

HUAWEI

T e c h n o l o g i e s



**Quidway NetEngine 40 Series
Universal Switching Router**



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CHOICE is not
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obvious one.



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So if you are looking for a supplier that not only listens carefully to your needs, but also cares passionately about your profits, then it's time to make a new choice.

The right choice. The Huawei choice.



Huawei Technologies

Introduction

The Quidway NetEngine 40 Series Router (abbreviated as NE40) is Huawei's unique Universal Switching Router (abbreviated as USR), focusing on a complicated/mixed application circumstance: the backbone or edge of full service carrier-class IP networks. The NE40 USR includes three models: NE40-8, NE40-4 and NE40-2. The NE40 USR evolves from Huawei's flagship GSR NetEngine 80, and adopts the same distributed hardware architecture as NE80. It has carrier-class availability, wire-speed forwarding performance, and feature-rich services (QoS, VPN, etc.) handling capability. The NE40 USR features the low cost of Layer 3 switches, as well as the high IP service capability of high-end routers, so that it can deliver a cost-effective, flexible network with abundant services. Its excellent expandability makes the NE40 USR the right choice for the construction and expansion of large scale IP networks.



1-1 NE40-8



1-2 NE40-4



1-3 NE40-2

Product Features

Integration of Router and Ethernet Switch

The most outstanding characteristic of the NE40 USR is that it can be used as some kind of Layer 3 Ethernet switch, as well as the core router to meet the requirements of a scalable/mixed network. There are two kinds of LPUs (Line Processing Units) for the NE40 USR: Switched LPUs and Routed LPUs. The Routed LPUs support router's features such as wire speed IP/MPLS forwarding, advanced QoS, and MPLS VPN, while the Switched LPUs support switching features such as Layer 2 VLAN forwarding, VLAN aggregation, VLAN Trunk, L2QoS, RSTP, HGMP (Huawei Group Management Protocol), and VPLS (Virtual Private LAN Service).

Wire Speed Forwarding Performance

Adopting the industry-leading network processor technology, the NE40 USR achieves wire speed IP/MPLS forwarding capability for 2.5G POS interface, with its total forwarding performance reaching 48/24/12Mpps (respectively for NE40-8/4/2).

Advanced Diff-Serv QOS

The NE40 USR supports comprehensive QoS functions such as traffic classification, traffic policy (CAR), congestion avoidance, queue scheduling, and general traffic shaping. In addition, it also provides an option for users with the new congestion avoidance algorithm SA-RED (Shock Absorber Random Early Detection), which can handle the jitter of traffic in a smoother way than the traditional WRED algorithm. Its robust queue scheduling function and general traffic shaping function can satisfy the requirements for multi-service networks, providing efficient/refined service classification.

Carrier-class Reliability Design

All the key components used in the NE40 (except NE40-2) USR, including switching fabric, route processing system as well as power supply, are designed-in redundant with hot backup. It satisfies the requirements of carrier-class/high-reliability backbone/edge networks. Moreover, the MPLS Fast Rerouting function further boosts the reliability of MPLS networks.

Feature-rich Services Handling Capability

The NE40 USR provides rich routing protocols and policy routing management functions. In addition, it supports multicast services, traffic engineering (TE) and MPLS VPN.

Flexible Service Upgrade

As the typical implementation of the 5th Generation Router, the NE40 USR adopts advanced NP (Network Processor) chipset, designed as the forwarding engine for the next generation IP network. With these NPs, the NE40 USR can support IPv6 and many more new services just by software upgrade.

