



The RuggedRouter® RX1100P is an industrially hardened, Power Over Ethernet (PoE) enabled, cyber security appliance with integrated router, firewall, and VPN functionality. The RuggedRouter® may be equipped with up to 4 10/100Base TX 802.3af (PoE) compliant Ethernet ports. The RX1100P can be used to establish an electronic security perimeter around critical cyber assets found in control and automation systems, in order to prevent the disruption of operations by accidental or malicious acts. Ideally suited for electric power utilities, the industrial plant floor, and traffic control system applications, the RuggedRouter® is designed to protect and secure SCADA system networks connected directly to the Internet, or within a company's private Wide Area Network (WAN) or Local Area Network (LAN).

The RX1100P includes security functions such as full IPsec Virtual Private Networking (VPN), firewall capabilities with the capacity to securely connect hundreds of remote sites across a Wide Area Network, and Intrusion Detection Services for performing real-time network traffic analysis and packet logging on IP networks. Also, when with Industrial Defender's Access Manager, the RX1100 helps electric utilities comply with NERC CIP cyber security requirements.

The modular architecture of the RX1100P allows customization of the number and types of Ethernet and WAN ports. Integrated modem and GPS time synchronization options are also available. The RX1100P is hardened to the RuggedRated™ specification which provides a high level of immunity to electromagnetic interference (EMI) and heavy electrical surges typical of many harsh environments found in many industrial applications. An operating temperature range of -40 to +85°C (-40 to +185°F) allows the RX1100P to be placed in almost any location.

Key Features and Benefits

Power Over Ethernet (PoE)

- 2 or 4 10/100BaseTx 802.3af compliant ports
- Data and power over a single Ethernet cable
- Powered from the internal 48VDC source
- No mid-span patch panel required
- Fully compatible with 802.3af powered devices
- Auto-sensing ports that provide power only to PoE end devices
- Power to port is turned off if cables are removed
- Optional 2 Port Fast Ethernet Module

Security Appliance Functions

- Integrated Router/Firewall/VPN
- Stateful Firewall with NAT
- Full IPsec Virtual Private Networking
- VPN with 3DES, AES128, AES256 support
- Intrusion Detection Services (IDS)
- Supports Access Manager NERC CIP Cyber Security compliance
- RADIUS centralized password management

RuggedRated™ for Reliability in Harsh Environments

- Immunity to EMI and high voltage electrical transients
 - Meets IEEE 1613 (electric utility substations)
 - Exceeds IEC 61850-3 (electric utility substations)
 - Exceeds IEC 61800-3 (variable speed drive systems)
 - Exceeds IEC 61000-6-2 (generic industrial environment)
 - Exceeds NEMA TS-2 (traffic control equipment)
- -40°C to +85°C operating temperature (no fans)
- Failsafe Output Relay: For critical failure or error alarming
- 18 AWG galvanized steel enclosure and 19" rack-mount adapter

Physical Ports

- Ethernet Options (up to 4 ports):
 - 10/100BaseTX, 100BaseFX
- Cellular Modem (GSM-EDGE)
- WAN Port Options (up to 8 ports):
 - T1/E1 (channelized/unchannelized)
 - supports 2Mbps G.703 with 120 ohm balanced connections
 - PPPoE/Bridged Ethernet via ADSL
 - T3 DS3
 - 56 Kbps DDS
- Serial Ports (up to 8 ports):
 - Fully compliant EIA/TIA RS485, RS422, RS232 serial ports (software selectable) – RJ45 connectors
 - Raw socket mode support allows conversion of any serial protocol
- Embedded Modem Port
- Precision Time Protocol (PTP): Accurate time synchronization with using NTP, IRIG-B, and/or IEEE1588

Protocols

- WAN
 - Frame Relay RFC 1490 or RFC 1294
 - PPP RFC 1661, 1332, 1321, 1334, PAP, CHAP Authentication
 - PPPoE over DSL
 - GOOSE messaging support
- IP
 - Routing: VRRP, OSPF, RIP, BGP
 - DHCP Agent (Option 82 Capable)
 - Traffic prioritization, NTP Server, IP Multicast Routing

Universal Power Supply Options

- Fully integrated power supplies (no external adaptors)
- Input voltage range of 9-59VDC, 88-300VDC, and 85-264VAC for worldwide operability
- PoE power supply: 48VDC
- CSA/UL 60950 safety approved to +85°C



RuggedRouter® RX1100P

Multiple Ethernet Ports:

- ▶ Up to 4 100 Mbps ports
- ▶ Fiber or Copper
- ▶ LC, ST, MTRJ, SC

Power Over Ethernet

- ▶ Up to 4 10/100 Base Tx Ports
- ▶ 802.3af Compliant Ports
- ▶ Auto-Sensing

Multiple WAN Ports:

- ▶ Up to 8 T1/E1
- ▶ Dual DSL
- ▶ Dual DDS 56kbps
- ▶ T3 DS3

Modular HMI

- ▶ Front or Rear Mount

Cell Modem (Optional);

- ▶ GSM- EDGE



Precision Time Protocol (Optional):

- ▶ Built-in GPS, Antenna Input
- ▶ NTP Server and Client
- ▶ IRIG-B (user selectable)
- ▶ IEEE 1588 master or slave port
- ▶ see separate PTP card datasheet

V.90 Modem (Optional);

- ▶ 56kbps or

RS232 External Modem Interface (Optional)

Serial Ports

- ▶ 4 or 8 ports
- ▶ Software Selectable RS232/RS422/RS485
- ▶ RJ45 connector

Mounting Options

- ▶ Panel/Din rail
- ▶ 19" Rack Mount

Enclosure:

- ▶ IP40
- ▶ 18 AWG Galvanized Steel

Operating Temperature

- ▶ -40°C to +85°C
- ▶ No Fans



Integrated Power Supply:

- ▶ 24VDC (9-36VDC), 48VDC (36-59VDC), or HI (88-300VDC/85-264VAC) power supply options
- ▶ Separate 48 VDC PoE Power Supply

EMI Immunity

- ▶ Meets IEEE 1613 (electric utility substations)
- ▶ Exceeds IEC 61850-3 (electric utility substations)
- ▶ Exceeds IEC 61800-3 (variable speed drive systems)
- ▶ Exceeds IEC 61000-6-2 (generic industrial environment)
- ▶ Exceeds NEMA TS-2 (traffic control equipment)

Router Software Features

Rugged Operating System™
on Linux

Frame Relay Central Site Concentration

RuggedRouter® Frame Relay provides the ability to inexpensively network a large number of widely separated remote sites via a Frame Relay network provider. A number of remote sites are established, using physical interfaces such as 56Kbps DDS, Fractional or full T1, and in some cases broadband DSL. Remote sites may be fully meshed, but typically connect only to a central site. The central site typically employs one or more T1 connections and routes data between remote sites if required. Data link connections are configured to carry traffic from the remote sites to the central site. The maximum traffic rate and traffic bursting characteristics can be programmed individually for each connection. The connection can then be treated as a routed IP link. Traffic shaping policies (see below) can then be applied to the link.

