

SIEMENS



RUGGEDCOM Multi-Service Platforms

Modular Managed Layer 2 / 3
Ethernet Switches, Routers
and Security Appliances

Brochure

11/2016

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The RUGGEDCOM Multi-Service Platforms include a rich array of carrier grade features designed and tested to withstand the demands of the substation environment.

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RUGGEDCOM Multi-Service Platforms features and benefits

Low total cost of ownership

- No hassle upgrades in the field, and the flexibility to adapt to the changing network

Reliability

- Utility-grade reliability designed in from the very beginning
- Current field demonstrated MTBF of 180 years
- Designed as per MIL-HDBK-217F reliability guidelines
- HALT analysis to enhance product robustness

Carrier grade performance

- Layer 2 and layer 3 switching and a rich set of WAN, serial, switching, routing and management features

Immunity

- IEEE 1613 class 2 error-free for substations
- IEC 61850-3 performance for substations
- Class-B emissions for demanding installations

Suitable for all environments

- Certified to several industry standards: power, rail, ITS, and MIL-STD
- Available in various form factors
- Best-in-class warranty, support, and services
- Expandable with external applications, appliances and utilities

Common features

Management	Layer 2 (switching)	Layer 3 (routing)	Security
Web UI	QoS	MPLS	Integrated firewall
HTTPS	RSTP, eRSTP, MSTP	DHCP	IPSec
SSH	SNTP	VRRPv2 and VRRPv3	VPN
RMON	L2TPv2, L2TPv3	PIM SM	HTTPS
SNMP	Port rate limiting	OSPF	VLANs
CLI	Link backup	BGP	SNMPv3
Secure remote syslog	Port mirroring	Traffic prioritization	Port-based access control
Real-time line traces	Broadcast storm filtering	WAN interfaces	MAC-based port security
USB mass-storage	Jumbo frame (9 kb)	Cellular interfaces	RADIUS
Serial console		IS-IS	Brute Force Attack prevention
		Virtual routing & forwarding (VRF)	Dead peer detection
		Dynamic L2TPv3	IPv6 tunneling
			IPv6 firewall

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 DC: 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 relaying devices.



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.

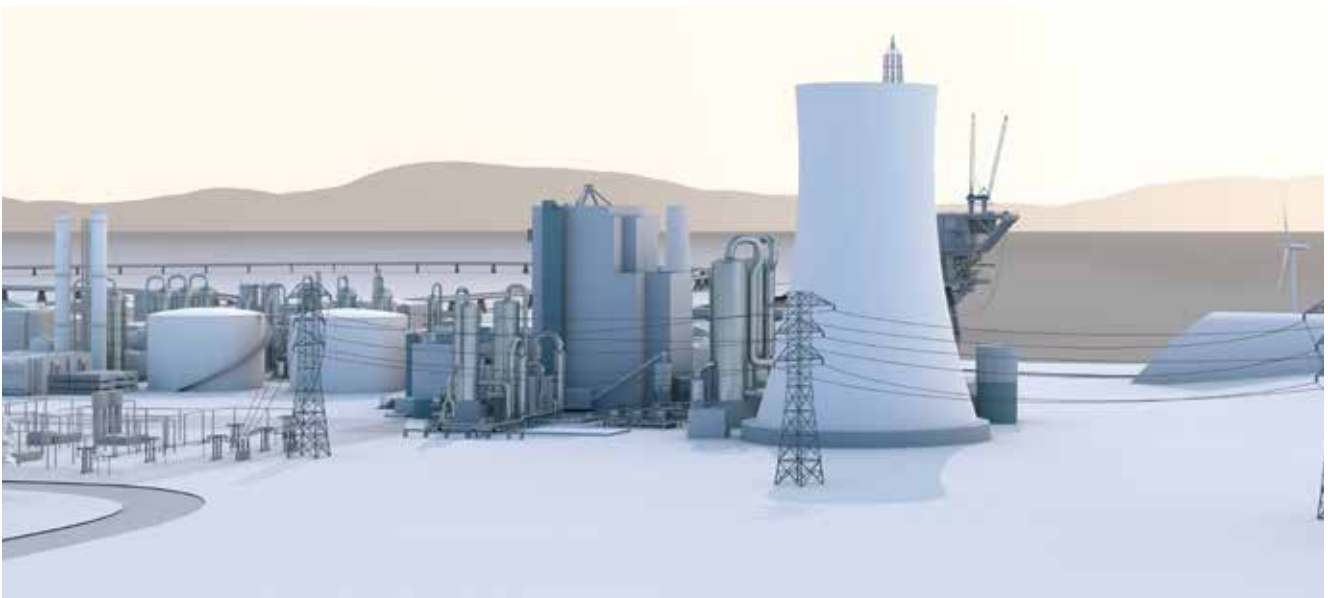
Within the standard, two classes of devices are defined, based on the outcome of a specific set of potentially destructive EMI type tests (EMI stress) designed to simulate EMI phenomena in the substation. These type tests are derived from the same type tests applied to mission critical protective relays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



RUGGEDCOM RX1400



The RUGGEDCOM RX1400 is a multiprotocol intelligent node which combines Ethernet switching, routing, and firewall functionality with various wide area connectivity options.

