BROCADE NETIRON XMR 4000, 8000 16000, 32000

CARRIER-CLASS ROUTING

IPv4/IPv6/MPLS Multi-Service Backbone Routers

HIGHLIGHTS

- Provides 4-, 8-, 16-, and 32-slot high-end IPv4/IPv6/MPLS multi-service routers
- Leverages terabit-scale architecture, offering up to 3.2 Tbps data capacity and approximately 2 billion pps per system
- Provides up to 16 100 GbE, 256 10 GbE, 768 1 GbE, 64 OC-192, or 256 OC-48 ports per system
- Provides wire-speed IPv4, IPv6, and MPLS forwarding performance with 1 million FIB entries
- Delivers high-capacity MPLS Layer 2/3 VPNs and IP over MPLS routing
- Enables virtual routing in non-MPLS environments via Multi-VRF
- Provides highly resilient architecture with redundant management modules, switch fabrics, power supplies, cooling, and hitless failover

The Brocade One™ strategy helps simplify networking infrastructures through innovative technologies and solutions. The Brocade NetIron XMR Series supports this strategy by enabling higher network performance and scalability with the best price/performance, helping service providers transform their businesses with new, high-value cloud-based services.

Today's service providers face market challenges that require a new breed of solutions to ensure successful and profitable operation. Service providers operate in an environment of fierce competition that continues to drive service pricing down. A smooth introduction of new, reliable, and scalable services is difficult for many service providers; yet, it is crucial to expanding the subscriber base and improving subscriber retention. Adding to these challenges is an exponential growth trend in Internet traffic that continues to erode network capacities. Furthermore, ensuring and increasing profitability, which require controlling Capital Expenditures (CapEx) and Operational Expenditures (OpEx), are key goals for any service provider.

Brocade® NetIron® XMR Series routers are built to address all these hurdles by offering state-of-the-art design in hardware and software. Based on a superior terabit-scale architecture that includes cutting-edge, fifth-generation network processors, this series comprises the industry's most powerful, high-density IPv4/ IPv6/MPLS multi-service routers. To enable the deployment of scalable, high-value, and profitable services, the NetIron XMR Series offers highly versatile, cost-efficient solutions for Internet routing, inter-Metro backbones, large-scale multi-service backbones, and carrier transport networks.

The NetIron XMR Series includes the 4-slot NetIron XMR 4000, the 8-slot NetIron XMR 8000, the 16-slot NetIron XMR 16000, and the 32-slot NetIron XMR 32000. The series offers industry-leading port capacity and density for both Carrier Ethernet and Packet

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over SONET/SDH (POS) with up to 256 10 Gigabit Ethernet (GbE), 768 1 GbE, 64 OC-192 (STM-64), or 256 OC-48 (STM-16) ports in a single-chassis, high-density router.

HIGH PERFORMANCE AND SCALABILITY

The NetIron XMR Series is designed from the ground up for high performance and scalability to address the needs of the most demanding ISP, Internet data center, inter-Metro connectivity, and multi-service operator applications. All routers in the series feature wire-speed, low-latency, and low jitter routing for IPv4, IPv6, MPLS, and MPLS VPN services, and they support both Provider Edge (PE) and Provider core (P) router deployments. For Metropolitan Area Networks (MANs), the NetIron XMR routers support high-performance Layer 2 switching, enabling cost-efficient and seamless integration with Layer 2 MANs or Layer 2 MAN access layers—without compromising performance.

Designed for high-end routing applications, the NetIron XMR Series features Brocade Direct Routing technology for full Forwarding Information Base (FIB) programming in hardware, together with hardware-based, wire-speed Access Control Lists (ACLs), and Policy-Based Routing (PBR) for robust, high-performance IPv4, IPv6, and Layer 3 VPN routing. Complementary to Brocade Direct Routing technology is a full suite of unicast and multicast routing protocols for both IPv4 and IPv6. Supported IPv4 protocols include RIP, OSPF, IS-IS, BGP4, PIM-DM, PIM-SM/SSM, IGMP, BGP-MP for multicast, and MSDP. Supported IPv6 protocols include RIPng, OSPFv3, IS-IS, BGP-MP for IPv6 (BGP4+), PIM-SSM, and MLD. Building on this solid routing architecture, the NetIron XMR routers also provide dual-stack IPv4/IPv6 wire-speed routing to facilitate a seamless migration to IPv6 without sacrificing performance.

