NEC's IPv6 Directions

July 20th, 2001

NEC Europe Network Laboratories - Heidelberg

Heinrich Stüttgen, stuttgen@ccrle.nec.de

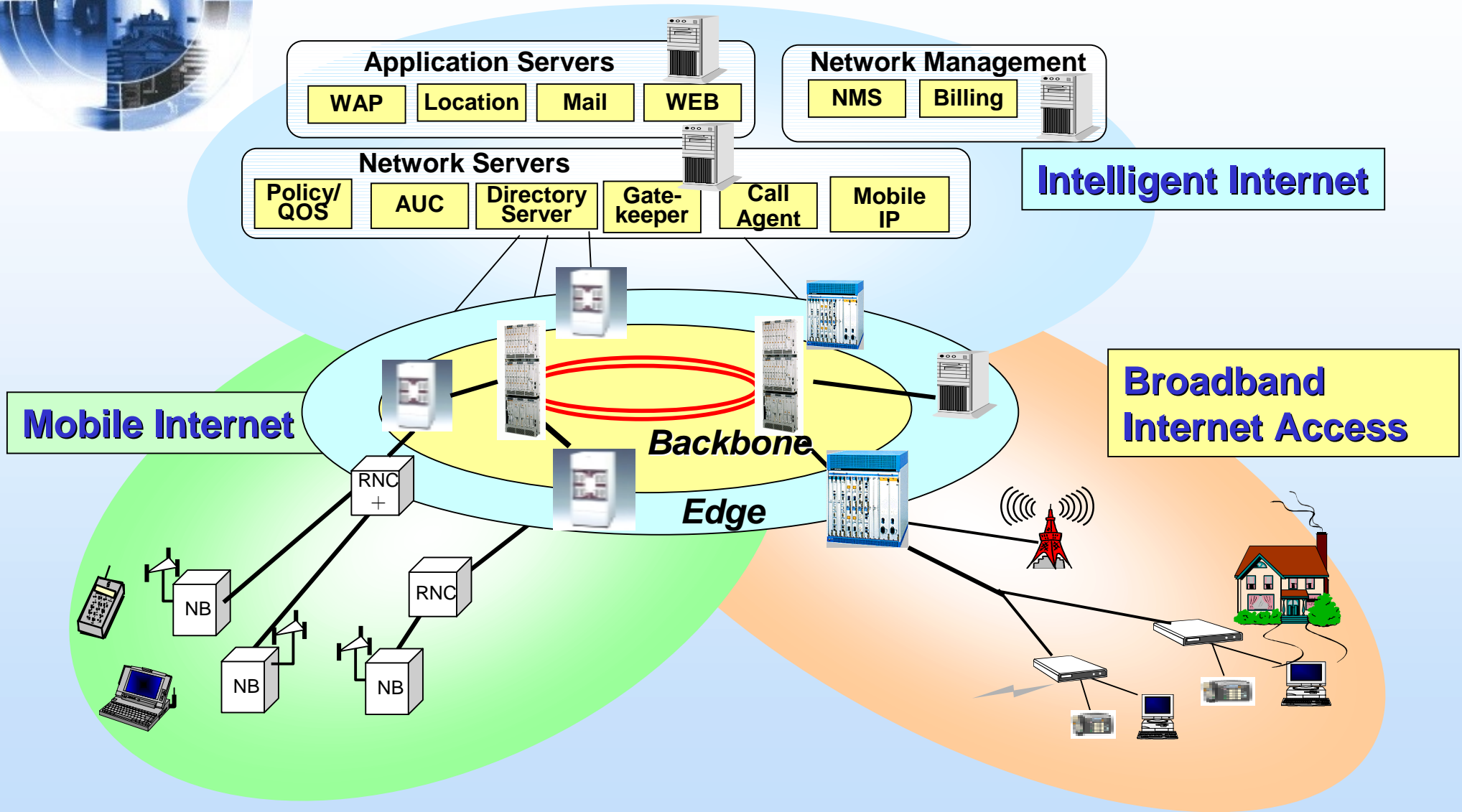*Adenauerplatz 6, D69115 Heidelberg*

NEC

Content

- Network Vision

- NEC's IPv6 Activities

- IPv6 products
  - IX 50x0
  - CX 5210
  - CX 6800-QS

- Summary and Conclusions

NEC

IPv6-based Network Vision

Application Servers
- WAP
- Location
- Mail
- WEB

Network Management
- NMS
- Billing

Intelligent Internet

Network Servers
- Policy/QOS
- AUC
- Directory Server
- Gate-keeper
- Call Agent
- Mobile IP

