D
  - Copper, multi-mode and single-mode optical transceivers
- Universal power supply options**
- Fully integrated, optional dual redundant power supplies
  - Universal high-voltage range: 88-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (10 – 36 VDC) or 48 VDC (36 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

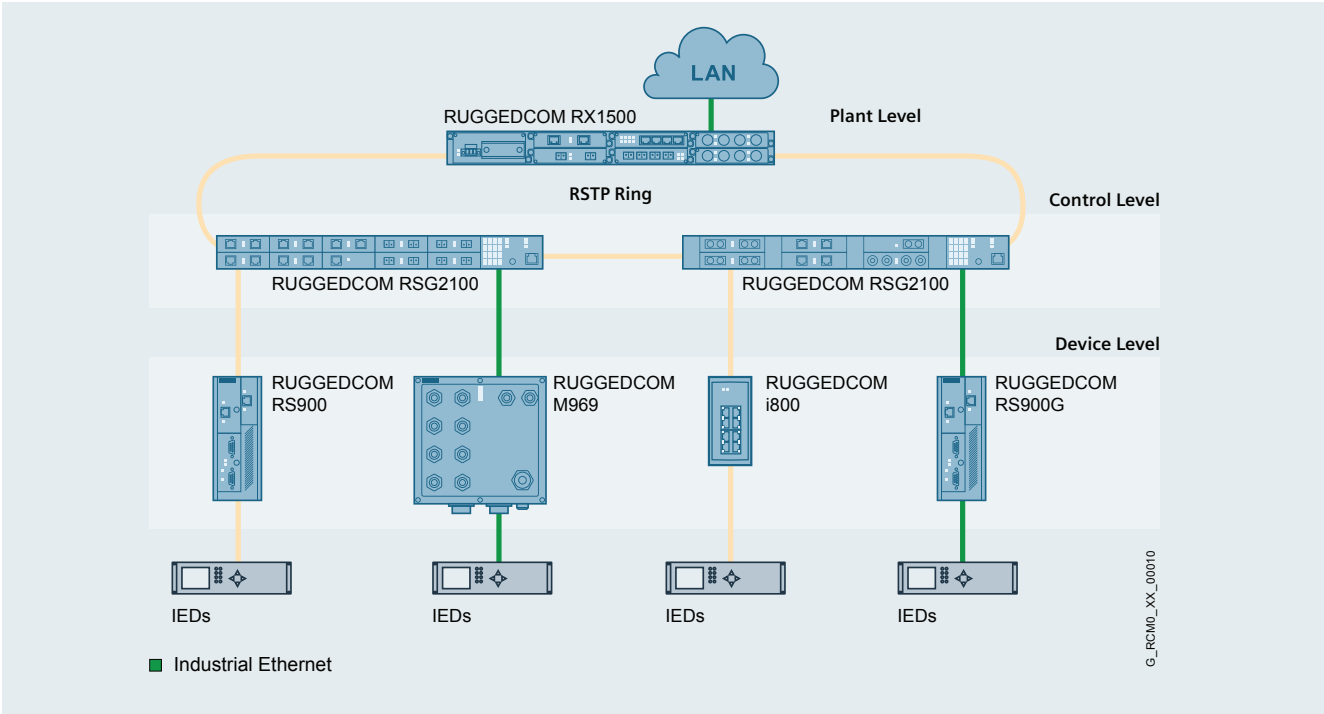
RUGGEDCOM RSG2100P



The RUGGEDCOM RSG2100P is a utility-grade, fully managed, 19-port Power-over-Ethernet (PoE) enabled modular Ethernet switch with Gigabit uplinks specifically designed to operate reliably in electrically harsh and climatically demanding environments.