The RUGGEDCOM RX1400 has an IP40 degree of protection, does not use internal fans for cooling and supports a wide temperature range of -40° C to +85° C. This device supports a LINUX virtual machine environment, allowing customers and third party application developers to deploy customized intelligence at the network edge.

Certifications

- Electric power (IEC 61850-3, IEEE 1613)
- Rail and transportation (NEMA TS-2, EN 50121-4)
- Oil and gas (IEC Ex, ATEX Zone II, HazLoc (Class 1, Div.2) available)

Specifications	RX1400
Cellular interface (optional)	
Connectors	2 x SMA-type
GSM/GPRS/EDGE	Quad band
UMTS/HSDPA+	850/900/1900/2100 MHz
LTE	B1, B2, B3, B4, B7, B8, B13, B17, B19, B20, B21, B25
Number of SIM cards supported	2
Wireless LAN interface (optional)	
Interfaces	2 x R-SMA-type
Standards	IEEE 802.11a/b/g/n (2.4/5 GHz)
Supported modes	Access Point, Client
Wired interfaces	
LAN	4 x RJ45 (10/100BASE-TX), 2x SFP-Slot (1000BASE-LX / 100BASE-FX)
Serial	2 x DB9 male connector
Console	1 x DB9 male connector
GPS interface (optional)	
Connectors	1 x SMA-type
Standards	GPS (Global Positioning System), GLONASS (Global Navigation Satellite System)
Power supply	
Number of supplies	1
Power supply range	9-36 VDC / 36-72 VDC / 98-300 VDC / 88-264 VAC
Power consumption	17 W
Permitted ambient conditions	
Operating temperature	-40° C to +85° C
Maximum heat dissipation	58 BTU/hr
Degree of protection	IP40
Constructional design	
Maximum weight	2.5 kg
Dimensions (w x h x d)	88 x 150 x 120 (mm) 3.4 x 5.9 x 4.7 (in)

RUGGEDCOM RX1500 / RX1501



The RUGGEDCOM RX1500 series is a cost efficient utility grade layer 2 and layer 3 switch and router.

The RUGGEDCOM RX1500 has an IP30 degree of protection, does not use internal fans for cooling and supports a wide temperature range of -40° C to +85° C. The RX1500's modular and field replaceable platform allows customers to select amongst WAN, serial and Ethernet options making it ideally suited for electric power utilities, the industrial plant floor, rail and traffic control systems.

Certifications

- Electric power (IEC 61850-3, IEEE 1613, IEC 60255)
- Rail and transportation (NEMA TS-2, EN 50155, EN 50121-4)

Specifications	RX1500 / RX1501	RX1500	RX1501
Connectivity	Type	Maximum port density	
Gigabit	LC, M12 (A, X-coded), RJ45, SFP	8	4
Fast Ethernet	LC, RJ45, M12 (D, A, X-coded), SFP	24	36
APE	RJ45, USB, DVI	2	2
10 FL	ST – up to 2 km	12	18
T1/E1	T1 = RJ48 (channelized), E1 = RJ48, BNC (channelized)	4	4
Cellular	SMA (antennas), 2FF (mini-SIM), GSM, EDGE, HSPA, EVDO (network)	8	12
Serial	RJ45 (RS232, RS422, RS485)	24	36
Console and management	DB9/RJ45 console, RJ45 management, USB		
Power supply			
Number of supplies		2	1
Power supply range	9-15 VDC / 15-36 VDC / 36-72 VDC / 88-300 VDC or 85-264 VAC		
Power consumption	65 W		
Permitted ambient conditions			
Operating temperature	-40° C to +85° C		
Maximum heat dissipation	222 BTU/hr		
Degree of protection	IP30		
Constructional design			
Maximum weight	5 kg		
Dimensions (w x h x d)	440 x 300 x 44 (mm) 17.3 x 11.8 x 1.7 (in)		

RUGGEDCOM RX1510 / RX1511 / RX1512



The RUGGEDCOM RX1510 series is a compact, cost efficient utility-grade layer 2 and layer 3 switch and router.

The RUGGEDCOM RX1510 has an IP30 degree of protection, does not use internal fans for cooling and supports a wide temperature range of -40° C to +85° C. The RX1510's modular and field replaceable platform allows customers to select amongst WAN, serial and Ethernet options making it ideally suited for electric power utilities, the industrial plant floor, rail and traffic control systems.

