

GIGABIT



RuggedSwitch™ RS900G

Product Summary

The RuggedSwitch™ RS900G is an industrially hardened, fully managed Ethernet switch providing dual fiber optical Gigabit Ethernet ports and eight Fast Ethernet copper ports.

Designed to operate reliably in harsh industrial environments the RS900G provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, factory floors or in curb side traffic control cabinets. An operating temperature range of -40°C to +85°C coupled with hazardous location certification, optional conformal coating and a galvanized steel enclosure allows the RS900G to be placed in almost any location.

The embedded Rugged Operating System (ROSTM) provides advanced networking features such as Enhanced Rapid Spanning Tree (eRSTP™), Port Rate Limiting and a full array of intelligent functionality for high network availability and manageability.

Features and Benefits

Ethernet Ports

- 2 - Fiber Optical Gigabit Ethernet Ports (1000BaseX)
- 8 - Fast Ethernet Ports (10/100BaseTX)
- Full compliance with IEEE: 802.3, 802.3u & 802.3z
- Non-blocking, store and forward switching
- Full duplex operation and flow control (IEEE 802.3x)
- Industry standard fiber optical connectors: LC, SC, SFP
- Bi - directional singlestrand fiber support
- Long haul optics allow Gigabit distances up to 70km

RuggedRated™ for Reliability in Harsh Environments

- Meets IEEE 1613 (electric utility substations)
- Exceeds IEC 61850-3 (electric utility substations)
- Exceeds IEEE 61800-3 (variable speed drive systems)
- Exceeds IEC 61000-6-2 (generic industrial environment)
- Exceeds NEMA TS-2 (traffic control equipment)
- Hazardous Location Certification: Class 1 Division 2
- -40 to +85°C operating temperature (no fans)
- Conformal coated printed circuit boards (optional)
- 20 AWG galvanized steel enclosure

Universal Power Supply Options

- Fully integrated power supply
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Dual low-voltage DC inputs (24 or 48VDC)
- CSA/UL 60950 safety approved to +85°C

Simple Plug and Play Operation

- Automatic learning of up to 8192 MAC addresses
- Auto-negotiation on all 10/100BaseTX ports
- Auto-MDI/MDIX (crossover) on all 10/100BaseTX ports
- LED indicators for link, activity and speed

ROSTM Advanced Network Management

- Enhanced Rapid Spanning Tree (eRSTP™)
- Quality of Service (802.1p) for real-time traffic
- Port rate limiting: 128kbps to 8Mbps
- VLAN (802.1q) with double tagging
- IGMP Snooping for multicast filtering
- Port configuration, status, statistics, mirroring, security
- Loss of link management on fiber ports
- Web-based, Telnet, CLI management interfaces
- SNMP v2 and RMON
- Rich set of diagnostics with logging and alarms

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ROS™ Features

Enhanced Rapid Spanning Tree Protocol (eRSTP™)

RuggedCom eRSTP allows the creation of fault-tolerant ring and mesh Ethernet networks that incorporate redundant links that are 'pruned' to prevent loops. eRSTP yields worst-case fault recovery¹ of 5ms times the 'bridge diameter' and allows rings of up to 80 switches. For example, a ring of ten switches will have fault recovery times under 50ms. eRSTP implements both STP and RSTP to ensure interoperability with commercial switches unlike other proprietary 'ring' based solutions.

QUALITY of Service (IEEE 802.1p)

Some networking applications such as real-time control or VoIP (voice over IP) require predictable arrival times for Ethernet frames. Switches can introduce latency in times of heavy network traffic due to the internal queues that buffer frames and then transmit on a first come first serve basis. ROS supports 'Class of Service' in accordance with IEEE 802.1p that allows time critical traffic to jump ahead to the front of the queue thus minimizing latency and reducing jitter to allow such demanding applications to operate correctly. ROS allows priority classification by port, tags, MAC address, and IP type of service (TOS). A configurable "weighted fair queuing" algorithm controls how frames are emptied from the queues.

