

SVME/DMV-680 SwitchBlade



Overview

Enabling the vision of

Network Centric operations and extending the reach of transformational networks, the VME-680 SwitchBlade is a managed rugged Gigabit Ethernet (GbE) multi-layer switch that is ideally suited for building Intra-Platform Networks (IPNs) for air, land, and sea vehicles. VME-680 SwitchBlade enables fast, reliable, and deterministic forwarding (switching and routing) of control and data packets with up to 24 wire-speed 10/100/1000 Mbps interfaces that can be used to connect multiple chassis, cards, or even processors within platform networks. Using star, dualstar, mesh and hybrid network topologies, the VME-680 SwitchBlade provides a flexible cost effective solution that can be used to architect reliable backbone communications infrastructure for current and future networked platforms. Redundancy and fail-over can be implemented using dualstar and mesh networks while investment dollars can be retained by implementing hybrid network topologies that co-exist with legacy and/or next generation interconnection strategies. Ready to deploy, the Curtiss-Wright Controls Embedded Computing (CWCEC) VME-680 SwitchBlade allows systems integrators to reduce development costs and Time-to-Integration (TTI) by simply plugging the VME-680 SwitchBlade into their 6U VME chassis, connecting the appropriate Ethernet ports, and focusing on the optimal partitioning and segmentation of their application's network.

Features

- Fully managed, intelligent multi-layer (Layer 2/3) GbE switch designed for highest port density in a 6U VME64x form factor
- Supports complete range of convection- and conductioncooled formats (IEEE 1101.1, IEEE 1101.2)
- Data plane designed with dual Broadcom BCM5690 switch chips with up to 24 wire-speed 10/100/1000 Mbps non-blocking, auto-negotiating ports
- Flexible fast Ethernet, GbE and fiber optic port combinations with the RazorBlade Expansion Module
- Control and management functionality provided through a Freescale Power Architecture MPC8245 integrated system controller with 64 MB SDRAM, 4 MB boot flash, 32 MB flash file system disk
- Supports both in-band management through any of the 24 ports, and out-of-band management through a serial RS-232/RS-485 interface and a 10/100Base-TX debug Ethernet interface
- Fully integrated Layer 2 switching, Layer 3 routing, QoS, IP multicast, security and network management. Intuitive CLI, Web interface, SNMP interface and Telnet access for easy configuration and network management
- RTM with up to 24 RJ45 ports for easy network setup and lab development
- Front panel LED status indicator provides per port link speed (10, 100 or 1000 Mbps) and per-port link activity (receive or transmit)

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Figure 1: SVME/DMV-680 Hardware Block Diagram

Designed for Maximum Performance

Allowing system integrators to develop and deploy switchfabric based architectures today, the VME-680 SwitchBlade provides a completely integrated and unified management, control, and data plane solution for wire-speed performance of switched GbE traffic. Whether its small medium or larger IPNs, the VME-680 provides unique port combinations that scale from 12-, 20- and 24-port versions.

The VME-680 SwitchBlade is comprised of a basecard (Figure 1) with either 12 or 20 GbE interfaces, a processor PMC that provides control and management functionality, optional RazorBlade port expansion modules that provide four additional Ethernet interfaces (provides full 24 ports in single VME slot), a Rear Transition Module (RTM) for easy RJ45 connectivity in the lab, and an LED front panel indicator for port status and activity. On the 12-port version of the VME-680 SwitchBlade, only one switch chip is required, thus saving power and price while maintaining the same performance for small network applications. On 20- and 24-port versions of the VME-680 SwitchBlade, two BCM5690's are stacked using a HiGig[™] 10 Gbps XAUI interface allowing two 12-port BCM5690 switch chips to effectively act as a combined single 24-port switching solution.

Based on the industry leading Broadcom[®] BCM5690 multi-layer switch, the VME-680 SwitchBlade data plane is capable of providing up to 24 10/100/1000 Mbps Ethernet ports with 64 million packets/second (line rate) aggregate switching capacity. The key features at the core of each BCM5690 that facilitate low latency wire-speed performance include 1 MB of high-speed fully integrated on-chip packet buffer memory, fast filter processors (FFP) per port, and advanced packet flow control capability per port.



Basecards with Flexible Expansion Capability

The VME-680 SwitchBlade was designed from the ground up to maximize the number of GbE channels within a single VME64x chassis while keeping port combination flexibility in mind. The base card will support various port combinations as listed in the table below (Table 1).

Total Port Count	Basecard GbE (rear)	RI Fast Ethernet (rear)	RII GbE (front)	RIII Fiber Optic-SX (front)	RIV Fiber Optic-LX (front)
12	12	-	-	-	-
20	20	-	-	-	-
24	20	4	-	-	-
24	20	-	4	-	-
24	20	-	-	4	-
24	20	-	-	-	4
Routing	P2 & P0	P1	Front Panel	Front Panel	Front Panel

Table 1: VME-680 SwitchBlade Port Combinations

Both the 12- and 20-port versions of the VME-680 SwitchBlade route all GbE interfaces to the backplane (Rear Panel I/O) over P2 and P0 connectors. Each copper GbE interface is fed through integrated Quad BCM5464 PHY transceivers that are compliant to IEEE 802.3i (10Base-T) 802.3u (100Base-TX), 802.3ab (1000Base-T) standards. The copper transceivers support MDI/MDX cross over which has the capability of ensuring correct interface operation in the chance that Rx and Tx wiring is crossed. Additionally, Semtech SIVU28-8 transient voltage suppressors are used on all GbE interfaces to protect low voltage, state of the art CMOS semiconductors from transients caused by electro static discharge (ESD), cable discharge events (CDE), lightening and other induced voltage surges.

