

Hitachi GR2000 Hardware-Based IPv6 Routers

High-Performance, Carrier-Class Gigabit Routers for Commercial IPv6 Networks



IPv6 DATASHEET

IPv6 Features

- Greater levels of address hierarchy: address space has increased from 32 bits to 128 bits, supporting a much larger number of nodes.
- A simplified header format, for lower overhead and packet processing costs. Some IPv4 header fields have been dropped; others are now optional.
- Dual-stack and configured tunnel support ensure a simple transition to IPv6.
- Quality of Service has been added to that traffic flow which requires special handling, such as "real-time" service.
- Stateless auto-configuration automatically assigns an IP address to a host device upon its connection to the network, eliminating the need for manual configuration or use of a DHCP server.
- MultiCast functionality supports bandwidth-intensive applications such as video conferencing, on-line corporate communication, distance learning, and software distribution.
- MultiPath functionality allows stable, even load balancing across multiple hosts.
- Flexible IP address assignments, including IPX and NSAP, provide an easy-to-integrate, smooth migration to IPv6.

The Hitachi IPv6 Accomplishments

- Founding member of the IPv6 Forum.
- Deployed the world's first commercial IPv6 network, linking seven major cities in Europe.
- Released the world's first commercial IPv6 protocol translation router (NR60), debuting in Asia.
- Member of the MoonV6 Project:
<http://moonv6.sr.unh.edu/>
- Member of the KAME Project:
<http://www.kame.net>
- Member of the USAGI Project:
<http://www.linux-ipv6.org>
- Sponsors of the IPv6 Summit:
<http://www.ipv6-es.com>
- Selected as the IPv6 platform for the Euro6IX Network.
- Continuous IETF leadership; operated the IETF interim meeting (September 1999) with IETF contributions, RFC2767 (BIS).
- Interoperability Testing:
 - Member of the UNHIOL Testing Consortium.
 - Connectathon 2000, IOL, TAHI Project:
<http://www.tahi.org>
- Won 'Best of Show' at the Network + Interop (N+I) 2002, Tokyo. Awarded for the infrastructure building product and received excellent reviews for its superior IPv6 routing performance.



IPv6 is an easily integrated, flexible mechanism, designed to meet the needs of such emerging markets as handheld personal computers, IP-enabled cellular devices, and high-speed wireless technology.

IPv6 Technology Scope

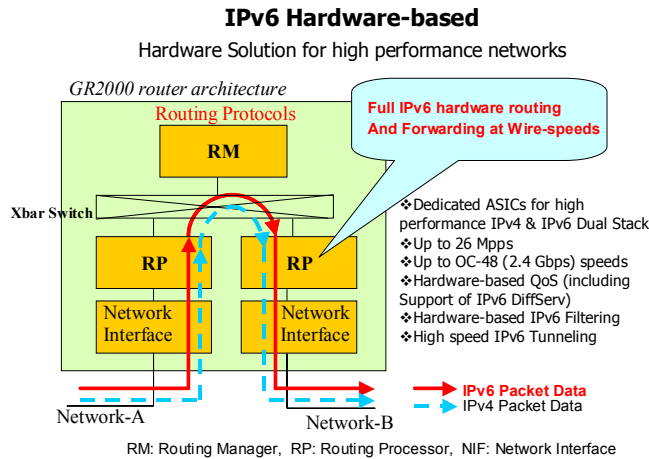
IP Service	IPv4 Solution	IPv6 Solution
Addressing Range	32-bit, Network Address Translation	128-bit, Multiple Scopes
Autoconfiguration	DHCP	Serverless, Reconfiguration, DHCP
Security	IPSec	IPSec Mandated, Works End-to-End
Mobility	Mobile IP	Mobile IP With Direct Routing
Quality-of-Service	Differentiated Service, Integrated Service	Differentiated Service, Integrated Service
IP Multicast	IGMP / PIM / Multicast BGP	MLD / PIM / Multicast BGP, Scope Identifier

IPv6 is appropriate for the next generation of Internet protocols for many reasons: customizable, cost-efficient and easy to integrate, not only does it fulfill the demand for increased IP addresses, it also solves the Internet scaling problem by considerably reducing routing table size.

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GR2000 IPv6 Hardware Architecture

The GR2000 delivers excellent IPv6 performance, at wire-speed rates. Processed by dedicated Hitachi ASICs, IPv6 packet routing achieves forwarding rates of up to 26 Mpps, and OC-48 speeds (2.4 Gbps).



Thoroughly tested, up-to-date features using the KAME stack ensure stable, reliable code, while features such as IPv6 filtering, tunneling, and QoS provide multiple application support.