PPP Networking

Certain remote sites may be located “off” of the Frame Relay network or may be infrequently used. RuggedRouter® supports the ability to allocate a portion of the central site channelized T1 line for connection to these remote sites. The T1 link can then simultaneously support IP over Frame Relay connections to the Frame network and PPP connections to off-net devices. PPP can be employed on the embedded modem, over unchannelized T1 lines or as PPPoE using the broadband DSL card.

Virtual Private Networking

Virtual private networking provides the ability treat your remote sites as if they are part of a secure private network, by creating secure tunnels through untrusted networks. All traffic on those tunnels is encrypted. The RuggedRouter® allows you establish a tunnel to each of your remote sites with strong authentication and encryption. Tunnels may be constructed to the site as a whole, to specific hosts on specific ports at the remote site or passed through to the hosts.

Firewalls

Firewalls restrict traffic between specific hosts using specific services. RuggedCom provides easy to configure, robust firewalls that operate in conjunction with VPN. Network Address Translation (NAT), Port Forwarding and message logging are only some of the features provided by the firewall.

Cellular Modem Support

Fixed telephone line infrastructure is not always available. The RuggedRouter® can be equipped with a cellular modem allowing you to cost effectively connect to your remote sites; anywhere there is cell coverage. There are a number of options available including GSM/EDGE, EV-DO Rev A (for CDMA networks) and HSPA.

Traffic Prioritization

Traffic shaping is the ability to prioritize the transmission of data over a network link. Traffic prioritization is used to optimize or guarantee performance, low-latency, and/or bandwidth. The RuggedRouter® can prioritize based on wide number of criteria, including: type of protocol, TOS fields in received packets, IP address and port numbers.

VRRP (Virtual Router Redundancy Protocol)

VRRP is an Internet protocol that provides a way to have one or more backup routers when using a statically configured router on a local area network (LAN). Using VRRP, a virtual IP address can be specified as a default. A virtual IP address is shared among the routers, with one designated as the master router and the others as backups. In case the master fails, the virtual IP address is mapped to a backup router's IP address. (This backup becomes the master router.) The MAC address of the Virtual IP address is also not changed, but is moved from the malfunctioning master router to the backup master, making sure that Mac Address tables are kept current and unchanged.

OSPF (Open Shortest Path First)

OSPF is a routing protocol that determines the best path for routing IP traffic over a TCP/IP network based on link states between nodes and several quality parameters. OSPF is an interior gateway protocol (IGP), which is designed to work within an autonomous system. It is also a link state protocol, meaning that the best route is determined by the type and speed of the inter-router links, not by how many router hops they are away from each other (as in Distance-Vector routing protocols, i.e. RIP and RIP II).

PPP Networking Extended (Point-to-Point Protocol)

The most popular method for transporting IP packets over a serial link between the user and the ISP. Developed in 1994 by the IETF and superseding the SLIP protocol, PPP establishes the session between the user's computer and the ISP using its own Link Control Protocol (LCP). PPP supports PAP and CHAP authentication, as well as EAP, which is a conduit for numerous other authentication methods. PPP can run on any full-duplex link from POTS to ISDN to T1, etc. On dial-up connections, PPP can hang up a low-quality call and redial.

Using Multilink PPP (MPPP), two modems and phone lines can be bonded together to increase speed. PPP encapsulates high-level protocol packets in HDLC-based frames; for example, IP over PPP (IPCP) for the Internet and IPX over PPP (IPXCP) for NetWare networks, and it can multiplex different protocols over the same circuit. PPP also supports Ethernet frames for DSL and cable modem hookups (PPPoE).

Router Software Features

Rugged Operating System™
on Linux

Link Backup

Link backup provides an easily configured means of raising a backup link upon the failure of a designated main link. The main and backup links can be Ethernet, CDMA or Dial Modem, TE1, DDS, ADSL or T3. The feature can back up to multiple remote locations, managing multiple main:backup link relationships. When the backup link is a modem, many “profiles” of dialed numbers can exist (each serving as a distinct backup link). The feature can also back up a permanent high speed WAN link to a permanent low speed WAN link and can be used to migrate the default route from the main to the backup link.

Precision Time Protocol (PTP) Card

The PTP card features a GPS receiver, IRIG-B output ports and an additional 10/100BaseTX port. With the addition of this card the router can synchronize via Network Time Protocol (NTP) and IRIG-B to a stratum 0 clock source. NTP allows Intelligent Electronic Devices (IED) and Remote Terminal Units (RTU) to obtain accurate time information. The IRIG-B protocol allows IEDs and RTUs to obtain nanosecond accuracy via TTL Pulse Width Modulation (PWM) and Pulse Per Second (PPS) ports and a 12VPP Amplitude Modulation (AM) port. IEEE 1588 synchronization protocol is offered on the added 10/100BaseTX port. (see PTP card datasheet for more information.)

Serial IP Encapsulation

Many ‘legacy’ devices (RTU, PLC, IED, etc.) only support serial communications via RS232, RS422 or RS485. ROX™ encapsulates the serial data within a TCP connection allowing these devices to be reached via an IP network. A wide range of baud rates, frame packetization options, and diagnostics are available and the raw socket support allows conversion of any serial protocol.

HTML Web-Browser and SSH

ROX™ provides a simple, intuitive user interface for configuration and monitoring via a standard graphical web browser or via SSH. All system parameters include detailed on-line help to make setup a breeze. ROX™, presents a common look and feel and standardized configuration process allowing easy migration to other RuggedCom managed products.

SNMP (Simple Network Management Protocol)

SNMP provides a standardized method for network management stations the ability to interrogate devices from different vendors. SNMP versions supported by ROX™ are v1, v2c, and v3. SNMPv3 in particular provides security features (such as authentication, privacy, and access control) not present in earlier SNMP versions. ROX™ also supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS). A feature of SNMP supported by ROX™ is the ability to generate “traps” upon system events. A NMS can record traps from multiple devices providing a powerful network troubleshooting tool.