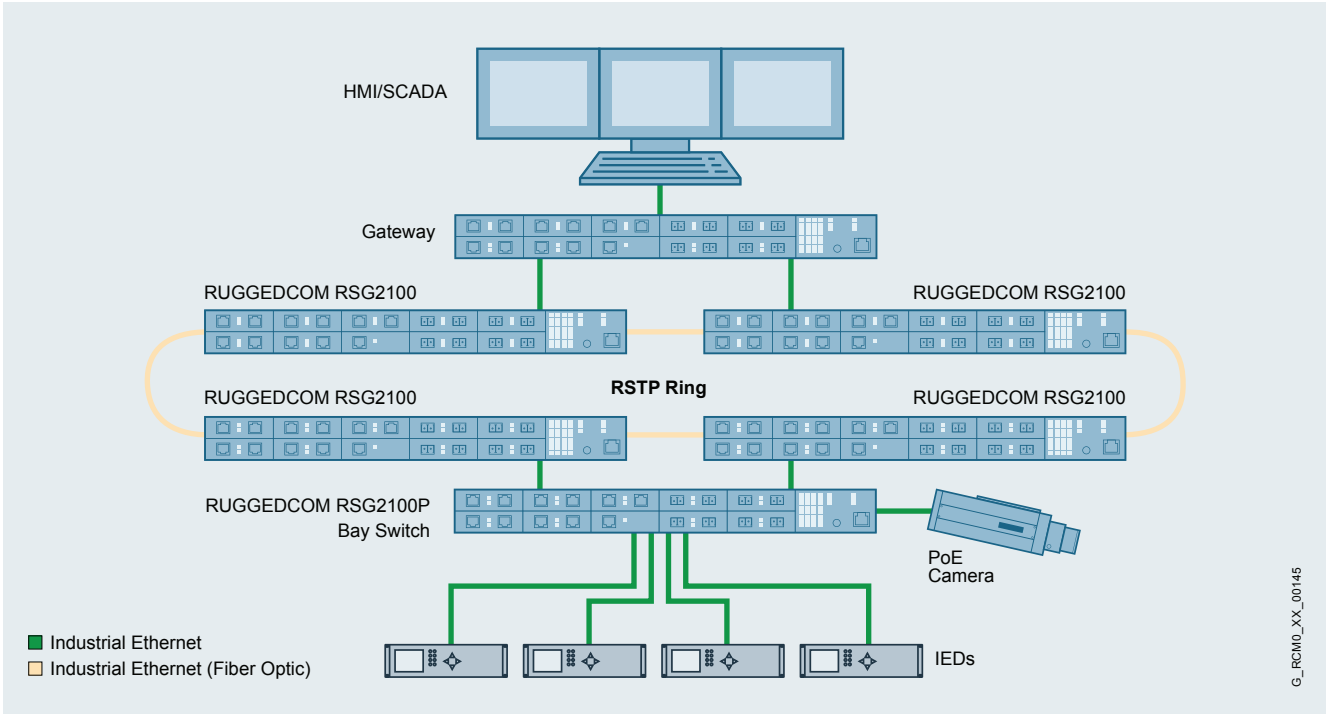
- Ethernet ports**
- Up to 19 ports:
    - 3 x 10/100/1000BASE-X ports
    - 16 x 10/100BASE-X ports
    - 2 port modules for added flexibility
  - Industry standard fiber optic connectors: ST, MTRJ, LC, SC, RJ45, micro-D
  - Copper, multi-mode and single-mode optical transceivers
- Power-over-Ethernet (PoE)**
- Up to 4 PoE ports
  - 4 x optional 10/100BASE-TX 802.3af compliant ports
- Universal power supply options**
- Fully integrated power supplies
  - Universal high-voltage range: 88-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (10 – 36 VDC) or 48 VDC (36 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

Use case



The interface versatility of the RUGGEDCOM RSG2100 makes it ideal to connect different devices using a combination of fiber optic and copper with different connector types and speeds.

Use case



The RUGGEDCOM RSG2100 is deployed in a redundant ring network architecture based on RSTP for optimal reliability.

RUGGEDCOM RSG2200



The RUGGEDCOM RSG2200 is a utility-grade, fully managed, 9-port modular Gigabit Ethernet switch specifically designed to operate reliably in harsh environments and withstand high levels of electromagnetic interference.

- Ethernet ports**
- Up to 9 x 10/100/1000BASE-X ports
  - 2 port modules for added flexibility
  - Industry standard fiber optic connectors: RJ45, ST, MTRJ, LC, SC
  - Copper, multi-mode and single-mode optical transceivers
- Universal power supply options**
- Fully integrated, optional dual redundant power supplies
  - Universal high-voltage range: 88-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (10 – 36 VDC) or 48 VDC (36 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