Specifications

3.1 Software Specifications

Performance	<ul style="list-style-type: none"> Forwarding capability for IPv4 packets: wire speed forwarding for various interfaces Forwarding capability for IPv6 packets: wire speed forwarding for various interfaces Packet forwarding rate: 48M/24M/12Mpps/single chassis system
Layer 2 Protocol	<ul style="list-style-type: none"> LAN protocol: Ethernet II, Ethernet SNAP, Ethernet SAP, LACP (IEEE 802.3ad), 802.3z, 802.3ae WAN protocol: PPP, MP, HDLC, POS, ATM Layer 2 VLAN forwarding, VLAN aggregation, VLAN Trunk, L2QoS, RSTP, HGMP (Huawei Group Management Protocol) and VPLS (Virtual Private LAN Service)
IPv4 Routing Protocol	<ul style="list-style-type: none"> Unicast: static routing, RIP, OSPF, IS-IS and BGP4 Upgradeable for IPv6 protocol suite
IPv6 Routing Protocol	<ul style="list-style-type: none"> Support for IPv4 and IPv6 dual stacks Support for basic transition technologies from IPv4 to IPv6: manually configuration tunnels, automatic configuration tunnels, 6to4 tunnels, NAT-PT (based on hardware), etc Support for IPv6 static routing and dynamic routing protocols such as BGP4+, RIPng, OSPFv3 and ISISv6 Support for ICMPv6 MIB, UDP6 MIB, TCP6 MIB, IPv6 MIB, etc
Multicast	<ul style="list-style-type: none"> GARP Multicast Registration Protocol (GMRP) Internet Group Management Protocol (IGMP) Protocol Independent Multicast-Dense Mode (PIM-DM) Protocol Independent Multicast-Sparse Mode (PIM-SM) Multicast Source Discovery Protocol (MSDP) Multi-protocol Border Gateway Protocol (MBGP)
MPLS VPN	<ul style="list-style-type: none"> Support for wire speed IP/MPLS forwarding, and the applications of LER and LSR Support for L2/L3 MPLS VPN and VPLS, can be deployed as provider (P) or provider edge (PE) router Support for MPLS TE and FRR Support for Layer 2 tunneling protocol (L2TP) Support for Generic Routing Encapsulation (GRE) Support for HoVPN (Hierarchy of VPN) Support for multi-role host Support for Multicast VPN <p>All above features conform to the corresponding IETF standards, being inter-operable with other vendors</p>
QoS	<ul style="list-style-type: none"> Support for bi-directional traffic policing CAR, traffic shaping

	<ul style="list-style-type: none"> • Support for PQ/CQ/WFQ/CBQ, LLS/LLQ/NLS • Support for RED, WRED, SARED • Support for policy routing • Support for Layer 2 QoS • Support for MPLS QoS
NAT	<ul style="list-style-type: none"> • Support for NAT service: wire speed NAT capability (bi-directional 2G) • Support for 1M simultaneous sessions in NAT functionality • Support for application layer gateways (ALGs), such as FTP, ICMP
High Availability	<ul style="list-style-type: none"> • High Reliability in the system architecture • MPLS Fast Rerouting (FRR) • Virtual Route Redundant Protocol (VRRP) • Support for Nonstop Forwarding (NSF) • Support for self-constrain standing routing (SCSR) • RPR self-healing ring for a MAN or long-haul national network
System Security	<ul style="list-style-type: none"> • 2 kinds of user authentication modes: local authentication and RADIUS authentication (to authenticate user identity and authorization) • 3 kinds of routing protocol authentication modes: clear text authentication (OSPF, IS-IS, and RIP), MD5, and HMAC-MD5 authentication (IS-IS, OSPF and BGP) • Basic ACL and enhanced ACL: based on source/destination IP address, DSCP, IP protocol type, source/destination port No • Support for static black hole/reject route function • Support for NetStream • Support for Port Mirroring • Support for unicast Reverse Path Forwarding (uRPF)
Network Management	<ul style="list-style-type: none"> • Support for inter-operation with Huawei's IPTN (IP Telecom Network) operation Framework • Support for inter-operation with Huawei's carrier-class MPLS VPN management system • Support for Huawei Group Management Protocol (HGMP) • Support for SNMP V1, V2, V3 and RMON • Support for SSH

3.2 Hardware Specifications

Description	NE40-8	NE40-4	NE40-2
System Architecture	Distributed NP-based forwarding 19-inch standard rack architecture Hot-swappable for all the key units		
Main Control Slots	2	2	1
Service Slots	8	4	2
Switching Capacity	64G non-block switching, redundant &hot backup	32G non-block switching, redundant &hot backup	16G non-block switching
Forwarding Capability	48Mpps	24Mpps	12Mpps
Dimensions (W X D X H)	482.6 X 420 X 797.3 mm (18U)	482.6 X 420 X 352.8 mm (8U)	482.6 X 420 X 2 19.5 mm (5U)
Weight	< 85Kg	< 50kg	< 35kg
Input Voltage	AC: 100V to 240V, 50/60Hz DC: -36 to -75V		
Max. Power Consumption	1000W	600W	600W
Operating Attitude	4000m		
Operating Temperature	0°C to 40°C		
Operating Humidity	10% to 90%, non-condensing		

