

NanoSWITCH™

Rugged Small Form-Factor 10/16 Port GigE Ethernet switch



- Versatile layer 2/3 GigE Ethernet switch with built-in x86 PC
- Noiseless, passively cooled 1.7" x 6" x 9.8" form factor
- MIL-STD-1275E, -704F, -461F, and -810G
- Environmentally sealed to IP67 for water, dust, salt, fog protection
- Vehicle Integration for C4ISR/EW Interoperability (VICTORY) implemented

The NanoSWITCH brings enterprise level layer 2/3 switching into harsh environments found in military ground, air and sea vehicles and offshore oil platforms.

Reliable and Compact

Weighing less than 3.6lbs, the Themis NanoSWITCH™ delivers multi-layer GigE Ethernet switch capabilities with an embedded x86 PC in a compact form-factor. Its multi-layer performance and cost-competitive pricing makes it an attractive choice for a multitude of field applications including:

- Vehicle network switching
- Distributed architecture vehicle controller
- VICTORY compliant switch, router, timing, and control
- WAN – LAN interconnectivity and firewall
- Shared processing and peripheral communications

Featuring sealed MIL connectors, the NanoSWITCH meets IP67 standards (water, dust, salt fog) and has an operating temperature range of -40°C to 71°C.

Precision Control

The NanoSWITCH's 10x or 16x external GigE Ethernet ports operate at rates of 10, 100, and 1000 Mbps. It supports sophisticated IPv4 and IPv6 routing such as tunneling, IP Multicast, VLANs, IETF, IEEE, and DSL Forum standards. A full management suite and Command Line Interface (CLI) is included to simplify switch control and routing operations.

Mercury Systems is a leading commercial provider of secure sensor and safety-critical processing subsystems. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs.

An IGMP snooping feature enables the network to operate at peak efficiency by limiting the IP multicast traffic to the ports that request it, while 802.1Q VLAN support quickly segregates network traffic. VLANs provide an additional layer of security by separating sensitive data from other network workgroups.

