Решения в области кибербезопасности

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RUGGEDCOM Multi-Service Platforms include a rich array of carrier grade features designed and tested to withstand the demands of critical infrastructure environments.

Contents

Benefits and features	**3**
RUGGEDCOM technology	**4**
RUGGEDCOM RX1400	**6**
RUGGEDCOM RX1500, RX1501, RX1524, RX1536	**7**
RUGGEDCOM RX1510, RX1511, RX1512	**8**
RUGGEDCOM RX5000, MX5000	**9**
RUGGEDCOM APE1808	**10**
RUGGEDCOM RX1500, RX5000 modules	**11**
Use cases	**13**
Accessories	**15**

RUGGEDCOM Multi-Service Platforms benefits and features

Low total cost of ownership

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

Reliability

- Designed for utility-grade reliability
- Current field-demonstrated MTBF of 220 years
- Designed according to MIL-HDBK-217F reliability guidelines
- HALT analysis to enhance product robustness

Carrier-grade performance

- Layer 2 and layer 3 switching
- A rich set of WAN, serial, switching, routing, cybersecurity, 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 according to several industry standards: electric power, transportation, and MIL-STD
- Available in various form factors
- Best-in-class warranty, support, and services

IIoT platform for OT networks

- Integrate commercially available applications for cybersecurity, Edge computing, network management, etc. using the RUGGEDCOM APE1808 line module

Common features

Management	Layer 2 (switching)	Layer 3 (routing)	Security
Web UI	QoS (Quality of Service)	MPLS	Integrated firewall
HTTPS	RSTP, eRSTP, MSTP, MRP	DHCP	IPsec
SSH	SNTP	VRRPv2 and VRRPv3	VPN
RMON	L2TPv2, L2TPv3, GRE	PIM SM, PIM-SSM, IGMPv3	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, TACACS+
Serial console		IS-IS	Brute Force Attack prevention
		Virtual routing and forwarding (VRF)	Dead peer detection
		Dynamic L2TPv3	IPv6 tunneling
		DMVPN	IPv6 firewall
		R-GOOSE	
		NetFlow	

RUGGEDCOM technology

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

Rugged rated

Highly Accelerated Life Testing (HALT) is used in the early stages of product development to detect any design and performance issues. Highly Accelerated Stress Screening (HASS) is performed 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 V DC or 85 – 264 V AC
- Low voltage: 12 V DC, 24 V DC, or 48 V DC

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 in 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

The IEC 61850 standard for communications in substations is composed of ten parts, which outline 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 must operate without any physical damage, reset, or latch-up while being subjected to 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 may experience any permanent damage under EMI stress.

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

RUGGEDCOM RX1400

The RUGGEDCOM RX1400 is a multiprotocol intelligent node that 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, the RUGGEDCOM VPE1400 virtual processing engine, 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, B5, B7, B8, B12, B13, B14, B17, B20, B25, B26, B28, B29, B30, B38, B40, B41, B66, B71
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), 2 x 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 V DC/36 – 72 V DC/98 – 300 V DC/88 – 264 V AC
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, RX1524, RX1536

The RUGGEDCOM RX1500 series are cost-efficient utility-grade layer 2 and layer 3 switches and routers.

NEW

The RUGGEDCOM RX1500 family's design uses hot-swappable line modules and power supplies, allowing customers to select amongst WAN, serial, and Ethernet options even after it is installed in the network. This, coupled with a wide operating temperature range of -40 °C to +85 °C and a high level of immunity to EMI, surge voltages, and shocks, makes it ideal for electric power utilities, industrial networks, railways, and traffic control systems.

RUGGEDCOM RX1524 and RX1536 are the latest additions to the rack mount RX1500 series. They provide customers with enhanced switching and routing performance along with upgraded security features, including increased IPsec VPN throughput.

Certifications

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

Specifications	RX1500 Family	RX1500	RX1501	RX1524	RX1536
Hot-swappable modules		**4**	**6**	**4**	**6**
Connectivity	**Type**	**Maximum port density**			
Gigabit	LC, M12 (A, X-coded), RJ45, SFP	8	4	8	4
Fast Ethernet	LC, RJ45, M12 (D, A, X-coded), SFP	24	36	24	36
APE1808	RJ45, USB, Display port (Intel HD 500) and MicroSD reader	2	2	2	2
10 FL	ST – up to 2 km	12	18	12	18
Cellular	SMA (antennas), 2FF (mini-SIM), GSM, EDGE, HSPA, EVDO (network)	8	12	8	12
Serial	RJ45 (RS232, RS422, RS485)	24	36	24	36
Console and management	DB9/RJ45 console, RJ45 management, USB				
Power supply					
Number of supplies		2	1	2	1
Power supply range	9 – 15 V DC/15 – 36 V DC/36 – 72 V DC/88 – 300 V DC or 85 – 264 V AC				
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 are a compact, cost-efficient utility-grade layer 2 and layer 3 switches and routers.