Mobile Internet

Backbone

Edge

RNC +

RNC

NB

NB

NB

Broadband Internet Access

3

NEC

NEC's recent IPv6 Activities

- Operation of IPv6 test network （1997-）
- Participation in conformance and inter-operability tests using our prototype FreeBSD router
  - Connectathons
  - TAHI
- Networld+Interop Tokyo Exhibition
  - 1998: prototype router, tunneling, etc.
  - 1999: IPv6/IPv4 Translator

    Mobile IPv6

    -> Awarded "Networld+Interop 99 Tokyo Best of Show Award"
  - 2000: IPv6 Integrated Switching Router - IX5000 Series
    IPv6 ISP Service demonstration
- Participation in EU IST projects on IPv6
  - MobyDick - Mobile IPv6 optimization for End to end IPv6 mobile NW
  - NGNLab – DiffServ IPv4/IPv6 test labs

NEC IPv6 Development Focus

- Large-capacity IPv6 packet-transfer control
  - Wire-speed processing (OC-192, 10GbE)
- Large-capacity Mobile-IP processing
  - Large-scale HA server
- High-precision QoS control
  - Traffic engineering
  - Centralized QoS control
- Support of a IPv4→v6 migration period (v4/v6 combined environment)
  - Dual stack
  - v6/v4 translator

NEC

NEC's IPv6 Status

available

- NEC starts to deliver IPv6 products and Services
  - IPv6 Integrated Switching Router - IX5000 Series
  - Core network IPv6 switch/router – CX 5210 (80 Gbps)
  - IPv6/IPv4 Translator (based on H.Kitamura (NEC) RFC 3089)
  - BIGLOBE(NEC's ISP) IPv6 Trial Service

Coming up soon

  - Functional enhancements for CX/IX router series
  - Core Network IPv6 switch/router – CX 5220 (320 Gbps/OC 192)
  - SOHO router

IPv6-compatible Router Products

- Complete support of IPv6 standard functions
- High-speed forwarding by hardware engine
- Hardware support of various tunnel functions

Edge router IX5000

Mid-capacity core router CX5210

- 80 Gbps throughput (backplane capacity: 128 Gbps)
- Multi-QoS control (COPS support)
- High reliability through redundant configuration and online file updating