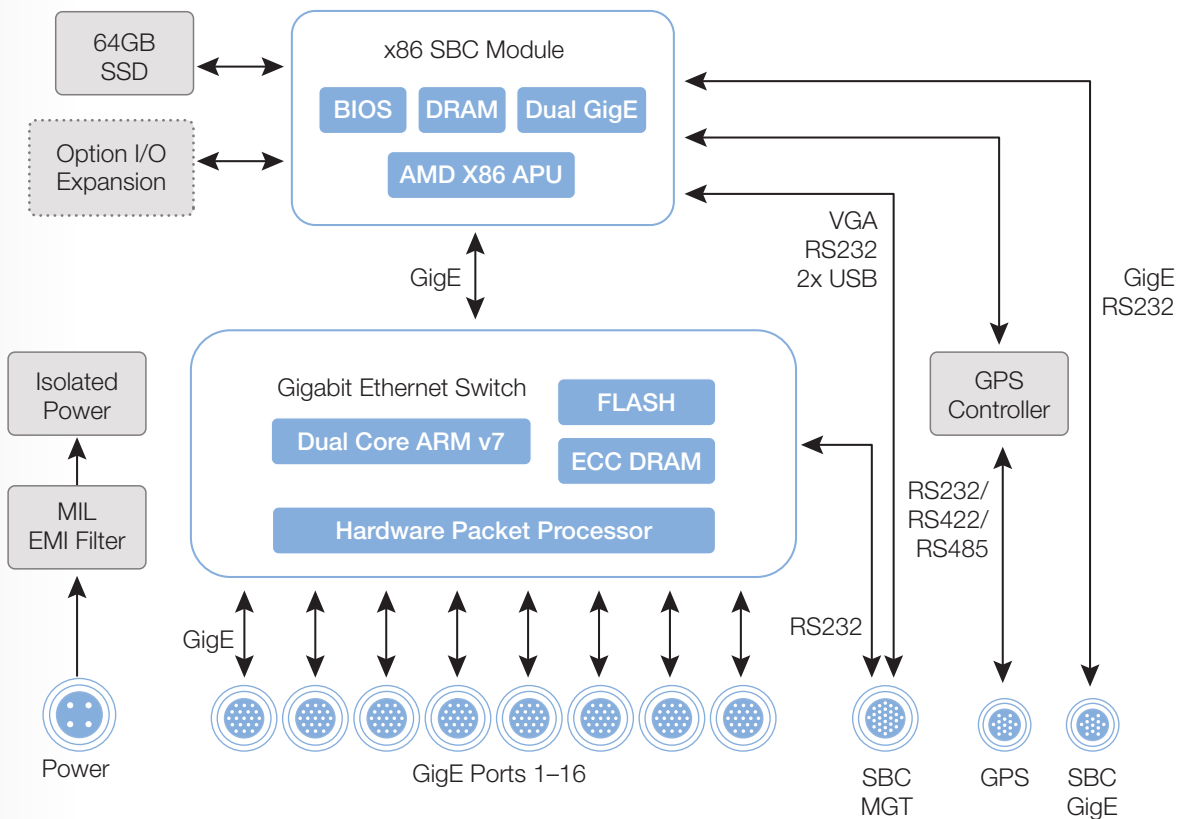
Workload Efficiency

With numerous Quality of Service (QoS) features, the NanoSWITCH ensures traffic is prioritized to deliver superior performance for real-time applications. These features include system management, voice, video, and bandwidth-intensive file uploads and downloads. Additional capabilities, such as IEEE 802.1p priority tagging, DSCP, and eight hardware traffic class queues maintain quality for real-time applications.

Proven with VICTORY

NanoSWITCH is the only field implemented VICTORY (Vehicular Integration for C4ISR/EW Interoperability) CTS compliant switch – a software configuration that provides a common data-bus centric approach which eliminates redundancy and reduces SWAP in Army ground vehicles. The NanoSWITCH also meets multiple military standards including: MIL-STD-1275E, MIL-STD-704F, MIL-STD-461F, and MIL-STD-810G.





Network Switch Functional Diagram

Main Features

- 16 or 10 port GigE Ethernet switch
- Full wire-speed non-blocking forwarding
- QoS management enabled by advanced queuing
- IPv4/v6 differentiated services (DiffServ)/ DSCP traffic prioritization specifications
- WEB, NSP and CLI (terminal, ssh) configuration and monitoring
- 802.1Q-based VLANs enabling and selective QnQ enabling
- Port-level security via 802.1X authentication
- 4/8/16 Group LAG support with protocol (LACP)
- All types of storm control
- Port mirroring for noninvasive monitoring of switch traffic

Switch Architecture

- 10x or 16x GigE Ethernet ports with auto tri-speed 10/100/1000Mbps and MDIX
- Layer 2/3 enterprise non-blocking network switch for demanding SWAP-C environments
- Dual Core ARM® v7 800MHz CPU for CLI (Command Line Interface) and management
- ECC protected DRAM
- Marvell Prestera®-DX PONCat3 hardware based packet processor
- Glenair 801-033 Mighty Mouse series connectors, environmentally sealed
- Wire speed ingress and egress traffic policers
- Management via Ethernet (http/telnet/SNMP) or RS232

Embedded x86 PC Module

- Full featured AMD Fusion APU for VICTORY or user applications (e.g. Firewall, Gateway, IoT)
- 1GB DRAM, 64GB SSD
- External GB-GRAM/DAGR/Polaris compliant GPS Port with selectable RS232/RS422/RS485
- 1x Internal GigE port into switch (17th port) and 1x external GigE
- VGA video output
- 2x RS-232 ports
- 2x USB 2.0 ports
- Replaceable long life RTC battery or external power support
- Linux Ubuntu installed as standard

Basic Features

- 16x or 10x tri-mode 10BASE-T/100BASE-TX/1000BASE-T
- Fully managed L2/L3 switch
- Layer-2 wire speed switching engine
- Layer-3 wire speed routing engine
- Auto Medium Dependent Interface (MDI) and MDI crossover (MDI-X)
- Auto negotiate/manual setting
- Fully non-blocking wire-speed performance with all ports and all frame sizes
- LEDs: System, GigE Link/Act and Speed – all blankable

Layer 2/3 Feature Set

- 16K L2 forwarding entries
- 802.1w rapid spanning tree
- 802.1s spanning tree protocol
- 802.3ad link aggregation/LACP
- 4-16 LAGs
- 802.1Q VLANs (256-4K VLANs)
- 802.1AB link layer discovery protocol
- Port mirroring
- Jumbo frames (10KB)
- 802.3x PAUSE
- Static MAC addresses
- IGMPv1, 2, 3 snooping
- MLDv1, 2 snooping