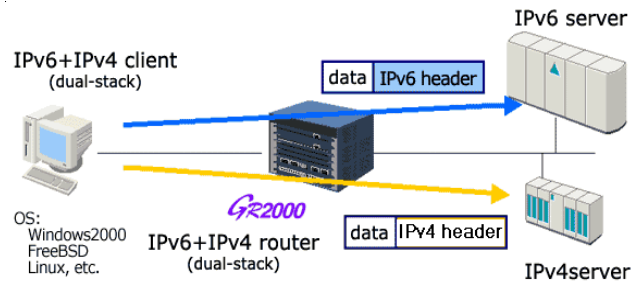
IPv4 to IPv6: A Smooth Migration

A key requirement for a successful transition to IPv6 is to maintain full compatibility with IPv4, while implementing IPv6. This allows IPv6 hosts to operate alongside IPv4 hosts over an existing IPv4 infrastructure. The transition mechanisms should be transparent to end users, easy to administer, and non-disruptive to the network.

The Hitachi GR2000 offers a powerful and intelligent migration strategy from IPv4 to IPv6. The following mechanisms ensure a smooth migration:

Dual Stack

The dual-stack approach allows IPv4 and IPv6 networks to run simultaneously within the same box, resulting in a cost-sensitive, simple architecture which both preserves and maximizes your existing investments.

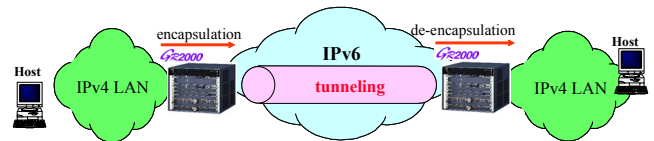


Tunneling

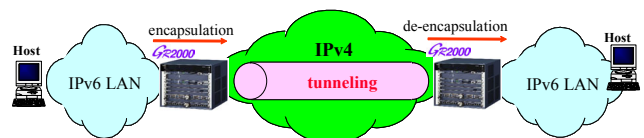
Tunneling provides a way to use existing IPv4 routing infrastructures to carry IPv6 traffic. This technique encapsulates IPv6 packets within IPv4, so that they can be routed (tunneled) across an IPv4 infrastructure.

When the IPv6 packet arrives at the end of its tunnel, another dual-stack router or host de-encapsulates the packet, and re-routes it to its destination.

Example of IPv4 over IPv6 Tunneling



Example of IPv6 over IPv4 Tunneling



The GR2000 IPv6 Platform

MODEL	-1B/2B/BH	-4S	-6H	-10H	-20H
BACKPLANE CAPACITY	2/4/16Gbps	8 Gbps	30 Gbps	50 Gbps	90 Gbps
NUMBER OF SLOTS	1/2/2 (plus integrated 10/100 Ethernet)	4	6	10	20
ARCHITECTURE	BUS	BUS	CROSSBAR	CROSSBAR	CROSSBAR
IPv6 SUPPORT	Hardware	Hardware	Hardware	Hardware	Hardware



The Hitachi GR2000 IPv6 Hardware-Based Platform for the Next-Generation Internet

Summary of Features:	<i>Feature</i>	<i>Benefit</i>
<ul style="list-style-type: none"> • Hitachi-Designed and Custom-Built ASICs • Hardware-Based IPv6 <ul style="list-style-type: none"> • Dual-Stack IPv6 • IPv6 Packet Filtering • IPv6 QoS with DiffServ • IPv6-Supported MIBs • IPv6 Routing (Static, RIPng, OSPFv3, BGP4+) • Hardware-Based QoS Controls <ul style="list-style-type: none"> • DiffServ • Priority Levels (8) • Reserved Bandwidth Guarantees • Discard Classes (4) • Hardware-Based Route Table Management • IPv4 Performance with IPv6 Addressing • IPv6 over IPv4 Tunneling • IPv4 over IPv6 Tunneling • 6To4 • NAT-PT • DHCPv6 Server • IPv6 Multipath Support • IPv6 Address Auto-Configuration • IPv6-Capable Network Interfaces, with OC48 Speeds • Up-To-Date IPv6 Features, using the KAME stack 	Hardware Architecture	Delivers wire-speed performance, with forwarding rates up to 26 Mpps and speeds up to OC-48 (2.4 Gbps).
	Dual-Stack Approach	IPv4 and IPv6 can operate simultaneously and within the same box, allowing you to maximize all of your current and legacy assets.
	IPv6 Filtering	Provides full network security.
	IPv6 QoS (DiffServ)	Delivers a complete, cost-effective solution in guaranteed service for voice, video and mission-critical applications.
	IPv6 over IPv4 Tunneling IPv4 over IPv6 Tunneling	Provides a smooth, seamless transition to IPv6.
	6to4	6to4 provides a transition to get IPv6 connectivity for hosts that only have a IPv4 uplink.
	NAT-PT	IPv6/IPv4 translator.
	DHCPv6 Server	Manages the distribution of IPv6 prefixes and addresses of the DNS and NTP server to the IPv6 DHCP client enabling for a seamless integration of new network services.
	IPv6 Multipath	Provides stable, reliable load balancing via multipath routing on IPv6 networks, for uninterrupted quality of service.
	Auto-Configuration	Eliminates manual configuration for host systems by providing unique addressing for each link.
	A wide variety of IPv6-capable network interfaces, with speeds up to OC48.	Accommodates edge and core connectivity for a complete end-to-end solution.
	Supports up-to-date IPv6 features, using the "KAME" stack.	The KAME code is based on the WIDE Hydrangea IPv6/IPsec stack, and is aimed at creating a single, solid software set targeted at IPv6. The current status of the KAME IPv6 is reported as "rock solid, and working fine."