A comprehensive set of path calculation and signaling capabilities using OSPF-TE, IS-IS-TE, RSVP-TE, CSPF, and LDP allows the creation of both traffic-engineered and non-traffic-engineered infrastructures.

Within either infrastructure, the NetIron XMR Series supports IP over MPLS as well as MPLS VPN applications. The NetIron XMR Series supports all three popular MPLS VPN services—Virtual Leased Line (VLL), LDP-Based Virtual Private LAN Service (VPLS), and BGP/MPLS VPN—on all ports at wire speed.

UNMATCHED SIMPLICITY

In addition, the NetIron XMR Series offers Multi-VRF Routing for environments where virtual routing is needed without the complexity of MPLS. Using Multi-VRF Routing, backbone operators can create multiple routing protocol instances that peer with each other in completely virtualized domains while sharing the same physical routers and links. The NetIron XMR Series is able to support overlapping IP address spaces through complete separation of the routing tables. Forwarding plane separation is supported through the use of standard 802.1Q VLAN tags.

HIGH AVAILABILITY AND RESILIENCY

The NetIron XMR Series is also designed for enabling the evolving multi-service and triple-play infrastructures. Built with an innovative view of Virtual Output Queuing (VOQ) architectures, packet buffering, and packet scheduling, the NetIron XMR routers offer non-blocking packet forwarding and large capabilities for handling severe congestion scenarios. Built on that superior foundation, the NetIron XMR Series delivers a comprehensive suite of Quality of Service (QoS) mechanisms to enable next-generation architectures. Using the NetIron XMR routers, operators can implement eight distinct traffic classes of prioritization with true performance guarantees. Operators can implement those performance guarantees by choosing from different packet scheduling schemes and tweaking the associated configurable parameters. Additionally, by relying on DSCP Drop Precedence, operators can take advantage of Weighted Random Early Discard (WRED) for differentiated packet dropping in case of congestion within a given traffic class.

High availability, crucial to converged networks, is ensured through a combination of highly resilient hardware and software design, and advanced failure detection and traffic protection/restoration schemes. The routers feature complete hardware redundancy combined with resilient software featuring hitless failover and hitless software upgrades with OSPF and BGP graceful restart for maximizing router uptime. Features such as enhanced control packet prioritization help ensure optimal management protection and performance. The Multi-Service IronWare operating system, powering the NetIron XMR Series, offers advanced capabilities for rapid detection and bypass of link/node failures such as BFD, UDLD, MPLS FRR, and Hot Standby paths.

POWERFUL SECURITY

Security is an increasing concern for today's operators, and the NetIron XMR Series offers a powerful set of security mechanisms that allow operators to enhance both infrastructure security and subscriber security. The NetIron XMR routers feature highly scalable inbound and outbound ACLs, which allow operators to implement IPv4, IPv6, and Layer 2 security policies. These policies can be applied permanently or on demand without impacting normal operations. Receive ACLs further harden platform and infrastructure security, allowing operators to implement strict policies for controlling management traffic and control traffic. To counter IP address spoofing used in many forms of Denial of Service (DoS) attacks, the NetIron XMR routers offer hardware-based wire-speed Unicast Reverse Path Forwarding (uRPF) for both edge applications (strict mode), and backbone applications (loose mode). uRPF allows the routers to check the packet's source IP address against the routing table to ensure that the packet came from a valid, and expected, source network.

SOFTWARE-DEFINED NETWORKING

Software-Defined Networking (SDN) is a powerful new network paradigm designed for the world's most demanding networking environments. The NetIron XMR Series enables SDN by supporting the OpenFlow protocol, which allows communication between an OpenFlow controller and an OpenFlow-enabled router. Using this approach, organizations can control their networks programmatically, transforming the network into a platform for innovation through new network applications and services.

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.

