

OVERVIEW

The Themis NanoSWITCH™ is a Size, Weight, Power and Cost (SWAP-C) optimized rugged multi-layer gigabit Ethernet switch with an embedded x86 PC. The NanoSWITCH brings enterprise level layer 2/3 switching into the rugged environments found in military ground, air and sea vehicles and unforgiving industrial environments such as offshore oil platforms. Typical applications include:

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

NanoSWITCH provides 16x or 10x external Gigabit Ethernet ports that operate at rates of 10, 100, and 1000 Mbps. A full management suite is included, as well as a Command Line Interface (CLI) for controlling switch and routing operations. The NanoSWITCH supports sophisticated IPv4 and IPv6 routing, including tunneling and IP Multicast, VLANs, and IETF, IEEE, and DSL Forum standards.

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

VICTORY

NanoSWITCH is available in a VICTORY software configuration. The VICTORY open standard, or “Vehicular Integration for C4ISR/EW Interoperability” standard (<http://victory-standards.org/>), provides a common data-bus centric approach to sharing services and hardware components, eliminating redundancy and reducing SWAP in Army ground vehicles.

Switch Architecture

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

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

Power

- ▶ 28V nominal (22-31W Typical, 34W Maximum) isolated power input
- ▶ +/- 250V transient, 100V surge, 12V starting surge capable
- ▶ Voltage ripple filtering
- ▶ 30W maximum (NanoSWITCH), 23W maximum (NanoSWITCH FLEX)

Environmental Features

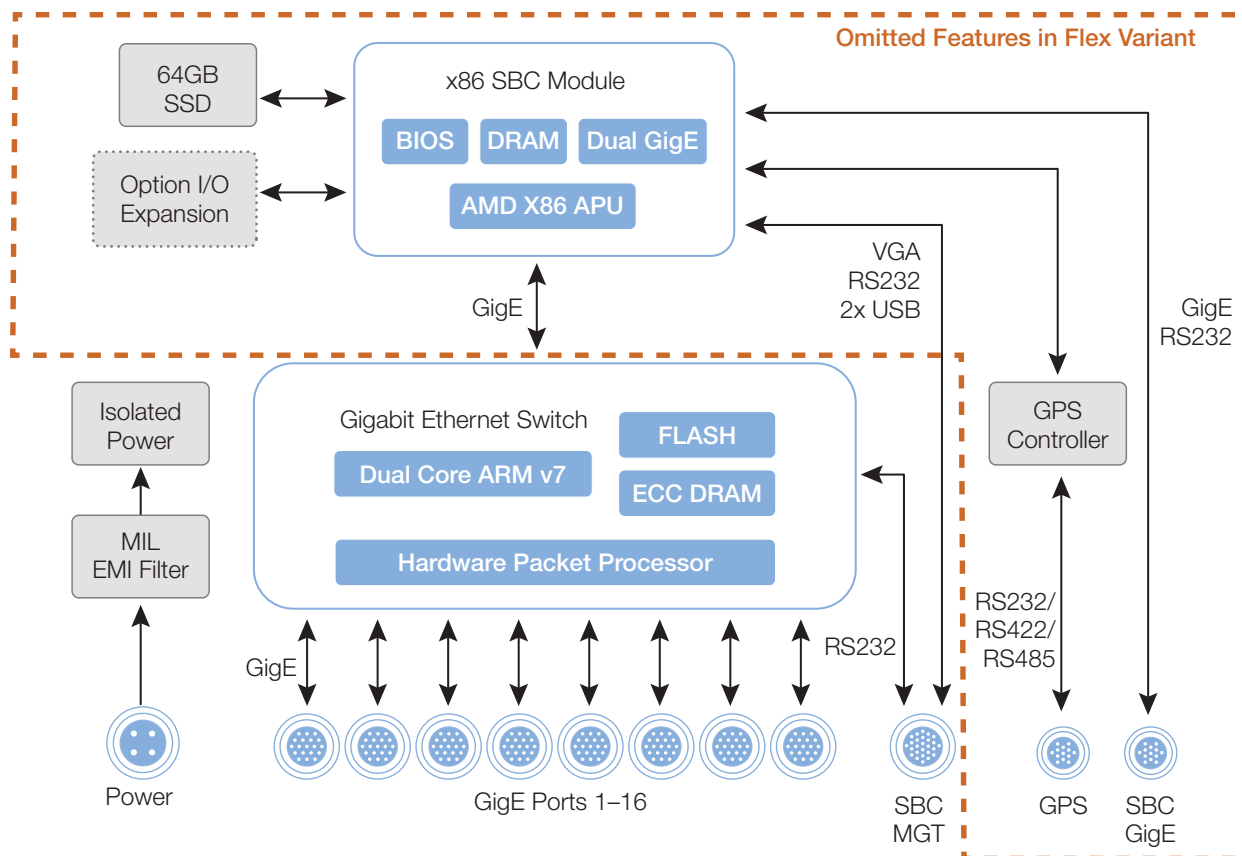
- ▶ IP67 environmentally sealed (water, dust, salt fog)
- ▶ Sealed MIL connectors
- ▶ Storage temperature: -40°C to 105°C
- ▶ Operating temperature: -40°C to 71°C
- ▶ Shock: 50g @25ms
- ▶ Vibration: 5G RMS 10Hz to 2KHz
- ▶ Status LED blanking control