VLAN (IEEE 802.1q)

Virtual local area networks (VLAN) allow the segregation of a physical network into separate logical networks with independent broadcast domains. A measure of security is provided since hosts can only access other hosts on the same VLAN and traffic storms are isolated. ROS supports 802.1q tagged Ethernet frames and VLAN trunks. Port based classification allows legacy devices to be assigned to the correct VLAN.

IGMP Snooping

ROS uses IGMP snooping (Internet Group Management Protocol v1&v2) to intelligently forward or filter multicast traffic streams (e.g. MPEG video) to or from hosts on the network. This reduces the load on network trunks and prevents packets from being received on hosts that are not involved. ROS has a very powerful implementation of IGMP snooping that:

- Can be enabled on a per VLAN basis.
- Detects and filters all multicast streams regardless of whether subscribers exist.
- Supports "router-less" operation by supporting an "active" mode.
- Restores traffic streams immediately after an RSTP topology change.

Port Mirroring

ROS can be configured to duplicate all traffic on one port to a designated mirror port. When combined with a network analyzer, this can be a powerful troubleshooting tool.

Port Configuration and Status

ROS 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.

Port Statistics and RMON (Remote Monitoring)

ROS provides continuously updating statistics per port that provide both ingress and egress packet and byte counters as well as detailed error figures. Also provided is full support for the RMON statistics, history, alarms, and event groups. RMON allows for very sophisticated data collection, analysis and detection of traffic patterns.

Loss of Link Management

Some intelligent electronic devices (IEDs) have dual fiber optic ports with automatic failover to a backup port should the primary fail. ROS ensures this mechanism works reliably under all failure modes by appropriately disabling link signals when required. ROS also flushes learned MAC addresses to ensure the failover occurs quickly.

Port Security

ROS provides the ability to filter or accept traffic from specific hosts to prevent unknown users or devices from gaining access to the network. Unauthorized access results in the port being shutdown for a period of time along with SNMP trap and alarm generation.

Broadcast Storm Filtering

Broadcast storms wreak havoc on a network and can cause attached devices to malfunction. This could be disastrous on a network with mission critical equipment. ROS limits this by filtering broadcast frames with a user-defined threshold.

Port Rate Limiting

ROS supports configurable rate limiting per port to limit unicast and multicast traffic. This can be essential to managing precious network bandwidth for service providers. It also provides edge security for denial of service (DOS) attacks.

¹ eRSTP fault recovery times may be approximated as follows:

For 100 Mbps, fault recovery performance is <5ms/hop

For 1,000 Mbps, fault recovery performance is <5ms/hop + 20ms

ROS™ Features

SNMP (Simple Network Management Protocol)

SNMP provides a standardized method for network management stations the ability to interrogate devices from different vendors. ROS supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS). A feature of SNMP supported by ROS is the ability to generate "traps" upon system events. A NMS can record traps from multiple devices providing a powerful network troubleshooting tool. RuggedVue™ is RuggedCom's NMS that provides graphical visualization of the network and is fully integrated with all RuggedCom products.

HTML Web Browser and Telnet User Interfaces

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

Event Logging and Alarms

ROS 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 extreme hardware relay is de-energized during the presence of critical alarms allowing an external controller to react if desired.

SNTP (Simple Network Time Protocol)

SNTP automatically synchronizes the internal clock of all ROS devices on the network. This allows for correlation of time stamped events for troubleshooting.

