

BROCADE MLX 20-PORT 10 GBE MODULE

HIGH- PERFORMANCE ROUTING

Flexible Scale and Wire-Speed Throughput with Uncompromised Feature Set

HIGHLIGHTS

- Maximizes performance and investment protection for new software capabilities at scale with a programmable architecture built on Brocade VersaScale Packet Processor technology
- Delivers 400 Gbps of throughput per half-slot module with full Layer 2, IPv4, IPv6, Multi-Protocol Label Switching (MPLS), and OpenFlow performance
- Provides unmatched scalability and flexibility with 640 wire-speed 10 Gigabit Ethernet (GbE) or 1 GbE (combo) ports in a single chassis and support for up to 2 million IPv4 routes and 800,000 IPv6 routes
- Delivers integrated hardware support for OpenFlow 1.3 in the industry's only true hybrid port mode, enabling Software-Defined Networking (SDN) for increased agility and programmatic control of the network
- Is hardware-enabled for industry-standard MAC security (MACsec) and MACsec Key Agreement (MKA), enabling data privacy with support for flexible policy application on customer-owned networks
- Provides a scalable and flexible solution for Internet service provider networks, cloud data center cores and borders, High-Performance Computing (HPC) networks, secure campus cores, and mobile and data center visibility applications

Networks today are straining to support unprecedented levels of traffic due to high-bandwidth demands for on-demand personalized content. Leading-edge services such as high-definition video streaming, mobile broadband, and cloud services have significantly altered network traffic behavior. Instead of localized flows with occasional bursts, traffic flows are more collaborative over geographical distances and last longer. These new traffic patterns not only consume enormous amounts of network capacity, but also add a greater degree of complexity to network operations. Additionally, as many organizations look to offer IT services via the cloud, the need for networks to be cloud-optimized and cloud-ready is pressing. As a result, today's network planners are seeking solutions that provide the right mix of scalability, performance, and operational simplicity.

The Brocade® MLX® half-slot 20-port 10 GbE/1 GbE combo module for Brocade MLXe Core Routers delivers 40 to 400 Gbps of throughput per half-slot module without compromising the performance of features such as Layer 2, IPv4, IPv6, Multi-Protocol Label Switching (MPLS), OpenFlow-based Software-Defined Networking (SDN), and MAC security (MACsec). The 10 GbE/1 GbE combo ports deliver flexibility and scalability by enabling up to 640 ports of wire-speed 10 GbE or 1 GbE in a single chassis. This high-density half-slot module also uses less infrastructure to deliver services by helping to collapse network architectures, vastly improving operational efficiency and helping to reduce costs. In addition, the Brocade MLX 20-port 10 GbE/1 GbE half-slot module comes in two versions, offering a flexible scale-as-you-grow model with hardware Forwarding Information Base (FIB) capacity



options in an –M version for up to 512,000 IPv4 routes or 240,000 IPv6 routes, or an –X2 version for up to 2 million IPv4 routes and 800,000 IPv6 routes.

ENSURING DATA PRIVACY THROUGH HIGH-PERFORMANCE ENCRYPTION

Today’s organizations face a wide range of data privacy challenges, from cyber attacks and third-party snooping on private networks, to compliance and regulatory requirements. Ensuring data privacy throughout the network is therefore imperative as organizations seek to enable secure operations while increasing growth, productivity, and profitability. To address this, the Brocade MLX 20-port 10 GbE module supports IEEE 802.1AE MACsec, which provides 128-bit MAC layer encryption at wire speed. MACsec provides fast, low-latency, easy-to-deploy hop-by-hop encryption, which is ideal within the campus or data center network where the physical network is owned and there is a need to support unified communications and apply policy to traffic at the switch or router level. This allows for fine-grained management of the traffic while meeting security requirements for data-in-flight.

BROCADE VERSASCALE PACKET PROCESSOR

The Brocade MLX 20-port 10 GbE module is built on the Brocade VersaScale-200 Packet Processor. The processor is designed to enable service innovation through programmability and flexibility without sacrificing performance. The Brocade VersaScale-200 provides leading density, zero-packet loss, and line speed for all packet sizes—supporting up to 16,000 simultaneous hardware-multicast entries at line rate. The processor provides extremely deep packet buffering to handle the dynamic traffic. In addition, it supports large-scale Equal-Cost Multi-Pathing (ECMP) for 32 IPv4 or IPv6 paths, which is ideal for cloud service providers and Web 2.0 companies that need scalable solutions to handle explosive bandwidth growth and to optimize the core for efficient packet transport.

