VPX6-688
Gigabit Ethernet Switch

Key Features

- 24 ports of IEEE 802.3 1000BASE-T Gigabit Ethernet
- Fully managed multi-layer switching with CLI, SNMP and web-based interfaces
- Extensive networking feature set for segmentation, filtering, QoS and traffic management
- Optional optical interfaces
- Supports services XMC for routing, security or network services
- Available in standard air-cooled and conduction-cooled rugged form factors

Applications

- Pin-compatible replacement for VPX6-684 Ethernet Switches
- Standards-based connectivity for VPX embedded computing systems
- Robust and secure Ethernet for in-vehicle networks

Overview

The VPX6-688 from Curtiss-Wright is a fully-featured Gigabit Ethernet switch designed to provide a complete networking solution for VPX systems.

Suitable for a wide range of embedded computing and vehicle network applications, the VPX6-688 provides 24 ports of IEEE 802.3 compliant 1000BASE-T Gigabit Ethernet to the backplane. Optional optical interfaces provide four 1000BASE-SX Gigabit links.

The VPX6-688 features a highly integrated enterprise-class switch device that delivers line-rate switching on all ports across all packet sizes. Integrated multi-layer switching software provides an extensive set of features for monitoring and enforcing traffic policies. Management interfaces include a powerful command line interface, SNMP and web-based options. In-band management and networking features provide support for both IPv4 and IPv6.

As more devices and critical systems connect to the network, robust security has become essential. To address this need, the VPX6-688 is designed to address common security requirements, with the ability to disable non-essential services and control management access. Regular maintenance updates to the VPX6-688 networking software serve to address emerging threats.

For connections to external networks, the VPX6-688 can also be configured with an XMC-620 ESR module that provides a fully-featured Cisco® IOS® services router with VPN, firewall and mobile networking capabilities.

Designed from the ground up for superior durability and reliability, the VPX6-688 incorporates Curtiss-Wright's industry-leading hardware design and validation practices to meet the stringent requirements of the most demanding front-line environments.

To support lifecycle extensions and upgrades, the VPX6-688 is a pin-compatible replacement for the earlier VPX6-684 switch products.
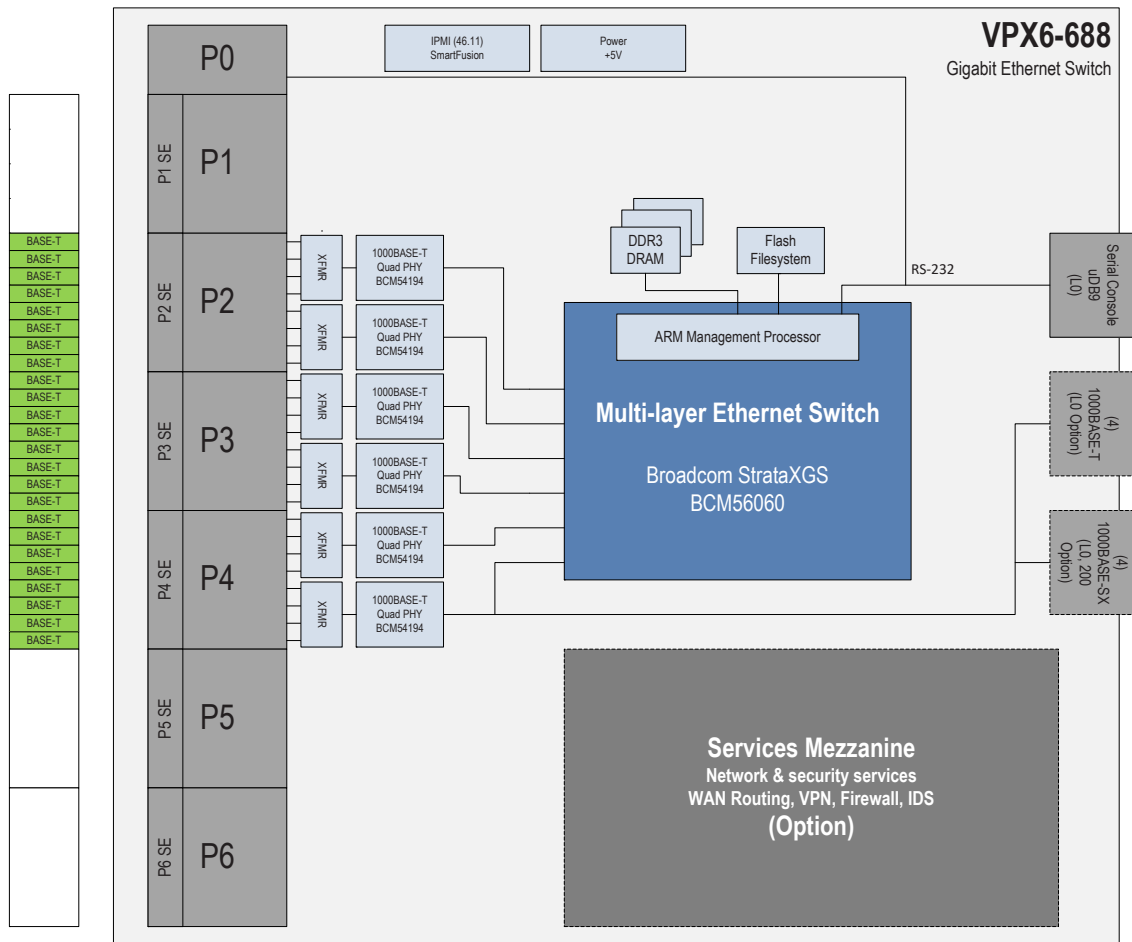
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Figure 1: VPX6-688 block diagram

