SwitchX™ Virtual Protocol Interconnect® Converged Switch–Silicon IC Device

36-port Switch-Router Device Provides Leading FDR 56Gb/s InfiniBand, 40 Gigabit Ethernet and Fibre Channel Throughput
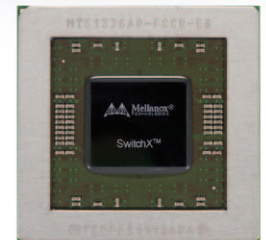
Mellanox continues its connectivity leadership by providing the highest performing server and storage system interconnect solution for Enterprise Data Centers, Cloud Computing, High-Performance Computing, and embedded environments.

SwitchX, the fifth generation switching IC from Mellanox, further improves the company's tradition of leading bandwidth, low-latency, and scalability by integrating Virtual Protocol Interconnect (VPI) technology - allowing InfiniBand, Ethernet and Fibre Channel traffic to exist on a single 'one-wire' fabric. The industry-leading integration of 144 SerDes which are flexible enough to run 1 Gigabit to 14 Gigabit speeds per lane, independent of network protocol, makes SwitchX an obvious choice for OEMs that must address end-user requirements for faster and more robust applications. Reduced power, footprint and a fully integrated PHY capable of connectivity across PCBs, backplanes as well as passive and active copper/fibre cables allow interconnect fabrics based on SwitchX to be utilized by network architects deploying leading, fabric-flexible computing and storage systems with the lowest TCO.

FDR

InfiniBand FDR technology moves from 8b10b encoding to more efficient 64/66 encoding while increasing the per lane signaling rate to 14Gb/s. Using FDR 4x ports and Mellanox ConnectX® family of InfiniBand adapters, users can increase end-to-end bandwidth up to 85% over previous QDR solutions. Mellanox end-to-end systems can also take advantage of the efficiency of 64/66 encoding on 4x10Gb/s links using Mellanox FDR-10.

HIGHLIGHTS

- Industry-leading Cut Through Latency
- I/O Consolidation
  - *IB and IP Routing*
  - *Ethernet and FC Gateways*
- Virtualization Support
  - *VEB, VEPA (+), Port Extender*
- Data Center Bridging (DCB)
  - *PFC, DCBX, ETS*
- Low Cost Solution
  - *Single-Chip Implementation*
- Fully Integrated Phy
  - *Backplane and cable support*
  - *1, 2 and 4 Lane*
- Up to 4Tb/s switching capacity
- Flexible Port Configurations
  - *Up to 36, 56Gig IB, 40GigE Ports*
  - *Up to 64 10GigE Ports*
  - *Up to 24 2/4/8Gig FC Ports*
- Adaptive Routing
- Congestion Control
- Quality of Service 802.1p, DIFFSERV
- Switch Partitioning
- Multichip Support
  - *All ports support stacking*
  - *Management across multiple devices*
- Energy Efficient Ethernet
- IEEE 1588 Clock Synchronization
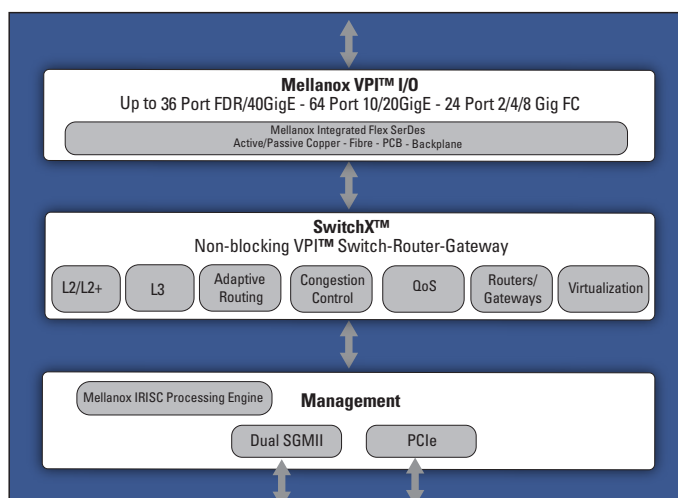- Active Power Governor

Mellanox VPI™ I/O
Up to 36 Port FDR/40GigE - 64 Port 10/20GigE - 24 Port 2/4/8 Gig FC