The RUGGEDCOM RX1510 have an IP30 degree of protection, do not use internal fans for cooling, can withstand high levels of electromagnetic interference, and support a wide temperature range of -40 °C to +85 °C. The 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 Family	RX1510	RX1511	RX1512
Hot-swappable Modules		4	2	2
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
APE1808	RJ45, USB, DVI	2	2	0
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		

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
Hot-swappable Modules	8			
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 – 300 V DC or 85 – 264 V AC			
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)			

RUGGEDCOM APE1808

The RUGGEDCOM APE1808 is a compact yet powerful industrial application hosting platform that lets you tap into a range of in-house and third party applications in harsh environments.

Line module for the RUGGEDCOM RX1500 product family

- Microsoft Windows
- Linux

Two physically separated Gigabit Ethernet interfaces for:

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

Cloud and Edge

CloudConnect on RUGGEDCOM APE1808 is an all-in-one solution for plug-and-play connectivity to allcommon Cloud solutions, e.g., MindSphere, AWS, etc. along with the functions of data acquisition and conversion.

The APE1808 also provides a standards-based platform to deploy edge computing applications in industrial networks.

Secure remote and local access

A RUGGEDCOM CROSSBOW SAC (Station Access Controller) can be installed directly on the RUGGEDCOM RX1500 product family or on the RUGGEDCOM APE1808. The APE1808 can be ordered with CROSSBOW ADM and can soon be ordered with SAM-L (Secure Access Manager–Local) applications pre-installed.

Protocol conversion

RUGGEDCOM ELAN can be ordered pre-installed on the RUGGEDCOM RX1500 product family or on the RUGGEDCOM APE1808.