Port Configuration and Status

ROX™ allows individual ports to be ‘hard’ configured for speed, duplex, auto-negotiation, flow control and more. This allows proper connection with devices that do not negotiate or have unusual settings. Detailed status of ports with alarm and SNMP trap on link problems aid greatly in system troubleshooting.

Event Logging and Alarms

ROX™ records all significant events to a non-volatile system log allowing forensic troubleshooting. Events include link failure and recovery, unauthorized access, broadcast storm detection, and self-test diagnostics among others. Alarms provide a snapshot of recent events that have yet to be acknowledged by the network administrator. An external hardware relay is de-energized during the presence of critical alarms allowing an external controller to react if desired.

GOOSE Tunnels

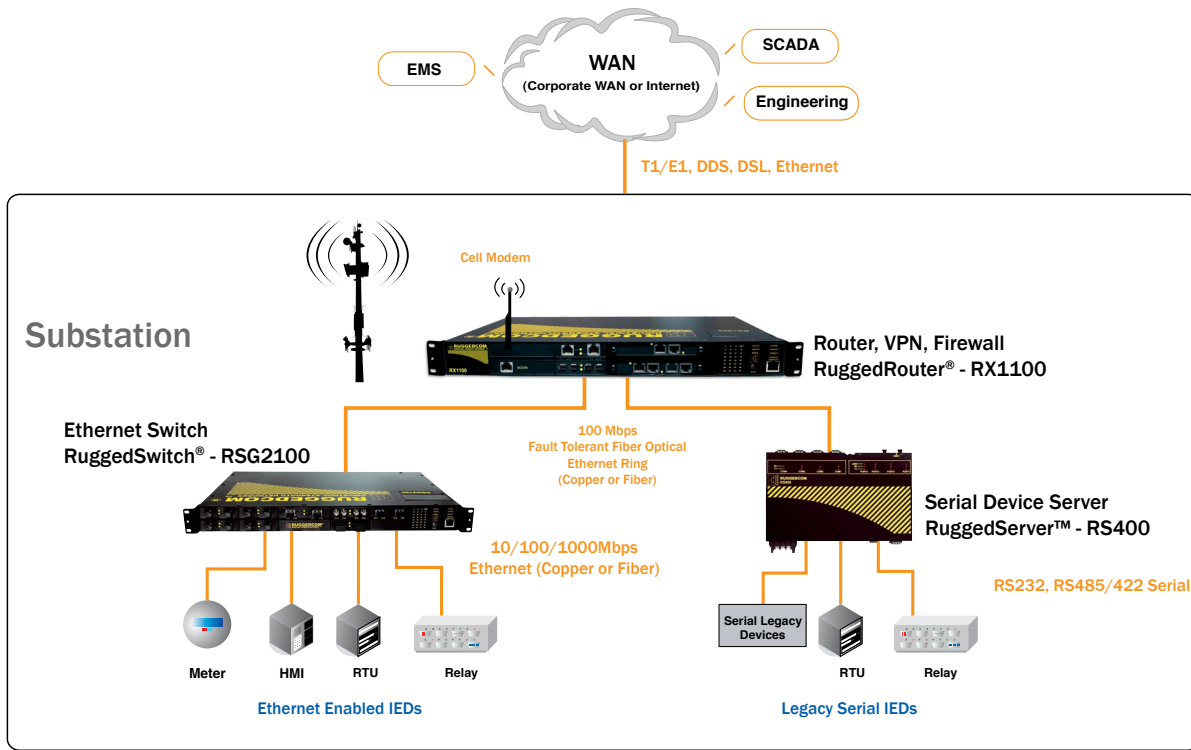
IEC61850 is an international standard for substation automation. One feature of IEC61850 is the Generic Object Oriented Substation Event (GOOSE) protocol that facilitates the fast transfer of events. IEC61850 uses Layer 2 multicast frames to distribute its messages and hence, is incapable of operating outside of a switched Ethernet Network. The GOOSE tunnel feature provides a capability to bridge GOOSE frames over a wide area network (WAN).

RADIUS Authentication

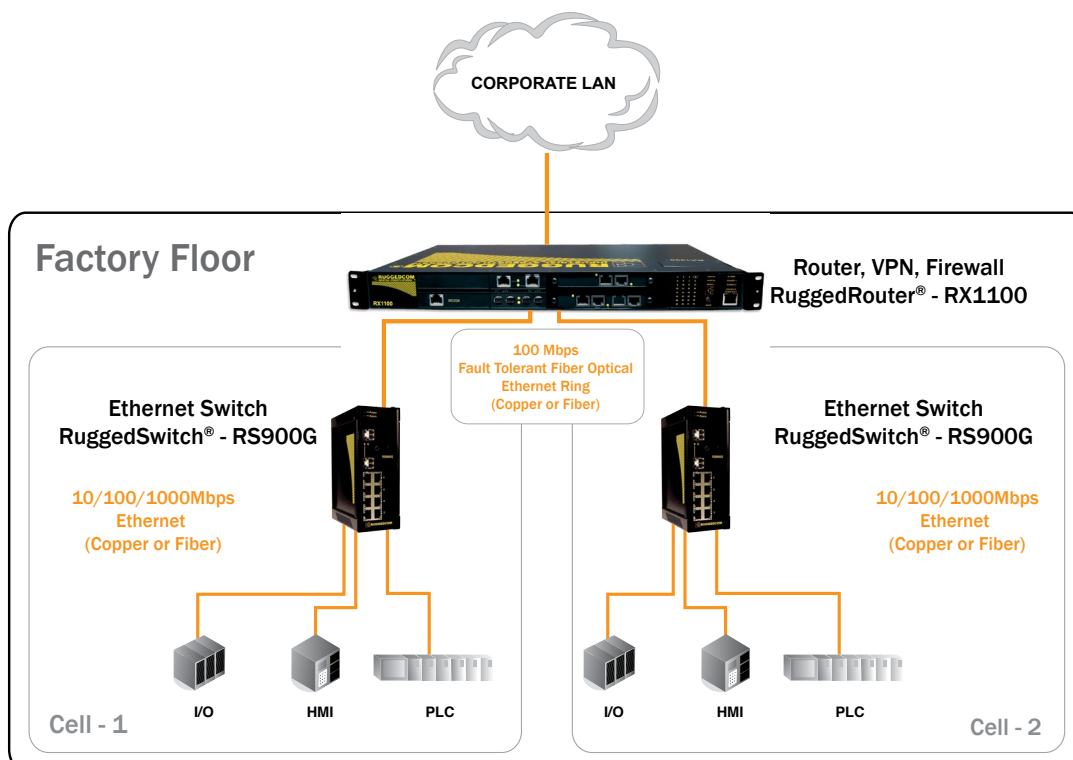
The RADIUS protocol provides a means for carrying authentication, authorization, and configuration information between a client (the router) which desires to authenticate its links and a shared Authentication Server. Transactions between the router and RADIUS server are authenticated through the use of a shared secret, which is never sent over the network. In addition, any user passwords are sent encrypted between the router and RADIUS server, to eliminate the possibility that someone snooping on an insecure network could determine a user's password.