IX5000: Overview

- **IP switch 4Gbps**
  - IX5005 (Redundant Power)
    - 4 slots
  - IX5010 (Redundant Power)
    - 4 slots + 2 slots for Voice compress module
  - IX5020(Redundant Power)
    - 4 slots + 8 slots for Full Redundant
  - Various LAN/WAN I/F
    - POS: STM1-SM/MM, OC-3SM/MM
    - ATM: STM1-SM/MM, OC-3SM/MM, I.432.5(25M)
    - Channelized T1/E1(PPP/FR)
    - 10/100Mbps Ethernet, Gigabit Ethernet
- **High reliability** for carrier/ISP customer
- **VPN & QoS** service
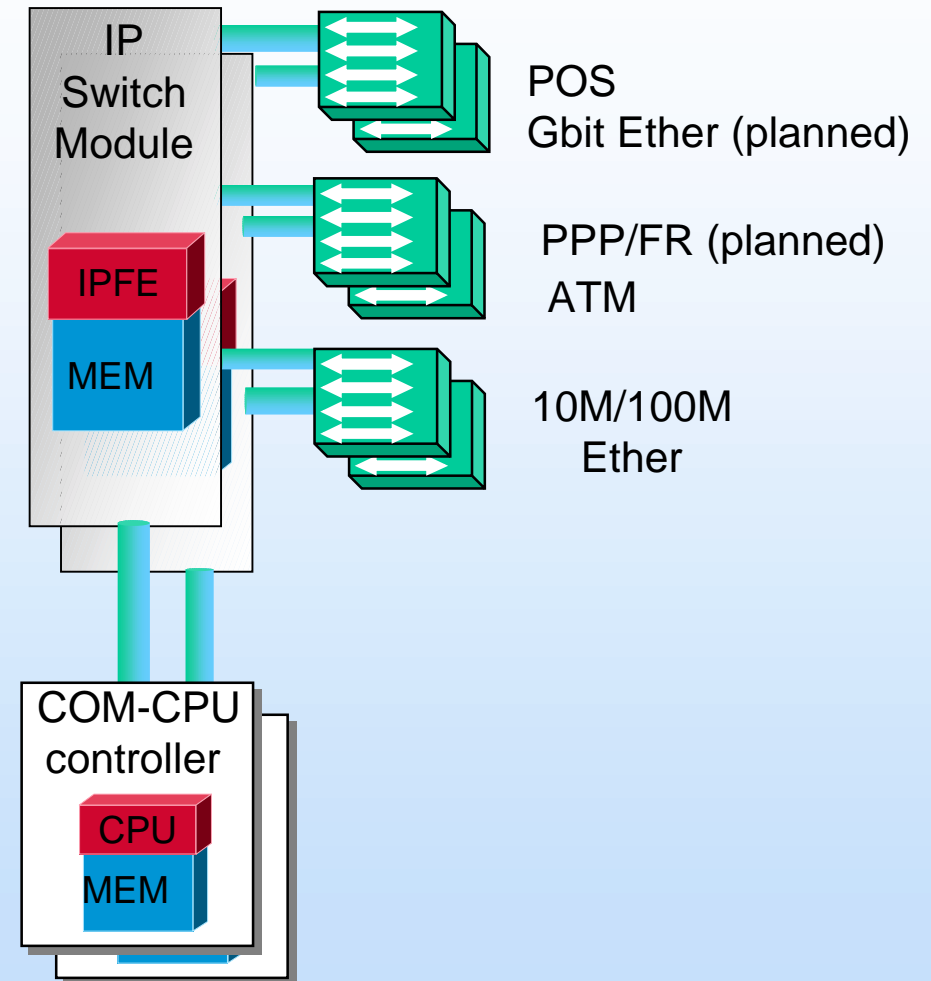- DiffServe, IP tunneling, RSVP,MPLS

NEW

IX5005

IX5010

IX5020

8

NEC

IX 5000 Switch Architecture

- IP&ATM integrated router (integrating L3&L4 and ATM switch)

- Redundant configuration on IX5020
  - Common controller
  - IP switch module
  - Line card
  - Power unit

- High-speed routing at IP switch module with 4 Gbps throughput

IP Switch Module

IPFE

MEM

POS
Gbit Ether (planned)

PPP/FR (planned)
ATM

10M/100M
Ether

COM-CPU controller

CPU

MEM

NEC

IX 5000 Highlights

Enabling IPv6 High-speed forwarding !

Product Functions
- IPv6 shipping since October 2000
- IPv4 version since 1999

Concepts
- NEC Original Code
- Same Hardware for both IPv6 and IPv4
- High-speed Hardware Switching Capability for IPv6 and IPv4
- Ultimate Inter-operability
- Full Redundancy Architecture:
  - Power unit, Common Control module, Interfaces
- Easy Operation and Maintenance

IX 5000 Highlights

- IPv6 standard specifications
- IPv6 Hardware forwarding
- IPv6 Routing Protocol:
  - RIPng, OSPFv3, BGP4+, PIM-SM/DM
- IPsec/IKE authentication/encryption
- Interfaces
  - 10Base-T/100Base-TX, ATM PVC Point-to-Point (STM-1,25Mbps)
  - PoS(STM-1), GbE, Channelized T1/E1
- Tunnel functions
  - IPv6 over IPv4, IPv6 over IPv6, IPv4 over IPv6, IPv4 over IPv4, auto-tunnel

Backbone Core/Edge IPv4 & IPv6 Router (CX5210/5220)

- Support high quality / Real-time QoS using DiffServ+ and ATM-like bandwidth control mechanism

- Support Bandwidth guarantee service managed by QoS Server (CX6800-QS)