CLOUD-OPTIMIZED NETWORK ACQUISITION

Brocade helps organizations easily address their information technology requirements by offering flexible network acquisition and support alternatives to meet their financial needs. Organizations can select from purchase, lease, and Brocade Network Subscription options to align network acquisition with their unique capital requirements and risk profiles.

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.

KEY FEATURES

Service provider-grade IPv4/IPv6/MPLS multi-service backbone routers

4-, 8-, 16-, and 32-slot systems for maximum deployment versatility

Terabit-scale architecture designed for massive 100 Gigabit Ethernet (GbE) and OC-192 scalability

Performance of competitor multi-chassis routers in a fraction of the rack space:
- Up to 2 billion pps routing performance with non-blocking 3.2 Tbps data capacity

Industry-leading port capacity for a single-chassis router:
- 16 100 GbE, 256 10 GbE, 768 GbE ports
- 64 OC-192, 256 OC-48 ports

Advanced and scalable Metro Ethernet Layer 2 services:
- Super aggregated VLANs(QinQ)
- Comprehensive set of Layer 2 control protocols: MRP, VSRP, RSTP, MSTP
- IEEE 802.1ad Provider Bridges
- Extended statistics, including per-port per-VLAN per priority counters for VPLS and VLL endpoints

MEF 9 and MEF 14 certification for Carrier Ethernet services

Industry-leading 640 Gbps link aggregation capability for aggregating up to 64 10 GbE/OC-192 links in provider backbones

Support for fate sharing off link groups and bypass LSPs for increased resiliency

Wire-speed, dual-stack IPv4/IPv6 routing

Wire-speed Provider Edge (PE) and Provider core (P) Label Switching Routers

Industry-leading performance for MPLS services, providing several service choices: IP over MPLS, MPLS over GRE Virtual Leased Line (VLL), Virtual Private LAN Service (VPLS), BGP/MPLS VPN, Multi-VRF, and routing over VPLS

High-performance, robust routing via Brocade Direct Routing for complete, distributed programming of the Forwarding Information Base (FIB) in hardware

Full suite of unicast and multicast IPv4 and IPv6 routing protocols:
- Supported IPv4 protocols include RIP, OSPF, BGP-4, IS-IS, PIM-DM, PIM-SM/SSM, IGMP, BGP-MP for multicast, MSDP, and Anycast RP
- Supported IPv6 protocols include RIPng, OSPFv3, IS-IS for IPv6, BGP-MP for IPv6 (BGP4+), PIM-SM/SSM, MLD, and IPv6 Non-Stop Routing (NSR)

Comprehensive MPLS signaling and path calculation algorithms for both traffic-engineered and non-traffic-engineered applications:
- OSPF-TE, IS-IS-TE, RSVP-TE, CSPF, LDP over RSVP
- MPLS FRR (detour, bypass) and hot standby paths for traffic protection
- LDP

Secure Multi-VRF routing to support Virtual Routing applications over non-MPLS backbones; supports both IPv4 and IPv6 Multi-VRFs

Industry-leading scalability up to:*
- 10 million BGP routes
- 1 million IPv4 routes in hardware (FIB)
- 240,000 IPv6 routes in hardware (FIB)
- 2000 BGP peers per system
- 2000 BGP/MPLS VPNs and up to 1 million VPN routes
- 48,000 VLLs per system

Scalability limits dependent on configured system parameters, system profile selected, and routing database complexity.

KEY FEATURES (CONTINUED)

- 16,000 VPLS instances and up to 1 million VPLS MAC addresses
- 4094 VLANs and up to 2 million MAC addresses
- 64,000 RSVP-TE LSPs

8-path Equal Cost Multi-Path (ECMP)

Superior high-availability design:

- Redundant management modules
- Redundant switch fabrics
- Redundant power supplies and cooling system
- Hitless Layer 2/3 failover with stateful OSPF and IS-IS redundancy, and BGP graceful restart
- Hitless (in-service) software upgrades with graceful restart

Advanced QoS:

- Hierarchical Quality of Service (H-QoS) for 8×10 GbE (M and X) modules
- Inbound and outbound two-rate three-color traffic policers with accounting
- Eight distinct priority levels
- WRED support for congestion management and precedence dropping (tunable via configuration)
- Support for hybrid queue servicing disciplines: Mixed, Strict Priority, and Weighted Fair Queuing

