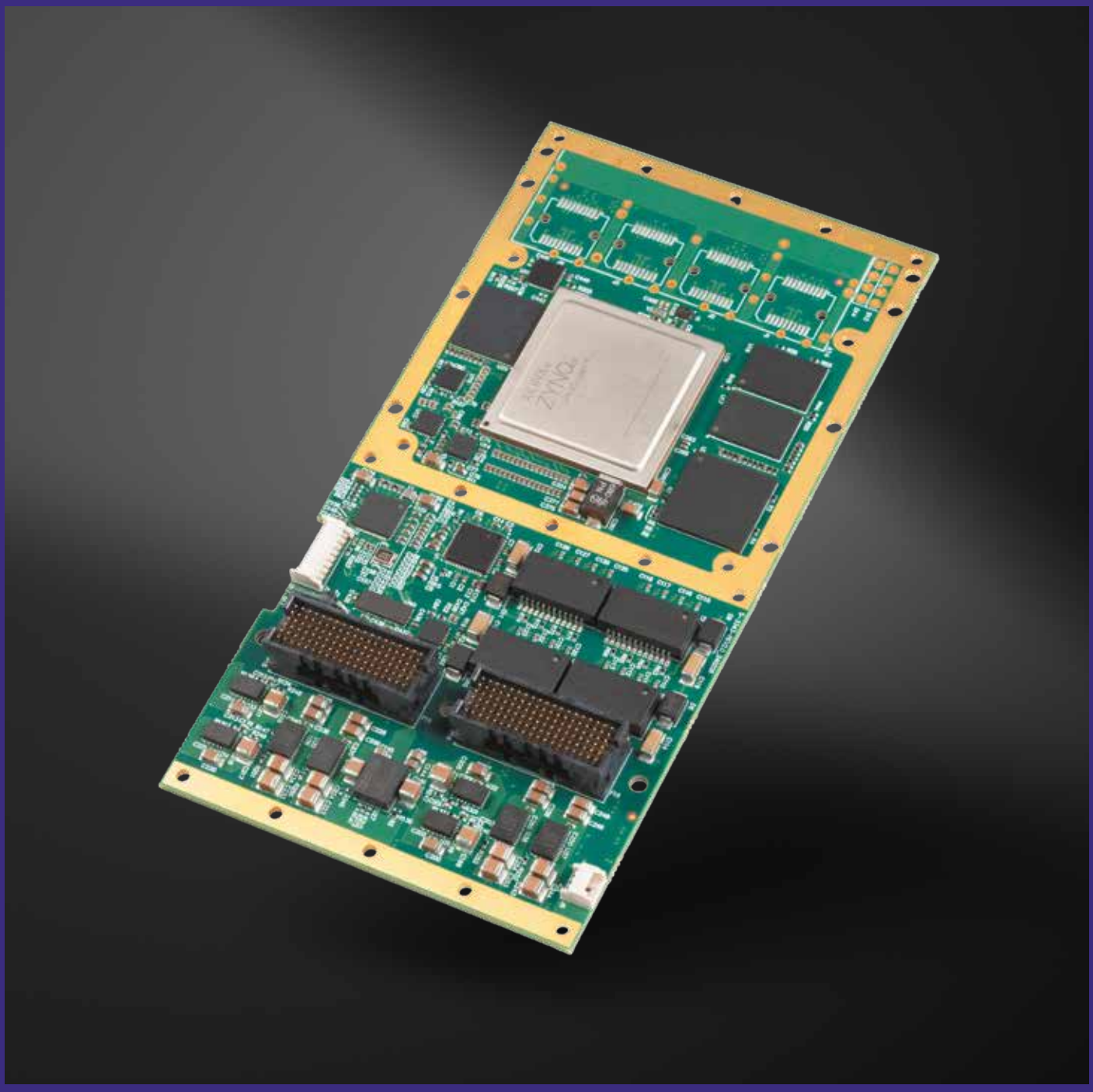
RelyUm® Rugged



Time-Sensitive Networking Endpoint Switch
XMC Mezzanine

XMC-TSN

XMC-10TSN

Overview

The XMC-TSN and XMC-10SR series are military-certified switch routers that take full advantage of SOC-E's TSN technology to deliver both performance and availability improvements over traditional networks.