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

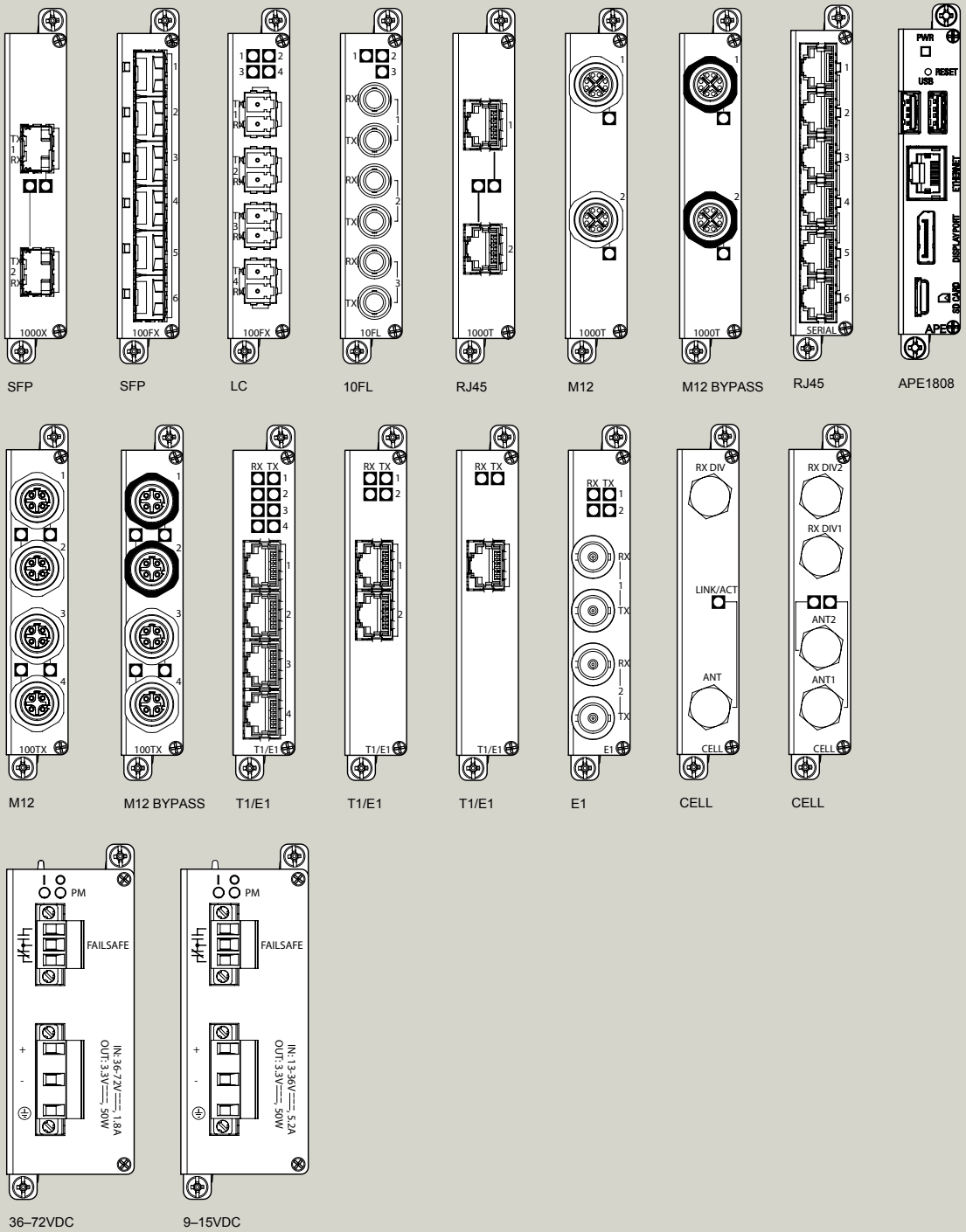
RUGGEDCOM APE1808 with Linux

The RUGGEDCOM APE1808 with Linux can be bundled with best-in-class cybersecurity solutions from our software partners and deployed in OT networks with the help of Professional Services. These include

- Physical firewalls
- Intrusion detection sensor and intrusion detection system with rules selection
- Intrusion prevention system