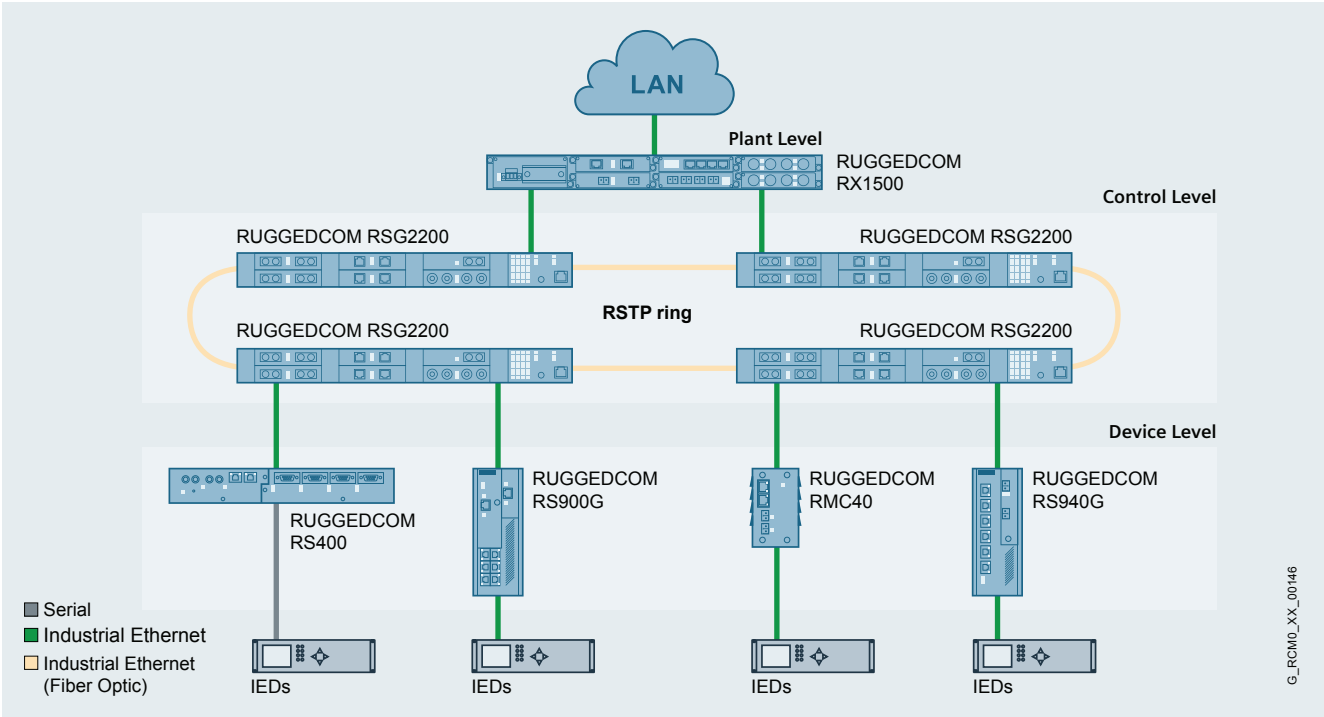
RUGGEDCOM RST2228



The RUGGEDCOM RST2228 is a 28 port, field modular, 19" Layer 2 / Layer 3 rack switch with 10 Gbit/s uplinks and compliant with PTP IEEE 1588 v2. It supports Layer 3 static unicast routing, imparting greater flexibility over standard Layer 2 switches for modern digital substation networks.

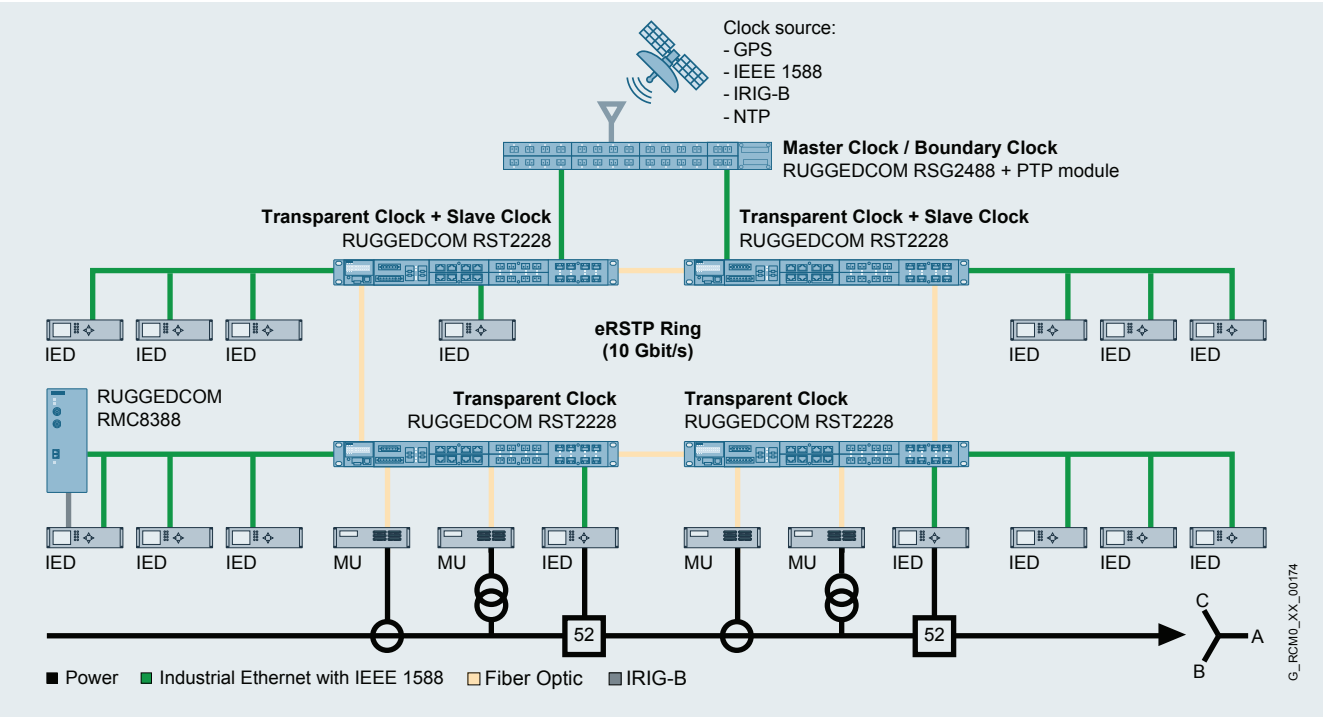
- Ethernet ports**
- 4 x 1000BASE-X/10GBASE-X uplinks
  - Up to 24 x 10/100/1000BASE-X ports
  - 4-port modules for added flexibility
  - Industry standard connectors: RJ45, LC & SFP
  - Copper, single and multi-mode optical transceivers
- Engineered for the modern Digital Substation**
- **Precision timing:** IEEE 1588v2 with hardware time stamping and support for transparent clock
  - **Redundant protocols:** RSTP, eRSTP, MSTP, STP, PRP/HSR (with RMM 2972-2RNA) and link aggregation
  - **RUGGEDCOM CLP:** Removable storage media port to easily save and reuse all configuration data
- Universal power supply options**
- Fully integrated, optional dual redundant power supplies
  - Universal high-voltage range: 88 – 300 VDC or 85 – 264 VAC
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C
  - Low Voltage power supply options 12 VDC (10.5...15 VDC), 24 VDC (13...36 VDC) and 48 VDC (36...72 VDC)

Use case



With the RUGGEDCOM RSG2200, Gigabit communication is possible for reliable and high speed connection throughout the network.