Comprehensive hardware-based security and policies:

- Layer 2/3 ACLs (both inbound and outbound)
- Granular ACL accounting (both inbound and outbound)
- Hardware-based packet filtering
- Hardware-based Policy-Based Routing (PBR)
- Unicast Reverse Path Forwarding (uRPF)
- Receive ACLs
- Extensive sFlow Layer 2-7 traffic monitoring for IPv4, IPv6, and MPLS services

Combined Carrier Ethernet and powerful Packet over SONET/SDH (POS):

- MEF 9 and MEF 14 certification for Carrier Ethernet services
- Flexible set of POS interfaces with carrier-class timing offering internal stratum 3, loop, line, and BITS timing support

Software-Defined Networking (SDN):

- Support for OpenFlow v1.0

BROCADE NETIRON XMR SERIES AT A GLANCE

Features	NetIron XMR 4000	NetIron XMR 8000	NetIron XMR 16000	NetIron XMR 32000
Interface Slots	4	8	16	32
Switch Fabric Capacity	960 Gbps	1.92 Tbps	3.84 Tbps	7.68 Tbps
Data Forwarding Capacity	400 Gbps	800 Gbps	1.6 Tbps	3.2 Tbps
Packet Routing Performance				
Full Duplex	240 million pps	480 million pps	~1 billion pps	~2 billion pps
Total	480 million pps	960 million pps	~2 billion pps	~4 billion pps
Switch Fabric Redundancy	2+1	2+1	3+1	7+1
Max 100 GbE Ports	2	4	8	16
Max 10 GbE Ports	16	32	64	256
Max 1 GbE Ports	96	192	384	768
Max OC-192 (STM-64) Ports	8	16	32	64
Max OC-48 (STM-16) Ports	32	64	128	256
Height (inches/rack units)	6.96 in./4RU	12.21 in./7RU	24.47 in./14RU	57.71 in./33RU
Power Supply Redundancy	M+N	M+N	M+N	M+N
Air Flow	Side to side	Side to side	Front to back	Front to back

BROCADE NETIRON XMR SERIES POWER SPECIFICATIONS

	NETIRON XMR 4000	NETIRON XMR 8000	NETIRON XMR 16000	NETIRON XMR 32000
Maximum DC Power Consumption (W)	1289	2560	5191	10,591
Maximum AC Power Consumption (W) (100–240 VAC)	1289	2560	5191	10,591
Maximum Thermal Output (BTU/HR)	4724	9386	19,017	38,476

BROCADE NETIRON XMR SERIES PHYSICAL SPECIFICATIONS

	Dimensions	Weight
NetIron XMR 4000	Width: 44.32 cm (17.45 in.) Height: 17.68 cm (6.96 in.) Depth: 57.15 cm (22.5 in.)	35 kg (78 lb)
NetIron XMR 8000	Width: 44.32 cm (17.45 in.) Height: 31.01 cm (12.21 in.) Depth: 57.15 cm (22.5 in.)	60 kg (131 lb)
NetIron XMR 16000	Width: 44.32 cm (17.45 in.) Height: 62.15 cm (24.47 in.) Depth: 64.77 cm (25.5 in.)	107 kg (236 lb)
NetIron XMR 32000	Width: 44.32 cm (17.45 in.) Height: 146.58 cm (57.71 in.) Depth: 61.21 cm (24.1 in.)	Approx. 217 kg (approx. 478 lb)

BROCADE NETIRON XMR SERIES SPECIFICATIONS

IEEE Compliance

- 802.3-2005 CSMA/CD Access Method and Physical Layer Specifications
- 802.3ab 1000BASE-T
- 802.3ae 10 Gigabit Ethernet
- 802.3x Flow Control
- 802.3ad Link Aggregation
- 802.3ah Ethernet in the First Mile
- 802.1Q Virtual Bridged LANs
- 802.1D MAC Bridges
- 802.1w Rapid STP
- 802.1s Multiple Spanning Trees
- 802.1ad Provider Bridges; partial support: port-based and S-tagged service interface
- 802.1ag Connectivity Fault Management (CFM)
- 802.3ba 100 Gigabit Ethernet
- 802.1ab Link Layer Discovery Protocol
- 802.1ah Provider Backbone Bridging