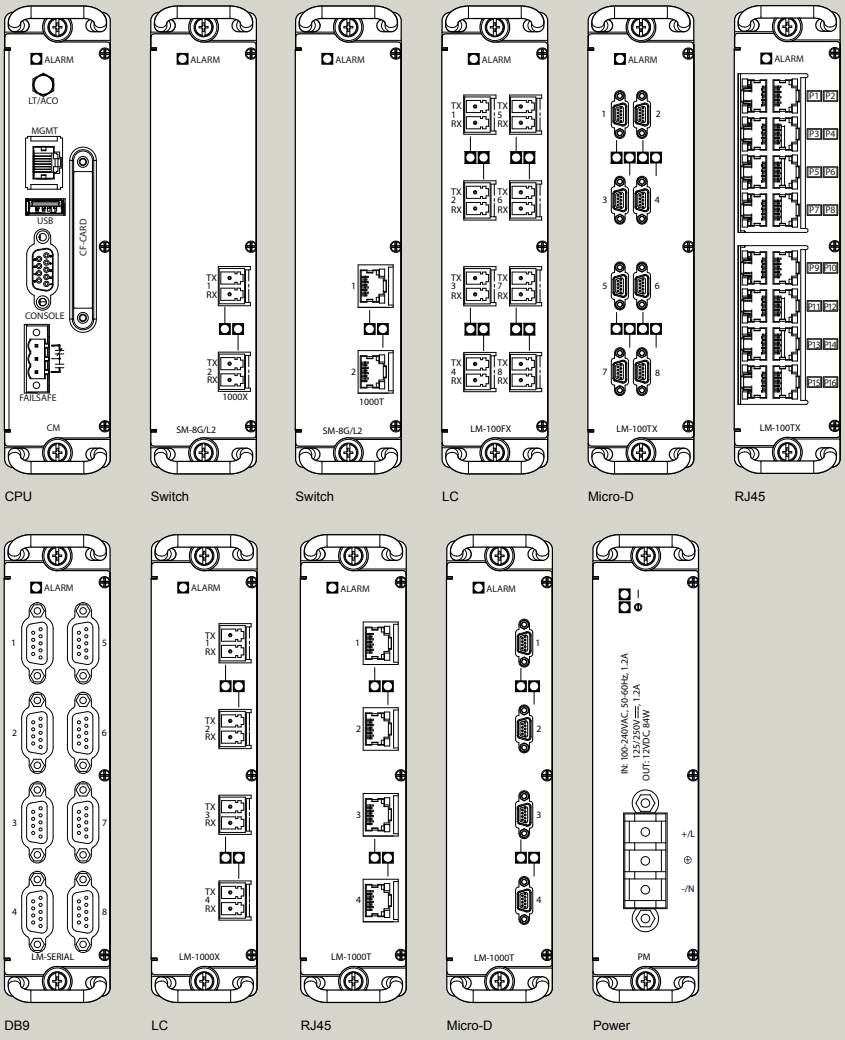
Specifications	APE1808LNX	APE1808W10
Operating system	Linux	Windows 10
Front Ethernet	Gigabit, RJ45 ports	
Backplane Ethernet	Gigabit, internal to RUGGEDCOM RX1500 series chassis	
USB ports	2 x USB 3.0	
Processor	Intel Atom x5-E3940, 4 cores, x86_64, 1.6 GHz (Burst 1.8 GHz), 2 MB L2 cache, Intel VT-x and VT-d	
Display	Intel HD 500 (Display port)	
RAM	8 GB DDR3 with ECC	
Storage	80 GB eMMC	