Use case



Up to 24 modern IEDs or other IEEE 1588 slaves can be connected directly to the RUGGEDCOM RST2228 via Fast Ethernet or Gigabit ports.

RUGGEDCOM RST2228P

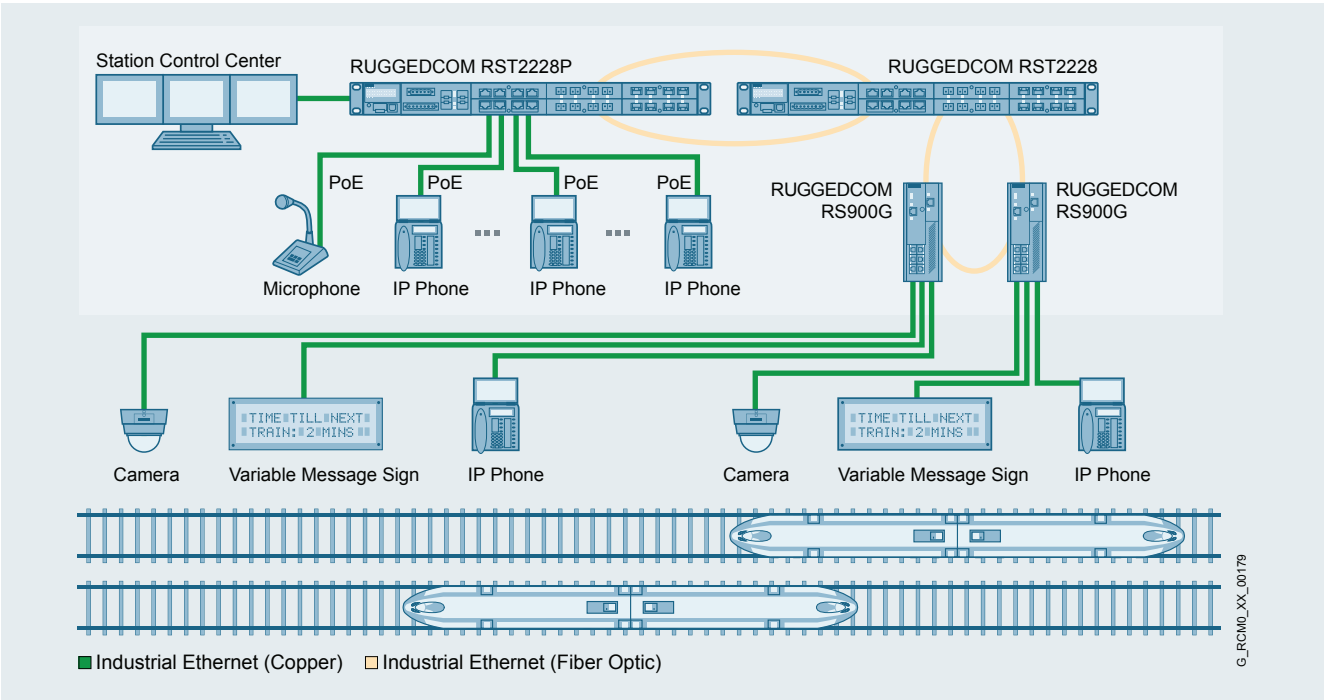


The RUGGEDCOM RST2228P is a 28 port, field modular, Power-over-Ethernet (PoE) enabled, 19" Layer 2 / Layer 3 rack switch with 10 Gbit/s uplinks and compliant with PTP IEEE 1588 v2. It supports Layer 3 static unicast routing, imparting greater flexibility over standard layer 2 switches for modern industrial networks.

- Ethernet ports**
- 4 x 1000BASE-X/10GBASE-X uplinks
  - Up to 24 x 10/100/1000BASE-X ports
  - 4-port modules for added flexibility
  - Industry standard connectors: RJ45, LC & SFP
  - Copper, single and multi-mode optical transceivers
- Engineered for the modern industrial networks**
- **Power-over-Ethernet (PoE):** Up to 24 PoE ports at IEEE 802.3at / IEEE 802.3bt (draft) and 500W shared power budget per switch at up to 60W per port
  - **Precision timing:** IEEE 1588v2 with hardware time stamping and support for transparent clock
  - **Redundant protocols:** RSTP, eRSTP, MSTP, STP, PRP/HSR (with RMM 2972-2RNA) and link aggregation
  - **RUGGEDCOM CLP:** Removable storage media port to easily save and reuse all configuration data

