



RuggedServer™ RS416

Modular 16 port Serial Device Server with Integrated Managed Ethernet Switch and IEEE 1588 v2 Precision Timing



Product Overview

The RS416 is the ideal product to implement IEEE 1588 v2 precision timing to networks that currently use IRIG-B for time synchronization. The RS416 features IEEE 1588 v2 Slave Clock functionality allowing it to be synchronized to the 1588 Master clock with 100µs accuracy. The synchronized time signals are then converted to IRIG-B and distributed over dedicated IRIG-B or serial cabling. This unique timing feature allows IRIG-B devices to be synchronized with state of the art 1588 devices and provides the optimal migration path to 1588 while reducing new equipment and cabling costs.

With up to 4 managed Ethernet ports and 16 serial ports capable of providing IRIG-B timing, the RS416 is well suited to connecting and synchronizing legacy protection and control equipment. The RS416 is designed to work in the demanding substation environments with extremes in temperature ranges and electromagnetic interference and is certified with both IEC 61850-3 and IEEE 1613 electric utility substation standards, the RS416 provides uninterrupted operation and keeps mission critical substation IEDs in sync.

Features:

Precision Timing:

- IEEE 1588 v2, IRIG-B
- Slave clock operation with multiple output possibilities

Substation Rated:

- IEC 61850-3
- IEEE 1613
- -40 to +85C operating (no fans)
- Zero-Packet-Loss

Port Features:

- Up to 16 serial and 4 Fast Ethernet ports
- Ports available in copper and multimode or singlemode fiber
- MAC or 802.1x authentication
- VLANs, QoS, Link Aggregation
- 802.3af PoE (RS416P)

Management:

- Radius or TACACS user authentication
- SSH/SSL encryption
- Web-based, Telnet, CLI, SNMP, RMON
- Alarms, Critical Relay

Industrial Design:

- 19 inch rack, Panel or DIN mounting
- Front or rear ports
- Top or Bottom LED display panel
- Dual redundant, load sharing, multi-source power supplies

Support and Service:

- 5 Year Warranty
- Global 24x7x365 Technical Action Center
- Personalized Support

Benefits and Applications

Precision Timing – the RS416 provides the most options available for connecting precision timing to connect to substation IEDs whether they are serially or Ethernet connected devices.

- Slave / ordinary clock – slave functionality synchronizes with the master clock input and compensates for propagation time, ordinary clock is synchronized and keeps running even if network sync signals are lost
- Multiple clock outputs include 1588 v2 or IRIG-B TTL output that can be distributed over dedicated IRIG- B cabling or up to 16 serial outputs
- Clock source provided over the network by 1588 v2 or IRIG-B TTL input

Highest Availability – the RS416 provides stable performance under the high levels of temperature variations, EMI stress and voltage fluctuations that occur in substations and provides resiliency for when problems do occur.

- Maintains uninterrupted communication with Zero-Packet-Loss under heavy EMI stress when critical, time-sensitive communication is needed the most
- Enhanced Rapid Spanning Tree provides faster convergence than regular RSTP and supports any network architecture including ring-in-ring
- Integrated, dual redundant power supplies with a range of supply voltages and connection options ensures continued operation from multiple sources

Flexibility in Substation Design – configure the RS416 to meet any design criteria from network architecture to mounting and connecting to substation equipment.

- Full Port Modularity offers the widest selection of copper, short or long haul fiber optic connectors and cables for ease of network design
- Support for Modbus TCP, DNP 3, TIN serial protocols and raw socket
- Transmit serial data over Ethernet network
- Rack, DIN rail or panel mounting; front or top LED display; front or back Ethernet connections accommodate any installation requirement

Secure Substation Networks – the RS416 provides the means to secure management traffic and provide security at the port level.

- Ports are secured with MAC based or 802.1x authentication to prevent network access from unknown or unauthorized devices
- Radius or TACACS provides user authentication and access privileges for switch management; encrypted password protection through SSH / SSL
- SNMP v3 provides authentication and encryption of management traffic

Substation Performance – the RS416 is rich with features to optimize the performance of the substation network.

- Using VLANs and Quality of Service the IEC 61850 Process Bus and Station Bus traffic is kept separate and prioritized to minimize latency for time sensitive traffic and maintain bandwidth for data intensive instrumentation
- IGMP Snooping channels IED multicast traffic only to intended subscribers; preserving network bandwidth and preventing host flooding
- Automation and SCADA specific protocol support such as DHCP option 82 and Modbus TCP facilitates integration with other industrial Ethernet devices

Remote Management – the RS416 is designed to reside in the substation environments and to be managed remotely and securely.

- Event Logging and Alarms – are configurable and provide a snapshot of critical events that have occurred at the switch including link failure and recovery, unauthorized access attempts or broadcast storm detection
- HTML Web Browser and Telnet User Interfaces – provide a simple and intuitive method for remote configuration and monitoring complete with on-line help
- Configuration File – in text editable format allows remote backup and restore capabilities
- Port Statistics and RMON – provides continuous statistics per port allowing data collection and analysis of network traffic patterns
- SNMP v3 support – provides a standardized and secure method for remote management from RuggedCom's RuggedNMS or other third party NMS