Application Examples

Electric Utility Substation



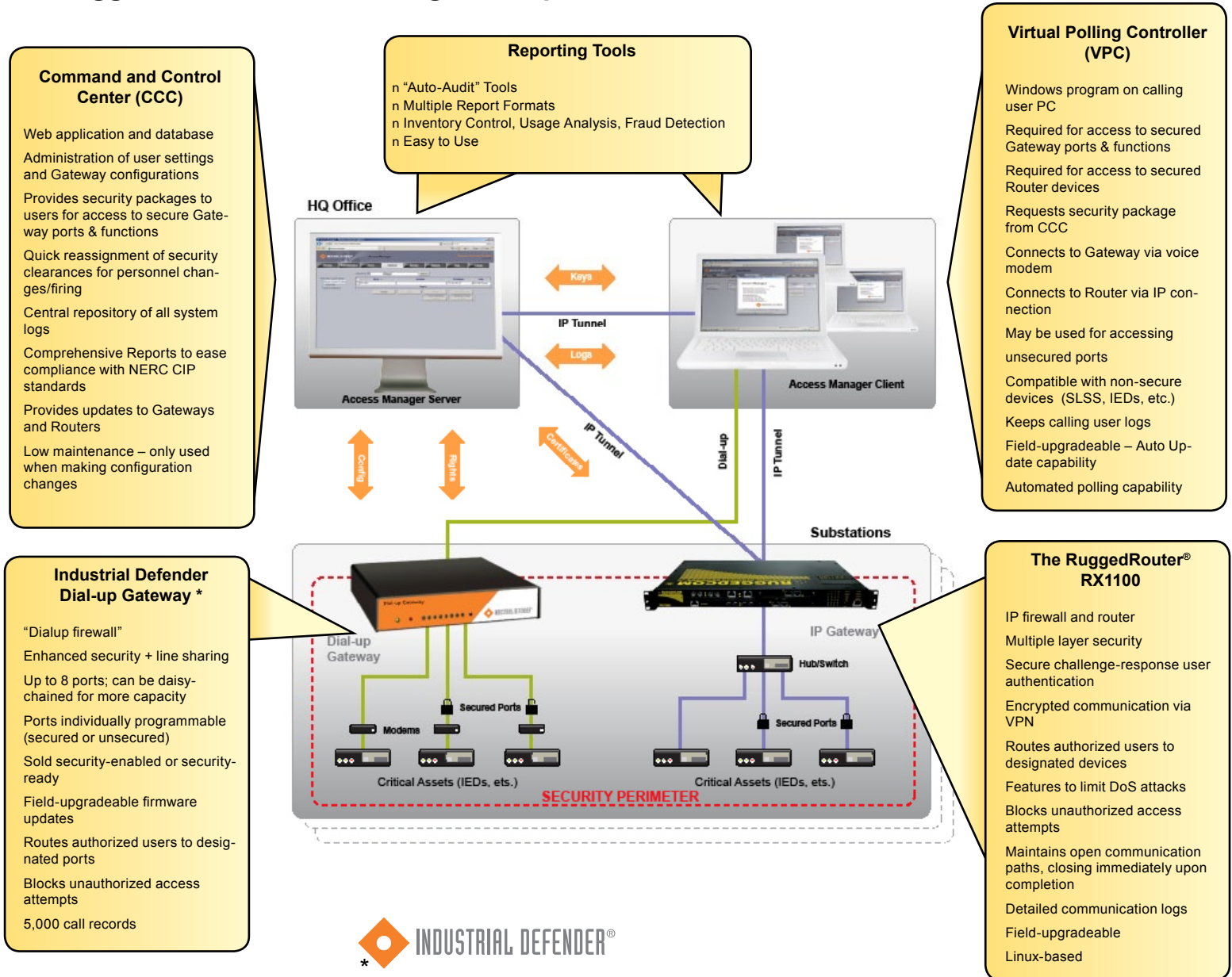
Industrial Plant Floor



RuggedCom NERC-CIP Cyber Security Solution - Industrial Defender's Access Manager with RuggedRouter RX1100

For utilities that access their substation devices via IP, use the RuggedRouter® with Access Manager 4.0, a 100% NERC-CIP compliant solution that provides an electronic security perimeter for effective cyber attack protection. All communication to substation devices are authenticated, controlled, and logged to prevent and detect unauthorized entry attempts. Also included are extensive reporting tools and the unique "Auto-Audit" feature that provides an easy "one-click" function that compiles all NERC-CIP required documents into a single report.

RuggedCom / Access Manager Component Overview



The Dial-up Gateway is available through Industrial Defender (www.IndustrialDefender.com) and is compatible with the RuggedCom Gauntlet solution. Use the Dial-up gateway to provide back-up dial in access to the substation. Industrial Defender is a strategic partner of RuggedCom in providing complete NERC CIP Cyber Security solutions.