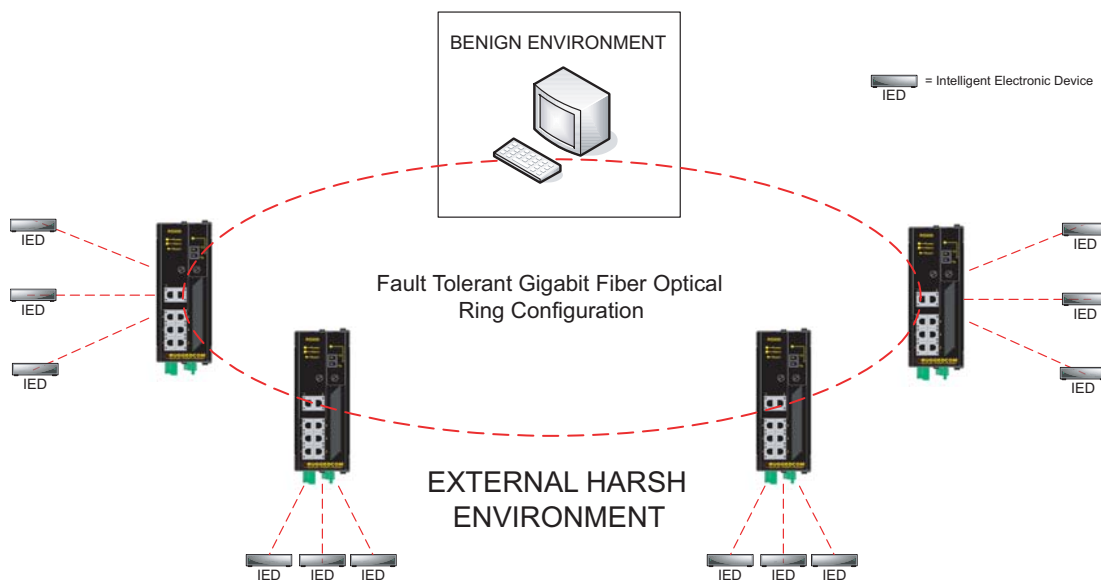
Configuration via ASCII Text File

All configuration parameters are stored in an ASCII formatted text file that can easily be transferred via TFTP or Xmodem. The configuration file can be saved for backup purposes and easily manipulated by a text editor. The text same file can be downloaded to the switch at a later date in order to re-configure or restore a previous configuration.

Command Line Interface (CLI)

A command line interface can be used in conjunction with remote shell to automate data retrieval, configuration updates, and firmware upgrades. A powerful SQL-like capability allows expert users the ability to selectively retrieve or manipulate any parameters the device has to offer.

Fault Tolerant Loop Architecture



Technical Specifications

Power Supply

- Power Consumption: 10W Max
- 24VDC: 18-36 VDC, 0.4A
- 48VDC: 36-59 VDC, 0.2A
- HI Voltage AC/DC: 88-300VDC or 85-264VAC

Critical Alarm Relay

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

Physical

- Height: 7.4"
- Width: 2.6"
- Depth: 5.0"
- Weight: 2.7lbs
- Ingress Protection: IP40 (1mm objects)
- Enclosure: 20 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

Switch Properties

- Switching method: Store & Forward
- Switching latency: 7 us
- Switching bandwidth: 5.6Gbps
- MAC addresses: 4096
- MAC address table size: 32kbytes
- Priority Queues: 4
- Frame buffer memory: 2 Mbit
- VLANs: 4096
- IGMP multicast groups: 256
- Port rate limiting: 128kbps, 256, 512, 4, 8Mbps
- No head of line blocking

Approvals

- ISO: Manufactured in an ISO9001 facility
- cCSAus: CSA C22.2 No. 60950, UL 60950
- CE: EN 60950
- Emissions: FCC Part 15, Class A
- Hazardous Location Certification: Class 1 Division 2
- Complies with 21 CFR Chapter 1, Subchapter J.
- NEMA TS 2

Warranty

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

Network Management

- HTTP graphical web-based
- SNMP v1, v2c
- Telnet, VT100
- Command Line Interface (CLI)

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

IEEE Compliance

- 802.3-10BaseT
- 802.3u-100BaseTX, 100BaseFX
- 802.3z-1000BaseLX
- 802.3x-Flow Control
- 802.3d-MAC Bridges
- 802.1d-Spanning Tree Protocol
- 802.1p-Class of Service
- 802.1q-VLAN Tagging
- 802.1w-Rapid Spanning Tree Protocol