Specifications

System Bandwidth: *B Series:* GR2000-1B: 2Gbps; GR2000-2B: 4Gbps; GR2000-BH: 16Gbps

S/H Series: GR2000-4S: 8Gbps; GR2000-6H: 30Gbps; GR2000-10H: 50Gbps; GR2000-20H: 90Gbps

Routing Manager Processor: Intel Pentium III, 850MHZ; Memory: up to 1 GB

Max. Route Entries: 1.6 Million

IP Forwarding Rate: *B Series:* GR2000-1B/2B: 1Mpps; GR2000-BH: 3Mpps

S/H Series: GR2000-4S: 1Mpps; GR2000-6H: 12Mpps; GR2000-10H: 20Mpps; GR2000-20H: 40Mpps

Physical Interfaces:

LAN Interfaces:

1000BASE-SX/LX w/VRPP
10/100BASE-TX w/VRPP
100BASE-FX

WAN Interfaces:

OC-48 POS APS
OC-12 POS
OC-3 POS/ATM
T1/E1, T3/E3, Synchronous Serial (V.24/V.35/X.21)

Port Density:

Network	Interface	GR2000-1B/2B/BH	GR2000-4S	GR2000-6H	GR2000-10H	GR2000-20H
LAN	10/100BASE-SX/LX w/VRPP	6 / 12 / -	32	48	80	160
	1000BASE-SX/LX w/VRPP	1 / 2 / -	1	12	20	40
	100BASE-FX	-	8	24	40	80
WAN	Synchronous Serial (V.24/V.35/X.21)	2 / 4 / -	32	48	80	160
	T1/E1 Clear/Channelized	4 / 8 / -	16	24	40	80
	T3/E3 Clear	-	8	12	20	40
	E3 Channelized	-	1	3	5	10
	OC-3 (POS)	-	4	24	40	80
	OC-12 (POS)	-	1	12	20	40
	OC-48 (POS) w/APS	-	0	3	5	10
	OC-3 (ATM)	1 / 2 / -	2	24	40	80

Routing Protocols:

Interior: RIPv1/v2, RIPng, OSPFv2/v3, IS-IS

Exterior: BGP4, BGP4+

Multicast: IGMPv2, DVMRPv3, PIM-SM/DM, MLD(IPv6)

Networking Protocols: IPv4, IPv6, IPX

QoS: DiffServ

Incoming bandwidth monitoring
Outgoing priority control (8 levels)
Outgoing bandwidth control
Discarding control (4 levels)

Network Management:

CLI, Web Browser, HiView Router Element Manager for HP Open View, SNMP MIB II, IP Forward Table MIB, PPP MIB, Ethernet like MIB, BGP4 MIB, OSPFv2 MIB, RMON MIB, Frame Relay DTE MIB, Private MIB, IPv6 MIBs, MPLS MIBs, Statistics for WAN, ATM, SONET. RADIUS Login Authentication, SSH.

Regulatory Compliance

Safety: UL1950 (U.S.), CSA950 (Canada), EN60950/IEC950 (Europe), EN60825-1, EN41003 (Europe)

EMI: FCC ClassA (U.S.), VCCI ClassA (Japan), CSA108.8 ClassA (Canada), EN55022 ClassA (Europe), EN61000-3-2

Immunity: EN 55024 (Europe)

Dimension & Weights:

Model:	GR2000-1B/2B/BH	GR2000-4S	GR2000-6H	GR2000-10H	GR2000-20H
Size (WxDxH) (cm):	44x48x8.8	44x48x18	44x48x36	44x60x63	44x60x89
Weight:	9kg / 10kg / 16kg	25kg	50kg	85kg	190kg
Power:	170VA / 190VA / 300VA	360 VA	1200VA	1600VA	2900VA
Input Voltage (AC)	100-120V/200-240V	100-120V/200-240	100-120V/200-240V	100-120V/200-240V	200-240V
Input Voltage (DC)	-	-	-48V/-60V	-48V/-60V	-48V/-60V
Frequency	50Hz/60Hz				
Ambient Operating Temperatures:	5 to 40 degrees C				
Relative Humidity (Non-condensing):	Non-operating 8% to 90% Operating 20% to 80%				

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