Figure 2: RazorBlade III provides four 1 GbE Fiber Optic 1000Base-SX interfaces and extends the VME-680 SwitchBlade to a full 24 GbE ports within a single VME slot.



The 20-port version of the VME-680 SwitchBlade can be extended to 24 ports with one of the various RazorBlade Port Expansion Modules as described below and in Tables 1 & 2.

RazorBlade I extends the VME-680 SwitchBlade with four Fast Ethernet interfaces through the backplane over the VME P1 connector without interfering with any VME signaling. Each Fast Ethernet interface requires two pair copper wires (four pins per interface, 16 pins total) and can be routed to P1 without interfering with any VME signals.

RazorBlade II extends the VME-680 SwitchBlade with four GbE interfaces. Since each GbE interface requires four pair category 5 copper wires (eight pins per interface, 32 pins total) and it cannot be routed to the backplane over P1 due to VME signaling conflicts - hence these interfaces are routed to the front.

RazorBlade III extends the VME-680 SwitchBlade with four optical fiber SX interfaces out the front (Figure 2). Using the Stratos Lightwave LTK-ST11H tranceivers, the IEEE 802.3z 1000Base-SX standard is fully supported.

RazorBlade IV extends the VME-680 SwitchBlade with four optical fiber LX interfaces out the front. Using the Stratos Lightwave LTKST12H tranceivers, the IEEE 802.3z 1000Base-LX standard is fully supported.

A single part number can be used to order a combined VME-680 SwitchBlade solution with the appropriate RazorBlade module preinstalled from the factory.

Intelligent Control and Management Capability

The control and management functionality on the VME-680 SwitchBlade is provided through a processor PMC that uses a Freescale[™] Power Architecture[™] MPC8245 integrated host processor, 64 MB SDRAM, 4 MB boot flash, 32 MB Flash File System Disk, real-time clock (RTC), out-of-band 10/100 debug port, and an RS-232/485 selectable serial interface (Figure 3). The MPC8245 host processor connects to single or dual BCM5690 switch chips on the basecard via the PMC connector through a 32-bit PCI bus. Any control, management or exception packets that the BCM5690 switch chips cannot handle get routed to the PMC8245 where they are handle in user-configured software policies and protocols. Additionally, systems



integrators can use the PrPMC to manage and configure the BCM5690 switch chips through serial and Ethernet interfaces.

Figure 3:	The VME-680	SwitchBlade	MPC8245-based
processor	PMC		

Table 2: RazorBlades I, II, III,	and IV Specification Summary
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ltem	RazorBlade I	RazorBlade II	RazorBlade III	RazorBlade IV
Card Format	XMC	XMC	XMC	ХМС
Transceiver	BCM5464	BCM5464	LTK-ST11H*	LTK-ST12H*
Interface Type	10Base-T, 100Base-TX	10Base-T, 100Base-TX, 1000Base-T	1000Base-SX	1000Base-LX
Optical Wavelength	N/A	N/A	850 nm	1310 nm
Optical Transmission	N/A	N/A	VCSEL	FP Laser
Optical Fiber Type	N/A	N/A	Multi-mode	Single-mode
Connection Interface	P1	RJ45 (front)	Duplex LC (front)	Duplex LC (front)
Distance	Up to 100 m	Up to 100 m	Up to 500 m	Up to 10 Km

Note: Depending on level of environmental requirements or availability, some part numbers may be different from this datasheet.



Complete Integrated Software Solution

The VME-680 SwitchBlade provides extensive pre-integrated software that runs on its processor PMC. Major software components include the full suite of Layer 2/3 software protocols required for intelligent switching and routing of IP packets (Figure 4).



Figure 4: The VME-680 SwitchBlade Software Block Diagram



Systems Integrators can plug the VME-680 into their VME64x chassis and focus on architecting their network through one of may intuitive management interfaces (Table 3) and (Figure 5).

Table 3: Management Interfaces and Connection Strategies

Interface	Connection	Client
СШ	-RS232/485 -Any in-band Ethernet port	Terminal Program Telnetl
Web	Any in-band Ethernet port	Web browser
Network Management Station (NMS)	Any in-band Ethernet port	Standard off-the-shelf NMS software





Accessories

For building networks in the lab environment, CWCEC provides a VME-680 SwitchBlade RTM that plugs into the backside of the VME64x backplane and provides up to 24 ports of RJ45 connectors (Figure 6). Two version of the RTM are available, one with a P1 connector (supports full 24 in-band RJ45 ports) and one without a P1 connector (supports 20 in-band RJ45 ports). Both RTMs can support the 12-port versions of the VME-680 SwitchBlade. Both RTMs also provide one RS-232/485 port, one 10/100 RJ45 out-of-band debug port, and a reset switch. An LED front panel indicator is include in all air-cooled versions of the VME-680 SwitchBlade cards. For conductioncooled versions, the LED front panel mezzanine connects to the outside of the thermal frame and is sold separately.