Line Processing Units and Modules

4.1 Routed Ethernet LPU

- 4 ports Fast Ethernet Electrical Interface (RJ45) and 4 ports Optical Interface (SFP) line card (E8FB)
- 16 ports Fast Ethernet Electrical Interface (RJ45) Line Card (EGFEE)
- 32 ports Fast Ethernet Electrical Interface (RJ45) Line Card (EWFEE)
- 16 ports Fast Ethernet Optical Interface (SFP) Line Card (EGFF)
- 8 ports Fast Ethernet Optical Interface (SFP) Line Card (E8FF)
- 4 ports Gigabit Ethernet GBIC Interface Line Card (E4GC)

4.2 Switched Ethernet LPU

- 16 ports Fast Ethernet Electrical Interface (RJ45) Line Card (RS-EGFEE)
- 32 ports Fast Ethernet Electrical Interface (RJ45) Line Card (RS-EWFEE)
- 16 ports 100M Ethernet Optical Interface (SFP) Line Card (RS-EGFF)
- 8 ports 100M Ethernet Optical Interface (SFP) Line Card (RS-E8FF)
- 4 ports Gigabits Ethernet GBIC Interface Line Card (RS-E4GC)

4.3 POS LPU

- 4 ports POS OC-3c/STM-1 Optical Interface Line Card (Multi-mode, 1300nm 2km-MTRJ) (P4CM)
- 4 ports POS OC-3c/STM-1 Optical Interface Line Card (Single-mode, 1300nm 15km-MTRJ) (P4CS)
- 8 ports POS OC-3c/STM-1 Optical Interface Line Card (Multi-mode, 1300nm 2km-MTRJ) (P8CM)
- 8 ports POS OC-3c/STM-1 Optical Interface Line Card (Single-mode, 1300nm 15km-MTRJ) (P8CS)
- 2 ports Channelized POS OC-3/STM-1 SFP Interface Line card (C2CF)
- 4 ports Channelized POS OC-3/STM-1 SFP Interface Line card (C4CF)
- 2 ports OC-12c/STM-4c POS Optical Interface Line Card (Multi-mode, 500m-SC) (P2HM)
- 2 ports OC-12c/STM-4c POS Optical Interface Line Card (Single-mode, 1300nm 15km-SC) (P2HS)
- 1 port OC-48c/STM-16c POS Optical Interface Line Card (Single-mode, 1300nm 2km-LC) (P1UZ)
- 1 port OC-48c/STM-16c POS Optical Interface Line Card (Single-mode, 1300nm 15km-LC) (P1US)
- 1 port OC-48c/STM-16c POS Interface Line Card (Single-mode, 1300nm 40km-LC) (P1UL)
- 1 port OC-48c/STM-16c POS Interface Line Card (Single-mode, 1550nm 70km-LC) (P1UV)
- 1 port OC-48/STM-16 POS Interface Line Card (Single-mode, 1300nm 2km-LC) (P1RZ)
- 1 port OC-48/STM-16 POS Interface Line Card (Single-mode, 1300nm 15km-LC) (P1RS)

4.4 RPR LPU

- 1 port OC-48C/STM-16C RPR Interface Card (Single-mode, 1300nm 2km-LC) (R1UZ)
- 1 port OC-48C/STM-16C RPR Interface Card (Single-mode, 1300nm 15km-LC) (R1US)
- 1 port OC-48C/STM-16C RPR Interface Card (Single-mode, 1300nm 40km-LC) (R1UL)
- 1 port OC-48c/STM-16c POS Interface Line Card (Single-mode, 1550nm 70km-LC) (P1UV)

4.5 ATM LPU

- 2 ports OC-12c/STM-4 ATM SFP Interface Line Card (A2HF)
- 8 ports OC-3c/STM-1 ATM Optical Interface Line Card (Multi-mode, 1300nm 2km- MTRJ) (A8CM)
- 8 ports OC-3c/STM-1 ATM Optical Interface Line Card (Single-mode, 1300nm15km- MTRJ) (A8CS)

