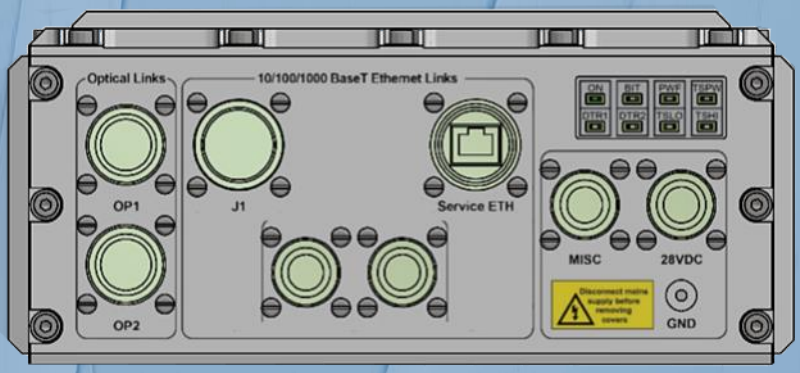
HIGH-AVAILABILITY MILITARY FIBER OPTIC SWITCH-ROUTER

POWERFUL, OPEN AND FLEXIBLE COTS L2/L3 MULTILAYER MANAGED SWITCH-ROUTER WITH EDGE-COMPUTING CAPABILITIES

RELY-MIL-FO-SWITCH-ROUTER



High-availability for mission-critical applications

HSR and PRP 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-SWITCH-ROUTER is a Managed 1/10G Ethernet Switch, Router and Edge Computing Military COTS family focused on Ground and Airborne applications.

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.

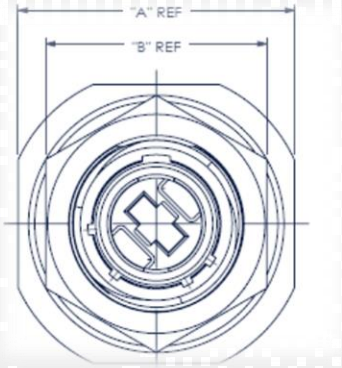
The heart of this versatile equipment is a Xilinx Ultrascale+ MPSoC device that includes 6x ARM CPUs, 1x GPU and a latest generation FPGA in the same Integrated Circuit. The switching and routing functions are accelerated by hardware in the FPGA section. This flexibility allows offering different Switching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

As an example, this flexibility allows offering equipment versions supporting HSR/PRP, (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.

The military certifications of the equipment include environmental, mechanical and electromagnetic aspects according to MIL-STD-810G and MIL-STD-461G. Additionally, an specific personality of this equipment has obtained the cybersecurity certification Common Criteria-LINCE by the Spanish Cryptologic National Center.

RELY-MIL-FO-SWITCH-ROUTER supports accurate time distribution via PTP and NTP. If GNSS sourced Grand Master operation is required, a GNSS/PTP/NTP Grand Master operation and the support for 2x additional Fiber Optic ports can be included.

Main Features



- 4x 10/100/1000-BaseT copper ports
- 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 Range (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
- Dual redundant MIL-STD-704 AC/DC power supply
- Tested and certified by independent official laboratories per MIL-STD-810G & MIL-STD-461G & Lince Common-Criteria Cybersecurity

General Networking Functionalities
(applicable to all personalities)

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)

Layer 3 Functionalities (not applies to HSR/PRP ports)
- IPv4/IPv6
- Multicast routing
- Static routing
- Dynamic Routing:
    - OSPFv2, OSPFv3, RIPv2, BGPv4, BGPv6
    - EIGRP, PIM-DM, PIM-SM
    - VRRP
- IGMP Snooping
- DSCP ToS

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
- Optional Ordinary Clock & Boundary Clock mode of operation
- S(NTP) & Client

Management and Monitoring
- Protocol SNMP V1/V2/V3
- HTTPS WEB 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)
- ANSI C Low Level library
- System Syslog
- MIB support
- Console port