ITU Compliance

- Y.1731 OAM functions and mechanisms for Ethernet-based networks

RFC Compliance

BGPv4	• RFC 4271 BGPv4
	• RFC 1745 OSPF Interactions
	• RFC 1997 Communities and Attributes
	• RFC 2439 Route Flap Dampening
	• RFC 2796 Route Reflection
	• RFC 1965 BGP4 Confederations
	• RFC 2842 Capability Advertisement
	• RFC 2918 Route Refresh Capability
	• RFC 1269 Managed Objects for BGP
	• RFC 2385 BGP Session Protection via TCP MD5
	• RFC 3682 Generalized TTL Security Mechanism, for eBGP Session Protection
	• RFC 4273 BGP-4 MIB
	• RFC 4893 BGP Support for Four-octet AS Number Space
	• RFC 4724 Graceful Restart Mechanism for BGP
OSPF	• RFC 2328 OSPF v2
	• RFC 3101 OSPF NSSA
	• RFC 1745 OSPF Interactions
	• RFC 1765 OSPF Database Overflow
	• RFC 1850 OSPF v2 MIB
	• RFC 2370 OSPF Opaque LSA Option
	• RFC 3630 TE Extensions to OSPF v2
	• RFC 3623 Graceful OSPF Restart

IS-IS	• RFC 1195 Routing in TCP/IP and Dual Environments
	• RFC 1142 OSI IS-IS Intra-domain Routing Protocol
	• RFC 2763 Dynamic Host Name Exchange
	• RFC 2966 Domain-wide Prefix Distribution
	• RFC 5120 IS-IS Multi-Topology Support
RIP	• RFC 1058 RIP v1
	• RFC 2453 RIP v2
	• RFC 1812 RIP Requirements
IPv4 Multicast	• RFC 1122 Host Extensions
	• RFC 1112 IGMP
	• RFC 2236 IGMP v2
	• RFC 3376 IGMP v3
	• RFC 3973 PIM-DM
	• RFC 2362 PIM-SM
	• RFC 2858 BGP-MP
	• RFC 3618 MSDP
	• RFC 3446 Anycast RP
General Protocols	• RFC 791 IP
	• RFC 792 ICMP
	• RFC 793 TCP
	• RFC 1350 TFTP
	• RFC 826 ARP
	• RFC 768 UDP
	• RFC 894 IP over Ethernet
	• RFC 903 RARP
	• RFC 906 TFTP Bootstrap
	• RFC 1027 Proxy ARP
	• RFC 951 BootP
	• RFC 1122 Host Extensions for IP Multicasting
	• RFC 1256 IRDP
	• RFC 1519 CIDR
	• RFC 1542 BootP Extensions
	• RFC 1812 Requirements for IPv4 Routers
	• RFC 1541 and 1542 DHCP
	• RFC 2131 BootP/DHCP Helper
	• RFC 3768 VRRP
	• RFC 854 TELNET
	• RFC 1591 DNS (client)
QoS	• RFC 2475 An Architecture for Differentiated Services
	• RFC 3246 An Expedited Forwarding PHB
	• RFC 2597 Assured Forwarding PHB Group
	• RFC 2698 A Two-Rate Three-Color Marker
Other	• RFC 1354 IP Forwarding MIB
	• RFC 2665 Ethernet Interface MIB
	• RFC 1757 RMON Groups 1, 2, 3, 9
	• RFC 2068 HTTP
	• RFC 4330 SNTP
	• RFC 2865 RADIUS
	• RFC 3176 sFlow
	• RFC 2863 Interfaces Group MIB
	• Draft-ietf-tcpm-tcpsecure TCP Security
	• RFC 3704 Ingress Filtering for Multihomed Networks (uRPF)