4.6 Flexible Card LPU (LPUF)

- Flexible Card Line Processing Unit (supporting 1 or 2 PIM cards)
- 8 ports 10/100M Adaptive Ethernet Electrical PIM Card (routed and switched)
- 16 ports 10/100M Adaptive Ethernet Electrical PIM Card (routed and switched)
- 1 ports Gigabit Ethernet (SFP) Optical PIM Card (routed and switched)
- 2 ports Gigabit Ethernet (SFP) Optical PIM Card (routed and switched)
- 1 ports ATM OC-3c/STM-1(SFP) Optical PIM Card
- 2 ports ATM OC-3c/STM-1(SFP) Optical PIM Card
- 4 ports ATM OC-3c/STM-1(SFP) Optical PIM Card
- 8 ports ATM OC-3c/STM-1 (SFP) Optical PIM Card
- 1 ports POS OC-3c/STM-1(SFP) Optical PIM Card
- 2 ports POS OC-3c/STM-1(SFP) Optical PIM Card
- 4 ports POS OC-3c/STM-1(SFP) Optical PIM Card
- 8 ports Channelized E1/T1 (RJ45) PIM Card
- 3 ports E3(SMB) PIM Card

4.7 Service Provider Unit (SPU)

- Network address translation processing card (NATB0)
- Netstream service processing board (SPUB0)
- NAT PIM card
- NATPT PIM card
- L2TP PIM card
- Layer 2 tunneling protocol board (SPUB1 plus L2TP PIM card)
- Generic routing encapsulation board (SPUC plus GRE PIM card)

4.8 Low-speed TDM LPU

- 8 ports E1 Interface Line Processing Card (RJ45) Unchannelized (8xE1)

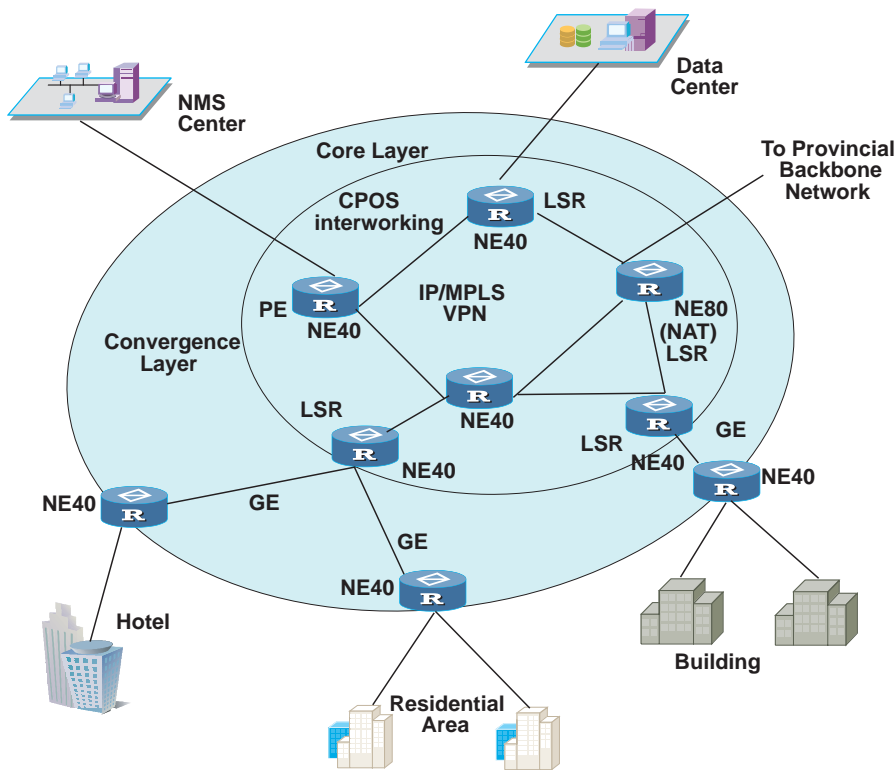
4.9 Multi-service LPU

- 4ports Fast Ethernet Electrical Interface (RJ45), 4 ports Optical Interface (SFP) line card (E8FB) and 4 ports OC-3c/STM-1 Optical Interface (Multi-mode, 1300nm 2km-MTRJ) line card (SPCB)

Applications

5.1 Application in MAN

The typical networking configuration of the NE40 series USR in a large-scale MAN is illustrated below.