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:

- ▶ Hermetically sealed:
 - Altitude 15,000ft
 - Immersion 1m
 - Dust, salt fog
- ▶ Operating Temperature -40°C to 71°C
- ▶ Shock 40g 11ms saw tooth, 50G 14ms half sine, all axis
- ▶ Vibration Table 514.6C-VI and Figures 514.6C-3



NanoSWITCH Block Diagram

NETWORK SWITCH DETAILS

NanoSWITCH provides 16x or 10x external Gigabit Ethernet ports that operate at rates of 10, 100, and 1000 Mbps. A full management suite is included, as well as a Command Line Interface (CLI) for controlling switch and routing operations. The NanoSWITCH supports sophisticated IPv4 and IPv6 routing, including tunneling, snooping and IP Multicast, Link Aggregation, VLANs (GARP, Voice), MSTP and DoS Protection. NanoSWITCH follows IETF, IEEE, and DSL Forum standards.

The NanoSWITCH includes numerous Quality of Service (QoS) features to ensure that traffic is prioritized to deliver the superior performance for real-time applications. These QoS features include system management, voice, video, and bandwidth-intensive file uploads and downloads.

Additional QoS capabilities, such as IEEE 802.1p priority tagging, DSCP, and eight hardware traffic class queues maintain quality for real-time applications.

An IGMP snooping feature limits IP multicast traffic to only the ports that request it, which enables the rest of the network to operate at peak efficiency. 802.1Q VLAN support enables the network to quickly segregate traffic. VLANs also provide an additional layer of security by keeping sensitive data separated from other workgroups on the network.

SWITCH MAIN FEATURES

- ▶ 16 or 10 Port Gigabit 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

BASIC FEATURES

- ▶ 16x or 10x tri-mode 10BASE-T/100BASE-TX/1000BASE-T
- ▶ Auto medium dependent interface (MDI) and MDI crossover (MDI-X)
- ▶ Auto negotiate/manual setting
- ▶ Layer-2 Wire-Speed Switching Engine
- ▶ Layer-3 Wire-Speed Routing Engine
- ▶ Fully Managed L2/L3 Switch
- ▶ Fully non-blocking wire-speed performance with all ports and all frame sizes
- ▶ LEDs System, Gigabit 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-RADIUS authentication
- ▶ 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 based or IPv4/v6 IP DSCP based

IEEE COMPLIANCE

- ▶ 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 Gigabit 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 Single Board Computer
- ▶ 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
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- ▶ Replaceable Long Life RTC Battery or External Power Support
- ▶ 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
- ▶ < 3.6 lb

COMPLIANCE

- ▶ Environmental MIL-STD-810G
 - ▶ Operating Temperature: -40°C to 71°C
 - ▶ Storage Temperature: -50°C to 105°C
 - ▶ Altitude: to 15,000ft
 - ▶ Immersion: 1m
 - ▶ Salt fog
 - ▶ Dust/sand
 - ▶ Shock 40g 11ms saw tooth, 50G 14ms half sine, all axis
 - ▶ Vibration Table 514.6C-VI and Figures 514.6C-3 (1 hour / Axis)
- ▶ 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
 - ▶ CAN Bus
 - ▶ 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

ORDERING

- ▶ 517-121816-L01 – NanoSWITCH 10 Port with VICTORY
- ▶ 517-121816-L02 – NanoSWITCH 16 Port with VICTORY
- ▶ 517-121816-L05 – NanoSWITCH 10 Port
- ▶ 517-121816-L06 – NanoSWITCH 16 Port
- ▶ 517-121816-L09 – NanoSWITCH FLEX 10 Port
- ▶ 517-121816-L10 – NanoSWITCH FLEX 16 Port

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More Information
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