RuggedCom RX1000 NERC-CIP Compliance Table When used with Access Manager

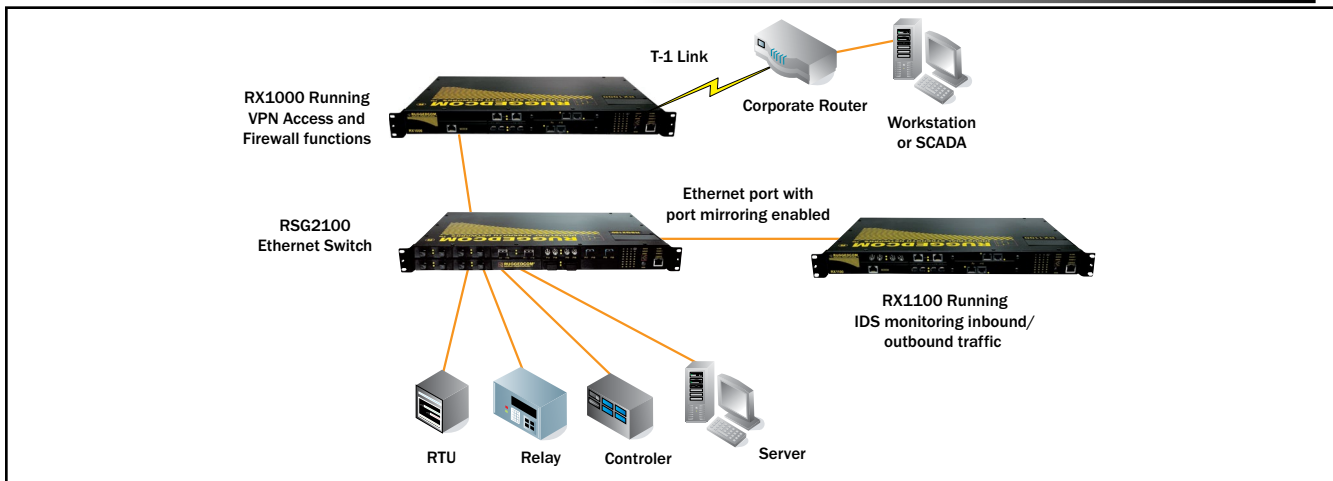
NERC CIP Category	Standard #	Feature
User Access and Passwords	CIP-004-1: R4, 4.1, 4.2 CIP-005-1: R2.1, R2.4 CIP-007-1: R5, 5.1, 5.2, 5.3	<ul style="list-style-type: none"> n Individual user accounts and passwords n Required strong passwords, one-time use passwords, expiring passwords, etc. n Digital security packages n Strong Two-factor authentication
Access Control Management	CIP-003-1: R5, 5.1, 5.1.1 CIP-005-1: R2.1, R2.4	<ul style="list-style-type: none"> n Centralized administration n Individual administration accounts and passwords n Comprehensive reports: lists of users, assets, access points, etc.
Electronic Security Perimeter	CIP-005-1: R1, 1.1 – 1.6 R2, 2.1 – 2.6 R3, 3.1 – 3.2 CIP-007-1: R2, 2.1 – 2.2	<ul style="list-style-type: none"> n Secure Access Points (Gauntlet Gateway and RX1100) n Access denied by default n Technical Control Methods (2-factor authentication, etc.) n Electronic access monitoring and logging n Appropriate use banners
Network / Routing Security	CIP-005-1: R2, 2.1, 2.2, 2.4 CIP-007-1: R2, 2.1 – 2.3	<ul style="list-style-type: none"> n Enable/Disable Ethernet Ports / Services n Firewall / VPN n IP Access Control n 802.1x Port Security / 802.1Q VLAN n Intrusion Detection System
Dial-up Security*	CIP-005-1: R1.2, R2.3, R3.1	<ul style="list-style-type: none"> n Secure dial-up modem access control, monitoring and logging
Logs, Reports and Audit Resources	CIP-003-1: R5, 5.1, 5.1.1, R6 CIP-004-1: R4, 4.1 CIP-005-1: R1, 1.6, R2, 2.5, R3, R5 CIP-007-1: R3.1, R5.1.2, R6, R9 CIP-008-1: R2	<ul style="list-style-type: none"> n Comprehensive reports n Searchable database n Detailed access logs with user, port and connection information n User, Administrator and Asset and Access Point lists n NERC CIP Auto Audit report n Cyber incident reports
Employee termination / User rights revocation	CIP-004: R4, 4.1, 4.2	<ul style="list-style-type: none"> n Account / security credential expiration n Administrator initiated user rights revocation n Suspended user accounts
Alerts and Notifications	CIP-005: R3.2 CIP-007: R6.2	<ul style="list-style-type: none"> n Configurable system alert email messages n Unauthorized access attempt notification n System lockout / system error notification
Security Patch Management	CIP-007: R3, 3.1	<ul style="list-style-type: none"> n Published Security Patch scrubs n Remote upgrades and auto-update
Malicious Software Prevention	CIP-007-1: R4, 4.1 – 4.2	<ul style="list-style-type: none"> n IDS system (future)

* Note: This feature only applies to the Gauntlet Dial-up Gateway

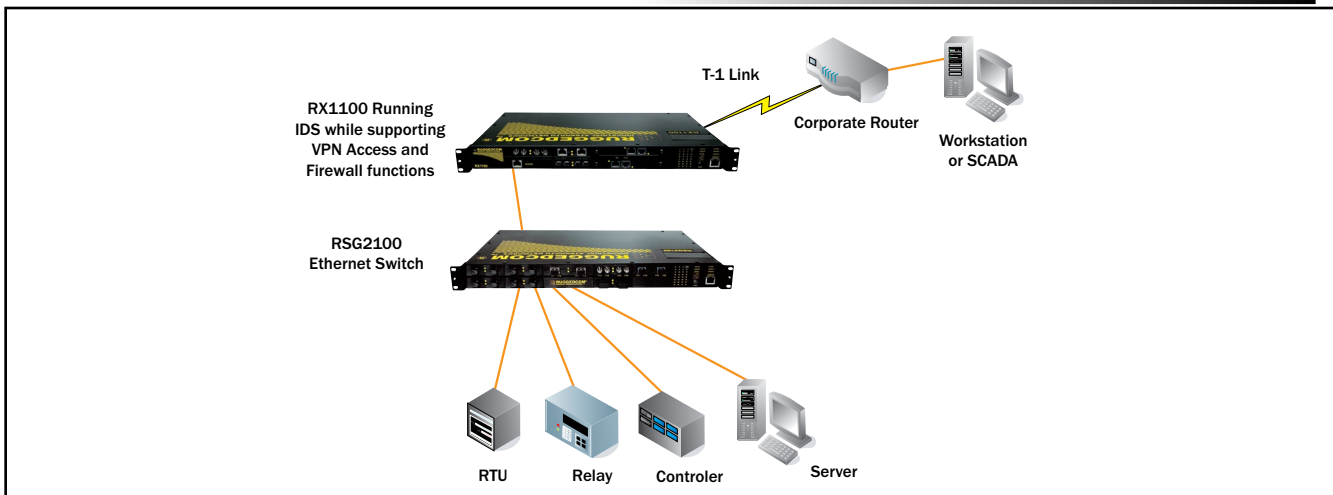
Intrusion Detection Services (IDS)