Other (Continued)	• RFC 2784 Generic Routing Encapsulation (GRE)
	• draft-ietf-bfd-base Bidirectional Forwarding Detection (BFD)
	• RFC 5881 BFD for IPv4 and IPv6 (Single Hop); for OSPFv2, OSPFv3, IS-IS
	• RFC 4741 NETCONF (Partial)
	• RFC 4087 IP Tunnel MIB
IPv6 Core	• RFC 2460 IPv6 Specification
	• RFC 2461 IPv6 Neighbor Discovery
	• RFC 2462 IPv6 Stateless Address Auto-configuration
	• RFC 4443 ICMPv6
	• RFC 4291 IPv6 Addressing Architecture
	• RFC 3587 IPv6 Global Unicast Address Format
	• RFC 2375 IPv6 Multicast Address Assignments
	• RFC 2464 Transmission of IPv6 over Ethernet Networks
	• RFC 2711 IPv6 Router Alert Option
	• RFC 3596 DNS support
	• RFC 3315 Dynamic Host Configuration Protocol (DHCP) for IPv6
IPv6 Routing	• RFC 2080 RIPng for IPv6
	• RFC 2740 OSPFv3 for IPv6
	• draft-ietf-isis-ipv6 Routing IPv6 with IS-IS
	• RFC 2545 Use of BGP-MP for IPv6
IPv6 Multicast	• RFC 2710 Multicast Listener Discovery (MLD) for IPv6
	• RFC 3810 Multicast Listener Discovery Version 2 for IPv6
	• RFC 4604 IGMPv3 and MLDv2 for SSM
	• RFC 4607 Source-Specific Multicast for IP
	• RFC 2362 PIM-SM
	• draft-ietf-pim-sm-v2-new; partial support: SSM mode of operation
IPv6 Transitioning	• RFC 2893 Transition Mechanisms for IPv6 Hosts and Routers
	• RFC 3056 Connection of IPv6 Domains via IPv4 Clouds
	• RFC 4798 Connecting IPv6 Islands over IPv4 MPLS Using IPv6 Provider Edge Routers
MPLS	• RFC 3031 MPLS Architecture
	• RFC 3032 MPLS Label Stack Encoding
	• RFC 3036 LDP Specification
	• RFC 2205 RSVP v1 Functional Specification
	• RFC 2209 RSVP v1 Message Processing Rules
	• RFC 3209 RSVP-TE
	• RFC 3270 MPLS Support of Differentiated Services
	• RFC 4090 Fast Reroute Extensions to RSVP-TE for LSP Tunnels
	• RFC 3812 MPLS TE MIB
	• RFC 5443 LDP IGP Synchronization
	• RFC 5712 MPLS Traffic Engineering Soft Preemption
	• draft-ietf-bfd-mpls BFD for MPLS LSPs (RSVP-TE)

Layer 3 VPN	• RFC 2858 Multiprotocol Extensions for BGP-4
	• RFC 3107 Carrying Label Information in BGP-4
	• RFC 4364 BGP/MPLS IP VPNs
	• draft-ietf-idr-bgp-ext-communities BGP Extended Communities Attribute
	• RFC 4576 Using LSA Options Bit to Prevent Looping in BGP/MPLS IP VPNs
	• (DN Bit)
	• draft-ietf-idr-route-filter Cooperative Route Filtering Capability for BGP-4
	• RFC 4382 MPLS/BGP Layer 3 VPN MIB
Layer 2 VPN and PWE3	• RFC 4664 Framework for Layer 2 Virtual Private Networks
	• RFC 4665 Service Requirements for Layer 2 Provider-Provisioned Virtual Private Networks
	• RFC 4762 VPLS Using LDP Signaling
	• draft-ietf-pwe3-arch PWE3 Architecture
	• RFC 4447 Pseudowire Setup and Maintenance using LDP
	• RFC 4448 Encapsulation Methods for Transport of Ethernet over MPLS Networks
	• RFC 5542 Definitions of Textual Conventions for Pseudowire (PW) Management
	• RFC 5601 Pseudowire (PW) Management Information Base

