

NetIron IMR 640



HIGHLIGHTS

- ▶ Service Provider grade multi-service 10-GbE router
- ▶ Wire-speed 480 Mpps routing performance with distributed, non-blocking 1.28 Tbps switching architecture
- ▶ High performance dual stack IPv4/IPv6 routing with up to 500 BGP peers and 4 million BGP routes
- ▶ Industry leading wire-speed performance for MPLS services providing concurrent Virtual Leased Lines (VLLs), Virtual Private LAN Services (VPLSes), and BGP/MPLS VPNs
- ▶ SONET/SDH interoperability with 10-GbE WAN PHY

IPv4/IPv6/MPLS MULTI-SERVICE ROUTER

- ▶ Full suite of unicast and multicast IPv4 and IPv6 routing protocols: Supported IPv4 protocols include RIP, OSPF, BGP-4, IS-IS, DVMRP, MSDP, PIM-DM, PIM-SM, and IGMP
- ▶ Supported IPv6 protocols include RIPng, OSPFv3, MP-BGP, PIM-SSM, and MLD
- ▶ Industry leading scalability for IPv4, IPv6, MPLS, as well as Layer 2 services
- ▶ State-of-the-art policy enforcement and monitoring
 - Two rate three color traffic policers (ingress and egress)
 - Hardware-based packet filtering
 - Traffic policer accounting
 - Hardware-based policy-based routing (PBR)
 - Layer 3 and Layer 2 ACLs (ingress and egress)
 - Extensive sFlow Layer 2-7 traffic monitoring
 - Granular ACL accounting for IPv4, IPv6 and MPLS services
- ▶ Highest density with 32 ports of 10-GbE and 320 ports of 1-GbE dual-stack IPv4/IPv6/MPLS routing and switching

NetIron IMR 640 Overview

The NetIron® IMR 640 is the industry's most powerful IPv4/IPv6/MPLS router designed for enabling Service Providers to deploy high-capacity, cost-efficient, and profitable services. Based on the award-winning NetIron 40G technology, Terathon™, the NetIron IMR features Foundry's latest and state-of-the-art network processor technology: Terathon-M™.

Designed from the ground up as a highly-scalable Internet and Metro router, the NetIron IMR features wire-speed, low-latency and jitter IPv4/IPv6 routing and MPLS services for both provider edge and core applications. The NetIron IMR also supports wire-speed and low-latency Layer 2 Ethernet switching to allow for cost-efficient and seamless integration with Ethernet Metros or MAN access layers without any performance compromise.

Requiring only 13 rack units, the platform accommodates up to 32 10-GbE ports or 320 1-GbE ports, offering Service Providers an immense traffic handling capability of up to 96 wire-speed 10-GbE ports or 960 wire-speed 1-GbE ports in a standard 7' rack.

The NetIron IMR 640 supports a full suite of unicast and multicast IPv4 and IPv6 routing protocols. Supported IPv4

protocols include RIP, OSPF, IS-IS, BGP4, DVMRP, PIM-DM, PIM-SM, and IGMP. Supported IPv6 protocols include RIPng, OSPFv3, MP-BGP, PIM-SSM and MLD. Featuring wire-speed Foundry Direct Routing (FDR) for full Forwarding Information Base (FIB) programming in hardware, together with hardware-based wire-speed ACLs and PBR, the NetIron IMR 640 offers a high-end, robust IPv4 and IPv6 routing solution that rivals alternative high-end router platforms at a fraction of the cost.

As an enabler of high-value and profitable MPLS services, the NetIron IMR 640 is the industry's most powerful platform to offer all three popular MPLS VPN services on all ports: Virtual Leased Lines (VLLs), LDP-based Virtual Private LAN Services (VPLSes), and BGP/MPLSVPNs as per RFC 2547. All services are available on all ports of the platform right out of the box without any additional cost to the Service Provider. For optimal deployment versatility, the NetIron IMR supports the creation of both traffic-engineered infrastructures (using OSPF-TE, RSVP-TE, and CSPF) and non-traffic engineered infrastructures (using LDP) for the delivery of these MPLS services.