Architecture Examples

Dedicated Monitoring



Combined Functionality



EMI and Environmental Type Tests

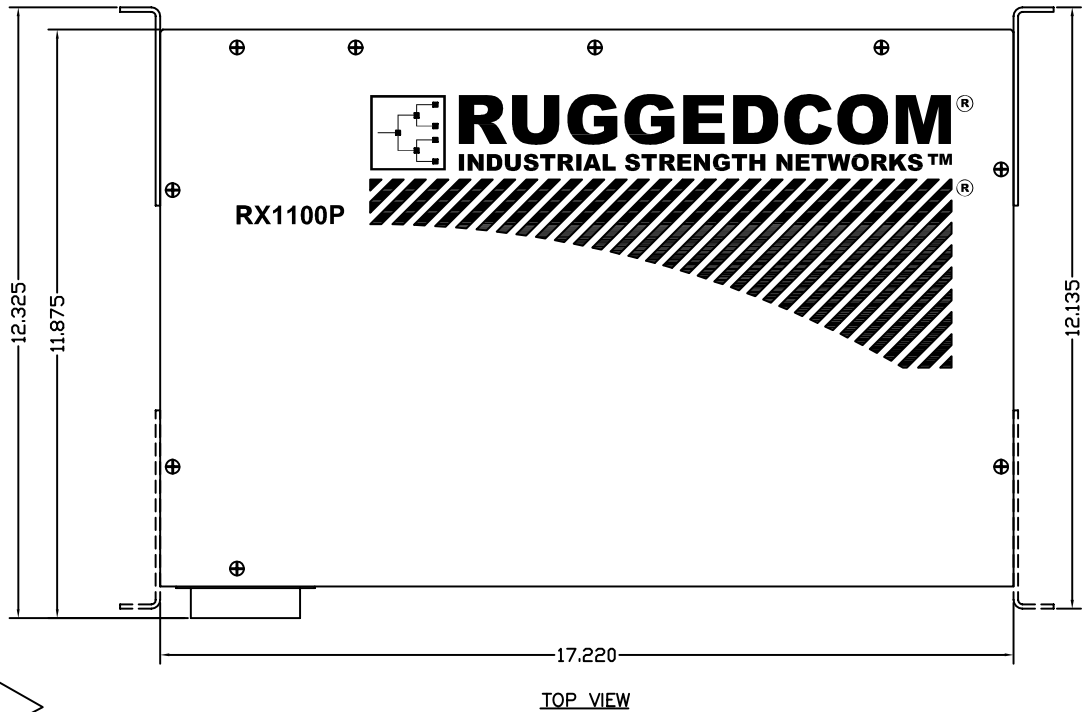
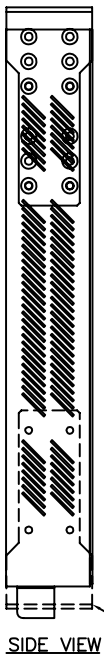
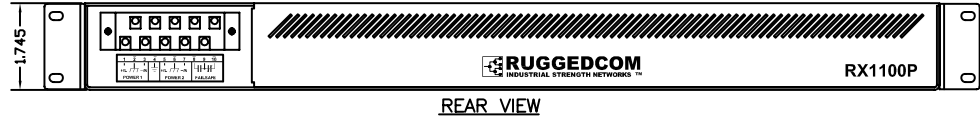
IEC 61850-3 EMI TYPE TESTS				
TEST	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8kV	4
		Enclosure Air	+/- 15kV	4
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	x
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4kV @ 2.5kHz	x
		D.C. Power ports	+/- 4kV	4
		A.C. Power ports	+/- 4kV	4
		Earth ground ports ³	+/- 4kV	4
IEC 61000-4-5	Surge	Signal ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
		D.C. Power ports	+/- 2kV line-to-earth, +/- 1kV line-to-line	3
		A.C. Power ports	+/- 4kV line-to-earth, +/- 2kV line-to-line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal ports	10V	3
		D.C Power ports	10V	3
		A.C. Power ports	10V	3
		Earth ground ports ³	10V	3
IEC 61000-4-8	Magnetic Field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	N/A
IEC 61000-4-29	Voltage Dips & Interrupts	D.C. Power ports	30% for 0.1s, 60% for 0.1s, 100% for 0.05s	N/A
IEC 61000-4-11		A.C. Power ports	30% for 1 period, 60% for 50 periods 100% for 5 periods, 100% for 50 periods ²	N/A
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5kV common, 1kV diff. mode@1MHz	3
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	3
IEC 61000-4-16	Mains Frequency Voltage	Signal ports	30V Continuous, 300V for 1s	4
		D.C. Power ports	30V Continuous, 300V for 1s	4
IEC 61000-4-17	Ripple on D.C. Power Supply	D.C. Power ports	10%	3
IEC 60255-5	Dielectric Strength	Signal ports	2kVac (Fail-Safe Relay output)	N/A
		D.C. Power ports	2kVac	N/A
		A.C. Power ports	2kVac	N/A
IEC 60255-5	H.V. Impulse	Signal ports	5kV (Fail-Safe Relay output)	N/A
		D.C. Power ports	5kV	N/A
		A.C. Power ports	5kV	N/A

IEEE 1613 (C37.90.x) EMI IMMUNITY TYPE TESTS				
Test	Description		Test Levels	Severity Levels
IEEE C37.90.3	ESD	Enclosure Contact	+/- 8kV	N/A
		Enclosure Air	+/- 15kV	N/A
IEEE C37.90.2	Radiated RFI	Enclosure ports	35 V/m	N/A
IEEE C37.90.1	Fast Transient	Signal ports	+/- 4kV @ 2.5kHz	N/A
		D.C. Power ports	+/- 4kV	N/A
		A.C. Power ports	+/- 4kV	N/A
		Earth ground ports ³	+/- 4kV	N/A
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode @1MHz	N/A
		D.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
		A.C. Power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
IEEE C37.90	H.V. Impulse	Signal ports	5kV (Fail-Safe Relay output)	N/A
		D.C. Power ports	5kV	N/A
		A.C. Power ports	5kV	N/A
IEEE C37.90	Dielectric Strength	Signal ports	2kVac	N/A
		D.C. Power ports	2kVac	N/A
		A.C. Power ports	2kVac	N/A