- Carrier Class Reliability / Availability by fully redundant Technology

- Advanced Wire-Speed MPLS and IPv6 (Dual Stack Forwarding)
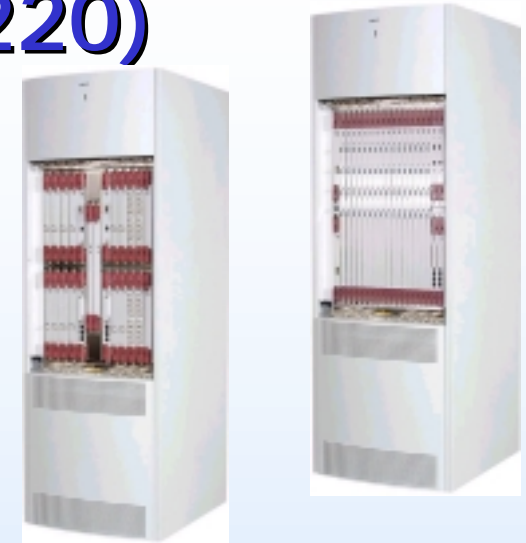
|	CX5210	CX5220
Capacity	80 Gbps/16 slots	320 Gbps/16 slots
Interfaces	POS : 2.4G,150M,600M ATM: 150M,600M Ethernet : Gigabit, 100M	POS : 10G, 2.4G, ATM: 600M Ethernet : GBE, 10GBE
Protocols	RIP2, RIPng, OSPF2, IS-IS, BGP4, BGP4+, OSPF-TE, RSVP, CR-LDP, MPLS	
Open Interfaces	COPS, SNMP	

NEC

IPv6 Wire-speed Processing in CX5210

- **Achieves wire speeds by hardware-based IPv4 & IPv6 forwarding**
- **Features IPv4/IPv6 dual stack**
- **Supports Mobile IPv6**