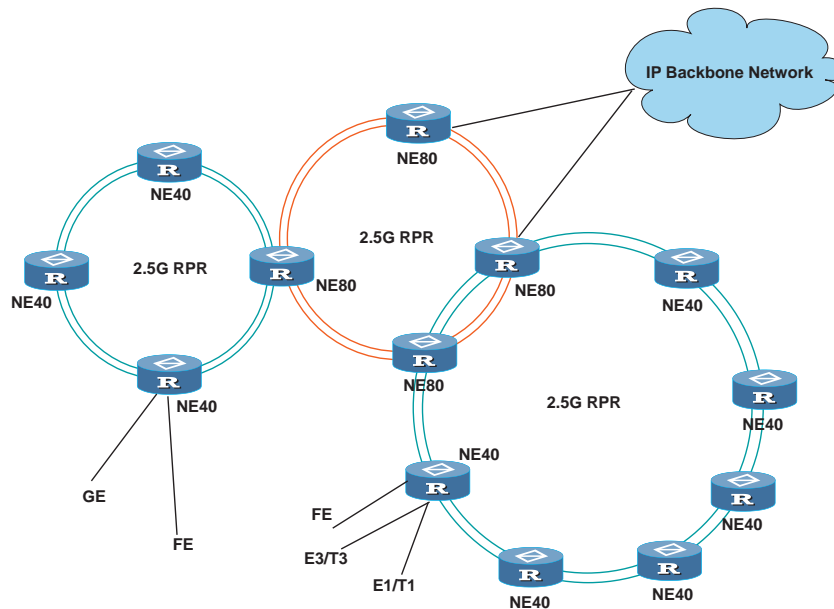
NE40 applied in MAN

The core layer is formed by the NE80 and the NE40, where the NE40 serves as the backbone router and the NE80 serves as the gateway router connecting to the provincial backbone network.

At the convergence layer the NE40 converges the broadband traffic from various residential areas, hotels or medium- and small-scaled enterprise networks, and then sends it to the core layer over high-speed links. The NE40 can extend the backbone network in case that the core layer devices are limited.

This networking solution can provide full MPLS VPN, where the NE40 serves as the PE or P device in the backbone network running MPLS.

5.2 Application in Optic MAN through RPR

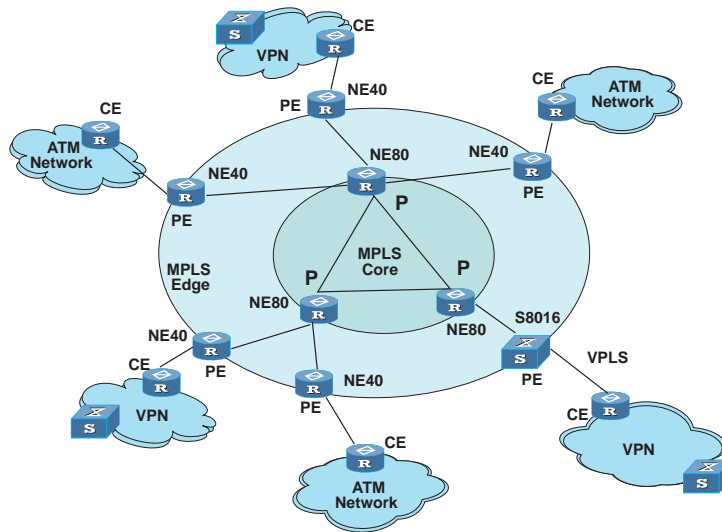


NE40 applied in optical MAN through RPR

The RPR technology boasts of fast self-healing resilient protection mechanism and highly effective bandwidth utility, flexible and simple networking, which is suitable for newly constructed MAN. In the practical networking environment, the NE80 is adopted to serve as the backbone layer router to form the core ring network, while the NE40 as the convergence layer router to form the access ring network, which intersects or is tangent with the core ring. The core ring network implements the scheduling of the coarse-granularity traffic with one or two routers serving as the upstream node(s).

The NE40 provides high-density GE and FE interfaces and other types of interface such as E1/T1 and E3/T3. It can directly connect to the Ethernet switch, and can also implement dedicated line access.