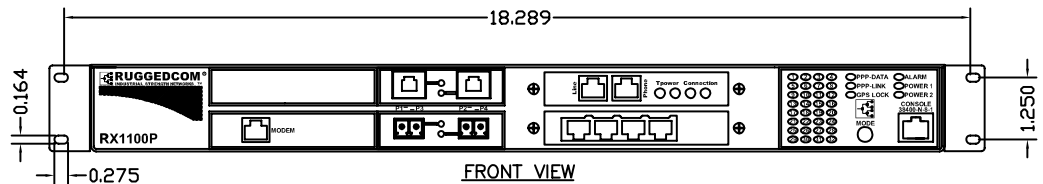
Environmental Type Tests				
Test	Description		Test Levels	Severity Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40°C, 16 Hours	N/A
IEC 60068-2-2	Dry Heat	Test Bd	+85°C, 16 Hours	N/A
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55°C , 6 cycles	N/A
IEC 60255-21-1	Vibration	Tests Fc	2g @ (10 - 150) Hz	Class 2
IEC 60255-21-2	Shock	Tests Ea	30g @ 11mS	Class 2

Notes: 1. Only applicable to functional earth connections separated from the safety earth connection.
 2. Class 2 refers to "Measuring relays and protection equipment for which a very high security margin is required or where the vibration levels are very high, (e.g. shipboard application and for severe transportation conditions)"

Mechanical Drawing

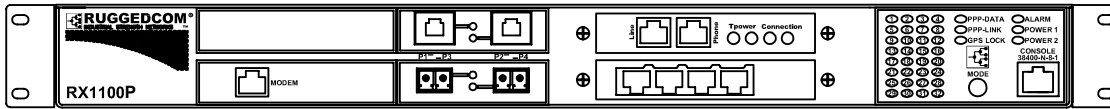


RACK MOUNT BRACKETS
FRONT OR REAR. BRACKETS CAN
ALSO BE MOVED BACK UP TO ONE INCH.



Mounting Options

19" Rack Front Mount - (Connectors At Front)



FRONT VIEW

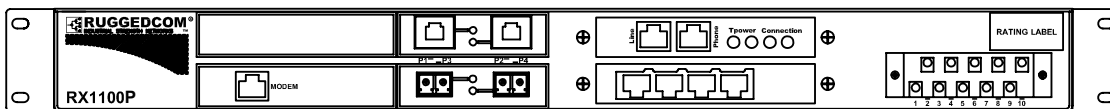


REAR VIEW

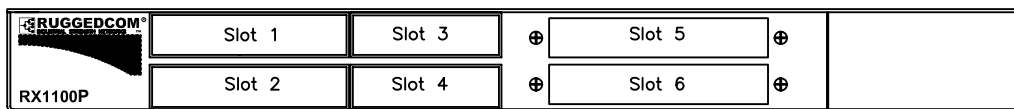
19" Rack Rear Mount - (Connectors At Rear)



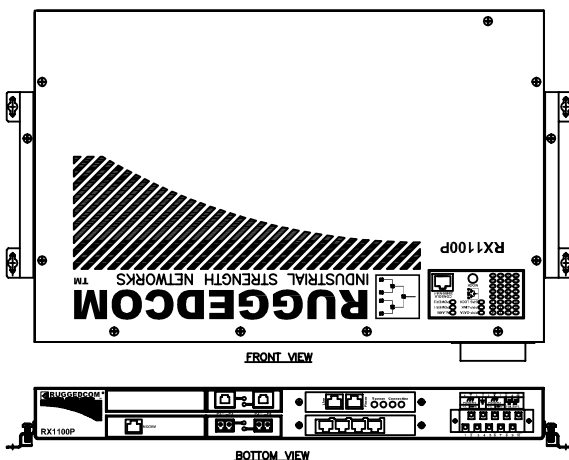
FRONT VIEW



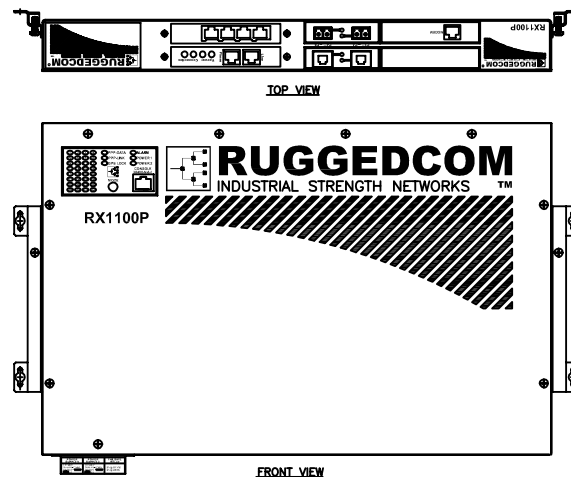
REAR VIEW



Panel/DIN Rail Bottom Mount – (Connectors At Bottom)



Panel/DIN Rail Top Mount – (Connectors At Top)



Technical Specifications

Power Supply

- Power Consumption: 25W (max)
- 24VDC: 9-36VDC (max)
- 48VDC: 36-59VDC (max)
- HI Voltage AC/DC: 88-300VDC, 85-264VAC (max)
- PoE Power Supply - 48 VDC: 36-59VDC 0.6A

Critical Alarm Relay

- Form-C failsafe contact relay: 1A@30VDC

Physical

- Height: 1.74"
- Width: 17.2"
- Depth: 11.9"
- Weight: 10lbs (4.5 Kg)
- Ingress Protection: IP40 (1mm objects)
- Enclosure: 18 AWG galvanized steel enclosure
- Mounting: Panel/DIN Rail mount or 19 inch Rack Mount

Approvals

- ISO: Manufactured in an ISO9001 facility
- cCSAus: CSA C22.2 No. 60950, UL 60950 (pending)
- CE Marking (pending)
- Emissions: FCC Part 15, Class A (pending)
- Complies with 21 CFR Chapter 1, Subchapter J. (pending)
- NEMA TS-2 (pending)

Warranty

- 5 Years-Applicable to design or manufacturing related product defects.