The Brocade VersaScale-200 has distributed network processing and advanced Quality of Service (QoS) capabilities, helping providers tighten their Service Level Agreements (SLAs) for traditional and value-add cloud services.

As demands for network virtualization through SDN increase, the ability to easily add new services becomes vital. The Brocade VersaScale-200 is SDN-enabled with OpenFlow support today, and field upgradable for future versions of OpenFlow and other overlay technologies.

BROCADE GLOBAL SERVICES

Brocade Global Services has the expertise to help organizations build scalable, efficient cloud infrastructures. Leveraging 15 years of expertise in storage, networking, and virtualization, Brocade Global Services delivers world-class professional services, technical support, and education services, enabling organizations to maximize their Brocade investments, accelerate new technology deployments, and optimize the performance of networking infrastructures.

AFFORDABLE ACQUISITION OPTIONS

Brocade Capital Solutions helps organizations easily address their IT requirements by offering flexible network acquisition and support alternatives. Organizations can select from purchase, lease, Brocade Network Subscription, and Brocade Subscription Plus options to align network acquisition with their unique capital requirements and risk profiles. To learn more, visit www.Brocade.com/CapitalSolutions.

10/1 GBE PORT DENSITY ON BROCADE MLX SERIES ROUTERS

Brocade MLXe Chassis	Wire-Speed 1 GbE Ports	Wire-Speed 10 GbE Ports
Brocade MLXe-4	80	80
Brocade MLXe-8	160	160
Brocade MLXe-16	320	320
Brocade MLXe-32	640	640

BROCADE MLX 20-PORT 10 GBE MODULE SPECIFICATIONS

Item	Maximum Scalability per –M Module	Maximum Scalability per –X2 Module
MAC entries	256,000	512,000
IPv4 routes	512,000	2,400,000
IPv6 routes	240,000	1,800,000
Bandwidth per half-slot	400 Gbps	400 Gbps
Virtual Output Queues (VOQ)	32,000	32,000
Multicast groups	16,000	16,000
Switch fabric modes	Normal and turbo	Normal and turbo
OpenFlow flows	32,000	64,000

MAXIMIZING INVESTMENTS

To help optimize technology investments, Brocade and its partners offer complete solutions that include professional services, technical support, and education. For more information, contact a Brocade sales partner or visit www.brocade.com.

SOFTWARE FEATURE HIGHLIGHTS

Comprehensive IPv4/IPv6 and

Layer 2 support:

- High-performance, robust routing using Forwarding Information Base (FIB) programming in hardware
- RIP/RIPng, OSPF/OSPFv3, IS-IS/IS-IS for IPv6, and BGP-4/BGP-MP for IPv6
- Secure Multi-VRF routing for supporting virtual routing applications over non-MPLS backbones
- VRRP and VRRP-E
- Connecting IPv6 islands over IPv4 MPLS using IPv6 Provider Edge (6PE) routers
- 6VPE enabling IPv6 multitenancy to the edge of the cloud
- BFD Holdover for OSPFv2/3 and IS-IS
- BFD for Static Routes
- BFD for OSPFv3
- ND6 IPv6 Prefix Suppress
- IS-IS Graceful Restart Helper Mode
- 127-Bit IPv6 Interface Addresses

Software-Defined Networking (SDN):

- OpenFlow 1.3: QoS (for metering and enqueue), Group Table (select and fast failover), QinQ (TAG type auto-recognition), Active-Standby Controller, IPv6, Transport Layer Security (TLS) 1.2 (controller interface)
- Brocade OpenFlow in hybrid port mode with support for sFlow, IP, and MPLS/VPLS (uplinks) with protected VLAN for additional flexibility
- Up to 64,000 flows per module (-X2)
- 12-tuple matching for a diverse set of applications

MPLS support:

- IPoMPLS
- MPLS VPNs: L3 VPNs, L2 VPNs (VPLS, VLL)
- BGP auto-discovery for VPLS endpoints
- MPLS-PBB- (B-VID + I-SID) based interworking
- MPLS over GRE
- BFD for RSVP-TE LSPs
- LDP Inbound and Outbound FEC Filtering
- RSVP Liberal Bypass LSP Selection
- Link Protection Request for RSVP Fast Reroute
- RSVP Hello Messages for Neighbor Failure Detection
- RSVP TE Link Metric for CSPF Computation
- Static Route over RSVP LSP
- Inter-VRF routing with MPLS LSP and MPLS VPN
- Multi-Chassis Trunking (MCT) support for routing over VPLS
- Map a VLL to a specific group of LSPs

Phenomenal scale:

- Carrier trunks: Advanced LAG, ECMP, LSP load balancing
- Terabit trunks with 64×10 GbE LAG