Certifications

- Electric power (IEC 61850-3, IEEE 1613, IEC 60255)
- Rail and transportation (NEMA TS-2, EN 50155, EN 50121-4)

Specifications	RX1510 / RX1511 / RX1512	RX1510	RX1511	RX1512
Connectivity	Type	Maximum port density		
Power	Screw terminal / plug terminal	2	1	1 (internal)
Gigabit	LC, M12 (A, X-coded), RJ45, SFP	8	4	4
Fast Ethernet	LC, RJ45, M12 (D, A, X-coded), SFP	24	12	12
APE	RJ45, USB, DVI	2	2	1
10 FL	ST – up to 2 km	12	6	6
T1/E1	T1 = RJ48 (channelized), E1 = RJ48, BNC (channelized)	4	4	4
Cellular	SMA (antennas), 2FF (mini-SIM), GSM, EDGE, HSPA, EVDO (network)	8	4	4
Serial	RJ45 (RS232, RS422, RS485)	24	12	12
Console and management	DB9/RJ45 console, RJ45 management, USB			
Power supply				
Number of supplies		2	1	1
Power supply range	9-15 VDC / 15-36 VDC / 36-72 VDC / 88-300 VDC or 85-264 VAC			
Power consumption		65 W	35 W	30 W
Permitted ambient conditions				
Operating temperature	-40° C to +85° C			
Maximum heat dissipation		222 BTU/hr	120 BTU/hr	102 BTU/hr
Degree of protection	IP30			
Constructional design				
Maximum weight		5kg	3.5 kg	2.5 kg
Dimensions (w x h x d)		115 x 125 x 200 (mm) 2.4 in x 4.9 in x 7.8 (in)	155 x 125 x 200 (mm) 6.1 x 4.9 x 7.8 (in)	115 x 125 x 200 (mm) 6.1 x 4.9 in x 7.8 (in)

RUGGEDCOM RX5000 / MX5000



The RUGGEDCOM RX5000 and MX5000 are high-port density Ethernet routing and switching platforms designed to operate in harsh environments.

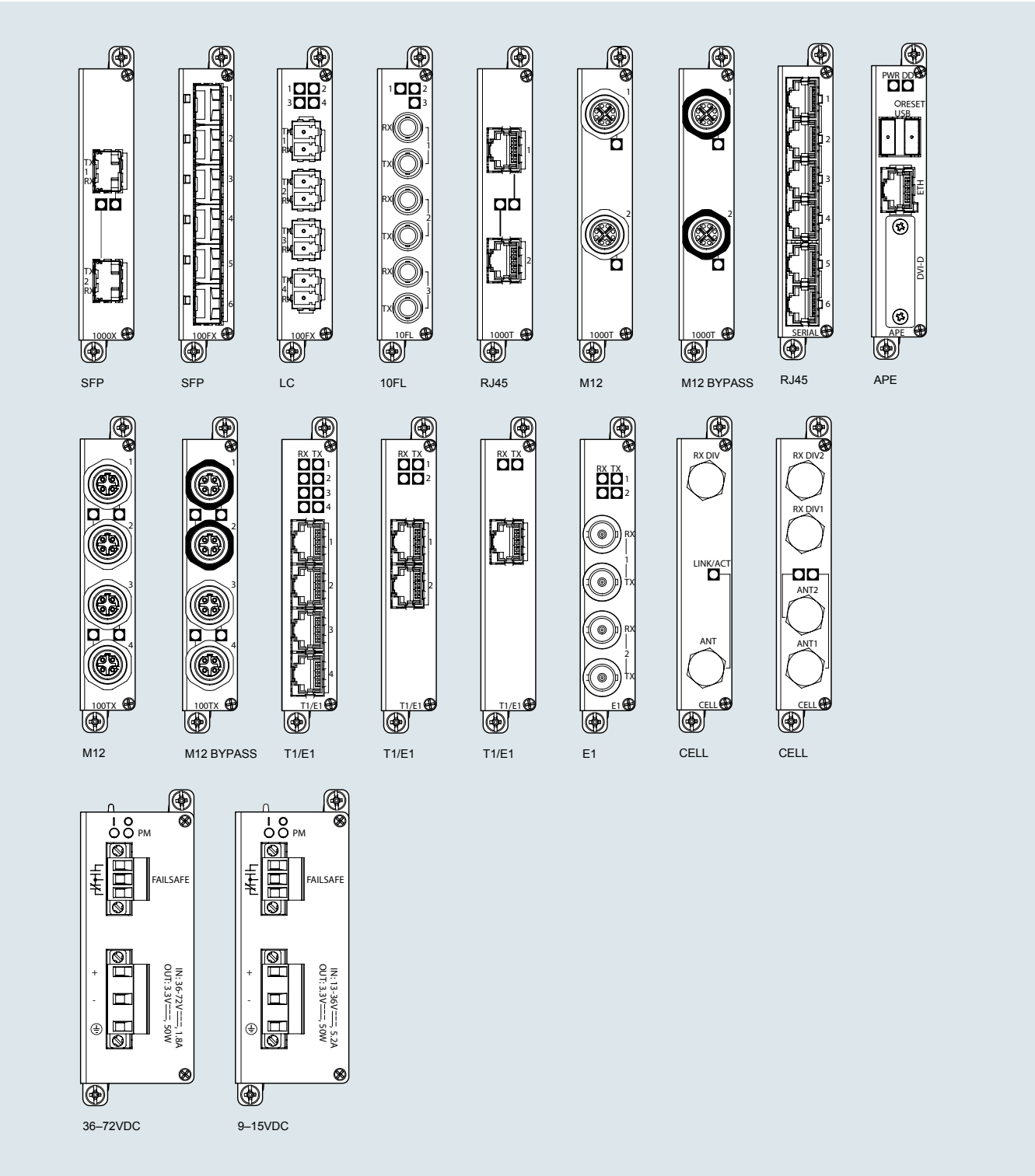
The RUGGEDCOM RX5000 and MX5000 have an IP30 degree of protection, do not use internal fans for cooling, can withstand high levels of electromagnetic interference, radio frequency interference and support a wide temperature range of –40° C to +85° C. These platforms are designed to meet the challenging climatic and environmental demands found in utility, industrial and military network applications.

