# Network Switch Module

powered by new Marvell Ironman processors
designed for 10G network, specifically for Industry 4.0 and IoT

**LARCH NETWORKS**

## Designed for

- Industry 4.0 and IoT
- Support for TSN/HSR
- Scalable, high-performance, low-power, small-footprint
- Optional PoE (PSE/PD)

## Whole range of modules and port layouts & SKU

**MO-P8Cx-4F** 8x1+4x10 (50 Gbps)
**MO-16Cx-4F** 16x1+4x10 (72 Gbps)
**MO-24Cx-6F** 24x1+6x10 (86 Gbps)
**MO-48Cx-6F** 48x1+6x10 (110Gbps)
**MO-24Cx-28F** 24x1+24x2.5+4x10
**MO-13F.** 13x10 (132Gbps)

## For more information:

### Industry 4.0 Network Module

Based on new generation of highly integrated packet processors this module is designed to deliver a full portfolio of scalable, high-performance, low-power, small-footprint, feature-rich Ethernet switch modules, optimized for industrial and Internet of Things (IoT) applications operating in extended temperature range.

The extensive support in **Time-Sensitive Networking (TSN)** IEEE standards and **High-availability Seamless Redundancy (HSR/PRP)**, empowers the transition to real-time communication solutions. Offering these standards in a single chip guarantees end-to-end transmission of high-priority traffic with deterministic latency and increased reliability. Ironman integration of groundbreaking technologies TIPS (Telemetry, Intelligence, Performance, Security) technology lays out the essential foundation for innovations in network visibility, intelligence, performance, and security. Intelligent workload management provides optimized data processing at or near the network access edge, reducing hybrid cloud bandwidth requirements; insightful telemetry reinforces automation and expedites forensic analytics; advanced security features underpin trustworthiness and provide network embedded protection from ever evolving security threats. Integrates forwarding tables, Longest Prefix Match (LPM) tables, and flexible multiple TCAM lookups, designed to address Industrial Access deployment needs.

With comprehensive embedded security services include high-bandwidth IEEE 802.1AE Media Access Control Security (MACsec) Engine, at full device bandwidth processing capacity can provide cryptography-based security for Ethernet traffic. The family also supports a device level security including Secured Boot and Secured Storage.

The module Integrates **Dual-Core ARM-v8.2 Cortex-A55 high-performance CPU** Cluster, designed to meet requirements of modern Network Operation Systems. Additionally, the module integrates multiple ARMv7 Cortex-M3 (CM3) uControllers, each with its own memory that can be used running control functions such as PoE Stack, Device Initialization, Telemetry Collection or User-Specific processes and tasks. The Control and Management subsystem integrates a16-bit DDR4 memory controller and supports rich interfaces for the internal and external management functions, that include PCI Express (PCIe) Gen3.0, Ethernet Port, eMMC, QSPI-Flash, NAND-Flash, USB 2.0 and others.

Furthermore, the module allows a wide-range modern packet processing feature-set, based on Marvell® extended-bridging (eBridge) architecture; virtual overlay networking with programmable tunnel header encapsulation; real-time flow granular telemetry and observability capabilities to facilitate network adaptation; robust QoS, load-balancing schemes and advanced congestion mechanisms, designed to meet the modern networks' needs. The device is compatible with the Marvell Prestera® DX Family software to enable a rapid product development and time-to-market.