Figure 6: VME-680 SwitchBlade Accessories (RTM and LED)





Specifications Summary

Table 4: Summary of Hardware Specifications

Specification	Description
Switching Solution	Single or dual Broadcom BMC5690
Management/Control Processor	MPC8245 PowerPC on PMC
Memory	64 Mbyte SDRAM with ECC, 4 Mbyte boot flash, 32 MB Flash File System Disk
Ethernet Ports	Up to 24 ports (see Table 1)
Serial Port	1x serial COM port
Debug Port	1x Ethernet port, 1x JTAG connector
Physical Interfaces	Up to 6x BCM5464
Reset Switch	Switch resetable through backplane
LEDs	Status and activity for each port
Power	28 W (12 ports), 37 W (20 ports), 45 W (24 ports)
Form Factor	6U VME64x (160 mm x 233 mm)
Ruggedization	Conduction- or convection-cooled



Table 5: Summary of Software Specifications

RTOS	
VxWorks + BSP + CWCEC BIT	N/A
IP	
IPv4	RFC 791
TCP	RFC 793
UDP	RFC 768
Telnet Server	RFC 854, 855, 856, 858
TFTP Client	RFC 1350
ICMP	RFC 2521, 1191, 1788, 792
Ethernet ARP	RFC 826
BootP Client	RFC 951
IGMP Router	RFC 2236
DHCP Client/ Server/Relay Agent	RFC 2131
Switching & VLAN	
VLAN	IEEE 802.1Q
Port, MAC, IVL, SVL VLANs	IEEE 802.1Q
GVRP/GMRP Support	IEEE 802.1D
Spanning Tree Protocol	IEEE 802.1D
Rapid Spanning Tree Protocol	IEEE 802.1w
Multiple Spanning Tree Protocol	IEEE 802.1s
IGMP Snooping	
Link Aggregation	IEEE 802.3ad
Routing	
Static Routing	RFC 1812
RIP v1/v2	RFC 2453, 2091, 2082
OSPFv2	RFC 1765, 1793, 2328, 2370
Inter VLAN Routing	

Multicasting	
PIM-SM	RFC 2362
PIM-DM	Draft pimv2 dmv3
QoS	
Priority Based Switching	IEEE 802.1p
Diffserv Support	
Security	
Port Based Authentication with EAP	IEEE 802.1x
Radius Client	RFC 2138
Management & Admir	histration
SNMP v1/v2c/v3	RFC 1155, 1157, 1215, 1905
CLI (Telnet and Console)	
Web UI (Embedded HTTP Server)	RFC 1945
TLS Protocol	RFC 2246
SSL Protocol	Draft
SSH Protocol Architecture	Draft
SSH Transport Layer Protocol	Draft
SSH Authentication Protocol	Draft
SSH Connection Protocol	Draft
MIB Save/Restore Using Flash	
MIB Save/Restore Through TFTP	
Traceroute Logging	
Logfile Upload to Remote System	

MIB Support	
MIB II	RFC 1213
MIB II for SNMPv2c	RFC 1907
Interface Group MIB	RFC 2233
Bridge MIB	RFC 1493
VLAN MIB	RFC 2674
Spanning Tree Protocol MIB	RFC 1493
Rapid STP MIB	Draft/Prop MIB
Multiple STP MIB	Prop MIB
Link Aggregation MIB	IEEE 802.3ad
Port-based Network Authentication Control MIB	IEEE 802.1X
Ethernet-like Interfaces MIB	RFC 2665
IPv4 MIB	RFC 2011, 2013, 2096, Prop MIB
DHCP	Prop MIB
RIP v1/v2 MIB	RFC 1723, 1724, 2453, Prop MIB
Radius Client MIB	RFC 2618
OSPFv2 MIB	RFC 1850
PIM MIB	RFC 2934
Statistics	
RMON (1, 2, 3 & 9 groups)	IEEE 2819
Port Mirroring	
Other	
Broadcast Storm Control	RFC 1213
Stacking Support	RFC 1907

Note: Not all RFCs may be listed here. Please contact your local Sales Representative for complete RFC information.



Ruggedization Levels

SVME card

Available in Levels 0 and 100 (required airflow is 10 cfm at sea level)

DMV card

Available in Levels 100 and 200

Unless otherwise noted environmental tolerance is as defined in CWCEC's Ruggedization Guidelines factsheet.

Part Numbers

Check with your local CWCEC representative for availability for specific part numbers.



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Warranty

This product has a one year warranty.

Contact Information

To find your appropriate sales representative, please visit: Website: <u>www.cwcembedded.com/sales</u> Email: sales@cwcembedded.com

Technical Support

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