CX5210

NEC
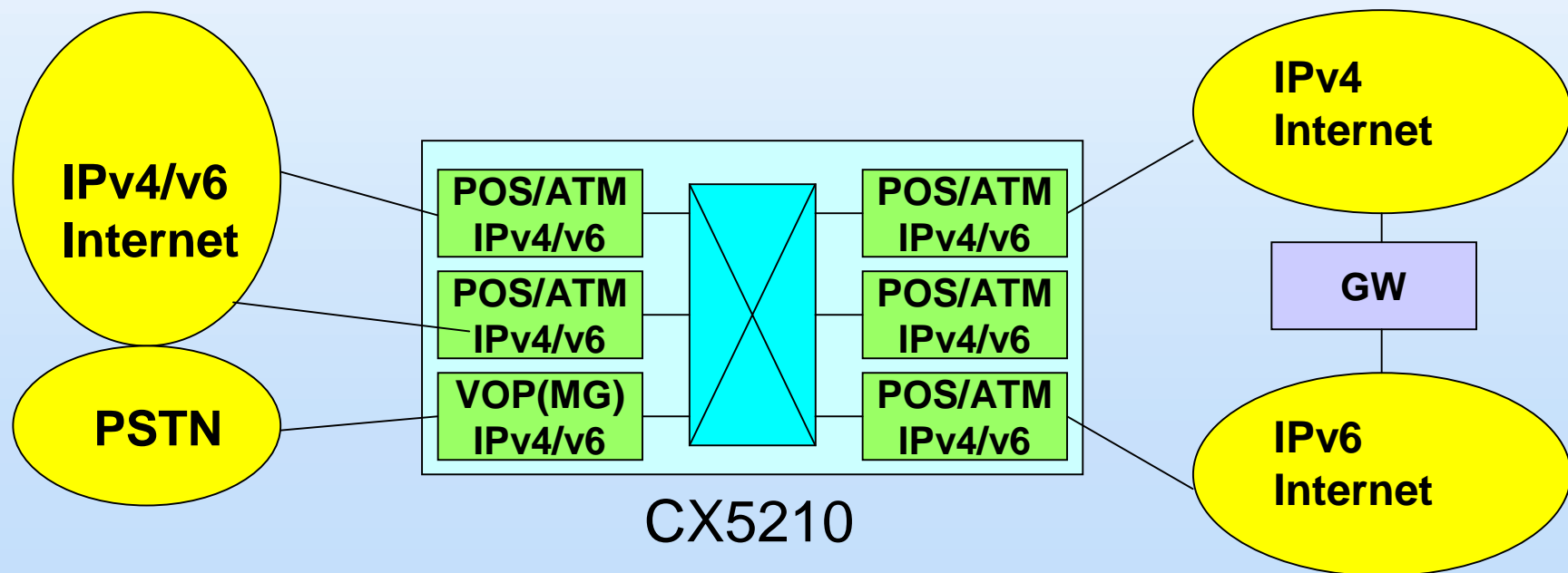
Mobile IP Home Agent Functions

Mobile IP processing card
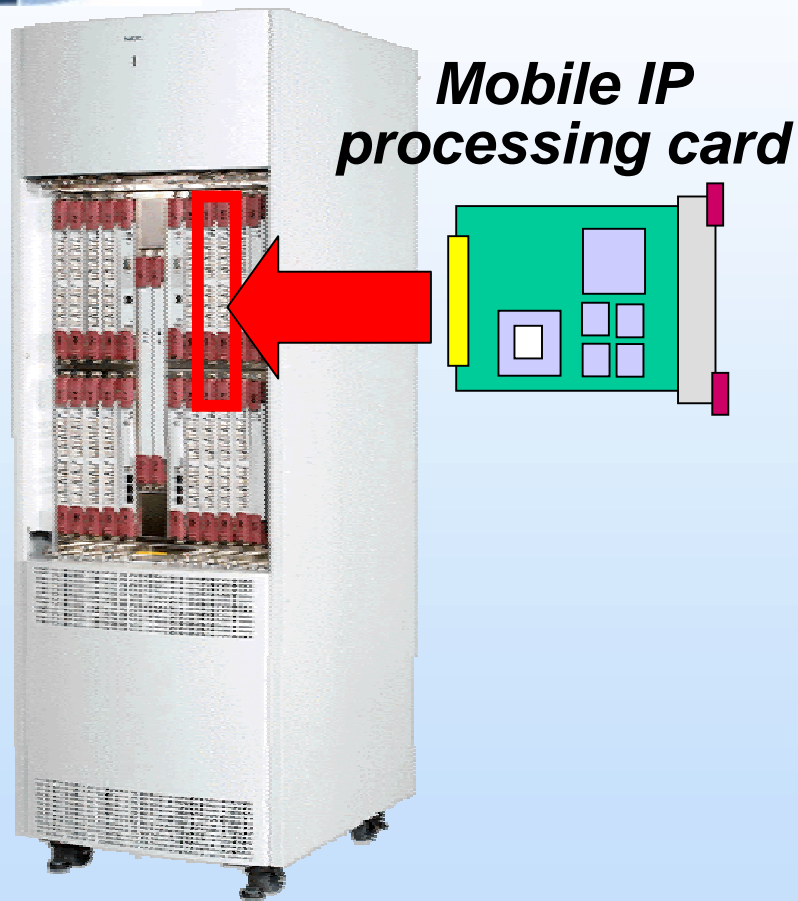
- Incorporates Mobile IP processing cards
  - Mobile-IPv4/v6 compatible
  - High-reliability redundant configuration
  - Scalable configuration in accordance with number of mobile terminals
  - High-speed processing by special engine
- Now in development
- Server-type HA product also in development