To facilitate seamless high-performance integration with Layer 2 MANs and/or cost-efficient Ethernet access layers, the platform features wire-speed Ethernet (i.e., Layer 2) switching that can be effortlessly and seamlessly integrated with the platform's routing and MPLS services.

Multi-service concurrency is one of the key advantages of the NetIron IMR 640. By virtue of Foundry's powerful Terathon-M network processors, the platform features unprecedented intelligence that allows multiple routing and MPLS services to be combined on the same physical port(s). This allows Service Providers to deploy cost-efficient service multiplexing as well as offer incremental services to their subscribers in order to grow Service Provider revenue.

Complementing the performance and functionality of the NetIron IMR 640 is Service Provider grade scalability. The system offers scalability that exceeds the requirements of today's most demanding Service Providers offering ample room for network and service growth. A single NetIron IMR 640 router supports up to:

- ▶ 4 million BGP routes and up to 500 BGP peers
- ▶ 1 million IPv4 routes in hardware (FIB)
- ▶ 256k IPv6 routes in hardware (FIB)
- ▶ 2000 BGP/MPLSVPNs and up to 1 million VPN routes
- ▶ 16k VLLs/VPLSes

The NetIron IMR 640 is designed for high availability; it features redundant and hot-swappable fans, power supplies, and management modules. The NetIron IMR 640 hitless management failover capability preserves traffic flows in the event of active management module failure for virtually zero impact on subscriber services. Built with stringent carrier-class environmental considerations, the NetIron IMR 640 is designed from the ground up to meet and exceed NEBS Level 3 requirements.

To ensure strict enforcement and monitoring of Service Provider policies and SLAs, the IMR features a unique, cutting-edge, hardware-based feature set.

- ▶ Two rate three color inbound and outbound traffic policers for highly versatile SLA enforcement
- ▶ Accurate traffic policer accounting for usage based billing
- ▶ Layer 3 and Layer 2 ACLs
- ▶ Granular ACL accounting for monitoring the effectiveness of the Service Provider policy
- ▶ Hardware-based packet filtering
- ▶ Hardware-based policy based routing (PBR)
- ▶ Built-in sFlow Layer 2-7 traffic monitoring for IPv4, IPv6 and MPLS traffic to facilitate network and service monitoring, troubleshooting, accounting, and capacity planning

NETIRON IMR 640



Sample Applications

CARRIER'S CARRIER-LONG-HAUL BACKBONES

The high BGP scalability of the NetIron IMR 640 makes it a perfect fit for carriers offering IP transport to a large number of other IP carriers. For these applications, the backbone edge router must maintain a large number of peering sessions with client ISP routers, a large number of BGP routes in its BGP Routing Information Base (RIB) and, in some cases, hundreds of thousands of non-aggregated routes in its hardware-based Forwarding Information Base (FIB). The NetIron IMR addresses these requirements offering carrier's carriers the ability to scale to 500 BGP peers, 4 million BGP routes and 1 million IPv4 routes in a single system.

Leveraging Foundry Direct Routing (FDR), the NetIron IMR 640 offers high-performance, secure, robust routing that is completely hardware driven, ensuring wire-speed performance and ultra low latency.

For transporting traffic over long distances, the NetIron IMR 640 optics support distances up to 40 km for 10-GbE (with 80 km planned for a future release) and up to 150 km for 1-GbE. In addition, the NetIron IMR 640 supports XENPAK WAN PHY optics for 10-GbE thereby enabling connectivity to existing SONET/SDH OC-192/STM-64 infrastructures allowing for cost-efficient transport up to thousands of kilometers over DWDM systems.