Network Management

- 10/100/1000 management ports
- RS-232 serial console port
- Syslog
- RADIUS
- Tacacs
- AAA
- Simple Network Time Protocol (SNTP)
- WEB management
- File download via HTTP
- SNMP v1/2/3

Security Features

- 802.1X Port-based Network Access Control (PNAC)
- MD5 encryption
- Port security-MAC-based filtering
- Management access control
- NAP full support
- TPM for SBC

Quality of Service (QoS)

- Priority levels 8 hardware queues
- Scheduling priority queuing and Weighted Round-Robin (WRR)
- Shaping per port and per queue
- Rate limiting for different packet types
- Class of service:
Port based, 802.1p VLAN priority or IPv4/v6 IP DSCP

Power

- 28V nominal isolated power input to MIL-STD-1275E
- +/- 250V transient, 100V surge, 12V starting surge capable
- Voltage ripple filtering
- 34W maximum (22-31W Typical)
- Status LED blanking control

MIL Specification Compliance

- MIL-STD-1275E - Ground vehicle power
- MIL-STD-704F - Aircraft power (with no hold up)
- MIL-STD-461F - EMC Army ground, Navy ground
- MIL-STD-810G - Environmental

MIL-STD-810G Environmental Compliance

- IP67 environmentally sealed (water, dust, salt fog)
- Sealed MIL connectors
- Altitude: 15,000ft
- Immersion: 1m
- Dust, salt, fog
- Storage temperature: -50°C to 105°C
- Operating temperature: -40°C to 71°C
- Shock: 50g, 25ms half sine, all directions
- Vibration: 5G RMS 8Hz to 2KHz, composite wheeled, cargo jet, helicopter profiles

IEEE ComplianceE

- 802.1D bridging and spanning tree
- 802.1p QOS/COS
- 802.1Q VLAN tagging
- 802.1w rapid spanning tree
- 802.1s spanning tree protocol
- 802.1AB link layer discovery protocol
- 802.3ad link aggregation with LACP
- 802.3x flow control
- 802.3ab 1000BASE-T
- 802.3z GigE Ethernet

Management MIBS

- Fully MIB managed device
- RFC 1213 - MIB-II
- Ether-like MIB
- SNMP-FRAMEWORK-MIB
- RFC 1493 - BRIDGE-MIB
- IF-MIB
- RMON-MIB

Vetronics SBC PC

- Embedded x86 SBC
- AMD Fusion APU, 615MHz single core with Radeon HD 6250 GPU
- 64KB L1, 512KB L2, 1GB DRAM
- 64GB SSD
- Trusted Platform Module (TPM)
- External GB-GRAM/DAGR/Polaris compliant GPS Port with selectable RS232/RS422/RS485
- 1x Internal GigE port into Switch (17th port) and 1x External GigE
- VGA video output
- 2x RS-232 ports
- 2x USB 2.0 ports
- Replaceable long-life RTC battery or external power
- Linux Ubuntu installed as standard

VICTORY Services Option

- Time synch VT50000
- Position VT50100
- Switch VT50900
- Shared processing VT51900
- VDB management VT52200
- IA configuration description
- C4ISR configuration description
- Platform system configuration description

Physical

- Dimensions 44mm x 151mm x 249mm
- Weight < 3.6 lb

Compliance

- Power
 - MIL-STD-1275E - Ground vehicle power
 - MIL-STD-704F (with no hold up)
- Safety
 - US: UL 60950-1
 - Canada: CSA C22.2 No. 60950-1
 - Europe: EN 60950-1
- Emissions/Immunity
 - MIL-STD-461F - Certified to Army/Navy Ground
 - US: FCC Part 15 Subpart B
 - Canada: ICES-003
 - Europe CE Mark: EN 55022, EN 55024
 - Japan: VCCI
 - Australia/New Zealand: CISPR

Customizable Options (Consult Factory)

- Inertial navigation/GPS
- VectorNAV VN100 IMU
- VectorNAV VN200/VN300 GPS/IMU
- Expansion for SBC
- MIL-STD-1553
- CANBus
- ARINC 429
- Other interfaces
- SSD
- Write protection (other devices already supported)
- Secure erase via hardware signal
- Hardware encryption
- MLC/SLC
- SBC PC
- FLEX option - no SBC (with smaller management Connector)
- Future embedded SBC PC module options

Configuration Options

- NanoSWITCH - 16 Port
- NanoSWITCH - 10 Port
- VICTORY option

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