Features

Ethernet interfaces

- Switch supports up to 24 x Gigabit
- Up to 24 x 1000BASE-T to backplane, with support for 10/100/1000 and auto-negotiation
- Option for 4 x 1000BASE-SX optical interfaces

Forwarding performance

- Line-rate non-blocking at all packet sizes on all interfaces
- 2 MB shared output buffer

Management interfaces

- Powerful command-line interface (CLI) for configuration and monitoring via serial port or SSH on Ethernet interfaces
- Web-based management via HTTPs
- SNMP v3

Multi-layer switching

- 802.1d bridging; STP, RSTP, MSTP
- VLANs
- Link aggregation with LACP
- IP multicast via IGMP, MLD snooping
- QoS and ACLs based on L2-L4 headers
- Multiple queues per port; priority queueing
- Rate limiting and flexible scheduling

Synchronization

- IEEE 1588v2 PTP transparent clock

Routing and security services

- Supports XMC-620 module for Cisco IOS-based firewall, routing and VPN services

Specifications

Form factor

- 6U VPX per VITA 46 / VITA 48
- Air-cooled and conduction-cooled models

Power

- 36W (24 ports 1000BASE-T)

Environmental

Standard Curtiss-Wright ruggedization:

- Air-cooled: Level 0 and Level 100
- Conduction-cooled: Level 200

Backward compatibility

- Pinout matches VPX6-684 to provide a drop-in replacement for full-duplex operation

Boot time (preliminary estimate)

- 30 seconds – fully-managed switching

Ethernet interfaces

- 1000BASE-T Ethernet per IEEE 802.3
- 100BASE-TX per IEEE 802.3
- Energy Efficient Ethernet (EEE) per 802.3az
- 1000BASE-SX per IEEE 802.3 (option)

Management interfaces

- 100BASE-TX Ethernet (maintenance)
- RS-232 Serial Console (contact factory for RS-422/485 option)
- All Ethernet ports (in-band via SSH, HTTPs)

Switching

- Support for jumbo frames 9KB per IEEE 802.3
- Hardware support for up to:
  + 8K MAC addresses
  + 4K VLANs
  + 512 multicast groups

Timing services

- Precision Time Protocol (PTPv2) per IEEE 1588-2008 with transparent clock hardware support in switch and PHY

Services

- DHCP server

Serviceability and monitoring

- Built-in test (PBIT, IBIT)

Switching features

- Bridging per IEEE 802.1d, with support for STP, RSTP, MSTP
- Ethernet priority flow control per IEEE 802.1p
- VLANs per IEEE 802.1q with tagging per IEEE 802.3ac
- Link aggregation per 802.3ad and LACP
- GARP, GMRP and GVRP
- UDLD per RFC 5171

Other Layer 2 features

- Port mirroring

Access control and port security

- Port-based authentication via IEEE 802.1x
- MAC-based access control lists
- DHCP snooping
- Static MAC filtering
- ACLs based on L2-L4

Multicast

- Multicast switching with full-rate replication in hardware
- Multicast distribution management using IGMP snooping per RFC 4541

Quality of Service

- Packet classification based on MAC, IPv4, IPv6, TCP/UDP header fields
- Configurable output queue mapping, priority queues, configurable queue service policies

Administration and monitoring

- RADIUS client & accounting
- RMON
- Access & change logging
- SSH 2.0, SSL, TLS
- Support for multiple admin accounts & privilege levels

SNMP

- SNMP v1, v2c, v3
- Contact Curtiss-Wright for complete table of supported SNMP MIBs

Warranty

- Includes 1 year standard Curtiss-Wright module warranty

Modern Networking for VPX

Developed to connect a new generation of VPX systems, the VPX6-688 delivers high-performance switching and enterprise-class managed networking features with the security and reliability required for today's rugged embedded applications.

The VPX6-688 features a 160 Gbps Broadcom® StrataXGS® switch device that provides rich multi-layer switching features and scalability. Based on a 28 nm process, the switch features an integrated management processor and significantly lower total power consumption than the modules it replaces.

Part of the third generation of Gigabit Ethernet switches from Curtiss-Wright Defense Solutions, the VPX6-688 provides an upgrade path for systems that included the VPX6-684 Gigabit Ethernet switch products. Its updated switching core and integrated software provide new capabilities and improved security with lower total power consumption.