System Summary

FEATURE	SPECIFICATION
Interface Slots	8
System switching architecture	1.28 Tbps
Switching throughput per system	640 Gbps
Routing performance per system*	480 Mpps
Routing performance per 7' rack	1.5 Bpps
Max 10-GbE ports per system	32
Max 10-GbE ports per 7' rack	96
Max 1-GbE ports per system	320
Max 1-GbE port per 7' rack	960
Height (inches/Rack units)	DC Version: 22.75/13 RU
Power supply redundancy	DC Version: 1+1 AC Version: N+1, 1+1

*Million Packets per second (Mpps) numbers are aggregate based on switching capacities of the line cards

IPv4/IPv6 SERVICE PROVIDERS

Designed for high end Service Provider grade routing, Foundry Direct Routing (FDR) offers wire-speed, highly scalable, hardware based routing for IPv4 and IPv6 traffic. FDR relies on the programming of the complete IP Forwarding Information Base (FIB) in hardware to eliminate any software processing from the packet forwarding path. This enables consistent high-performance routing at all times regardless of the traffic patterns.

The NetIron IMR 640 with its dual-stack, wire-speed IPv4/IPv6 capability offers a smooth migration path to IPv6. Since the NetIron IMR 640 is capable of routing both protocols on the same physical interfaces, customers can simply turn on IPv6 when needed without any performance sacrifice or additional cost.

To ensure the enforcement of security policies and policy based routing (PBR) rules, the system offers hardware-based wire-speed ACLs and PBR. In addition, granular per-ACL clause accounting provides visibility into the effectiveness of the applied ACL rules allowing for better tuning when needed.

Supporting all three popular Layer 2 Virtual Private Network and Layer 3 Virtual Private Network services, the NetIron IMR 640 allows ISPs to offer new value added services beyond traditional Internet access. By virtue of the Terathon-M network processors' multi-service capabilities, providers can start offering such value-added services to grow their revenue without bearing any additional cost.

Using the Terathon-M integral sFlow packet sampling, providers can gain real-time insight into traffic loads, and traffic composition, allowing for better capacity planning, and troubleshooting in case of a network problem.

METRO SERVICE PROVIDERS

From the simple Switched Ethernet Metro designs to the more sophisticated MPLS-based designs, the NetIron IMR 640 offers a robust, highly scalable solution that enables the creation of cost-efficient, high performance MANs.

Integral Ethernet switching capabilities feature sub-second service protection protocols including: IEEE 802.1w, MRP, and VSRP. Additionally, the system's extensive inbound and outbound Layer 2/3 ACL capabilities (with accounting) offer superior policy enforcement that used to be achievable only in Layer 3 IP networks.

The NetIron IMR 640 is, by design, an enabler for high value MPLS VPN metro services: VLLs, VPLSes, and BGP/MPLS VPNs. With the multi-service capabilities built into the Terathon-M network processors, the IMR provides a smooth migration path to these high-value services.

The NetIron IMR 640 can be deployed with the NetIron 2404 aggregation router for an end-to-end MPLS-based metro solution.

To ensure intelligent SLA enforcement, metro Service Providers can utilize the system's superior traffic policing capabilities to offer new SLAs for Metro Ethernet Networks that were previously feasible only on ATM or Frame Relay networks. The IMR offers a distributed, highly-scalable, traffic-policing functionality that offers up to 4096 inbound and 4096 outbound traffic policers per 10-GbE port. The policers are based on the state of the art Two Rate Three Color Marker algorithm offering Service Providers unprecedented flexibility in defining traffic profiles, and enforcing priority, and consequently, the ability to offer new and creative SLAs to differentiate themselves from other competitor service providers.

CABLE AND MULTI-SERVICE OPERATORS (MSOs)

The NetIron IMR 640 offers a full suite of unicast and multicast routing protocols making it a perfect fit for both broadcast TV as well as video-on-demand delivery. With wire-speed routing capacity on each port, the NetIron IMR 640 effectively addresses the huge bandwidth requirements of such Cable and MSO (triple play) networks.