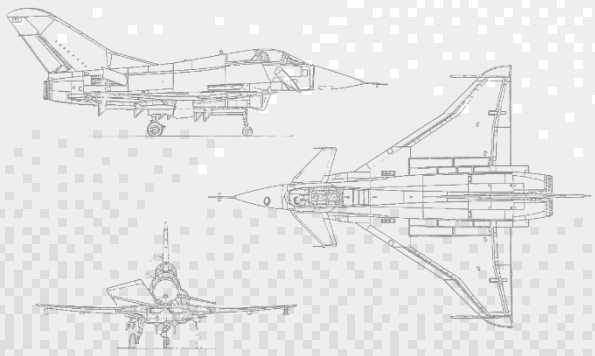
Security
- IEEE 802.1X access control: port & MAC based authentication
- MAC port binding & authentication for login security
- TACACS+, and RADIUS authentication
- Secure Shell (SSH) Protocol v2
- Internal Gyroscope and Accelerometer for security purposes
- TPM IC for identity authentication
- AES 256/HMAC/RSA 2048 encryption/authentication & signature for firmware and bitstream
- Firewall, VPN

Specific Functionalities
(applicable to each personality)

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)
- IEEE 802.1CB for Frame Replication and Elimination
- IEEE 802.1AS(rev) for Time Synchronization Layer
- IEEE 802.1Qav for Reserved Traffic: Credit Based Shaper: Configurable bandwidth reservation for each traffic class
- IEEE 802.1Qbv for Scheduled Traffic: Time Aware Shaper: Configurable number of time slots
- IEEE 802.1Qcc for Network Management (RESTCONF/NETCONF)
- IEEE 802.1Qci for Stream Filtering and Policing
- IEEE 802.1AB for LLDP (Link Layer Discovery Protocol)
- IEEE 802.1s for Multiple Spanning Tree Protocol
- Cut-Through support for Isochronous Scheduled Traffic
- IEEE 802.1Qat for Stream Reservation Protocol
- IEEE 802.1Qbu/802.3br for Frame Preemption

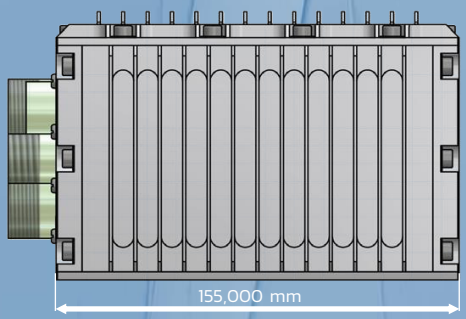
Wire-speed cryptographic
- In-line hardware implemented crypto-processor to cipher or decipher traffic

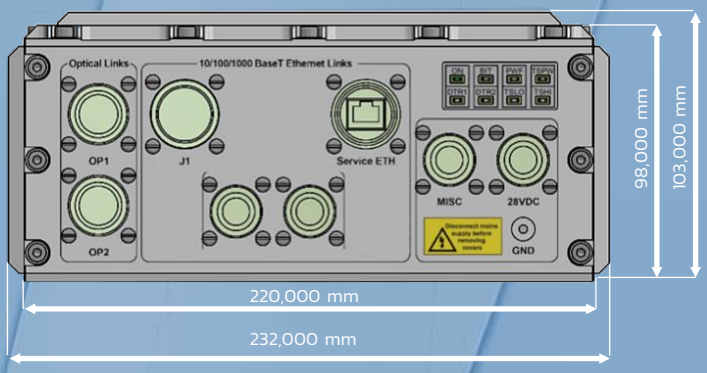


MIL-STD Testing & System Dimensions

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	

Dimensions (mm)	220 (W) | 155 (D) | 98 (H)
Weight (Kg)	1,9KG (metalwork) | 3,4Kg (with PSU & Payload)
DC Power Input / Consumption	+28VDC, +48VDC, +270VDC / 50W
AC Power Input / Consumption	115VAC 40-800Hz, 220VAC 40-800Hz / 50W
I/O ports	Ethernet (1x4), Fiber (2x2, 2x10), RS232 (1), RJ45 (1)
Power & Control	Miscellaneous (13 pin), Power (5 pin)





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