Packet Over SONET/SDH

- RFC 1661 The Point-to-Point Protocol (PPP)
- RFC 1662 PPP in HDLC-like Framing
- RFC 2615 PPP over SONET/SDH
- RFC 1332 Internet Protocol Control Protocol (IPCP)
- RFC 1377 The PPP OSI Network Layer Control Protocol (OSINLCP)
- RFC 2472 IPv6 over PPP
- RFC 3592 SONET/SDH Objects
- GR-253-CORE SONET Transport Systems: Common Generic Criteria
- G.707/Y.1322 Network Node Interface for SDH

MEF Certification

- MEF 9 Certified—Abstract Test Suite for Ethernet Services at the UNI
- MEF 14 Certified—Abstract Test Suite for Traffic Management Phase 1

Network Management

- Brocade Network Advisor Web-based Graphical User Interface (GUI)
- Integrated industry-standard Command Line Interface (CLI)
- sFlow (RFC 3176)
- Telnet
- SNMP v1, v2c, v3
- SNMP MIB II
- RMON
- Support for automated configuration management using NETCONF

Element Security Options

- AAA
- RADIUS
- Secure Shell (SSH v2)
- Secure Copy (SCP v2)
- HTTPs
- TACACS/TACACS+
- Username/Password (Challenge and Response)
- Bi-level Access Mode (Standard and EXEC Level)
- Protection against Denial of Service (DoS) attacks, such as TCP SYN or smurf attacks

Environmental

- Operating temperature: 0°C to 40°C (32°F to 104°F)
- Storage temperature: −25°C to 70°C (−13°F to 158°F)
- Relative humidity: 5% to 90%, at 40°C (104°F), non-condensing
- Storage humidity: 95% maximum relative humidity, non-condensing
- Operating altitude: 6600 ft (2012 m)
- Storage altitude: 15,000 ft (4500 m) maximum

Safety Agency Approvals

- CAN/CSA-C22.2 No. 60950-1-3
- UL 60950-1
- IEC 60950-1
- EN 60950-1 Safety of Information Technology Equipment
- EN 60825-1 Safety of Laser Products—Part 1: Equipment Classification, Requirements and
- User's Guide
- EN 60825-2 Safety of Laser Product—Part 2: Safety of Optical Fibre Communication Systems

Electromagnetic Emission

ICES-003 Electromagnetic Emission

FCC Class A

EN 55022/CISPR-22 Class A/VCCI Class A

AS/NZS 55022

EN 61000-3-2 Power Line Harmonics

EN 61000-3-3 Voltage Fluctuation and Flicker

EN 61000-6-3 Emission Standard (supersedes EN 50081-1)

Immunity

- EN 61000-6-1 Generic Immunity and Susceptibility (supersedes EN 50082-1)
- EN 55024 Immunity Characteristics. Supersedes:
  - EN 61000-4-2 ESD
  - EN 61000-4-3 Radiated, radio frequency, electromagnetic field
  - EN 61000-4-4 Electrical fast transient
  - EN 61000-4-5 Surge
  - EN 61000-4-6 Conducted disturbances induced by radio-frequency fields
  - EN 61000-4-8 Power frequency magnetic field
  - EN 61000-4-11 Voltage dips and sags

TELCO NEBS/ETSI

Designed to meet the following specifications (formal testing under way):

Telcordia GR-63-CORE NEBS Requirements: Physical Protection

Telcordia GR-1089-CORE EMC and Electrical Safety

Telcordia SR-3580 Level 3

ETSI ETS 300-019 Physical Protection

- Part 1-1, Class 1.1, Partly Temperature Controlled Storage Locations
- Part 1-2, Class 2.3, Public Transportation
- Part 1-3, Class 3.1, Temperature Controlled Locations (Operational)

ETSI ETS 300-386 EMI/EMC

Power and Grounding

- ETS 300 132-1 Equipment Requirements for AC Power Equipment Derived from DC Sources
- ETS 300 132-2 Equipment Requirements for DC Powered Equipment
- ETS 300 253 Facility Requirements

Physical Design and Mounting

19-inch rack mount supporting racks compliant with:	• ANSI/EIA-310-D
	• ETS 300 119
	• GR-63-CORE Seismic Zone 4