IETF RFC Compliance

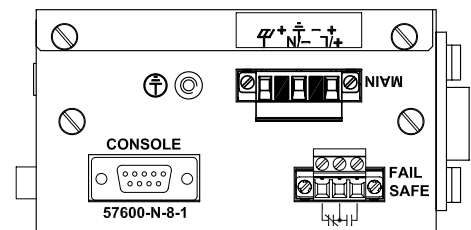
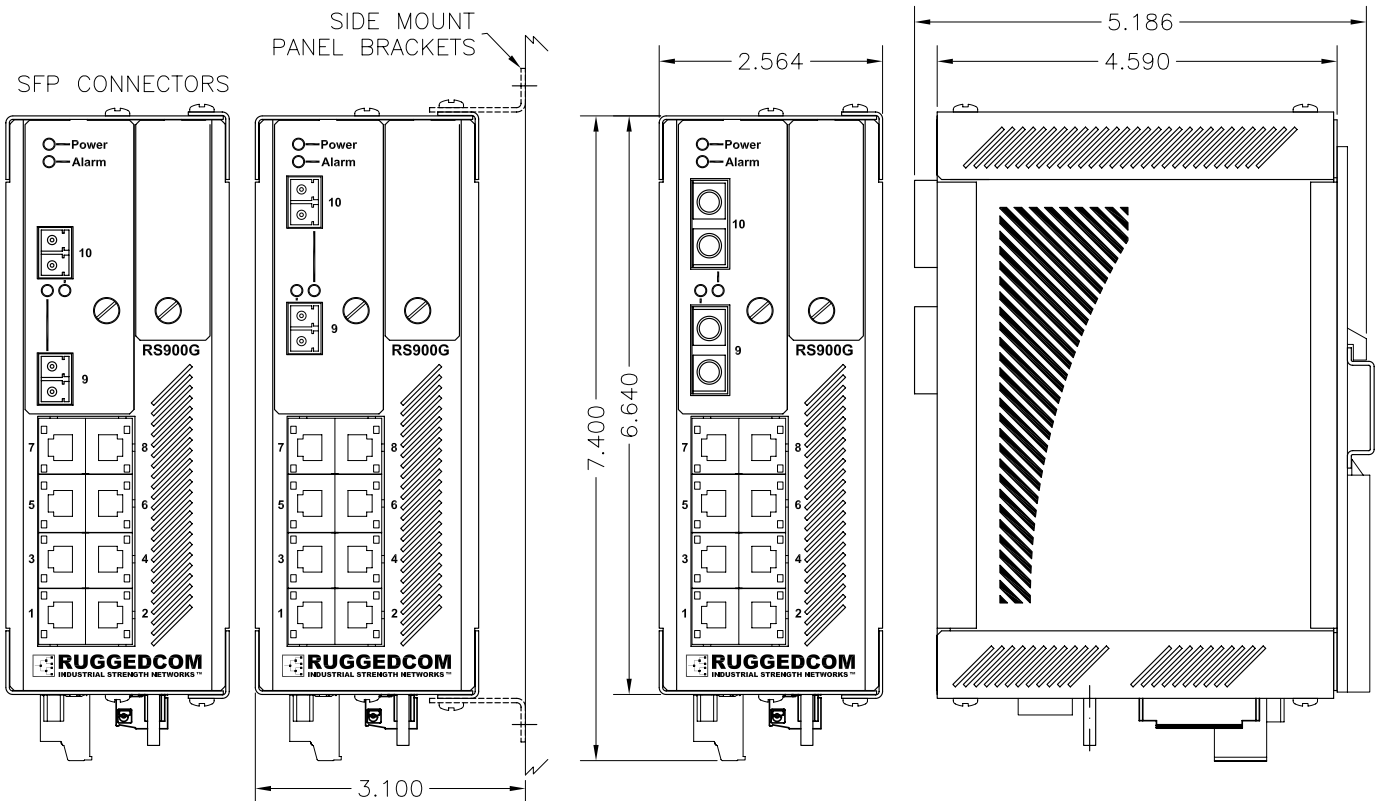
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC783-TFTP
- RFC826-ARP
- RFC768-UDP
- RFC894-IP over Ethernet
- RFC854-Telnet
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC1112-IGMP v1
- RFC2236-IGMP v2
- RFC2030-SNTP
- RFC2068-HTTP