### Network Features

- Integrated PHY
- On-board magnetic
- Jumbo Frames support
- Cut-through operation to minimize traffic latency
- IEC 62439-3 – HSR/PRP High available seamless redundancy (Parallel Redundancy Protocol)
- Time-Sensitive Networking (TSN) IEEE
- Parallel (x8) and Serial LED interface for port activity status
- Highly scalable (cascade up to 1K modules)

### Memory, Security and Hardware Features

- High bandwidth DDR4 (1G /2G options)
- eMMC (up to 256G)
- PCIe Gen3 dev or 1G OOB
- Trusted/Secure boot support
- IEEE 802.3ae standard compliant MACsec engine with capacity toprocess, encrypt and decrypt the entire devices bandwidth bi-directionally traffic
- RS232 CLI console
- Dimensions   80mm x 100mm
- Work temperatures   -40°C — +85°C

# Marvell ROS

Industrial ROS for Marvell packet processor-based devices.
With support of Marvell eDSA stacking capabilities

## Whole range of applications
- Access
- Campus
- Data Center
- Industrial

## Carrier grade features
- Layer 2+ switching
- Layer 3 Diverse routing protocol support* (Option)
- Full support for POE+ with extensive power budget management
- Dual Power Supply support (hot swap)
- Dying Gasp support
- Dual FAN support (hot swap)
- System health monitoring and alarms
- DDoS protection
- Industrial devices and technologies support

## Optional Features
- OpenROS extensibility
- BGP routing
- 1588 PTP & SyncE Clock synchronization
- McLAG
- ERPS G.8032
- VxLAN
- MACsec
- HSR/PRP
- TSN

## Centralized fleet management
- SNMP
- Miyagi.io

### *OpenROS Concept (Optional)
- Linux inside switch CPU (Debian/Ubuntu)
- All ROS functions as Linux process
- Support of Linux compatible devices with binary kernel modules supported.
- Virtual interfaces to flow traffic switch<->linux
- Internal virtual loopback to allow switch control
- Works on ARM and x86

## ROS Functions

### Basic Funtions
- Port Speed/duplex management
- Port Auto management
- VCT  Diagnostics Port features
- Jumbo Frames (FE and GE)
- LAG / LACP
- Green Ethernet
- STP/RSTP/MSTP etc.
- VLANS (Protocol / MAC / IPv4 based)
- GVRP/GARP
- Multicast/CPE(Triple Play) VLAN
- QinQ
- Flow Control 802.3x
- Back Pressure
- Loopback and UDLD (Unidirectional link) detection
- Optical Transceiver Analysis

### Quality of Service
- Basic / Advanced QOS (Port/Flow)
- CoS/QoS
- Ingress/egress Rate Limiting/Shaping
- SP/WRR Queue settings
- L2/L3 CoS->Queue mapping
- Per-Flow Actions

### Security
- Access Control and logging
- Time based ACL
- MAC/Port based security
- Ace priority
- 802.1x enchanced (all variants)
- 802.1x MAC/Port/Web/Time based
- Radius Authentication/Accounting/802.1x
- TACACS+ Client and Accounting
- Syslog
- DHCP Snooping
- ARP inspection
- IP Source Guard
- Secure Control Technology (protect CPU)
- DoS Attach prevention
- *MACSec (GCM-AES-(XPN)-128/256)

### Monitoring
- Mirroring SPAN/RSPAN
- RMON/SMON
- SNMP v1/2/3 with MIBs
- Environmental PS/RPS, FAN, Temperature
- SFLOW v5
- Counters with History

### Multicast
- IGMP Snooping v1/2/3
- MLD Snooping v1/2
- MLD Querier
- Unregistered Mcast
- *PIM-SM (optional)
- IGMP/MLD Proxy

### Management
- OOB & serial Console support
- CLI/SNMP management (IPv4,IPv6) over Telnet or SSH
- USB/SD flash storage support
- DHCP based Self-Configuration/Update
- RMON, Syslog, Radius, TACACS+
- DNS, DHCP, SNTP, LLDP-MED, UpnP
- LLDP 802.1ab + LLDP MED
- WEB-GUI interface for basic management
- *Detailed REST compatible API (Optional)
- *Full WEB-GUI with flexible configuration options (Optional)

### *Power Over Ethernet (Optional)
- PoE 802.3af 802.3at 60W PoE
- PoE Budget with LLDP negotiation
- Time Based PoE
- PoE Consumption monitor