Mellanox Integrated Flex SerDes
Active/Passive Copper - Fibre - PCB - Backplane

SwitchX™
Non-blocking VPI™ Switch-Router-Gateway

| L2/L2+ | L3 | Adaptive Routing | Congestion Control | QoS | Routers/Gateways | Virtualization |

Mellanox IRISC Processing Engine **Management**

Dual SGMII | PCIe

Figure 1: *Mellanox SwitchX Architecture*

Virtual Protocol Interconnect (VPI)

SwitchX VPI devices enable industry standard networking, clustering, storage, and management protocols to seamlessly operate over a single "one-wire" converged network. With auto-sense capability, each SwitchX port can identify and operate InfiniBand, Ethernet, Data Center Bridging (DCB) or Fibre Channel protocol. Combined with Mellanox's ConnectX family of VPI adapters, on-the-fly fabric repurposing can be enabled for Cloud, Web2.0, EDC and Embedded environments providing "future proofing" of fabrics indpendent of protocol.

Configurations

SwitchX allows OEMs to deliver:
– 36 Port 1U FDR IB switch
– 36 Port 40GigE or 64 Port 10GigE L2, L2+ and L3 switch
– 48 Port 10GigE to 12 Port 40GigE Top-of-Rack switch
– Blade switches for converged fabrics
  – (16 - 40GigE to servers, 12 - 10GigE to LAN, 8 - 8G FC to SAN and 2 - 40GigE stacking ports)
– Modular switch chassis up to 648 56G IB/40GigE ports

Switch Product Development Platforms

The SwitchX Evaluation Board (EVB) and Software Development Kit (SDK) are available to accelerate OEMs' time to market and for running benchmark tests. These rack mountable systems are available with a mix of QSFP and SFP+ connector for verifying InfiniBand, 10GigE, 40GigE and Fiber Channel functionality. In addition, SMA connectors are available for SerDes characterization.

Mellanox Advantage

Mellanox is the leading supplier of industry standard InfiniBand and Ethernet HCA, NIC and switch silicon. Our products have been deployed in clusters scaling to thousands-of nodes and are being deployed end-to-end in data centers and Top500 systems around the world.

HARDWARE

INFINIBAND
– IBTA Specification 1.2.1 compliant
– 10, 20, 40 or 56Gb/s per 4x port
– Integrated SMA/GSA
– Hardware-based congestion control
– 256 to 4Kbyte MTU
– 9 virtual lanes: 8 data + 1 management

ENHANCED INFINIBAND
– IB to IB Routing
– Hardware-based adaptive routing
– Up to 8 subnets/switch partitions
– Fine grained end-to-end QoS
– Port mirroring
– Supports Jumbo frameup to 10KB

ETHERNET
– 1, 10, 20 and 40Gb/s
– DCB (PFC, ETS, DCBX)
– FCoE

COMPATIBILIITY

CPU
– PowerPC, IntelX86, AMDX86 and MIPS

PCI EXPRESS INTERFACE
– PCIe Base 2.0 compliant, 1.1 compatible
– 2.5GT/s or 5GT/s link rate x4

CONNECTIVITY
– Interoperates with InfiniBand, Ethernet and Fiber channel adapters and switches
– Drives active/passive copper cables, fiber optics, PCB or backplanes

MANAGEMENT AND TOOLS
– Supports Mellanox UFM and IBTA compliant Subnet Managers
– Diagnostic and debug tools

I/O SPECIFICATIONS
– 36 4x SDR/DDR/QDR/FDR InfiniBand ports, 36 40GigE ports, 64 10/20GigE ports, 24 2/4/8Gig FC ports or a combination of port types
– PCI Express 2.0 x4 5GT/s (1.1 compatible)
– SPI Flash interface, I^{2}C
– IEEE 1149.1 boundary-scan JTAG
– Link status LED indicators
– General purpose I/O
– 45 x 45mm FCBGA

Ordering Part Number	InfiniBand 4X Port Speed	Typical Power
MT51236A0-FCCR-F	SwitchX, 36 Port FDR Switch IC	72W
MT51336A0-FCCR-F	SwitchX 36 Port VPI FDR/40GigE Switch IC	72W
MT51336A0-FCCR-Q	SwitchX 36 Port VPI QDR/10GigE Switch IC	55W