Hot-swappable RUGGEDCOM RX1500 series modules

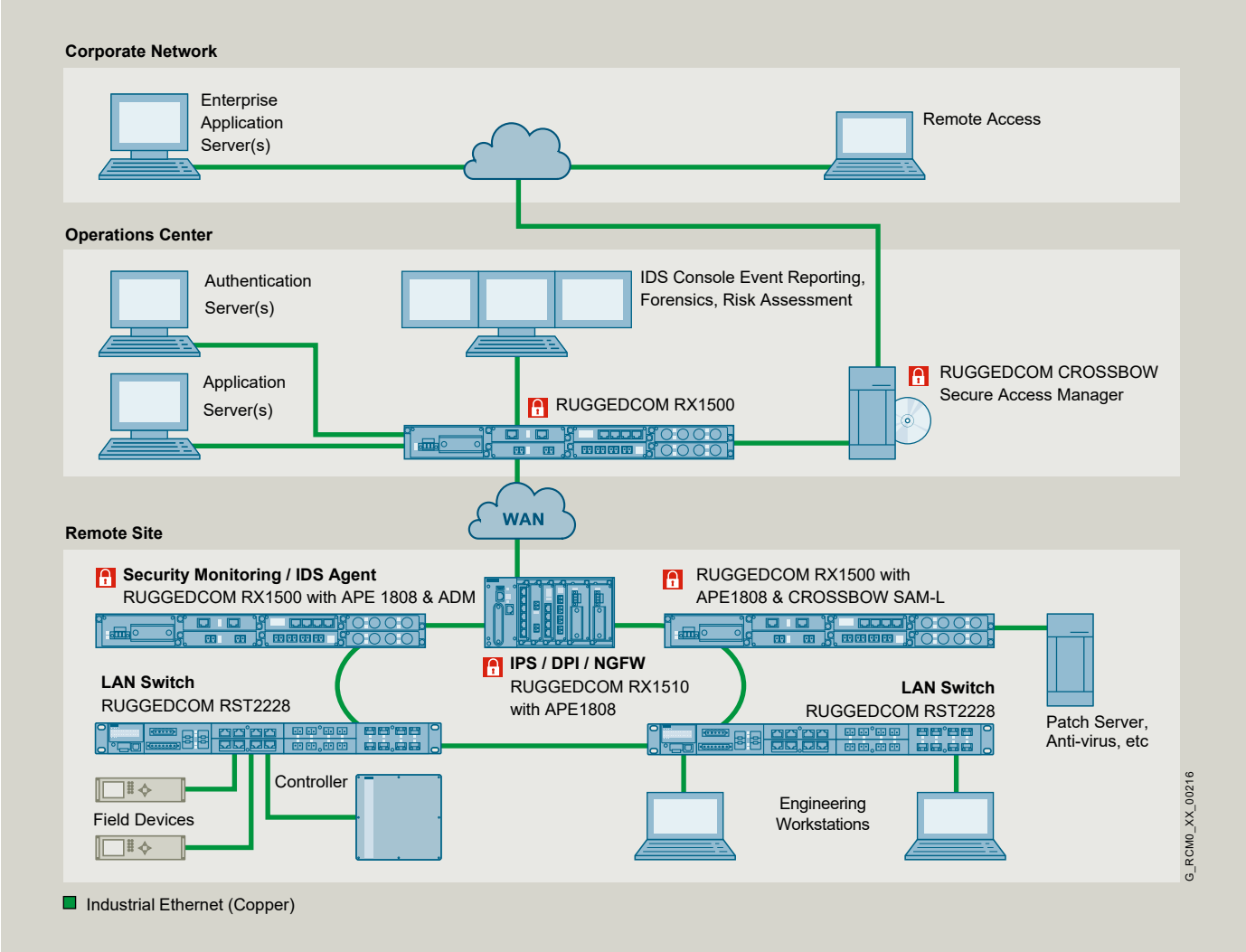


* Not compatible with RUGGEDCOM RX1524/RX1536

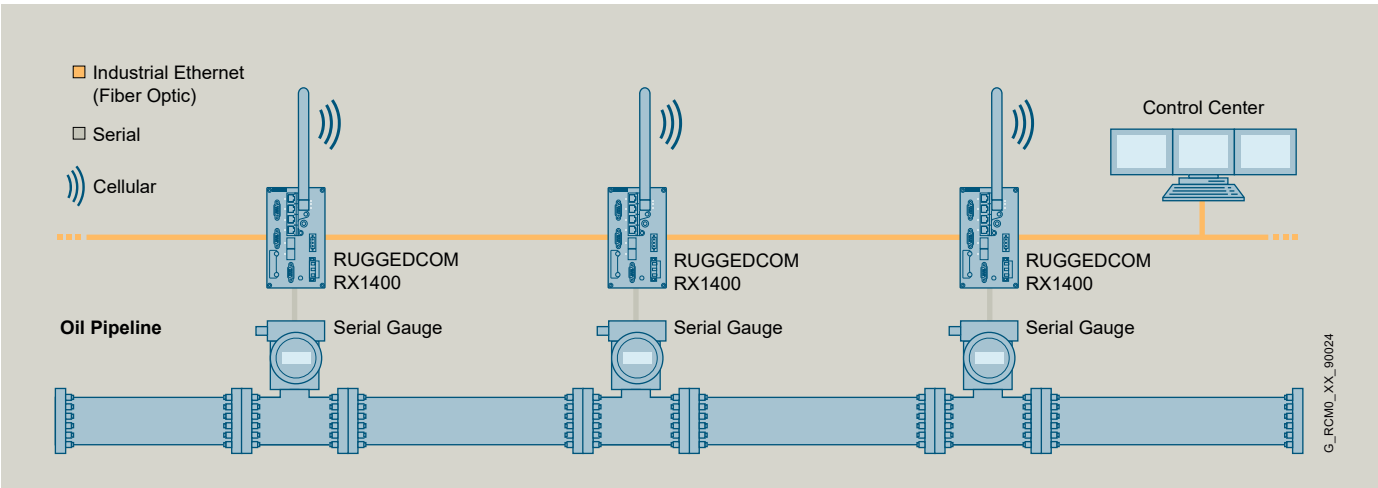
Hot-swappable RUGGEDCOM RX5000 series modules