### *IP Routing (Optional)
- L3 DHCP Relay
- Proxy ARP for IP Routing
- OSPF / RIP
- Equal Cost Multiple Path (ECMP)
- VRRP
- IP SLA
- Loopback IP interface (Source Address Selection)
- UDP Relay
- IPv6 static unicast routing

### *Stacking (Optional)
- Optional Stacking up to 8(16) units using uplinks
- Real cross-unit features, not just Management
- Stand-alone and Stack-mode operation
- Stack Master Election process
- Stack Backup capabilities
- Unit joining or leaving the stack
- Stacking Fast Failover & LAG

### *Industrial Features (Optional)
- G.8032, ERPS Ring Protection
- High accuracy one-step and two-step PTP compliant with IEEE 1588v1/v2 and ITU-T G.8273.2 Class C and IEEE 802.1AS-2020 support
- SyncE compliant
- IEC 62439-3 - HSR/PRP High available seamless redundancy (Parallel Redundancy Protocol)

### *TSN (Optional)
- IEEE 802.1CM-2018 Profile B
- IEEE 802.1AS-2020 - Timing and Synchronization 4 time domains plus 1 free running clock
- IEEE 802.1Qav, IEEE 802.1Qbv, IEEE 802.1Qbu and 802.3br, IEEE 802.1Qci, IEEE 802.1CB

### *Synchronization and Precision Time Protocol (PTP)
- High accuracy one-step and two-step PTP compliant with
- IEEE 1588v1/v2 and ITU-T G.8273.2 Class C
- SyncE compliant
- IEEE 802.1AS-2020 support

LARCH
NETWORKS

**Larch Networks build SONIC-Based switched products, integrating them with SONIC and leveraging modern DPU technologies. SONiC is an open source network operating system based on Linux that powers Microsoft Global Cloud**

**Whole range of applications**
- Access
- Campus
- Data Center
- Industrial

**Portfolio of ready-to-use hardware platforms with POE+ choice of power budgets and options.**
- 48x1G+4x10Gbps
- 24x1G+4x10Gbps
- 48x2,5G+4x10Gbps
- 24x2,5+4x10Gbps
- 48x10G+6x100G
- 32x100G
- 32x400G

**There are 40 different SKUs Available to order**

**Centralized fleet management**
- uCentral

**Telecom Infra Project Open LAN Switching member**
- Collaborative features development in the community
- Validation and features support

## Basic Functions

### Switching
- VLAN access port creation
- VLAN Trunk port creation
- Default VLAN setting on a port
- port description setting
- port duplex setting
- port auto-negotiation setting
- port loopback mode setting
- port speed setting
- Dynamic LAG (LACP based load share)
- Static LAG (Active-Standby & Load Share)
- RPVST
- Inventory Information
- Environmental Information
- Cooling Unit Information
- Active alarms
- Flow Control
- Auto MDI/MDIX

### Routing
- IPv4 / IPv6 Dual Stack
- Static Routing
- OSPFv2, v3
- BGPv4, v6
- ECMP
- Routing stack gracefull restart

### Data Center Switching
- BGP-EVPN support
- VRF
- Network Virtualization using Generic Routing Encapsulation (NVGRE)
- VXLAN

### Security
- Storm Control (Unknown Unicast, Multicast and Broadcast)
- L2/L3/L4 ACLs
- Idle Session Timeout
- TACACS/RADIUS AAA

### QoS
- QoS Packet Classifiers
- Traffic Marking
- Traffic Scheduling (SP, WFQ and CIR/EIR)
- Ingress Policing / Rate Limiting
- Congestion Avoidance
- Queue scheduling: SP, WRR, SP+WRR
- Class of Service
- DSCP

### Management
- SSH/Telnet
- HTTPS for XMP / REST APIs
- gRPC, Management & Console port
- ICMP, ping, traceroute

- DNS resolver / Client
- DHCPv4/ DHCPv6 client
- sFlow
- Port/VLAN Mirroring
- DHCP v4/v6 Relay Agent
- LLDP / LLDP-MED
- Jumbo MTU and MTU setting
- SONiC to SONiC upgrade
- ONIE install