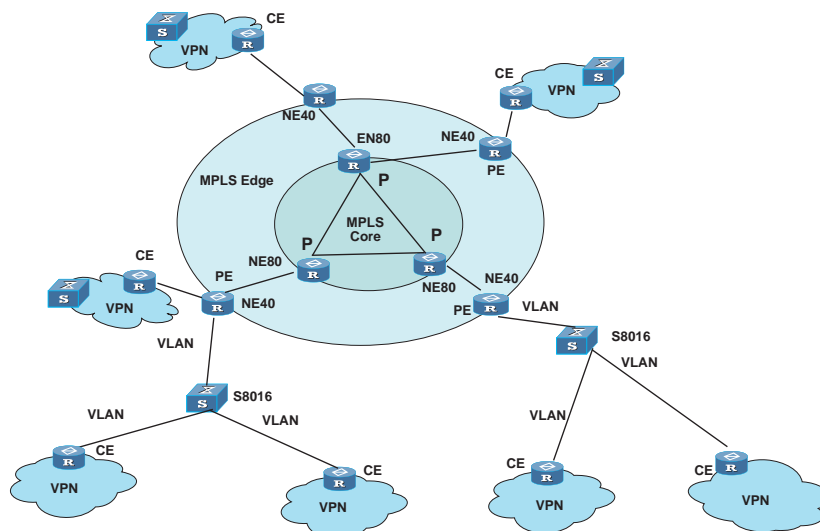
5.3 Application in MPLS L2VPN Network



NE40 applied in MPLS L2VPN network

In this application the NE80 serves as the MPLS core device to provide basic MPLS forwarding capability. In case that there is a requirement for trans-field, the NE80 can also serve as the trans-field ASBR device. The NE40 and S8016 can work as PE devices, providing the VPN users with point-to-point VLL service and point-to-multipoint VPLS service.

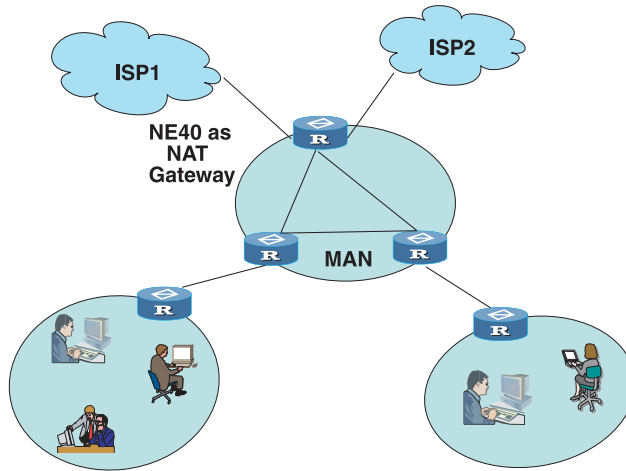
5.4 Application in MPLS L3VPN Network



NE40 applied in MPLS L3VPN network

In this application the NE80 serves as the P device and the route reflector in the network core. The NE80 can also work as the ASBR router in the trans-field VPN solution. The NE40 and S8016 can work as PE devices and also as NAT to provide Internet access service.

5.5 Application as NAT Gateway



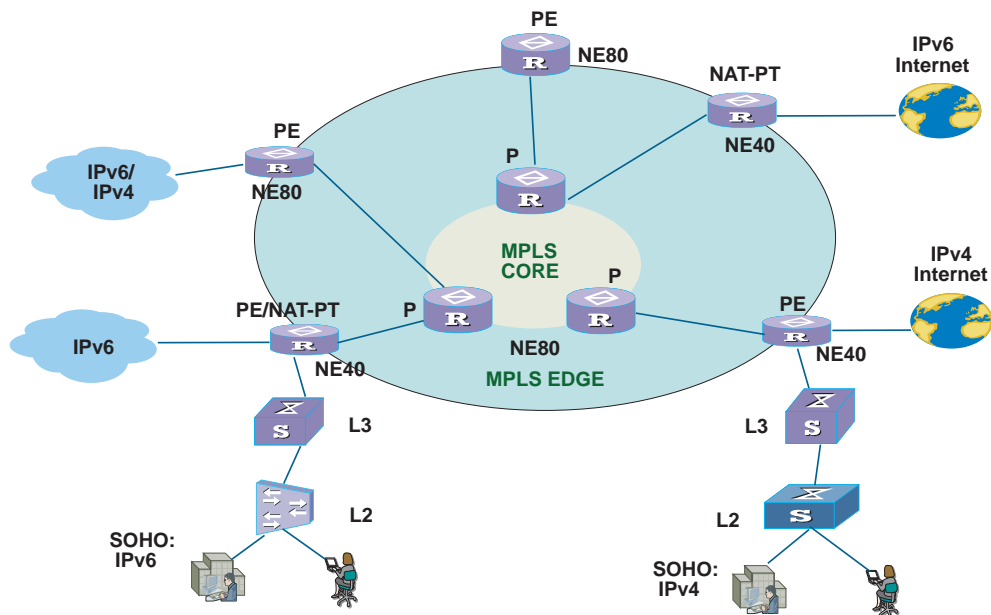
NE40 as NAT gateway

The NE40 can serve as the NAT device to provide line rate address translation for MAN egress.