- Universal power supply options**
- Fully integrated, optional dual redundant power supplies
  - Universal high-voltage range: 88 – 300 VDC or 85 – 264 VAC
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C
  - Low Voltage power supply options 12 VDC (10.5...15 VDC), 24 VDC (13...36 VDC) and 48 VDC (36...72 VDC)

Use case



The high port density of the RST2228P makes it possible to connect a large number of PoE devices like VoIP telephones and IP cameras with a single switch

RUGGEDCOM RST2228 and RST2228P modules

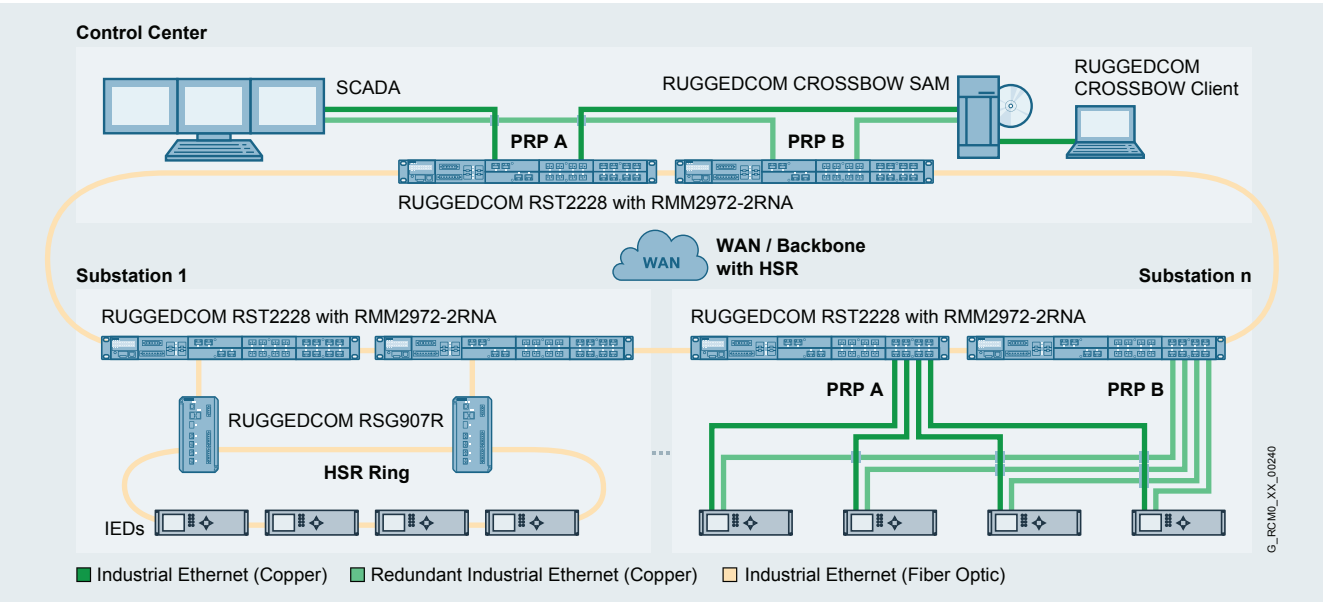


The RUGGEDCOM RST2228 and RST2228P are field modular Layer 2 / Layer 3 Ethernet switches equipped with 6 slots for various media modules. Media modules are available with different interface options.



- RUGGEDCOM RMM2972-2RNA** New
- Ethernet ports**
- 2 x 100/1000 Mbit/s RJ45 (SFP Fiber and copper, backplane)
  - PRP/HSR ports A & B, 100/1000 Mbit/s RJ45

The RUGGEDCOM RMM2972-2RNA line module for the RUGGEDCOM RST2228 and RST2228P switches can be used to build zero-downtime networks based on the IEC 62439 standard for PRP/HSR. With this module, the RUGGEDCOM RST2228 switch can function as a RedBox with support for up to 24 legacy SAN devices. It supports PRP to HSR coupling and can also function as a QuadBox that connects two HSR rings together by using two such modules in the same device.



Fully redundant network architecture for digital substations spread over a large geographical area.

RUGGEDCOM RSG2300



The RUGGEDCOM RSG2300 is a utility-grade, fully managed, 32-port modular Ethernet switch specifically designed to operate reliably in electrically harsh and climatically demanding environments.

- Ethernet ports**
- Up to 32 ports:
    - 4 x optional 10/100/1000BASE-X ports
    - 4 x optional 10/100BASE-X ports
    - 24 x fixed 10/100BASE-TX ports
  - 2 port modules for added flexibility
  - Industry standard fiber optic connectors: RJ45, ST, MTRJ, LC, SC
  - Copper, multi-mode and single-mode optical transceivers
- Universal power supply options**
- Fully integrated, optional dual redundant power supplies
  - Universal high-voltage range: 88-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (10 – 36 VDC) or 48 VDC (36 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