Timing Distribution with the RS416

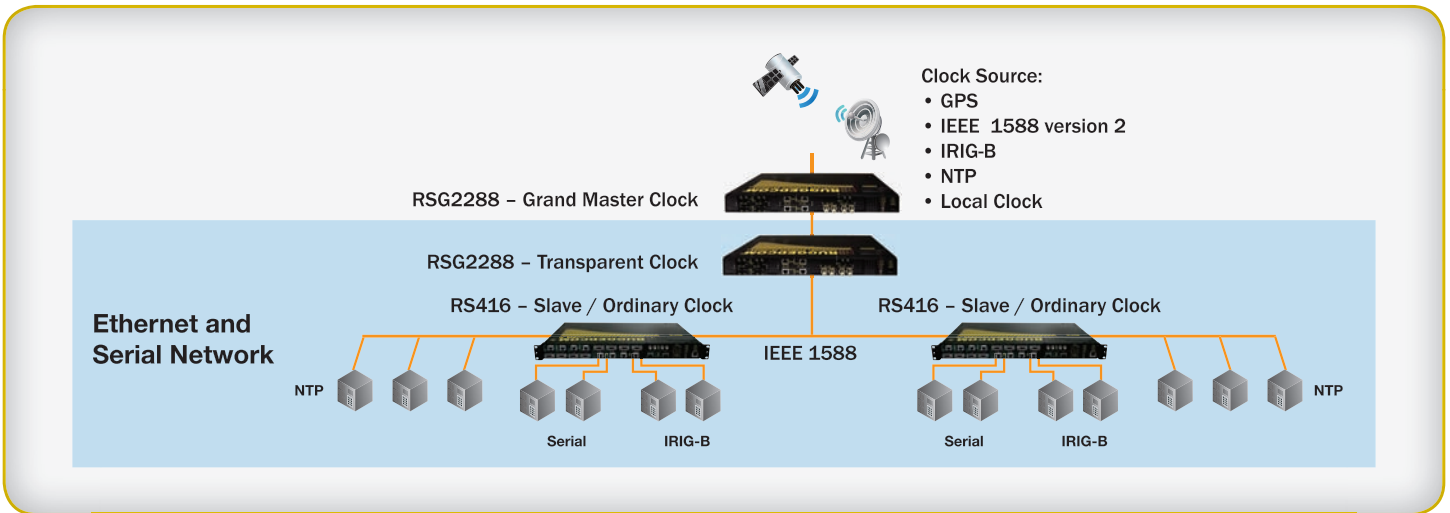


Figure 1. In a typical application, the RS416 provides 100µs accuracy for time synchronization of IEDs. The RS416 provides distribution of IRIG-B timing for synchronizing legacy IEDs with the IEEE 1588 v2 network.

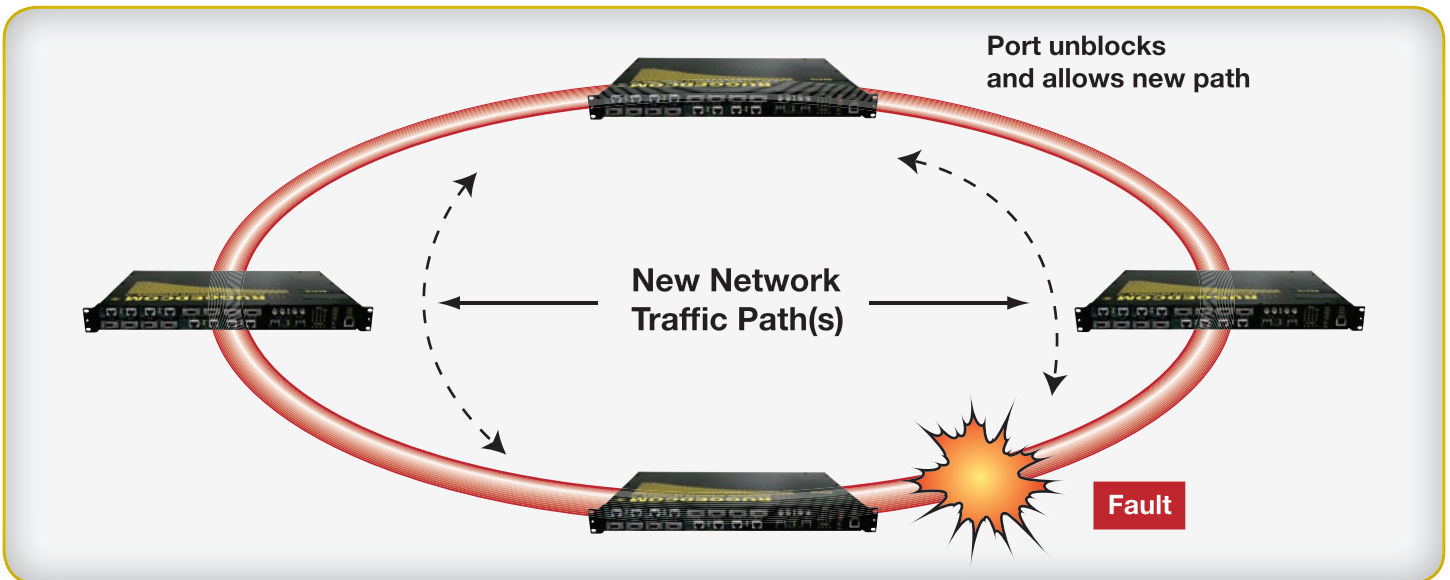


Figure 2. With the RS416 ring or mesh network architectures can be built to increase fault tolerance. Compatible with IEEE 802.1w, RuggedCom's enhanced Rapid Spanning Tree Protocol has a faster convergence time of < 5ms per hop and larger ring size up to 80 switches to handle the recovery time required by large networks.