IETF SNMP MIBS

- RFC1493-BRIDGE-MIB
- RFC1907-SNMPv2-MIB
- RFC2012-TCP-MIB
- RFC2013-UDP-MIB
- RFC2578-SNMPv2-SMI
- RFC2579-SNMPv2-TC
- RFC2819-RMON-MIB
- RFC2863-IF-MIB
- draft-ietf-bridge-rstpmib-03-BRIDGE-MIB
- draft-ietf-bridge-bridgemib-smiv2-03-RSTP-MIB
- IANAifType-MIB

Fiber Specifications and Mechanical Drawing

Fiber Optical Specifications					
Parameter	Fiber Port Type				
Mode	Multimode	Singlemode	Singlemode	Singlemode	Singlemode
Connector	LC, LC-SFP	SC, LC, LC-SFP	SC, LC, LC-SFP	LC-SFP	LC-SFP
Typical Dist.	500m	10km	25km	40km	70km
Optical Wavelength (nm)	850	1310	1310	1550	1550
Cable SizeCore/Cladding	50/125 or 62.5/125	8/125 or 9/125	8/125 or 9/125	8/125 or 9/125	8/125 or 9/125
TX Power (Min/Max) (dBm)	-9.5/-4	-9/-3	-7 / 3	-6 / 0	0 / 5
RX Sensitivity (dBm)	-20	-22	-26	-23	-23
RX Saturation (dBm)	0	-3	-3	0	0
Typical Budget (dB)	14	17	19	21	25



Order Codes

RS900G - - - -
 PS M P9P10 C

PS: Power Supply

- 24 = 24 VDC
- 48 = 48 VDC
- HI = 88-300VDC or 85-264VAC

M: Mounting Option

- D = DIN Rail
- P = Panel Mount
- N = None

C: Conformal coating

- 0 = None (No Coating)
- CC = Conformal Coating

P9P10 Transceiver Options (2):

- 2SFP = Dual 1000X SFP (Mini-GBIC). Order SFP Optics Separately.
- 2LCMM = Dual 1000SX Multimode LC 850nm 500m
- 2LC10 = Dual 1000LX Singlemode LC 1310nm 10km
- 2LC25 = Dual 1000LX Singlemode LC 1310nm 25km
- 2SC10 = Dual 1000LX Singlemode SC 1310nm 10km
- 2SC25 = Dual 1000LX Singlemode SC 1310nm 25km

SFP (MINI-GBIC) Transceiver Options (2):


- 25-10-0111 = 1000SX SFP, Multimode, LC, 850nm, 500m (1) (3)
- 25-10-0100 = 1000LX SFP, Singlemode, LC, 1310nm, 10 km (1)
- 25-10-0101 = 1000LX SFP, Singlemode, LC, 1310nm, 25 km (1)
- 25-10-0108 = 1000LX SFP, Singlemode, LC, 1550nm, 40 km (1) (3)
- 25-10-0109 = 1000LX SFP, Singlemode, LC, 1550nm, 70 km (1) (3)
- 25-10-0202 = 1000BX SFP, Singlemode / Singlestrand, SC, 1310nm TX, 1490nm RX, 10km (3)
- 25-10-0203 = 1000BX SFP, Singlemode / Singlestrand, SC, 1490nm TX, 1310nm RX, 10km

NOTES

- ¹ Distance ratings are typical but will depend on type of cabling, number of connectors and splices.
- ² Should you not find an appropriate fiber optic option listed here, please consult RuggedCom for other options.
- ³ These transceivers have an operating temperature range of -20 to +85°C. All other transceivers have an operating temperature range of -40° to +85°C.

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 Patent Pending
 All specifications in this document are subject to change without notice.
 Rev 1-H



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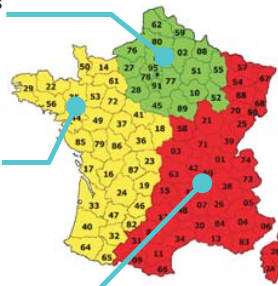
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