In addition, the system offers the industry's lowest latency and jitter—less than 10 microseconds of latency and 2 microseconds of jitter—making it an ideal platform for transporting delay sensitive voice and video traffic.

The NetIron IMR 640 enables MSOs to scale their backbone bandwidth up to 80 Gbps per link in order to accommodate future demand for video, voice, and data services.

The system's high port density makes it a highly attractive solution for multi-link backbone trunk connectivity as well as connectivity to large numbers of edge Gigabit Ethernet QAM devices, CMTS, and DMTS devices.

As the Cable and MSO Service Providers move towards IP based service delivery, it is anticipated that the increasing demand for millions of IP addresses may only be addressed using the abundant IPv6 address space. The NetIron IMR 640, with its support for IPv6 unicast and multicast, enables Service Providers to acquire large IPv6 address blocks and utilize those over the same infrastructure used for IPv4. This native dual stack capability eliminates any potential bottlenecks that may otherwise impede the growth of the Service Provider in the future.

Many MSOs have already started offering trial VPN services to the enterprise in order to broaden their service portfolio and revenue sources. However, due to limitations in incumbent equipment they may be locked into one type of VPN service offering. The NetIron IMR 640, complemented by the suitable edge equipment, can eliminate today's limitations and enable MSOs to offer Layer 2 and Layer 3 MPLS VPN services over one common infrastructure.

Technical Specifications

IEEE COMPLIANCE

- 802.3ae 10 Gigabit Ethernet
- 802.3x Flow Control
- 802.3ad Link Aggregation
- 802.1Q VLAN Tagging
- 802.1D Bridging
- 802.1w Rapid STP
- 802.1X User authentication
- 802.3 Ethernet Like MIB
- Repeater MIB
- Ethernet Interface MIB
- SNMP v1, v2c and V3
- SNMP MIB II

RFC COMPLIANCE

BGPv4

- RFC 1771 BGPv4
- RFC 1745 OSPF interactions
- RFC 1997 Communities & 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

OSPF

- RFC 2178 OSPF
- RFC 1583 OSPF v2
- RFC 1587 OSPF NSSA
- RFC 1745 OSPF Interactions
- RFC 1765 OSPF Database Overflow
- RFC 1850 OSPF Traps
- RFC 2154 OSPF w/Digital Signatures (Password, MD-5)
- RFC 2328 OSPF v2
- RFC 1850 OSPF v2 MIB
- RFC 2370 OSPF Opaque LSA Option
- RFC 3630 TE Extensions to OSPF v2

IS-IS

- RFC 1195 Routing in TCP/IP and Dual Environments
- RFC 2763 Dynamic Host Name Exchange
- RFC 2966 Domain-wide Prefix Distribution

RIP

- RFC 1058 RIP v1
- RFC 1723 RIP v2
- RFC 1812 RIP Requirements

IP Multicast

- RFC 1122 Host Extensions
- RFC 1122 DVMRP Host Requirements
- RFC 1112 IGMP
- RFC 2236 IGMP v2
- DVMRP v3-07
- PIM-DM v1
- RFC 2362 PIM-SM

General Protocols

- RFC 791 IP
- RFC 792 ICMP
- RFC 793 TCP
- RFC 783 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 Requirements
- RFC 1256 IRDP
- RFC 1519 CIDR
- RFC 1542 BootP Extensions
- RFC 1812 General Routing
- RFC 1541 and 1542 DHCP
- RFC 2131 BootP/DHCP Helper
- RFC 2338 VRRP
- RFC 854 TELNET
- RFC 1591 DNS (client)

Other

- RFC 1354 IP Forwarding MIB
- RFC 1757 RMON Groups 1,2,3,9
- RFC 2068 HTTP
- RFC 2030 SNMP
- RFC 2138 RADIUS
- RFC 3176 sFlow
- Draft-ietf-tcpm-tcpsecure TCP Security