Comprehensive OAM support:

- 802.1ag, Y.1731, 802.3ah, UDLD
- BFD for BGP, OSPF, IS-IS, RSVP LSPs
- Fine-grained timers (3.3 ms) with 802.1ag

Advanced resiliency:

- NSR for OSPF, IS-IS, multicast
- Graceful Restart for BGP, OSPF
- In-Service Software Upgrades (ISSU)

Scalable Carrier Ethernet:

- MEF 9, MEF 14 compliant
- G.8032 v1/v2 for ring resiliency
- MRP (Metro Ring Protocol)
- Virtual Switch Redundancy (VSRP)
- MCT
- Provider Backbone Bridging (PBB)

Advanced visibility, statistics:

- sFlow for granular network traffic accounting
- sFlow support for MPLS LSR and LER interfaces
- Flow- and port-based mirroring
- Per-queue counters
- Per-VLAN, port+VLAN, per-VE counters
- GTP session-based filtering and load balancing

Queuing:

- Virtual Output Queuing (VOQ) architecture

Encryption:

- IEEE 802.1AE: Media Access Control Security (MACsec)

HARDWARE COMPONENTS*

- Idle power consumption: 268 W
- Typical power consumption: 315 W
- Maximum power consumption: 440 W

*Under worst-case conditions, BR-MLX-10GX20-M/-X2 will operate up to 45 C° at sea level, or 35 C° at 3 km. All fans need to be installed and running.

PRODUCT SUPPORT FOR OPTICS WITH KEY STANDARDS AND FEATURES

Optic Type	IEEE Standards	Domestic Safety Standards	International Safety Standards	Wavelength (nm)	Fiber Type	Maximum Cable Distance	Digital Optical Monitoring
1 GbE Optics							
E1MG-SX-OM	802.3z	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	220 m to 550 m	Yes
E1MG-LX-OM	802.3z			1,310	MMF/SMF	550 m to 10 km	Yes
E1MG-LHA-OM	802.3z			1,550	SMF	70 km	Yes
E1MG-LHB	802.3z			1,550		150 km with 0.18 dB/km cable, 91 km with standard 0.3 dB/km cable	No
E1MG-BXD	802.3ah			TX: 1,490 RX: 1,310		10 km	No
E1MG-BXU	802.3ah			TX: 1,310 RX: 1,490		10 km	No
E1MG-CWDM80-XXXX	802.3z			1,470 to 1,610	80 km	No	
E1MG-TX	802.3z	CSA 60950-1-03/UL	EN 60950-1	N/A	Cat5	100 m	N/A
10 GbE Optics							
10G-XFP-SR	802.3ae	FDA 21CFR 1040.10 Class 1, CSA 60950-1-03/UL 60950-1	EN 60825-1, EN 60950-1	850	MMF	26 m to 300 m	Yes
10G-XFP-LR	802.3ae			1,310		10 km	
10G-XFP-ER	802.3ae			1,550		40 km	
10G-XFP-ZR	802.3ae			1,550		80 km	
10G-XFP-ZRD	802.3ae			1,528.77 to 1,561.42	80 km		
10G-SFPP-USR	N/A			850	MMF	100 m	
10G-SFPP-SR	802.3ae			850	MMF	26 m to 300 m	
10G-SFPP-LR	802.3ae			1,310	SMF	10 km	
10G-SFPP-ER	802.3ae			1,550	SMF	40 km	
10G-SFPP-ZR	802.3ae			1,550	SMF	80 km	
10G-SFPP-ZRD-T	802.3-2005 Clause 52 standard			102 C-band tunable wavelengths from 1,528 to 1,568 (50 GHz apart)	SMF	80 km	
10G-SFPP-LRM	802.3ae			1,310	MMF	220 m	
10G-SFPP-TWX-XXXX	802.3ae	Direct-attached SFP+ Twinax copper cables				1 m, 3 m, 5 m	No
10G-SFPP-AOC-XXXX	N/A	Direct-attached SFP+ active optical cables				7 m, 10 m	No

BROCADE MLX 20-PORT 10 GBE MODULE ORDERING INFORMATION

Part Number	Description
BR-MLX-10GX20-X2	Brocade MLX 20-port 10 GbE/1 GbE (X2) SFP+ and SFP combo module. Extended route table support for up to 2 million IPv4 routes or 1.8 million IPv6 routes.
BR-MLX-10GX20-M	Brocade MLX 20-port 10 GbE/1 GbE (M) combo module. Supports SFP+ and SFP with 512,000 IPv4 routes or 240,000 IPv6 routes in FIB.

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