### Power Over Ethernet
- PoE 802.3af 802.3at 60W PoE
- PoE Budget with LLDP negotiation
- Time Based PoE
- PoE Consumption monitor

## Optional Functions

### *Industrial Features (Optional)
- G.8032, ERPS Ring Protection
- High accuracy one-step and two-step PTP compliant with IEEE 1588v1/v2 and ITU-T G.8273.2 Class C and IEEE 802.1AS-2020 support
- SyncE compliant
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- IEEE 802.1Qav, IEEE 802.1Qbv, IEEE 802.1Qbu and 802.3br, IEEE 802.1Qci, IEEE 802.1CB

### *Synchronization and Precision Time Protocol
- High accuracy one-step and two-step PTP compliant with
- IEEE 1588v1/v2 and ITU-T G.8273.2 Class C
- SyncE compliant
- IEEE 802.1AS-2020 support

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# Marvell® Prestera® DX1500 Ethernet Switches Series

### Synchronization and Precision Time Protocol (PTP)
- High accuracy one-step and two-step PTP compliant with
- IEEE 1588v1/v2 and ITU-T G.8273.2 Class C
- SyncE compliant
- IEEE 802.1AS-2020 support

### MACsec
- GCM-AES-128/256
- GCM-AES-XPN-128/256

### Time-Sensitive Networking (TSN) IEEE
- Cut-through operation to minimize traffic latency
- Compliant with IEEE 802.1CM-2018 Profile B requirements to control packet delay and packet delay variation
- IEEE 802.1AS-2020 - Timing and Synchronization support in 4 hardware time domains plus 1 free running clock domain
- IEC60802 profile compliant
- IEEE 802.1Qav - Credit based per queue shaper
- IEEE 802.1Qbv - Time aware shapers
  Enhancements for Scheduled Traffic (Qbv) per IEEE Std 802.1Q-2018
  256 time slots table per port gating 8 priority queues
- IEEE 802.1Qbu and 802.3br - Frame Preemption
- IEEE 802.1Qci - Per-Stream Filtering and Policing
- IEEE 802.1CB - Frame Replication and Elimination for Reliability

### High available redundancy
IEC 62439-3 - HSR/PRP High availability seamless redundancy (Parallel Redundancy Protocol)
Operating as PRP Redbox
Operating as HSR Redbox in the following network configurations:
• HSR-SAN
• HSR-PRP
• HSR-HSR
Up to 10 HSR/PRP ports
• Any port type can be HSR/PRP port
Up to three instances of HSR and PRP. For example:
• Two HSR-SAN Redboxes and one PRP Redbox
• HSR-SAN Redbox and HSR-HSR Redbox (Consumes two instances)
Operating as HSR Redbox in the following modes: H, N, T, M, U and X.
Proxy Node table with 128 entries:
• Software can move Proxy Node table entries to the TCAM to increase the Proxy Node table size
• Age bit per entry enables the software to age out inactive entries
Hash-based Duplicate Discard algorithm:
• Entry key is <Source MAC, Sequence Number>
• Timestamp per entry detects sequence number wraparound
• Per ingress port counting of the number of duplicates
Duplicate Discard table is a resource shared with the Bridge Forwarding Database (FDB), in the following allocation modes:
• All the entries are FDB entries
• 1/2 of the entries are FDB entries and 1/2 of the entries are HSR/PRP entries
• 1/4 of the entries are FDB entries and 3/4 of the entries are HSR/PRP entries
• 1/8 of the entries are FDB entries and 7/8 of the entries are HSR/PRP entries
• All the entries are HSR/PRP entries
Hardware support for HSR/PRP host implementation:
• Hardware duplication of packets sent from the CPU
• Hardware discarding of duplicate packets to the CPU