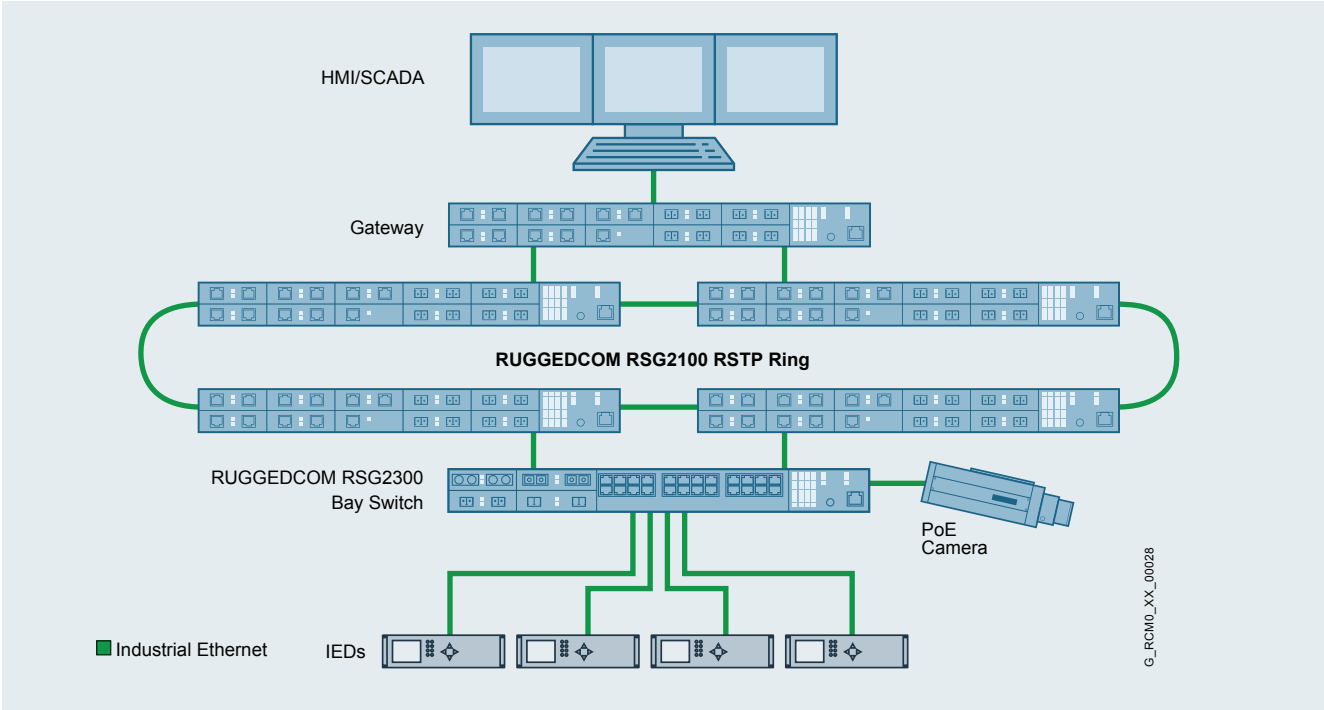
RUGGEDCOM RSG2300P



The RUGGEDCOM RSG2300P is a utility-grade, fully managed, 32-port modular Power-over-Ethernet (PoE) enabled Ethernet switch specifically designed to operate reliably in electrically harsh and climatically demanding environments.

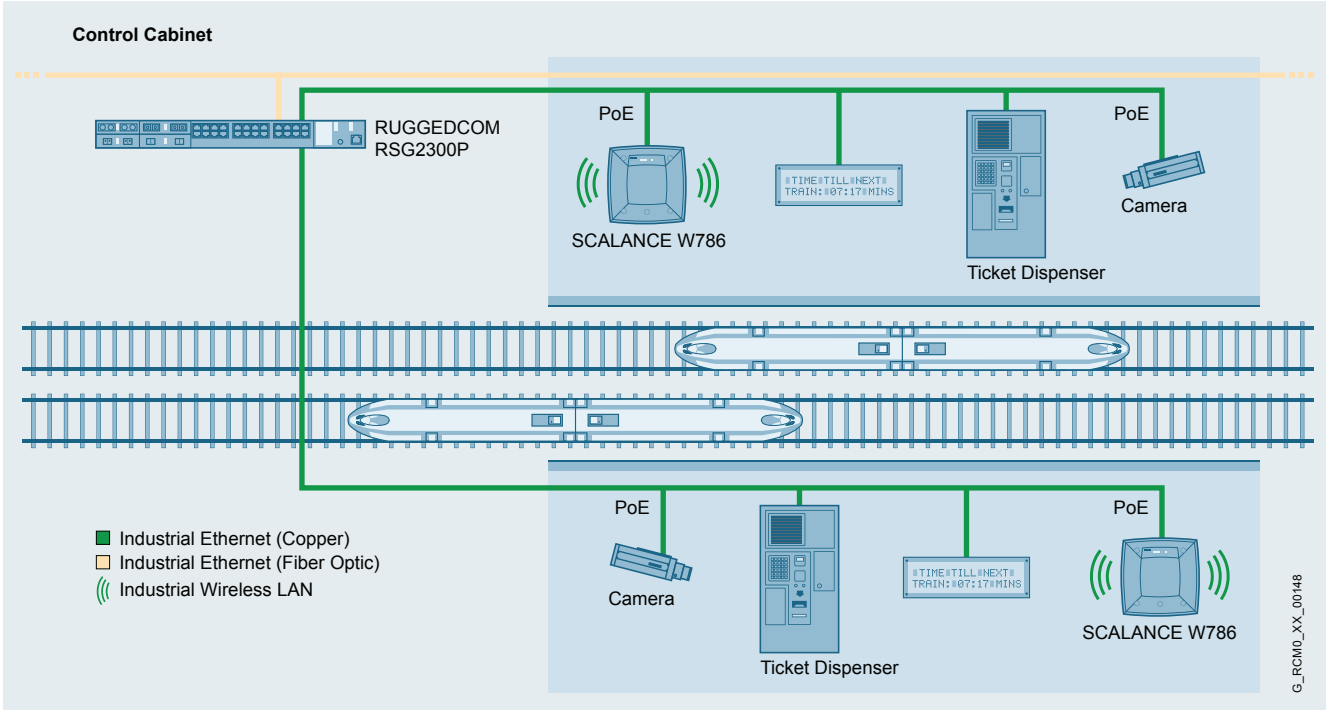
- Ethernet ports**
- Up to 32 ports:
    - 4 x optional 10/100/1000BASE-X ports
    - 4 x optional 10/100BASE-X ports
    - 24 x fixed 10/100BASE-TX ports
  - 2 port modules for added flexibility
  - Industry standard fiber optic connectors: RJ45, ST, MTRJ, LC, SC
  - Copper, multi-mode and single-mode optical transceivers
- Power-over-Ethernet (PoE)**
- Up to 4 PoE ports
    - 2 x fixed 10/100BASE-TX 802.3af compliant ports
    - 2 x optional 10/100BASE-TX 802.3af compliant ports
- Universal power supply options**
- Fully integrated power supplies
  - Universal high-voltage range: 88-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (10 – 36 VDC) or 48 VDC (36 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