Tabletop

Environmental Regulatory Compliance

- EU 2002/95/EC RoHS (with lead exemption)
- EU 2002/96/EC WEEE

ORDERING INFORMATION

Part Number	Description
NI-XMR-4-AC	4-slot NetIron XMR 4000 AC system
NI-XMR-8-AC	8-slot NetIron XMR 8000 AC system
NI-XMR-16-AC	16-slot NetIron XMR 16000 AC system
NI-XMR-32-AC	32-slot NetIron XMR 32000 AC system
NI-XMR-4-DC	4-slot NetIron XMR 4000 DC system
NI-XMR-8-DC	8-slot NetIron XMR 8000 DC system
NI-XMR-16-DC	16-slot NetIron XMR 16000 DC system
NI-XMR-32-DC	32-slot NetIron XMR 32000 DC system
BR-MLX-MR2-X	NetIron XMR/Brocade MLXe system management module, 4 GB SDRAM, 2 GB internal compact flash, external compact flash slot, EIA/TIA-232 and 10/100/1000 Ethernet ports for out-of-band management
BR-MLX-32-MR2-X	NetIron XMR/Brocade MLXe 32-slot system management module, 4 GB SDRAM, 2 GB internal compact flash, external compact flash slot, EIA/TIA-232 and 10/100/1000 Ethernet ports for out-of-band management
NI-XMR-MR	NetIron XMR Series system management module, 2 GB SDRAM, dual PCMCIA slots, EIA/TIA-232 and 10/100/1000 Ethernet ports for out-of-band management
NI-XMR-32-MR	NetIron XMR 32000 system management module, 2 GB SDRAM, dual PCMCIA slots, EIA/TIA-232 and 10/100/1000 Ethernet ports for out-of-band management
NI-X-4-HSF	NetIron XMR/Brocade MLX® 4-slot system high-speed switch fabric module
NI-X-16-8-HSF	NetIron XMR/Brocade MLX 8-/16-slot system high-speed switch fabric module
NI-X-32-HSF	NetIron XMR/Brocade MLX 32-slot system high-speed switch fabric module
NI-X-SF1	NetIron XMR 4-slot system switch fabric module
NI-X-SF3	NetIron XMR 8-/16-slot system switch fabric module
NI-X-32-SF	NetIron XMR 32-slot system switch fabric module
BR-MLX-100Gx1-X	NetIron XMR/Brocade MLX Series 1-port 100 GbE module with IPv4/IPv6/MPLS hardware support—requires CFP optics and high-speed switch fabric module
BR-MLX-10Gx8-X	NetIron XMR/Brocade MLX Series 8-port 10 GbE (X) module with IPv4/IPv6/MPLS hardware support—requires SFP optics. Supports 1M IPv4 routes in FIB. Requires high-speed switch fabric modules.
BR-MLX-10Gx4-X	NetIron XMR Series 4-port 10 GbE module with IPv4/IPv6/MPLS hardware support—requires XFP optics
NI-XMR-10Gx4	NetIron XMR Series 4-port 10 GbE module with IPv4/IPv6/MPLS hardware support—requires XFP optics
BR-MLX-1GCx24-X	NetIron XMR/Brocade MLX 24-port 1 GbE (X) copper (RJ-45) module. Supports 1 million IPv4 routes in FIB.
BR-MLX-1GFx24-X	NetIron XMR/Brocade MLX 24-port 1 GbE (X) fiber (SFP) module. Supports 1 million IPv4 routes in FIB.
NI-XMR-1Gx20-SFP	NetIron XMR Series 20-port FE/GE (100/1000) module with IPv4/IPv6/MPLS hardware support—requires SFP optics
NI-XMR-1Gx20-GC	NetIron XMR Series 20-port 10/100/1000 copper module with IPv4/IPv6/MPLS hardware support
NI-X-OC192x2	2-port Packet over SONET (SDH) OC-192 (STM-64) interface module
NI-X-OC48x8	8-port Packet over SONET (SDH) OC-12/48 (STM-4/16) interface module
NI-X-OC48x4	4-port Packet over SONET (SDH) OC-12/48 (STM-4/16) interface module
NI-X-OC48x2	2-port Packet over SONET (SDH) OC-12/48 (STM-4/16) interface module

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