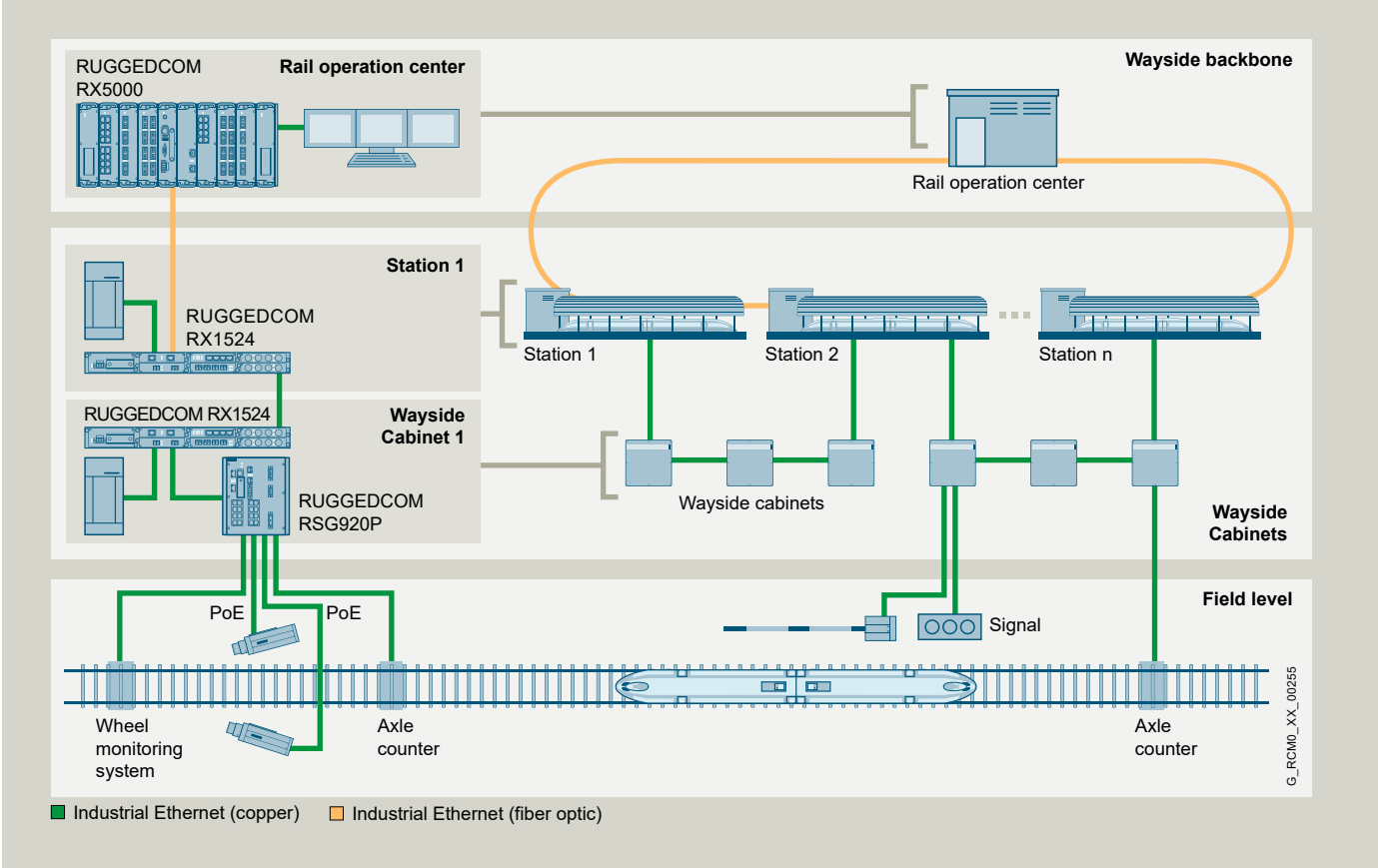
Use cases



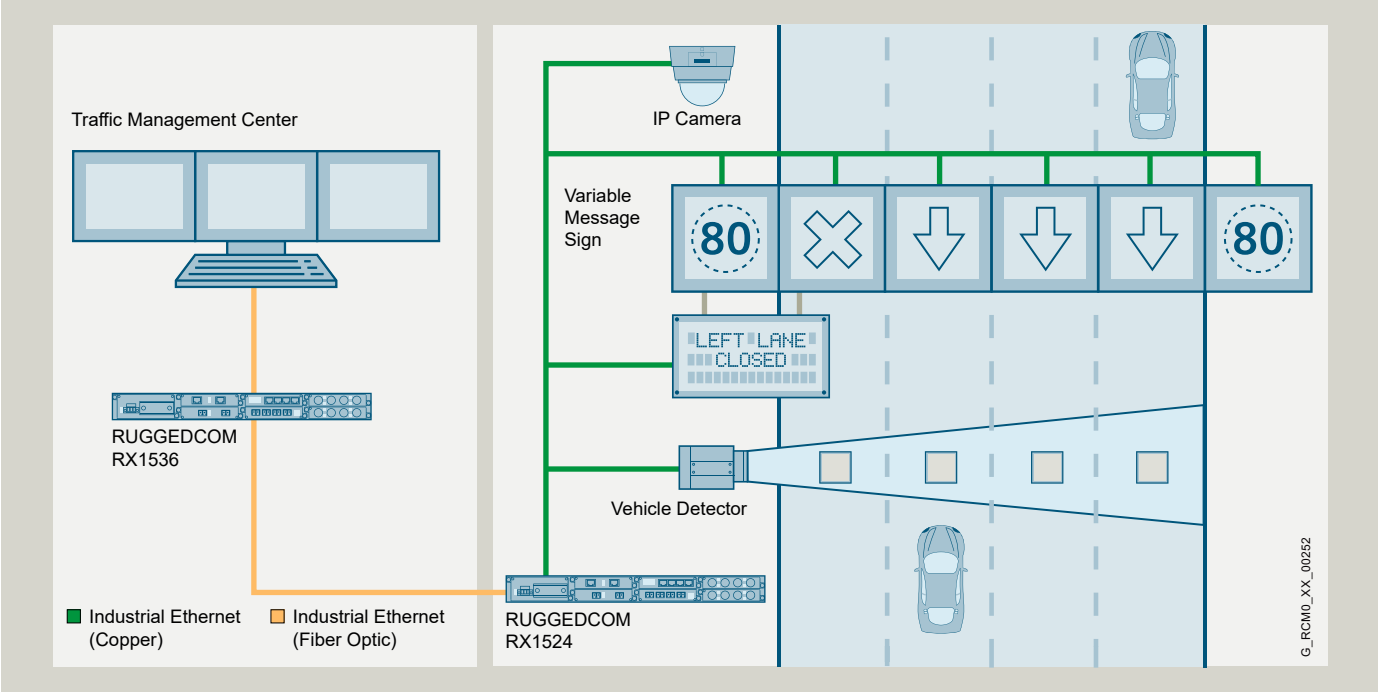
RUGGEDCOM cybersecurity solutions installed on the RUGGEDCOM Multi-Service Platform, which are designed for harsh environments and mission-critical applications.



