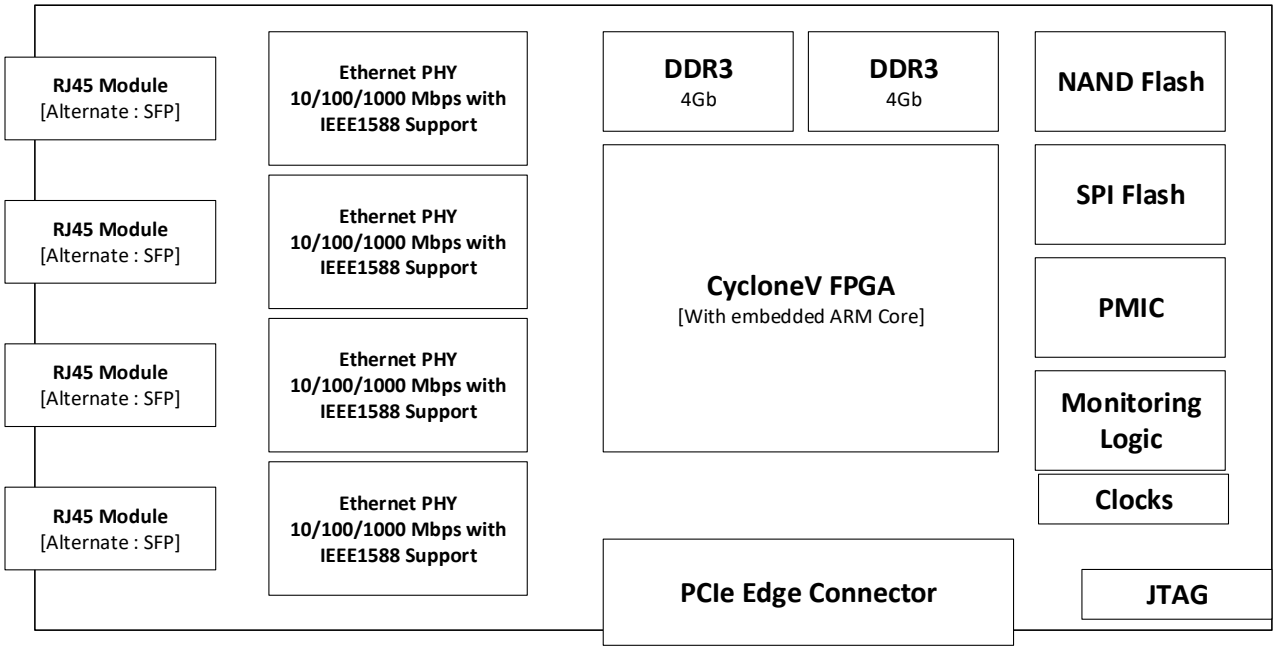
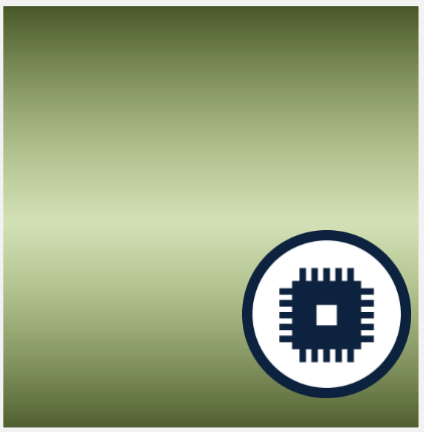
NETWORK INTERFACE CARD[NIC]

Time Sensitive Networking [IEEE802.1 TSN] NIC

Block Diagram:



Standard	Area of Definition	Title of the standard
IEEE 802.1AS, IEEE1588	Timing and Synchronisation	Enhancement and Performance improvements
IEEE 802.1Qbu, 802.3br	Forwarding and Queuing	Frame Pre-emption
IEEE802.1Qbv	Forwarding and Queuing	Enhancements for Scheduled Traffic
IEEE802.1Qca	Path Control and Reservation	Path Control and Reservation
IEEE802.1Qcc	Central Configuration Method	Enhancements and Performance improvements
IEEE802.1Qci	Time-based ingress policing	Per-stream filtering and Policing
IEEE802.1CB	Seamless Redundancy	Frame Replication and elimination for Reliability



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Description

IEEE802.1 TSN, an extension to 802.1 AVB [Audio Video Bridging] is an extension to take care of time sensitive networking requirements like Command and control networking of military or Industry 4.0 / IIOT fieldbus. IT brings time sensitiveness to Ethernet networks. Below list gives the important standards as part of the TSN.

Details:

This is a PCIe NIC card designed to work on a board/computer supporting 4 lane PCIe connector. It supports PCIe Gen1 speeds, Gigabit rate over Ethernet ports. Card dimension meets half size PCIe, consumes approx 7.5 watts of power [meets PCIe limits].

Specifications:

- Quad port TSN switch / bridge. Supports the protocols explained earlier. Card includes PHYs having IEEE1588 time stamping support –
  - Three Traffic Types – Scheduled Traffic, Best effort Traffic and Reserved Traffic
  - 802.1AS timing synchronisation and control for time sensitive network
  - 802.1X link aggregation
  - Per stream filtering and policing
  - Cycling queuing and forwarding
  - ECMP and W-ECMP
  - Frame replication and elimination for reliability
- Ethernet ports support 10/100/1000 Mbps speeds. Standard assembly is for RJ45 connectors. SFPs can be assembled to support Gigabit optics [SFP]
- Designed using Cyclone-V FPGA. FPGA also supports dual ARM cores for local management and control.
  - Field upgrade for firmware
  - Ports provided for software interface/debug
- 2 devices of 512MB DDR3.
- 1ppm oscillator + precision clock circuits.
- Thermal and voltage monitoring on card, will
- NAND Flash, optional SD Slot and SPI Flash
- Consumes approx. 7.5 watt power. Heat sink for CPU and Ethernet PHYs
- Uses Industrial grade parts. Operating range -40°C to +85°C

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Platform Support

- Windows 10 and Linux Ubuntu.
- GUI Support for Windows 10.