Network Management

- HTTP graphical web-based
- SNMP v2/v3
- Command Line Interface (Console and Remotely via SSH)
- Quick setup facility

EMI Immunity and Environmental Compliance

- IEC 61000-6-2 Industrial (Generic)
- IEC 61800-3 Industrial (Variable Speed Drive Systems)
- IEC 61850-3 Electric Utility Substations
- IEEE 1613 Electric Utility Substations
- NEMA TS-2 Traffic Control Equipment (pending)

IEEE Compliance

- 802.3-10BaseT
- 802.3u-100BaseTX, 100BaseFX

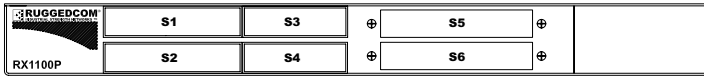
IETF RFC Compliance

- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC783-TFTP
- RFC826-ARP
- RFC768-UDP
- RFC854-Telnet
- RFC1490-Frame Relay

- RFC1294-Frame Relay
- RFC1661-PPP
- RFC1332-PPP (IPCP)
- RFC1321-PPP (MD5)
- RFC1334-PPP Authentication
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC1305-NTP
- RFC2068-HTTP
- RFC2338-VRRP
- RFC2475-Differentiated Services

RX1100P - _____ - _____ - _____ - _____ - _____ - _____ - _____ - _____ - _____ - _____
 Main Mount PS1 PS2 S1 S2 S3 S4 S5 S6

Order Codes



Main: Ethernet and Power Connectors

- R = Ethernet on rear; LED panel on front; power connector on rear
- F = Ethernet on front; LED panel on front; power connector on rear
- B = Ethernet on rear; LED panel on top; power connector on rear
- T = Ethernet on front; LED panel on top; power connector on rear

Mount: Mounting Options

- RM = 19" Rack Mount Kit
- DP = DIN and Panel Mount Kit
- RD = 19" Rack, DIN, and Panel Mount Kit
- 00 = No Mounting Option

PS1: Power Supply 1⁽⁹⁾

- 24 = 24VDC (9-36VDC), screw terminal block
- 48 = 48VDC (36-59VDC), screw terminal block
- HI = 88-300VDC or 85-264VAC, screw terminal block
- 24P = 24VDC (9-36VDC), pluggable terminal block
- 48P = 48VDC (36-59VDC), pluggable terminal block
- HIP = 88-300VDC or 85-264VAC, pluggable terminal block

PS2: PoE Power Supply⁽⁹⁾

- 48 PoE = 48VDC (36-59VDC) PoE Power Supply

S1: Modules for Slot 1⁽¹⁰⁾

- XX = Empty
- M1 = V90 Modem
- M2 = RS232 External Modem Interface
- W10 = Cellular Modem (GSM-EDGE)^{(6) (1)}

S2: Modules for Slot 2⁽¹⁰⁾

- XX = Empty
- M1 = V90 Modem
- M2 = RS232 External Modem Interface

S3: Ethernet Modules for Slot 3⁽³⁾⁽⁴⁾

- PX01 = 2x 10/100 Base TX PoE Ports

S4: Ethernet Modules for Slot 4⁽³⁾⁽⁴⁾

- XXXX = Empty
- PX01 = additional 2x 10/100 Base TX PoE ports
- FX01 = 2 x 100FX - Multimode, 1300nm, ST connectors
- FX02 = 2 x 100FX - Multimode, 1300nm, SC connectors
- FX11 = 2 x 100FX - Multimode, 1300nm, LC connectors
- FX03 = 2 x 100FX - Multimode, 1300nm, MTRJ connectors
- FX04 = 2 x 100FX - Singlemode, 1300nm, ST connectors, 20km
- FX05 = 2 x 100FX - Singlemode, 1300nm, SC connectors, 20km
- FX06 = 2 x 100FX - Singlemode, 1300nm, LC connectors, 20km
- FX07 = 2 x 100FX - Singlemode, 1300nm, SC connectors, 50km
- FX08 = 2 x 100FX - Singlemode, 1300nm, LC connectors, 50km
- FX09 = 2 x 100FX - Singlemode, 1300nm, SC connectors, 90km
- FX10 = 2 x 100FX - Singlemode, 1300nm, LC connectors, 90km

S5 and S6: RX1100 Modules for Slots 5 and 6⁽⁵⁾

- XXX = Empty
- TC1 = Single T1/E1 Channelized/Unchannelized
- TC2 = Dual T1/E1 Channelized/Unchannelized
- TC4 = Quad T1/E1 Channelized/Unchannelized
- DS3 = Clear Channel T3 DS3 card
- D01 = DSL
- D02 = 56 kbps DDS DSU/CSU
- TS1 = PTP Card: GPS, NTP, IRIG-B, IEEE 1588 Time Synchronization⁽²⁾
- S01 = 4 x RS232/RS422/RS485 via RJ45
- W11 = Cellular Modem GSM/EGDE/HSPA^{(1) (7)}
- W20 = Cellular Modem EVDO rev A - Verizon US^{(1) (8)}

Notes:

- 1 Only one cellular modem can be installed per RuggedRouter®
- 2 Only one (1) GPS card can be configured per router; see PTP card datasheet for more information.
- 3 One Ethernet module must be ordered with each router.
- 4 S3 must be populated before S4
- 5 S5 must be populated before S6
- 6 This module has an operating temperature range of -30°C to 50°C
- 7 Supported operating temperature range is pending final testing and excludes carrier provided SIM. Please contact your regional sales manager for information on carrier approval for this option.
- 8 This module's supported operating temperature range is pending final testing
- 9 PS1 and PS2 must be both either pluggable or screw terminal block
- 10 Only one v90 modem or one RS232 External Modem can be installed at a time.

Example Order Codes

RX1100P-R-RM-24-48POE-XX-XX-PX01-PX01-TC2-XXX

19" Rack mounted, 24VDC unit power supply with a 48VDC PoE power supply, 4 10/100 Base TX PoE ports, Dual T1 WAN interface with Ethernet ports on the rear

RX1100P-F-RM-48-48POE-XX-XX-PX01-FX02-TC4-XXX

19" Rack mounted, 48VDC unit and PoE power supplies, 2 10/100 Base TX PoE ports, and 2 FX02 Singlemode 1300nm Fiber Ethernet ports, Quad T1 WAN interface with Ethernet ports on the front

RX1100P-R-RM-48-48POE-XX-M2-PX01-FX05-TC4-XXX

19" Rack mounted, 48VDC unit and PoE power supplies, RS232 External Modem Interface, 2 10/100 Base TX PoE ports, and 2 1300nm Singlemode Fiber Ethernet ports, Quad T1 WAN interface with Ethernet ports on the rear

Accessories

- 41-11-0011 - Cable support bracket (one)
- 43-10-0007 - Power cable (North America three prong connector -> beau)
- 99-01-0001-001- Dual Band Antenna for use with the W20 Option
- 99-01-0002-001 - 7 Band Antenna for use with the W11 Option

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Rev 1-C-02152011

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