1/10G TSN/HSR/PRP MILITARY SWITCH-ROUTER FIBER OPTIC SOM

POWERFUL, OPEN AND FLEXIBLE COTS 1/10G TSN/HSR/PRP SWITCH-ROUTER WITH EDGE-COMPUTING CAPABILITIES

RELY-MIL-FO-SOM

High-availability for mission-critical applications

HSR, PRP and TSN-CB for zero-delay recovery time in case of network failure

Full IEEE 1588 (PTP) support

Nano-second range time accuracy even over redundant networking paths

SW and HW microservices supported

Cutting Edge multi-core CPU with FPGA to support user applications

Security-by-design

Multi-layered security to protect the system against heterogeneous threats.
Cybersecurity certified

MIL-STD

1st class military enclosure
MIL-STD-461G
MIL-STD-810G

Multiple media type

Support for copper and fiber based connections

RELYUM
by SoCe

Overview

The RELY-MIL-FO-SOM is a Managed 1/10G Ethernet Switch, Router and Edge Computing Military COTS SOM family focused on Ground and Airborne applications that demands massive Fiber Optic based connectivity.

It supports up to 4x 1G copper ports and up to 24x Fiber Optic (FO) ports following the next configuration: 16x 1G FO Short Range (SR) ports, 4x 1G/10G FO SR ports, 4x 1G/10G FO Short Range (SR) or Long Range (LR) ports.

An additional 1x 1G RJ45 Ethernet Service port is accessible in a specific connector. The support for different media type and its distribution in the MIL-DTL-38999 connectors allow implementing complete and cost-effective network infrastructures.

The heart of this versatile equipment is a Xilinx Ultrascale+ MPSoC device that includes 6x ARM CPUs, 1x GPU and a latest generation FPGA in the same Integrated Circuit. The switching and routing functions are accelerated by hardware in the FPGA section. This flexibility allows offering different Switching & Routing & Computing personalities according to the requirements of the program.

As an example, this flexibility allows offering equipment versions supporting HSR, (M)RSTP or Time-Sensitive Networking protocols with the same hardware. Fiber Optic rings combining these protocols are feasible thanks to the inter-switch coordination mechanism developed by RELYUM.

This module is qualified for environmental, mechanical and electromagnetic military certifications according to MIL-STD-810G and MIL-STD-461G. Additionally, specific personalities embedded in the module have obtained the cybersecurity certification Common Criteria-LINCE by the Spanish Cryptologic National Center.

Main Features

- Up to 24x Fiber Optic ports:
    - 16x 1G FO Short Range (SR) ports
    - 4x 1G/10G FO SR ports
    - 4x 1G/10G FO Short Range (SR) or Long Range (LR) ports.
- Short (SR) or Long Range (LR) ports
- General purpose Ethernet Service port
- Latest generation ARM, GPU and FPGA hardware
- High-availability Seamless Redundancy (HSR)
- Parallel Redundancy Protocol (PRP)
- Time-Sensitive Networking (TSN)
- Precision Time Protocol (PTP)
- Auxiliary RS232 console port
- Edge-computing capabilities for user defined applications
- General Purpose, PPS and IRIGb Input and Output available on auxiliary connector
- Optional Grand Master/Time Server/Clock bridging capabilities
- Sealed military enclosure cold plate cooled
- Qualified for MIL-STD-810G & MIL-STD-461G & Lince Common-Criteria Cybersecurity
- Extensible through high-speed connector to support additional features (high-speed networking, time-server, etc.)

General Functionalities*

Layer 2 General Functionalities
- IEEE 802.3-2000
- Automatic MAC address learning and aging
- Static MAC Table
- Port-Based Virtual LANs (VLANs)
- IEEE 802.1Q for VLAN tagging
- IEEE 802.1Q for VLAN based Ethernet priorities
- Ethertype based switching
- IEEE 802.1p for Class of Service (CoS)
- IEEE 802.1ab for Link Layer Discovery Protocol (LLDP)
- Priority Modes: PCP (802.1p), Ethertype (Up to 16)
- Broadcast protection configurable via register
- Layer 2 multicast filtering
- Jumbo frame support
- IEEE 1588 StateLess TC (Transparent Clock
- IEEE 802.1s/w for (M)RSTP (Rapid Spanning Tree Protocol)

High-availability Ethernet
- IEC 62439-3 Clause 4 PRP "Parallel Redundancy Protocol"
- IEC 62439-3 Clause 5 HSR "High-availability Seamless Redundancy"

Time-Sensitive Networking (TSN) ^

Layer 3 General Functionalities
- IPv4/IPv6 unicast and multicast routing
- Static routing
- Dynamic Routing:
    - OSPFv2, OSPFv3, RIPv2, BGPv4, BGPv6
    - EIGRP, PIM-DM, PIM-SM
    - VRRP
- IGMP Snooping
- DSCP ToS
- L3 Firewall
- L3 Tunneling:
    - PPP
    - GRETAP
    - L2TPv2/v3 support

Wire-speed cryptographic
- In-line hardware implemented crypto-processor to cipher or decipher traffic

Synchronization
- IEEE 1588v2 PTP "Precision Time Protocol" profiles with E2E mode and P2P mode of operation
- IEEE 1588v2 PTP "Precision Time Protocol" over HSR & PRP
- Grand Master capability
- S(NTP) & Client

Management and Monitoring
- Protocol SNMP V1/V2/V3
- HTTPS Web GUI interface with secure firmware/bitstream update
- Graphic representation of Network status (HSR DANs & VDANs)
- Statistics independent per port
- SNMP RFC 1157/RFC
- DHCP (Client and Server)
- System Syslog
- MIB support
- Console port

*: Not all features are available in all personalities. See the specific features supported in each personality and equipment variation.
^ This functionality is available only in TSN pesonalities.

MIL-STD Testing & Dimensions

MIL-STD-461G	CE101, CE102, CS101, CS114, CS115, CS116, RE101, RE102, RS101, RS103
MIL-STD-810G	Method: 501.5, 507.4, 508.5, 509.3 513.6, 514.6, 516.6
MIL-DTL-38999, MIL-STD-704F, MIL-STD-1474D, MIL-STD-110F, MIL-STD-1275D, IP66	

Tests performed with RELY-MIL-FO-SWITCH-ROUTER enclosure

Dimmensions (mm)	155.75 (W)	121.1 mm (D)	30.9 mm (h) (24.9 Top + 1.6 PCB + 4.4 Bottom)
Weight (Kg)	422 gr.
DC Power Input / Consumption	+3V3DC / 30W (depending on the configuration)
Power & Control	Miscellaneous, Power

Cold plate installation is recommended to significantly improve thermal performance and decrease payload Delta-T by approximately 12-15°C. This will double the MTBF of the enclosed electronics.