The MAN egress is connected to the NE40 through GE. The NE40 is connected to other ISP egresses through the CPOS interface or directly connected through GE to enable CAR.

The NE40 is applicable to NAT high-end application and is used for line rate address translation on MAN and ISP egress.

5.6 Application in IPv6 Network



PE: Provider Edge	NAT -PT: Network Address Translation Protocol Translation
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Application in IPv6 network

In the IPv6 network, the original IPv4 services, such as IPv4 forwarding and MPLS VPN, should not be impacted. So there are two problems to be solved:

- Interconnection between IPv6 islands
- Interworking between IPv6 and IPv4 networks

The NE40 brings forward the following solutions based on IPv6 techniques:

- All the routers in the backbone network support the IPv4/IPv6 dual-stack. In this case, IPv4 services are forwarded over IPv4, while IPv6 services are forwarded over IPv6.
- The interconnection between IPv6 islands can be implemented through Layer 3 tunnels, including manually configured tunnels or 6to4 tunnels. The core router needs only to support the IPv4 forwarding. The interworking between IPv6 and IPv4 networks can be implemented by configuring the NAT-PT on gateways.
- The interconnection between IPv6 islands can be implemented through MPLS L2 tunnels by applying MPLS L2 VPN techniques such as VPLS and CCC. The core router needs only to support the MPLS forwarding. The interworking between IPv6 and IPv4 networks can be implemented by configuring the NAT-PT on gateways.



Huawei End-to-End Solutions

Router Series

- Quidway NetEngine 5000E Terabit Switching Router
- Quidway NetEngine 80/80E Core Switching Router
- Quidway NetEngine 40/40E Series Universal Switching Routers
- Quidway NetEngine 20/20E Series High-Performance Edge Routers
- Quidway NetEngine 16E/08E/05 Series Multi-Service Edge Routers
- Quidway AR 46 Series Enterprise Core Routers
- Quidway AR 28 Series Modular Branch Routers
- Quidway AR 18 Series Access Routers

LAN Switch Series

- Quidway S8500 Series 10G Core Routing Switches
- Quidway S8016 Multi-Service Backbone Routing Switch
- Quidway S6500 Series Gigabit Routing Switches
- Quidway S5516 Gigabit Routing Switch
- Quidway S5000 Series Gigabit Intelligent Layer 2 Ethernet Switches
- Quidway S3900 Series Intelligent Routing Switches
- Quidway S3500 Series Intelligent Routing Switches
- Quidway S3000 Series Intelligent Layer 2 Ethernet Switches
- Quidway S2000 Series Enterprise Desktop Switches

Security & VPN Products

- Quidway Eudemon 1000/500/200/100 Series Firewalls
- Quidway Eudemon 2000 Series Session Border Controllers
- Quidway SecPath Series Security Gateways

VoIP Products and Solution

- Quidway A8010 Expert VoIP Gateway
- Quidway A8010 Mini-Expert VoIP Gateway
- Quidway A8010 VoIP GateKeeper

BRAS

- Quidway MA5200G Broadband Intelligent Access Server
- Quidway MA5200F Compact Broadband Intelligent Access Server

Access Servers

- Quidway A8010 Expert Remote Access Server
- Quidway A8010 Mini-Expert Remote Access Server

WLAN Products and Solution

- Huawei C9012 WLAN Authentication Server
- Quidway W1006E WLAN Access Point
- Quidway W1003 WLAN Access Point
- Quidway W1003A WLAN Access Point
- Quidway WL100M WLAN Cardbus Adapter
- Huawei WG202 GPRS+WLAN Combo Card

Network Management Solution

- iManager N2000 Datacomm Management System
- iManager NSM VPN Manager
- iManager NSM QoS Manager
- iTellin AAA System

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