Vessel Systems Local Area Network - Gigabit Ethernet

The Vessel Systems Local Area Network (VSLAN) is a ship-borne data network, that facilitates and manages the transfer of time-critical command and control messages, multimedia streams and background file transfer from many sources to many destinations. The VSLAN architecture supports unicast, broadcast and multicast data transfer types. Optionally it can also provide for network synchronisation and message timestamping as well as sophisticated built-in test and network management.

The VSLAN high overall data throughput performance and reliability.

Apart from ship-borne applications, other typical applications are in real-time vetronics systems as well as tactical command and control systems.

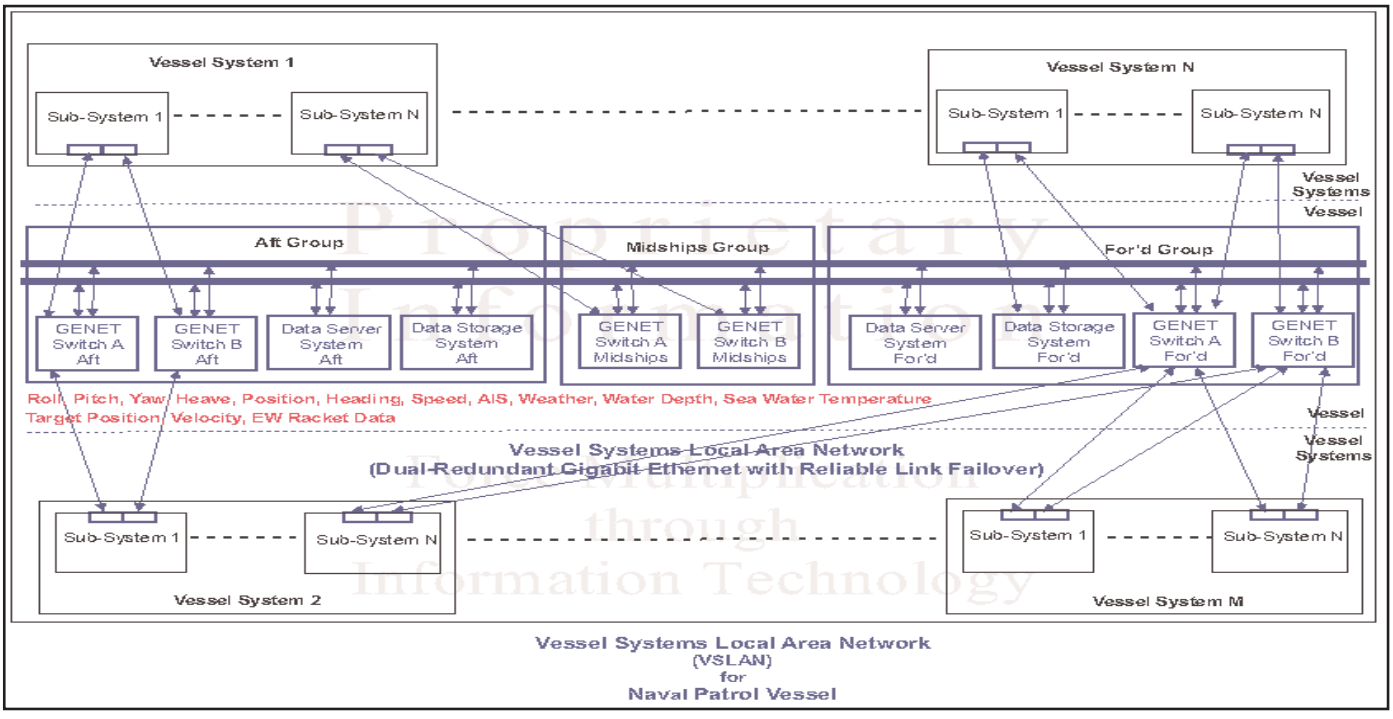
VSLAN Architecture

The Gigabit Ethernet version of the VSLAN (VSLAN-G) employs dual high-speed Gigabit Ethernet (GENET) fibre optic channels in a backbone arrangement connected to pairs of GENET Switches (typically Switch A and Switch B) in turn connected to the system nodes in a dual homed topology. The node-to-switch connections can be using either fibre or copper media and can be dual connected (dual homed) or single connected.

Each node employs a Dual Channel Gigabit Ethernet Adapter which is physically part of the node, but functionally part of the VSLAN.

The GENET Adapter is an intelligent network interface card which offloads processing load from its host processor by performing protocol processing (such as checksumming) as well as implementing reliable link failover through its Reliable Link Management Technology (RLMT) implemented in software. Typically link failover times in the range of 10 milliseconds to 100 milliseconds are achieveable which is adequate for all real-time control applications except fly-by-wire control of dynamically unstable aircraft.

The VSLAN supports the TCP/IP and UDP/IP protocols as standard as well as real-time protocols such as the Real-Time Transport Protocol (RTP) and the Precision Time Protocol (PTP) as optional.



VSLAN-G Architecture

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Functions

Application Interface (optional)

- Application Interface Services (APIS) - Real-Time Message-Oriented Middleware (MOM)

Transfer Control Data

- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)
- Real-Time Transport Protocol (RTP) (optional)
- Xpress Transport Protocol (XTP) (optional)
- Internet Protocol (IP)

Transfer Bulk Data (optional)

- File Transfer Services (FTP)

Network Time Services (optional)

- Precision Time Protocol (PTP) and Packet Timestamping

Network Management Services (optional)

- Built-in Test Services (BITS)
  - LAN Adapters, Cable Plant
- Simple Network Management Protocol (SNMP V2.0)
- Graphical Human-Machine Interface
- Operator-Assisted Trouble-Shooting, Maintenance and Reconfiguration

Operating System Support

- VxWorks, Linux, Windows

Cable Plant

- 50 µm / 125 µm Multimode Fibre Cable Plant (standard)
- 9 µm / 125 µm Singlemode Fibre Cable Plant (optional)
- Dual-Redundant (standard)
- Marinised COTS Switches
- Trunk Coupling Units (optional)

Features

- Fast and Reliable Link Failover
- Multi-Protocol Support
- Multi-Formfactor Support (PMC, PCI-104, PCI)
- NICs in air-cooled and conduction-cooled versions and commercial, industrial and ruggedised grades
- Ruggedised Fibre I/O Connectors (ST)

Performance

- 1 000 Mbps raw bandwidth
- > 900 Mbps node-to-node data throughput (> 1 000 byte messages)
- < 950 µs end-to-end latency (< 1 000 byte messages)
- 30 ms to 100 ms link failover time
- < 250 µs node-to-node synchronisation accuracy (2 σ)