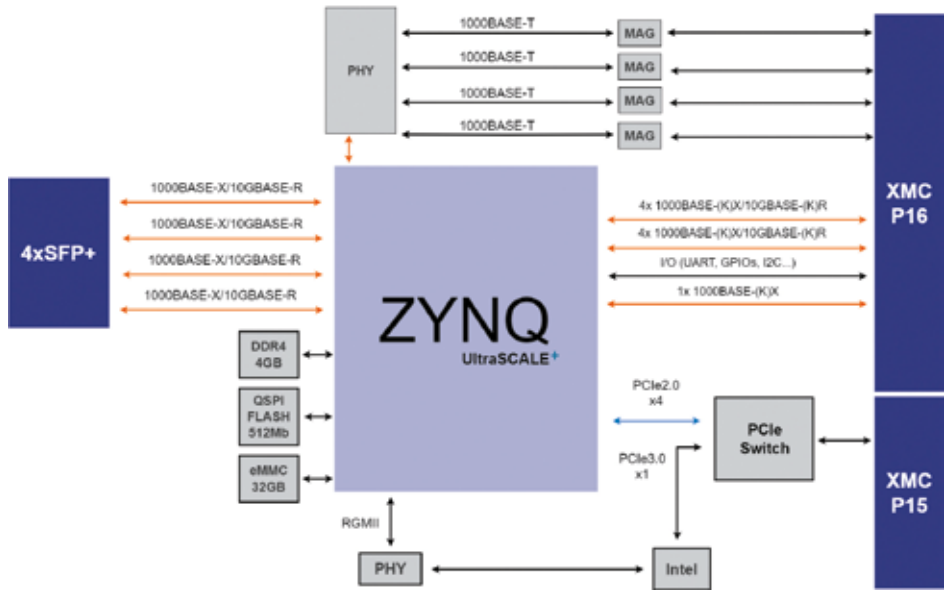
TSN allows to merge hard real-time and best effort traffic on the same network, and to deliver messages on-time without any loss or disturbance in the traffic. This leads to reduce equipment costs and to simplify maintenance, making it the first choice for future Ethernet networks.

Fully compliant with VITA 42/61 standards and SOSA aligned, the XMC-TSN / XMC-10TSN series can adapt to almost any situation and meet the requirements of a Digital Backbone (DBB) in the most demanding military programmes. The switching electronics is implemented in a high-performance FPGA, allowing to adapt the equipment to the latest versions of the TSN profiles, keeping it at the forefront of technology.

Key Features

- **Up to 17 configurable Ethernet** 10/100/1000BASE-T and 1GbE/10GbE ports.
- **Reconfigurable MPSoC platform** with edge computing capabilities to be fully compliant with IEEE 802.1DP and other TSN profiles.
- **"Zero-Packet Loss" redundancy** using TSN FRER for selected traffic combined with MSTP.
- All-in-one equipment with optional **Grand Master and Clock bridging** capabilities with accurate time distribution via IEEE 802.1AS.
- **Advanced security means** including IEEE 802.1X and MACsec, and optional firewall and VPN capabilities.
- Simplified management and monitoring via a user-friendly HTTPS web interface or a flexible console port. **Compliant with Qcc for centralized configuration through YANG model configuration files**.
- Compliant with **VITA 42.0, VITA 61.0, VITA 42.3 and SOSA** aligned.

Diagram



Technical Specifications

Communication Interfaces

- P15 connector:
  - 1x 1G/10G PCIe port for attachment to a second source on the carrier
- P16 connector:
  - 4x 1000BASE-T ports
  - Up to 8x 1000BASE-(K)X or 10GBASE-(K)R ports
  - 1x 1000BASE-(K)X Service port
  - 1x UART serial line
  - 1x PPS output
  - 1x PPS input
  - 1x optional IRIG-B output
  - 1x optional IRIG-B input
  - 1x optional 10MHz oscillator input
- Frontal I/O interfaces (only in Air-Cooled version):
  - 4x 1G/10G SFP+ ports

Layer 2 Features

- IEEE 802.3-2008 (Ethernet)
- Automatic MAC address learning and aging
- Static MAC Table
- Port-Based Virtual LANs (VLANs):
  - Logical segmentation of network for optimal use of bandwidth
  - IEEE 802.1Q for VLAN tagging (up to 4K VLAN groups)
  - IEEE 802.1p for Class of Service (CoS) / Quality of Service (QoS)
- IEEE 802.1AB for Link Layer Discovery Protocol (LLDP)
- Port rate limiting
- Storm control for flooded broadcast, multicast and unicast
- Layer 2 multicast filtering
- IGMP Snooping (up to 1024 multicast filters)
- Flexible Link Aggregation (up to 4 groups with 8 members each) (Expected 2025)
- Spanning Tree Protocol:
  - IEEE 802.1D (STP)
  - IEEE 802.1w (RSTP)
  - IEEE 802.1s (MSTP)

TSN Features

- IEEE 802.1AS - Timing and Synchronization
- IEEE 802.1Qav - Credit Based Shaper (CBS)
- IEEE 802.1Qbv - Time Aware Shaper (TAS)
- IEEE 802.1Qci - Per-Stream Filtering and Policing
- IEEE 802.1CB - Frame Replication and Elimination for Reliability (FRER)
- IEEE 802.1Qcc - Stream Reservation Protocol (SRP) Enhancements and Performance Improvements

Gateway

- Edge-computing capabilities for user defined applications
- Support for DDS standard and MQTT protocol in KVM Virtual Machine for user application
- Compliant with “DDS Extension for TSN” (OMG Group Standard)

Synchronization

- IEEE 802.1AS – Timing and Synchronization
- Optional time server and time bridging capabilities

Processing

- Xilinx Ultrascale+ MPSoC device:
  - 4x 64bit CPU ARM-Cortex-A53
  - 2x 32bit CPU ARM-Cortex-R5F
  - 1x GPU ARM-Mali 400MHz
  - 1x 16nm UltraScale+ FPGA
- Up to 4GB DDR4 RAM memory
- 32GB eMMC Flash memory
- 512Mb QSPI Flash memory