Certifications

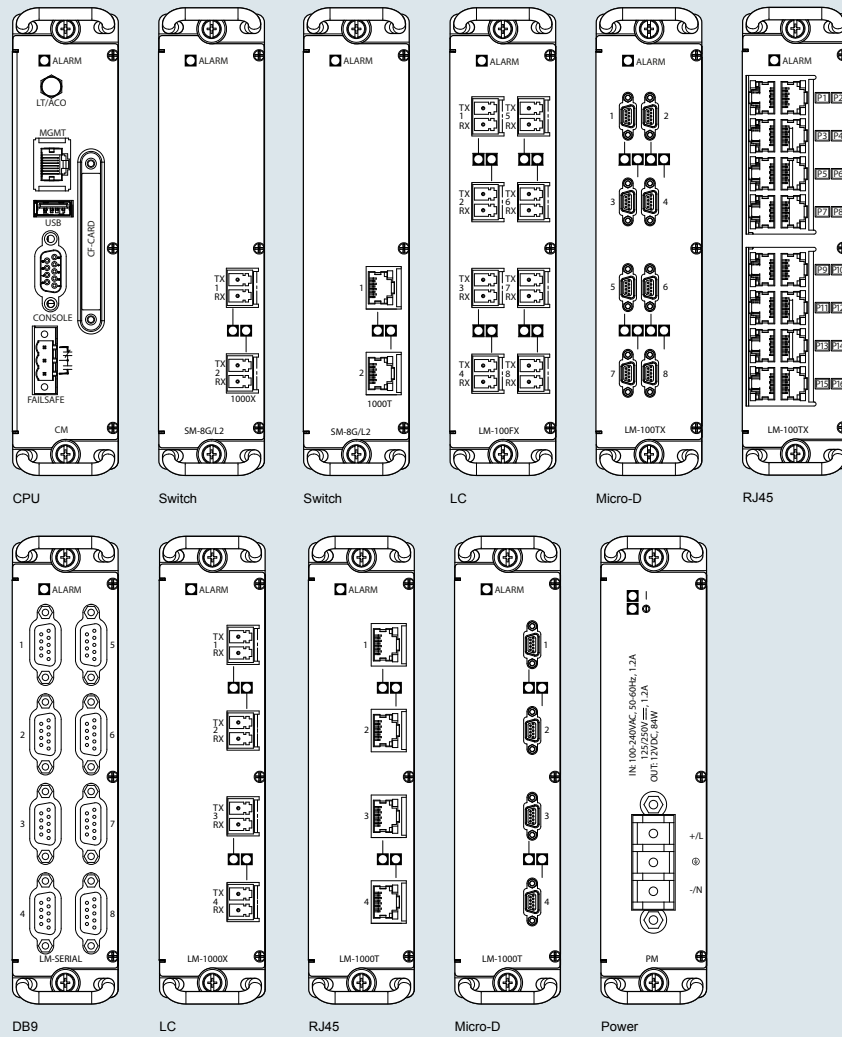
- Electric power (IEC 61850-3, IEEE 1613)
- Rail and transportation (NEMA TS-2, EN 50155, EN 50121-4)