Use case



With its high port density of copper interface the RUGGEDCOM RSG2300 is ideal for connecting a large number of devices at the Bay level.

Use case



The high port density of the RUGGEDCOM RSG2300P makes it ideal for connecting wireless LAN, IP cameras and other peripheral devices.



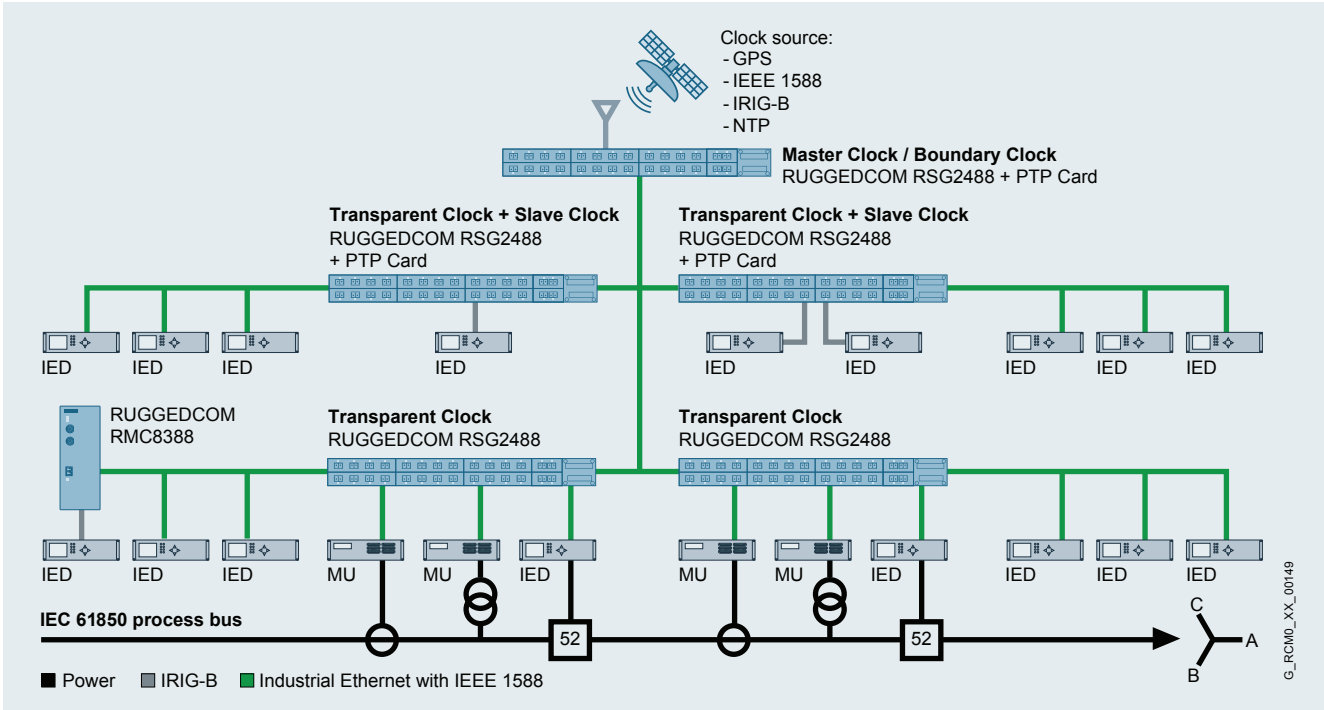
RUGGEDCOM RSG2488



The RUGGEDCOM RSG2488 is a utility-grade, field upgradable, fully managed, 28-port Gigabit Ethernet switch with hot-swappable dual redundant power supplies and full support for IEEE1588 precision timing protocol. It is specifically designed to operate reliably in electrically harsh and climatically demanding environments.