IPv6 Core

- RFC 2460 IPv6 Specification
- RFC 2461 IPv6 Neighbor Discovery
- RFC 2462 IPv6 Stateless Address Auto-configuration
- RFC 2463 ICMPv6
- RFC 3513 IPv6 Addressing Architecture
- RFC 1981 IPv6 Path MTU Discovery
- 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 3363 DNS support

IPv6 Routing

- RFC 2080 RIPv6 for IPv6
- RFC 2740 OSPFv3 for IPv6
- RFC 2545 Use of MP-BGP-4 for IPv6

IPv6 Multicast

- RFC 2710 Multicast Listener Discovery (MLD) for IPv6
- IETF Draft-vida-mld-v2 Multicast Listener Discovery Version 2 for IPv6
- draft-holbrook-idmr-igmpv3-ssm IGMPv3 & MLDv2 for SSM
- draft-ietf-ssm-arch SSM for IP
- draft-ietf-pim-sm-v2-new (Partial Support) PIM-SM Protocol Specification, SSM Mode of Operation

IPv6 Transitioning

- RFC 2893 Transition Mechanisms for IPv6 Hosts and 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

Layer 3 Virtual Private Network

- RFC 2858 Multiprotocol Extensions for BGP-4
- RFC 3107 Carrying Label Information in BGP-4
- draft-ietf-l3vpn-rfc2547bis BGP/MPLS IPVPNs
- draft-ietf-idr-bgp-ext-communities BGP Extended Communities Attribute
- draft-ietf-l3vpn-ospf-2547 OSPF as the PE/CE Protocol in BGP/MPLS IPVPNs
- draft-ietf-idr-route-filter Cooperative Route Filtering Capability for BGP-4

Layer 2 Virtual Private Network and PWE3

- draft-ietf-l2vpn-l2-framework Framework for Layer 2 Virtual Private Networks
- draft-ietf-l2vpn-requirements Service Requirements for Layer 2 Provider Provisioned Virtual Private Networks
- draft-ietf-l2vpn-vpls-ldp Virtual Private LAN Services over MPLS
- draft-ietf-pwe3-arch PWE3 Architecture
- draft-ietf-pwe3-ethernet-encap Encapsulation Methods for Transport of Ethernet Frames Over IP/MPLS Networks
- draft-ietf-pwe3-control-protocol Pseudowire Setup and Maintenance using LDP

NETWORK MANAGEMENT

- IronView Network Manager (INM) Web-based graphical user interface
- Integrated Standard-based Command Line Interface (CLI)
- sFlow (RFC 3176)
- Telnet
- SNMP
- RMON HP OpenView for Sun Solaris, HP-UX, IBM's AIX, and Windows NT

ELEMENT SECURITY OPTIONS

- AAA
- RADIUS
- Secure Shell (SSH v1.5)
- Secure Copy (SCP)
- TACACS/TACACS+
- Username/Password (Challenge and Response)
- Bi-level Access Mode (Standard and EXEC Level)
- Protection for Denial of Service attacks, such as TCP SYN or Smurf Attacks



ENVIRONMENTAL

- Operating Temperature: 0 °C to 40 °C (32 °F to 104 °F)
- Relative Humidity: 5 to 90%, @40 °C (104 °F), non-condensing
- Operating Altitude: 10,000 ft (3,000 m)
- Storage Temperature: -25 °C to 70 °C (-13 °F to 158 °F)
- Storage Humidity: 95% maximum relative humidity, non-condensing
- Storage Altitude: 15,000 ft (4,500 m) maximum

SAFETY AGENCY APPROVALS

- CAN/CSA-C22.2 No. 60950-00/UL 60950—Third Edition, 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 Products—Part 2: Safety of Optical Fibre Communication Systems
- EN 60950 Safety of Information Technology Equipment