Security

- IEEE 802.1X for port-based network access control
- MAC port binding & authentication for login security
- RADIUS authentication
- LDAP (Lightweight Directory Access Protocol)
- RBAC (Role Based Access Control)
- Selective ports disabling capability
- Unsecure protocols disabling capability
- Per port ingress and egress port mirroring including 10G mirroring
- Mirroring per VLAN and per content awareness match
- Secure Shell (SSH) Protocol v2 for command line interface
- HTTPS for web interface
- TPM 2.0 IC for identity authentication
- Encryption/authentication & signature for firmware and bitstream
- Secure-boot capability
- IEEE 802.1AE - MACsec (Media Access Control Security) support
- Other optional security features (XMC-SSR and XMC-10SSR series):
  - Virtual Private Network (VPN)
  - Stateful inspection firewall
  - Intrusion Prevention System / Intrusion Detection System

Not all the features may be supported in all the product models.

Configuration & Management

- HTTPS web interface
- SSHv2 command line interface (CLI)
- SNMP V1/V2c/V3 protocol support
- SNMP V3 encrypted authentication and access security
- SNMP over TLS support (optional)
- Netconf protocol (YANG model-based configuration) support
- Encrypted and digitally signed firmware/bitstream upgrades
- Saving and restoring configuration
- Internal status monitoring and logging
- Event notification through Syslog
- Statistics independent per port
- DHCP/DHCPv6 server and relay (optional)
- Built-in-Test capability including:
  - PBIT (Power-on BIT)
  - CBIT (Continuous BIT)
  - IBIT (Initiated BIT)
- In-band management via any Ethernet switch port or out-of-band via Ethernet service port
- UART serial console

Physical & Electrical Characteristics

- Dimensions (mm):
  - Air-Cooled version (with SFP+ ports): 167.5(W) | 74(D) | 9.5(H-TOP)
  - Conduction-Cooled version (w/o SFP+ ports): 143.75(W) | 74(D) | 4.7(H-TOP)
- Weight (g):
  - Air-Cooled version: 128
  - Conduction-Cooled version: 118
- Power input as defined in VITA 42.0 standard:
  - VPWR: +5VDC or +12VDC
  - +3V3: required
  - +3V3_aux: required
  - +/-12V: not required
- Power consumption: 15-25W (depends on the FPGA design)

Environmental

Design to meet the following environmental specifications:

***With enhanced cooling system in the equipment**

Specifications per VITA 47	Air Cooled	Conduction-Cooled
Operating Temperature	AC3 (-40 to +70ºC)	CC4 (-40 to +85ºC)
Non-Operating Temperature	C3 (-50 to +100ºC)	C4 (-55 to +105ºC)
Vibration	V2 (0.04g²/Hz; 5 to 2000Hz)	V3 (0.1g/Hz; 5 to 2000Hz)
Operating Shock	OS1 (20g, 11ms)	OS2 (40g, 11ms)
Relative Humidity	0-95%	0-95%

MTBF

- 2,054,951 hours GB@25
- MTTR = 0.5 hour

Warranty

- 2 years

Export Control

- ITAR Free

Standards

- VITA 42.0
- VITA 61.0
- VITA 42.3
- P16 mapping optimised for the following VITA 46.9 profiles:
  - X32s+X8+X12d
  - X24s+X8d+X12d (only 2x 1000BASE-T)
- Developed in alignment with the following SOSA profiles:
  - X16s+X8d+X12d (only 2x 1000BASE-T)

For more information, please contact your sales representative.

Ordering Code

Ordering code	Model and description
XPP-TSN-YY.07	XMCPP-TSN: 1G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC1.0 – Air-Cooled
XPP-TSN-YY.08	XMCPP-TSN: 1G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC1.0 – Conduction-Cooled
XPP-TSN-YY.31	XMCPP-TSN: 1G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC2.0 – Air-Cooled
XPP-TSN-YY.32	XMCPP-TSN: 1G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC2.0 – Conduction-Cooled
XPP-10TSN-YY.07	XMCPP-10TSN: 1G/10G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC1.0 – Air-Cooled
XPP-10TSN-YY.08	XMCPP-10TSN: 1G/10G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC1.0 – Conduction-Cooled
XPP-10SR-YY.31	XMCPP-10TSN: 1G/10G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC2.0 – Air-Cooled
XPP-10SR-YY.32	XMCPP-10TSN: 1G/10G Time-Sensitive Networking Endpoint Switch XMC Mezzanine – XMC2.0 – Conduction-Cooled

PP: Number of ports **YY:** Firmware personality code. In most cases, this code is defined upon receipt of the order.

To know more about other available references, please contact your sales representative.

RelyUm®

By

XMC-TSN
XMC-10TSN

Time-Sensitive Networking Endpoint Switch
XMC Mezzanine

SOC-E®

www.soc-e.com
info@soc-e.com

Calle Islas Canarias 19, piso -1
48015 Bilbao (Spain)