IEEE 802.3 Gigabit Ethernet

To connect between modules and to external systems, the VPX6-688 features up to 24 ports of standards-based Gigabit Ethernet.

Up to 24 ports of 1000BASE-T connect to the backplane, providing robust, high-performance connectivity between processing modules or to external systems. Compliance to the 802.3 standard helps to ensure compatibility with legacy endpoints and provides auto-negotiation to 10/100/1000 Mbps rates. Air-cooled variants are available with 4 ports of 1000BASE-T routed to the front panel.

The 1000BASE-T PHYs used on the VPX6-688 provide several improvements over previous generations of devices. Energy-Efficient Ethernet (EEE) can reduce power consumption when links are idle.

The VPX6-688 is also available with optical interfaces, including 1000BASE-SX for Gigabit Ethernet over multi-mode fiber. Optical interfaces are provided using standard LC connectors on air-cooled models, and rugged pigtails on conduction-cooled models.

High-Performance Switching

The VPX6-688 features a 160 Gbps switching core that provides line-rate, non-blocking forwarding for all packet sizes in all configurations. It performs extensive packet processing in hardware to provide an array of features at full rate without performance degradation.

Powerful Networking Features

In today's embedded systems, a switch must provide more than connectivity – it must ensure secure and reliable forwarding for a variety of applications on a converged network.

Managed networking software integrated on the VPX6-688 provides a rich set of enterprise-class multi-layer switching features. Policy features such as VLANs and ACLs allow traffic to be filtered and segregated. Support for IGMP snooping allows multicast traffic to be efficiently forwarded. Flexible quality of service (QoS) mechanisms can classify traffic to provide priority forwarding to delay-sensitive real-time applications. Port security and 802.1x authentication restrict access to the network to trusted devices.

Secure Management Interfaces

As embedded computers transition from stand-alone appliances to connected systems, the importance of network security continues to grow. The VPX6-688 is designed with cybersecurity in mind and uses a number of approaches to limit and mitigate potential vulnerabilities.

To support both system development and stable deployment, VPX6-688 offers multiple management interfaces for configuring and monitoring its networking features. These administrative interfaces can be individually disabled to limit access, protected with passwords, or secured with standards-based encryption. Hardware write protection features can be used to prevent unauthorized or unintentional modification of the switch configuration. Logging of configuration changes and administrative actions facilitates security audits. Other network services exposed on the switch interfaces can be disabled to further limit potential network threats.

Software Maintenance

To keep pace with emerging requirements and security threats, Curtiss-Wright continues to maintain switch networking software over the full lifecycle of a product. Customers with an active support contract receive access to periodic updates that address potential vulnerabilities and maintain compliance with published specifications.

Time and Synchronization

Maintaining accurate time is essential for many applications, including those that combine data from multiple sensors or connected systems. To enable high-precision synchronization of real-time clocks over the Ethernet network, the VPX6-688 supports the IEEE 1588-2008 Precision Time Protocol. Acting as a transparent clock, the

switch uses hardware timestamps in the switch and its PHY devices to account for the transit time through the network, allowing connected endpoints to synchronize with sub-microsecond precision.

Routing, Security and Network Services

For applications with connections to external networks, the VPX6-688 is available with an XMC-620 secure network services mezzanine. This optional module provides a fully-featured Cisco IOS ESR 5921 edge router. Its feature set includes an extensive list of WAN services including firewall, NAT and VPN gateway with standards-based (Suite B) encryption. It also provides robust dynamic routing protocols designed for scalability and compatibility to enable connections to large-scale wide-area-networks.

QoS and Real-Time Networking

Capable of forwarding at line-rate on all interfaces, the VPX6-688 delivers high performance and low latency for applications with high data rates. For applications where multiple applications share the network, a variety of quality of service (QoS) mechanisms are available to manage congestion and prioritize time-sensitive flows. Hardware parsing allows classification of packets based on L2-L4 headers for. Multiple output queues per port and configurable queue service schemes enable low-latency treatment for high-priority traffic. Rate limiting can be used to police best-effort traffic to enforce partitioning of overall network bandwidth.

Reliability and Serviceability

The VPX6-688 features a comprehensive power-on built-in test (PBIT) suite to detect hardware faults that affect module performance. Additional tests can be initiated (IBIT) while the card is operational.

To support diagnostics and monitoring at the system level, interface status and statistics are available via the management CLI. These vital signs can also be monitored using an array of SNMP MIBs.

Designed for Harsh Environments

Curtiss-Wright modules are designed and manufactured to meet the challenging requirements of military, aerospace and industrial environments and benefit from decades of experience and investment focused on achieving the highest levels of quality and durability.

The VPX6-688 is available in the Curtiss-Wright standard Level 0, Level 100 and Level 200 ruggedization levels.

Accessories for Development

To facilitate system development, the VPX6-688 rear transition module (RTM-688) provides access to all switch Ethernet interfaces, as well as the serial management console and maintenance interfaces.

Ordering Information

To order the VPX6-688, contact your local Curtiss-Wright sales representative or ds@curtisswright.com.