Specifications	RX5000	MX5000	RX5000	MX5000
Connectivity	Type		Maximum port density	
Power	Screw terminal		2	
10 Gbps	SFP+, up to 80 km		2	
Gigabit	LC, RJ45, SFP	LC, micro-D, SFP	24	
Fast Ethernet	LC, RJ45, SFPBNC (channelized)	LC, micro-D, RJ45	96	
Serial	None		48	
Console and management	DB9 console, RJ45 management, USB			
Power supply				
Number of supplies	2			
Power supply range	88-300VDC or 85-264 VAC			
Power consumption	110 W			
Permitted ambient conditions				
Operating temperature	-40° C to +85° C			
Maximum heat dissipation	375 BTU/hr			
Degree of protection	IP30			
Constructional design				
Maximum weight	16 kg			
Dimensions (w x h x d)	440 x 176 x 220 (mm)			
	17.3 x 6.9 x 8.6 (in)			

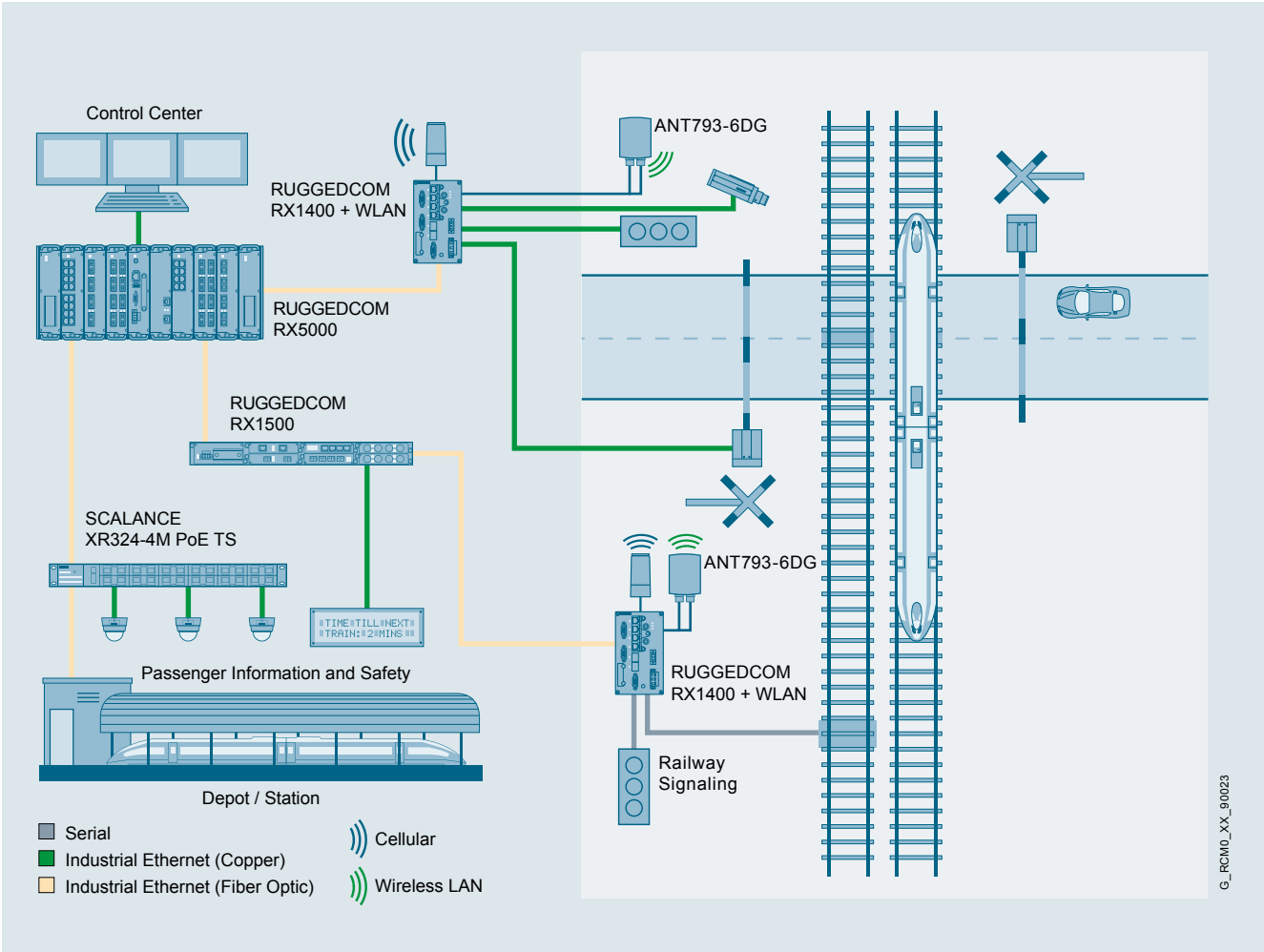
Hot-swappable RUGGEDCOM RX1500 modules



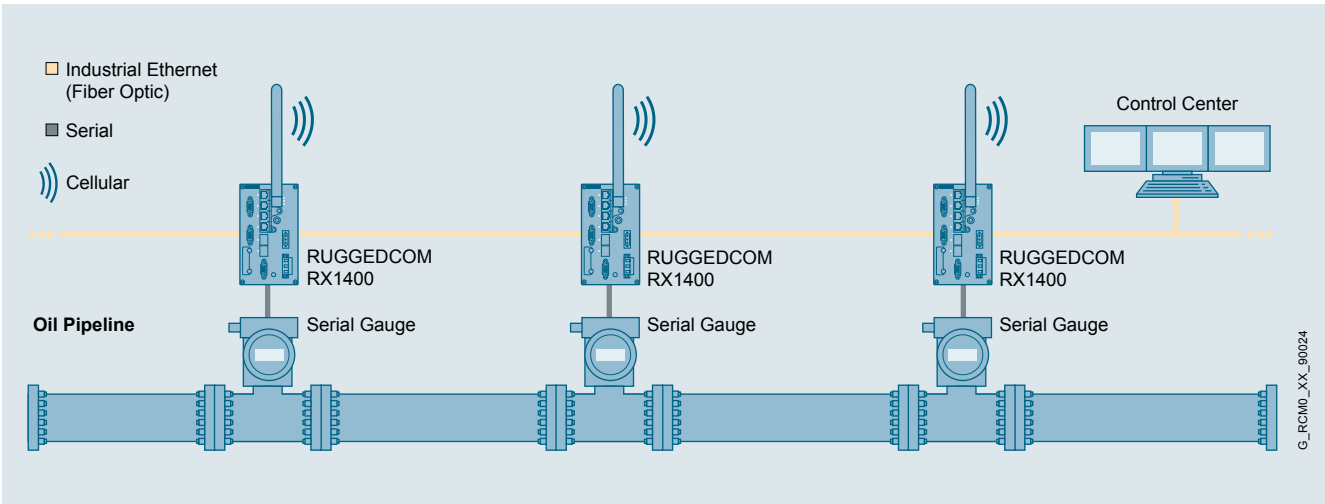
Hot-swappable RUGGEDCOM RX5000 modules



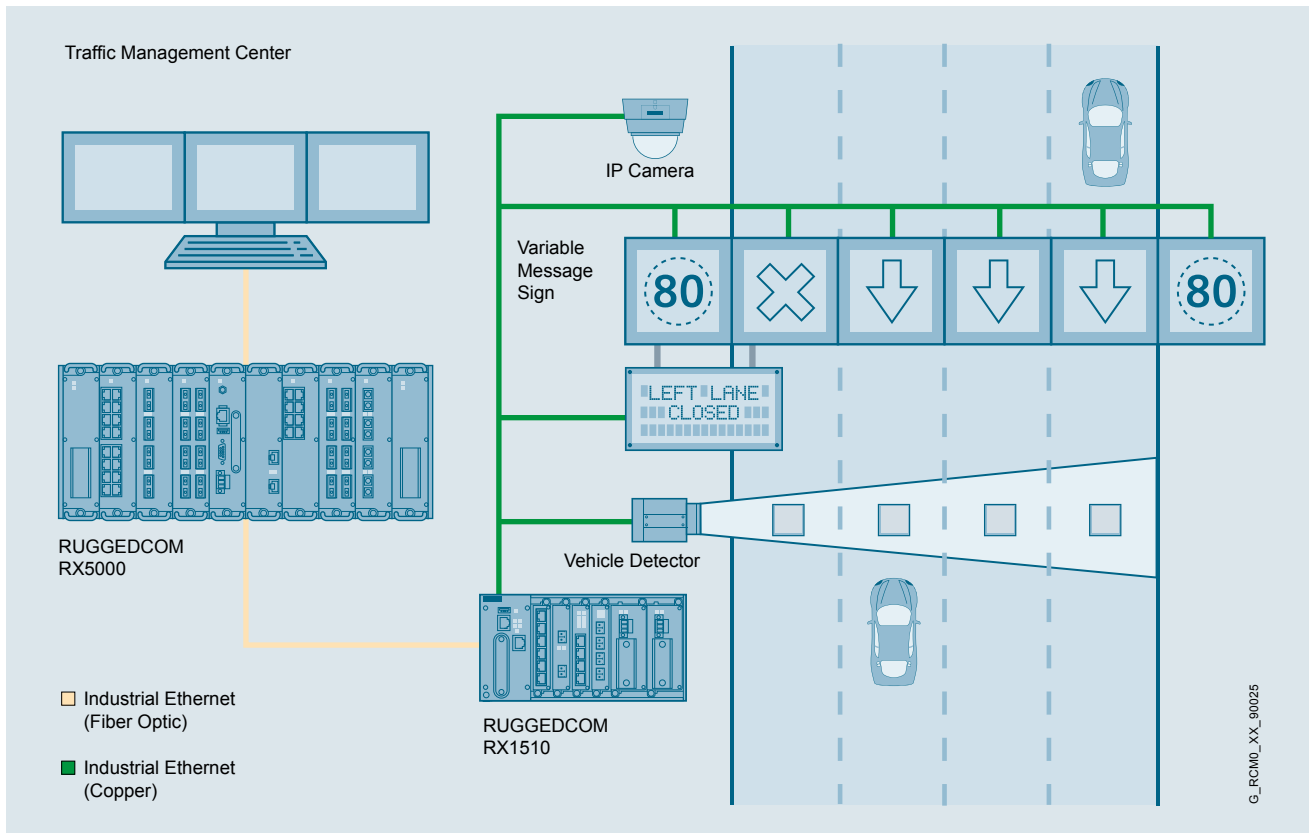
Use cases



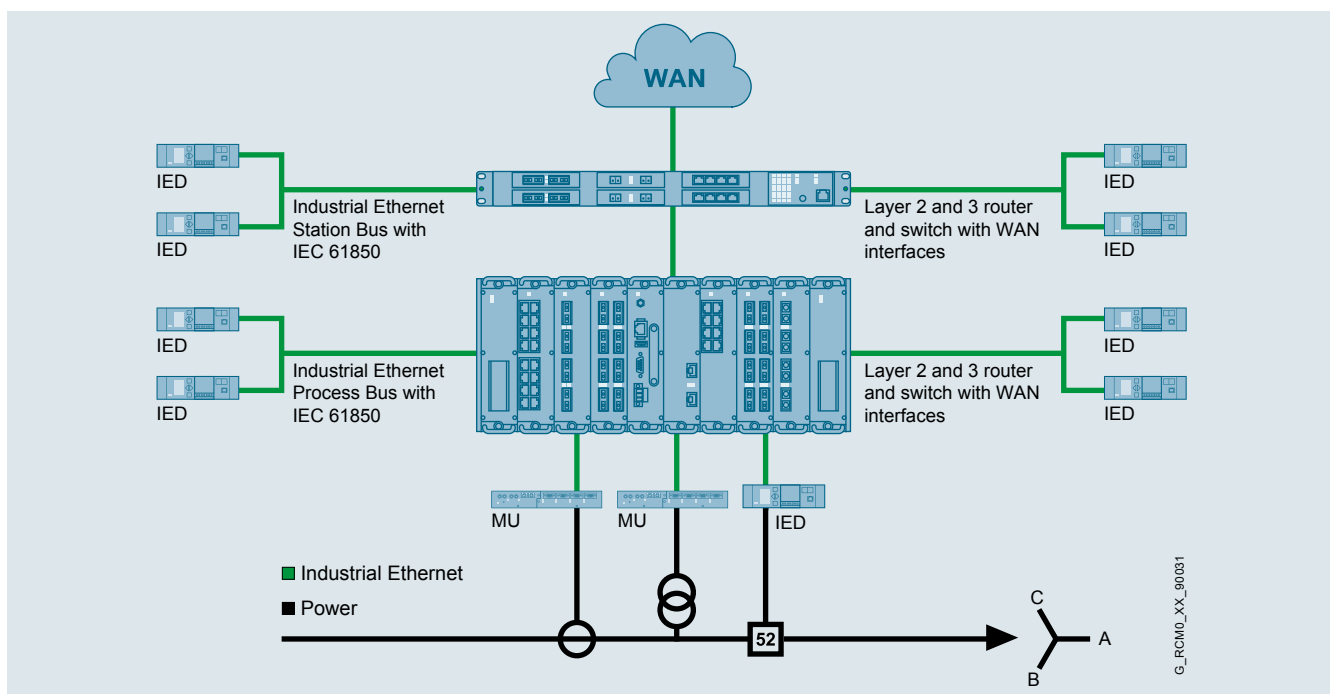
RUGGEDCOM Multi-Service Platforms provide ideal and versatile communication solutions for the rail industry.



The compact RUGGEDCOM RX1400 is an ideal field device in oil & gas environments.



RUGGEDCOM Multi-Service Platforms are used for traffic management in intelligent transportation systems.



RUGGEDCOM Multi-Service Platforms are widely used in the electric power industry.

RUGGEDCOM APE



The RUGGEDCOM APE is a utility-grade computing platform that plugs directly into any member of the RUGGEDCOM RX1500 family and makes it possible to run third party software applications without the need to procure an external industrial PC.