QoS Server Architecture

By using the QoS server, carriers can centrally manage network resources and change policy flexibly and dynamically
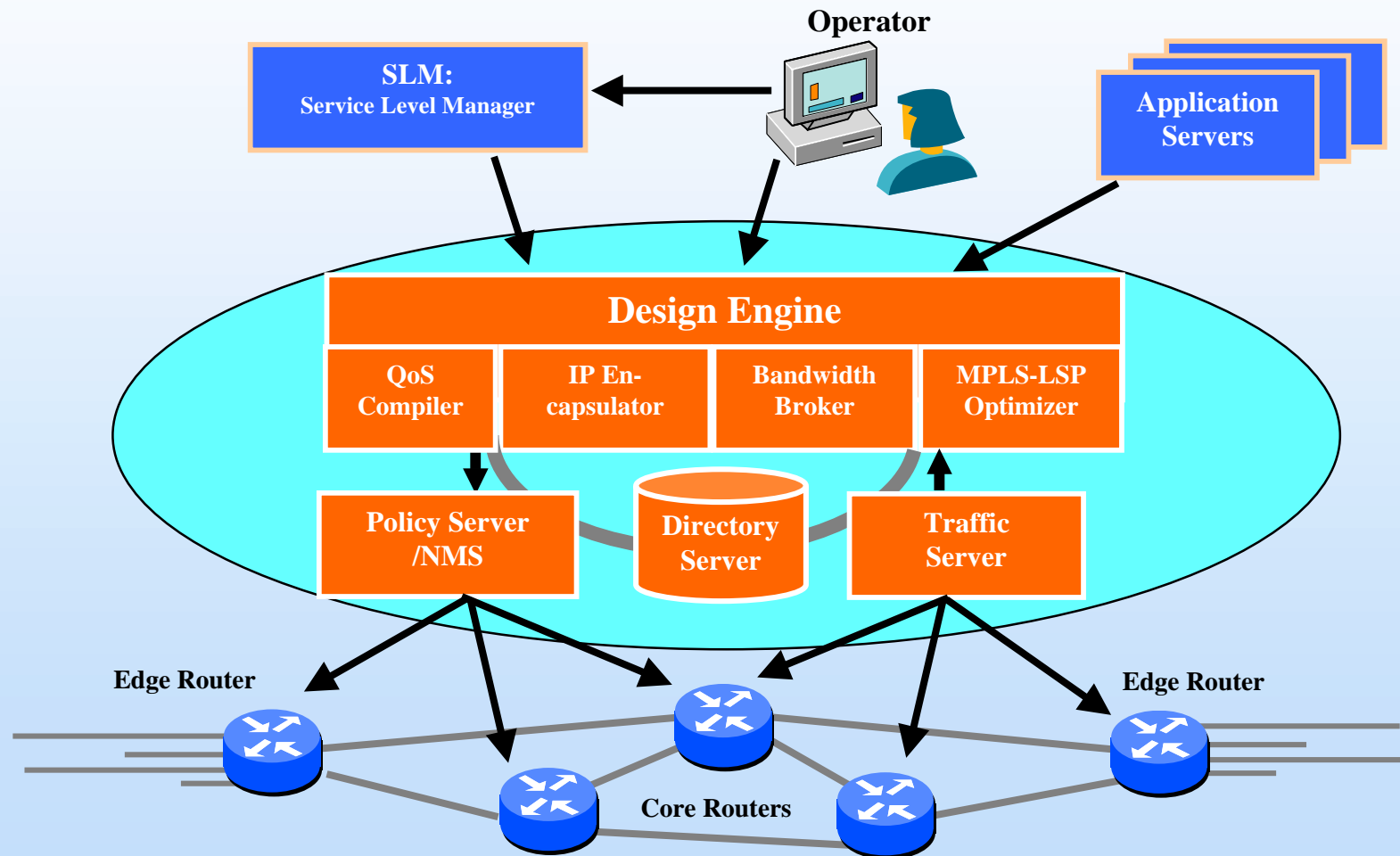
QoS Server(CX6800-QS)

◆ **QoS Control Scheme**
- **Diffserv based Policy control**

◆ **NE Interfaces**
- **LSP Management**
  - ➢ SNMP
- **Policy Management**
  - ➢ CLI, SNMP
- **Traffic Monitoring**
  - ➢ SNMP, Probe interface

◆ **Application/Network Servers Interface**
  - ➢ CORBA
  - ➢ LDAP (Option)

◆ **Hardware/Operating System**
- **Solaris 8 with Sun E series**
- **HP -UX with HP 9000 series**
- **Cluster Configuration (Option)**

CX6800-QS

NEC

Summary and Conclusions

- IPv6 will play an increasingly important role in Europe and Asia

- IPv6 network products are available to build small and large, ultra high performance IPv6 networks

- dual IPv4/v6 routers will ease the introduction of IPv6

- NEC has available IPv6 products for enterprise to core networks

- Added function from Mobile IPv6 to QoS management roll out is ongoing

- NEC's R&D groups are driving the further development of IPv6 (e.g. IPv4/v6 Translation, QoS Management, ...)

- NEC Europe is actively particpating in the further development of advanced IPv6 features (e.g. IST MobyDick, NGNLab) in Europe

- This is a good time for coordinated and cooperative actions between European and Japanese Technology Leaders to make IPv6 happen

NEC