ELECTROMAGNETIC EMISSION CERTIFICATION

- ICES-003 Electromagnetic Emission Certification
- FCC Class A

- EN 55022/CISPR-22 Class A/VCCI Class A
- EN 61000-3-2 Power Line Harmonics
- EN 61000-3-3 Voltage Fluctuation & Flicker

IMMUNITY

- EN 55024

WARRANTY

- 1-year hardware
- 90-day software

MOUNTING OPTIONS

- 19-inch Universal EIA 310 (Telco) Rack or Tabletop

NetIron IMR 640 System Specifications

POWER SPECIFICATIONS

	@ 100 VAC			@ 200 VAC			@ -48 VDC		
	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)	Current (Amps)	Power (Watts)	Thermal Output (BTU/HR)
NI-IMR-FAN	1.0	99	336	0.5	99	336	1.7	80	273
NI-IMR-MR	1.2	123	420	0.6	123	420	2.1	100	341
NI-IMR-SFM	1.5	148	504	0.7	148	504	2.5	120	409
NI-IMR-1Gx20-SFP	3.1	308	1,050	1.5	308	1,050	5.2	250	853
NI-IMR-1Gx40-SFP	4.3	431	1,471	2.2	431	1,471	7.3	350	1,194
NI-IMR-10Gx2	3.0	296	1,008	1.5	296	1,008	5.0	240	819
NI-IMR-10Gx4	4.2	419	1,429	2.1	419	1,429	7.1	340	1,160
System Max	40	4,039	13,782	20	4,039	13,782	68	3,280	11,191

NI-IMR-ACPWR Power supply module	AC Input Voltage: 100VAC to 240VAC Power Output Rating: 1150 Watts Current Draw: 14.2A @ 100VAC; 7.1A @ 200VAC AC Frequency: 47 – 63 Hz
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PHYSICAL SPECIFICATIONS

	AC VERSION	DC VERSION
Dimensions	26.25h x 17.5w x 24d inches 66.68h x 44.45w x 60.96d cm	22.75h x 17.5w x 24d inches 57.78h x 44.45w x 60.96d cm
Weight Fully-loaded	242 lbs (110 kg)	174 lbs (79 kg)



Ordering Information

PART NUMBER	DESCRIPTION
NI-IMR-DC	8-slot NetIron IMR 640 -48V DC Chassis with Backplane switch fabric, Dual Fan modules, Dual Fan Controllers, and replaceable Air Filter
NI-IMR-AC	8-slot NetIron IMR 640 AC chassis with 3 1100w power supplies, Backplane switch fabric, Dual Fan modules, Dual Fan Controllers, and replaceable Air Filter
NI-IMR-MR	NetIron IMR 640 System Management Module, 2 GB SDRAM, dual PCMCIA ports and out-of-band 10/100 Ethernet management port
NI-IMR-1Gx40-SFP	40-port Gigabit Ethernet module with SFP slots, with IPv4/IPv6/MPLS hardware support—requires optics
NI-IMR-10Gx4	4-port 10-GbE module with support for XENPAK optics, with IPv4/IPv6/MPLS hardware support—requires optics (10G-XNPK-SR/LR/ER)
NI-IMR-10Gx2*	2-port 10-GbE module with support for XENPAK optics, with IPv4/IPv6/MPLS hardware support—requires optics (10G-XNPK-SR/LR/ER)
NI-IMR-1Gx20-SFP*	20-port Gigabit Ethernet module with SFP slots, with IPv4/IPv6/MPLS hardware support—requires optics
NI-IMR-ACPWR	1100w AC power supply
10G-XNPK-SR	850nm serial pluggable XENPAK optic only (SC) over MMF
10G-XNPK-LR	1310nm serial pluggable XENPAK optic only (SC) for up to 10km over SMF
10G-XNPK-ER	1550nm serial pluggable XENPAK optic only (SC) for up to 40km over SMF
10G-XNPK-LW	10GBASE-LW 1310nm serial pluggable XENPAK WAN PHY optic only (SC) for up to 10km over SMF, OC-192 format

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