Line module for the RUGGEDCOM RX1500 product family

- Microsoft Windows 7 Embedded
- Check Point GAIa
- Linux

Two physically separated Gigabit Ethernet interfaces for:

- IPsec/VPN links
- IDS (requires Services contract)
- Secure access (RUGGEDCOM CROSSBOW)
- Protocol conversion (RUGGEDCOM ELAN)
- Third party software applications

Secure remote access

RUGGEDCOM CROSSBOW SAC can be installed directly on the RUGGEDCOM RX1500 product family, or on the RUGGEDCOM APE.

Protocol conversion

RUGGEDCOM ELAN can be ordered pre-installed on the RUGGEDCOM RX1500 product family or on the RUGGEDCOM APE

- Performance limits apply to internal RUGGEDCOM ELAN installation
- Internal RUGGEDCOM ELAN installation must be ordered at the same time as the RUGGEDCOM RX1500 unit

Security appliance

The RUGGEDCOM APE can be ordered with Check Point GAIa software pre-installed.

The RUGGEDCOM APE with Linux can be bundled with RUGGEDCOM Services contracts for:

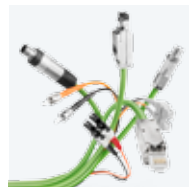
- Physical firewall (Shorewall configuration)
- Intrusion Detection Sensor (Snort) and Intrusion Detection system with rules selection

Specifications	APE1402	APE1404	APE1402W7	APE1404W7	APE1404CKP
Front Ethernet	Gigabit, RJ45 port				
Backplane Ethernet	Gigabit, internal to RUGGEDCOM RX15xx chassis				
USB	2 ports, USB 2.0				
Processor	Intel Atom E660T, 32-bit, 5000 MIPS at 1.3 GHz, 512 KB cache, Intel HT and VT-x				
Display	DVI port				
RAM	2 GB DDR-2 industrial-grade PCB-soldered				
Operating system	Debian Linux		Microsoft Windows 7 Embedded		Check Point GAIa
SDD (fixed)	8 GB	16 GB	8 GB	16 GB	16 GB

Accessories

Available pluggable transceivers		Specifications						RX1400	RX1500	RX1501	RX1510	RX1511	RX1512	RX5000
Product name	Cable	100 Mbit/s	1000 Mbit/s	10000 Mbit/s	Wavelengths	Max. range	Temp.							
SFP1121-1FX2	MM	1 x LC			1310 nm	2 km	-40 - 85 °C		●	●	●	●	●	●
SFP1121-1FX2A	MM	1 x LC			1310 nm	2 km	-40 - 85 °C	●						
SFP1131-1FX20	SM	1 x LC			1310 nm	20 km	-40 - 85 °C		●	●	●	●	●	●
SFP1131-1FX50	SM	1 x LC			1310 nm	50 km	-40 - 85 °C		●	●	●	●	●	●
SFP1131-1FX90	SM	1 x LC			1550 nm	90 km	-40 - 85 °C		●	●	●	●	●	●
SFP1132-1BX10R	SM		1 x LC		1310Tx 1490Rx	10 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1BX10T	SM		1 x LC		1490Tx 1310Rx	10 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1BX40R	SM		1 x LC		1310Tx 1490Rx	40 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1BX40T	SM		1 x LC		1490Tx 1310Rx	40 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1122-1SX	MM		1 x LC		850 nm	500 m	-40 - 85 °C	●	●	●	●	●	●	●
SFP1122-1SX2	MM		1 x LC		850 nm	500 m	-40 - 85 °C		●	●	●	●	●	●
SFP1132-1LX10	SM		1 x LC		1310 nm	10 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1LX25	SM		1 x LC		1310 nm	25 m	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1LX40	SM		1 x LC		1550 nm	40 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1LX70	SM		1 x LC		1550 nm	70 km	-40 - 85 °C	●	●	●	●	●	●	●
SFP1132-1LX100	SM		1 x LC		1550 nm	100 km	0 - 70 °C	●	●	●	●	●	●	●
SFP2133-1LR10	SM			1 x LC	1550 nm	10 km	-40 - 85 °C							●
SFP2133-1ER40	SM			1 x LC	1550 nm	40 km	-40 - 85 °C							●
SFP2133-1ZR80	SM			1 x LC	1550 nm	80 km	-40 - 85 °C							●

* SM = Single-mode, MM = Multi-mode



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)

With the RUGGEDCOM Selector you can transfer the order number to the Siemens Industry Mall and order your products.

To use the RUGGEDCOM Selector for the selection and configuration of RUGGEDCOM products, visit: [siemens.com/ruggedcom-selector](https://www.siemens.com/ruggedcom-selector)

For more information on wireless approvals, visit: [siemens.com/wireless-approvals](https://www.siemens.com/wireless-approvals)



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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:
[siemens.com/industrialsecurity](https://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:
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