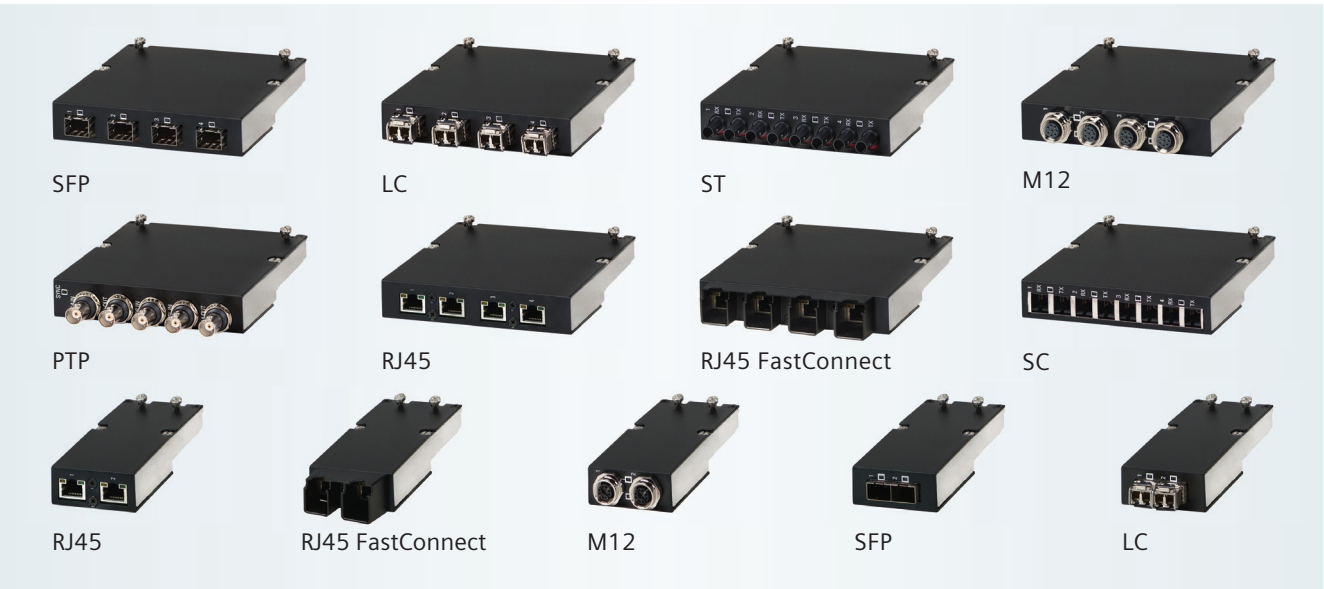
- Ethernet ports**
  - 28 x 10/100/1000BASE-X ports
  - 4 port field replaceable modules
  - Industry standard fiber optic connectors: RJ45, FastConnect, M12, ST, LC, SC
  - Copper, multi-mode and single-mode optical transceivers
- Precision timing**
  - IEEE 1588, SNTP, IRIG-B and GPS conversion
  - Supports IEEE 1588 1-step and 2-step hardware time stamping
  - GPS-Input to serve as grandmaster clock
  - Supports master, slave, ordinary and transparent clock modes
- Universal power supply options**
  - Fully integrated, hot-swappable dual redundant power supplies
  - Universal high-voltage range: 100-300 VDC or 85-264 VAC
  - Low-voltage range: 24 VDC (13 – 36 VDC) or 48 VDC (37 – 72 VDC)
  - Screw or pluggable terminal blocks for reliable, maintenance-free connections
  - CSA/UL 60950 safety approved to +85° C

Use case

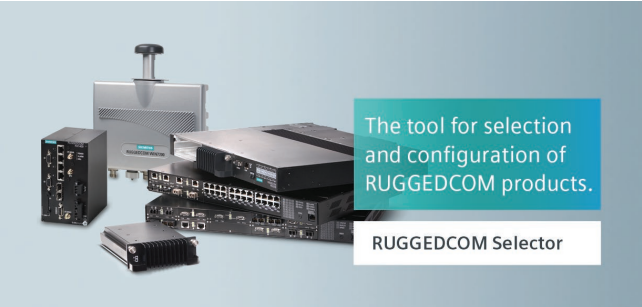


The field-modular RUGGEDCOM RSG2488 is the most versatile offering for IEEE1588 time synchronisation and can function as master, boundary, slave and transparent clock.

RUGGEDCOM RSG2488 modules



The RUGGEDCOM RSG2488 is a modular, field replaceable platform that supports different Ethernet connectors and speeds, making it xideally suited for electric power utilities, the industrial plant floor, rail and traffic control systems.



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**FastConnect Cabling System**

Stringent demands are placed on the installation of cables in an industrial environment. Siemens offers FastConnect, a system that fulfills all these requirements: on-site assembly – quick, easy and error-free. For more information, visit: [siemens.com/fastconnect](https://www.siemens.com/fastconnect)



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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:  
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