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



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



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

Accessories

Type	Media	Distance (km)	SFP Name	Article Number	RX1400	RX1500 Family		RX5000			
						FG50	FX50/6FX50	4FG50	8FX50	SM69	SM09/SM39
Copper	RJ45	0.1	SFP1112-1	6GK6000-8CG01-0AA0	●	●		●			●
			SFP1112-1I	6GK6000-8CG02-0AA0	●	●		●			●
100 Mbps Active	MM	2	SFP1121-1FX2A	6GK6000-8FE50-0AA0	●						
	SM	10	SFP1131-1FX10A	6GK6000-8FE60-0AA0	●						
		40	SFP1131S-1FX40A	6GK6000-8FE62-0AA0	●						
100 Mbps	MM	2	SFP1121-1FX2	6GK6000-8FE51-0AA0		●	●	●	●		
	SM	20	SFP1131-1FX20	6GK6000-8FE52-0AA0		●	●	●	●		
		50	SFP1131-1FX50	6GK6000-8FE53-0AA0		●	●	●	●		
		90	SFP1131-1FX90	6GK6000-8FE54-0AA0		●	●	●	●		
1 Gbps Single-fiber Bidirectional	SM	10	SFP1132-1BX10R	6GK6000-8FB51-0AA0	●	●		●			●
			SFP1132-1BX10T	6GK6000-8FB52-0AA0	●	●		●			●
		40	SFP1132-1BX40R	6GK6000-8FB53-0AA0	●	●		●			●
			SFP1132-1BX40T	6GK6000-8FB54-0AA0	●	●		●			●
1 Gbps	MM	0.5	SFP1122-1SX	6GK6000-8FG51-0AA0	●	●		●			●
		2	SFP1122-1SX2	6GK6000-8FE58-0AA0		●		●			●
	SM	10	SFP1132-1LX10	6GK6000-8FG52-0AA0	●	●		●			●
		25	SFP1132-1LX25	6GK6000-8FG53-0AA0	●	●		●			●
		40	SFP1132-1LX40	6GK6000-8FG57-0AA0	●	●		●			●
		70	SFP1132-1LX70	6GK6000-8FG54-0AA0	●	●		●			●
		100	SFP1132-1LX100	6GK6000-8FG55-0AA0	●	●		●			●
		115	SFP1132-1LX115	6GK6000-8FE56-0AA0		●		●			●
10 Gbps	MM	0.4	SFP2123-1SR	6GK6000-8FT50-0AA0						●	
	SM	10	SFP2133-1LR10	6GK6000-8FT51-0AA0						●	
		40	SFP2133-1ER40	6GK6000-8FT53-0AA0						●	
		80	SFP2133-1ZR80	6GK6000-8FT52-0AA0						●	

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Protect your investment for the long term

Now you can order eligible RUGGEDCOM products with an extended warranty term of 10 years. Choose option T10 at the time of order.

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.

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