

BitEngine 12000 IPv6 Core Router

Dr. Fu L zheng

VP Technology

Tsinghua Bitway Networking Technology Co.,Ltd.

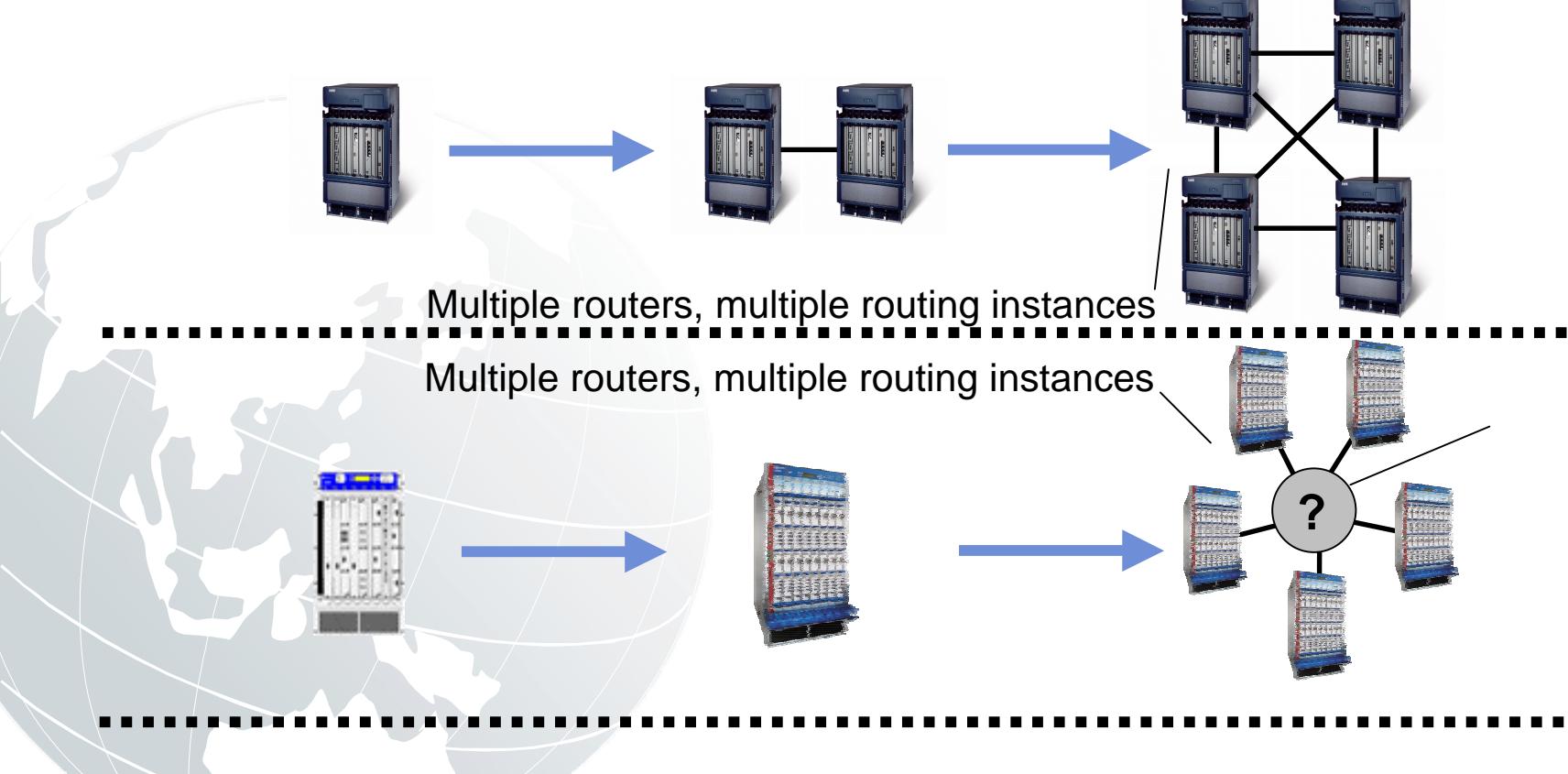
Feb. 23, 2005

The development of NGI in world

- The scale of NGI networks becomes much bigger in world:
 - Internet2 Abilene backbone upgrades to 10Gbps and IPv6
 - USA started NLR research project in last year
 - Next generation of EU GEANT,6net and Euro6IX
 - Asia Pacific academic network,APAN is becoming bigger , IPv6 Task Force,is pushing pure world-level IPv6 backbone
 - Whole world IPv6 NGI, GTRN
- January 2003 DoD declared to migration its network to IPv6
- IPv6 network equipments and application software
 - IPv6 equipment: Juniper , CISCO , Hitachi, Huawei, Bitway...
 - IPv6 software : Microsoft , SUN , ...
- August 2003 , China declared CNGI project in future years.
- December 25 2005, CERNET2, the biggest pure IPv6 testbed in the world was opened.

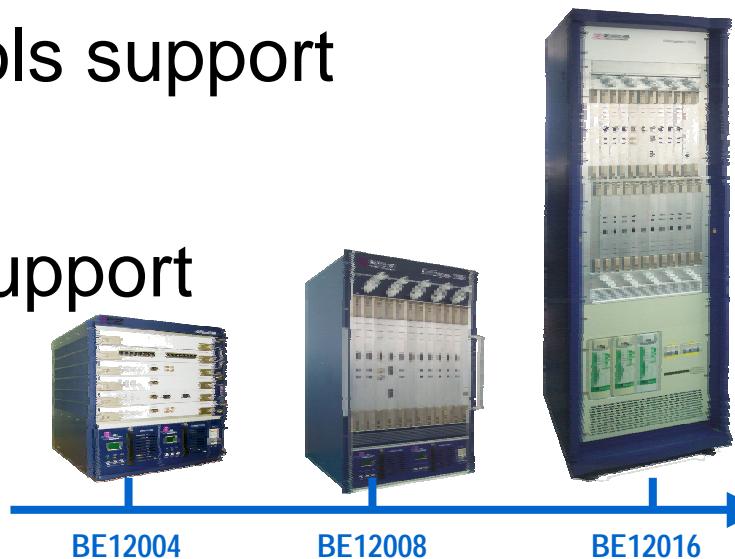
The Key Technologies of NGI

- IPv6/v4 core router
- Migration technology from IPv4 to IPv6
- Distributed-cluster Core router technology



Features of BitEngine12000 IPv4/v6 Core Router

- IPv6 oriented , but IPv4 support also
- Modular structure, smoothly upgrading support
- High speed physical interface
- Hot swapping and key components redundancy
- Hardware-supported packet forwarding
- Unicast and Multicast protocols support
- Securities support
- Multiple IPv4/v6 migrations support

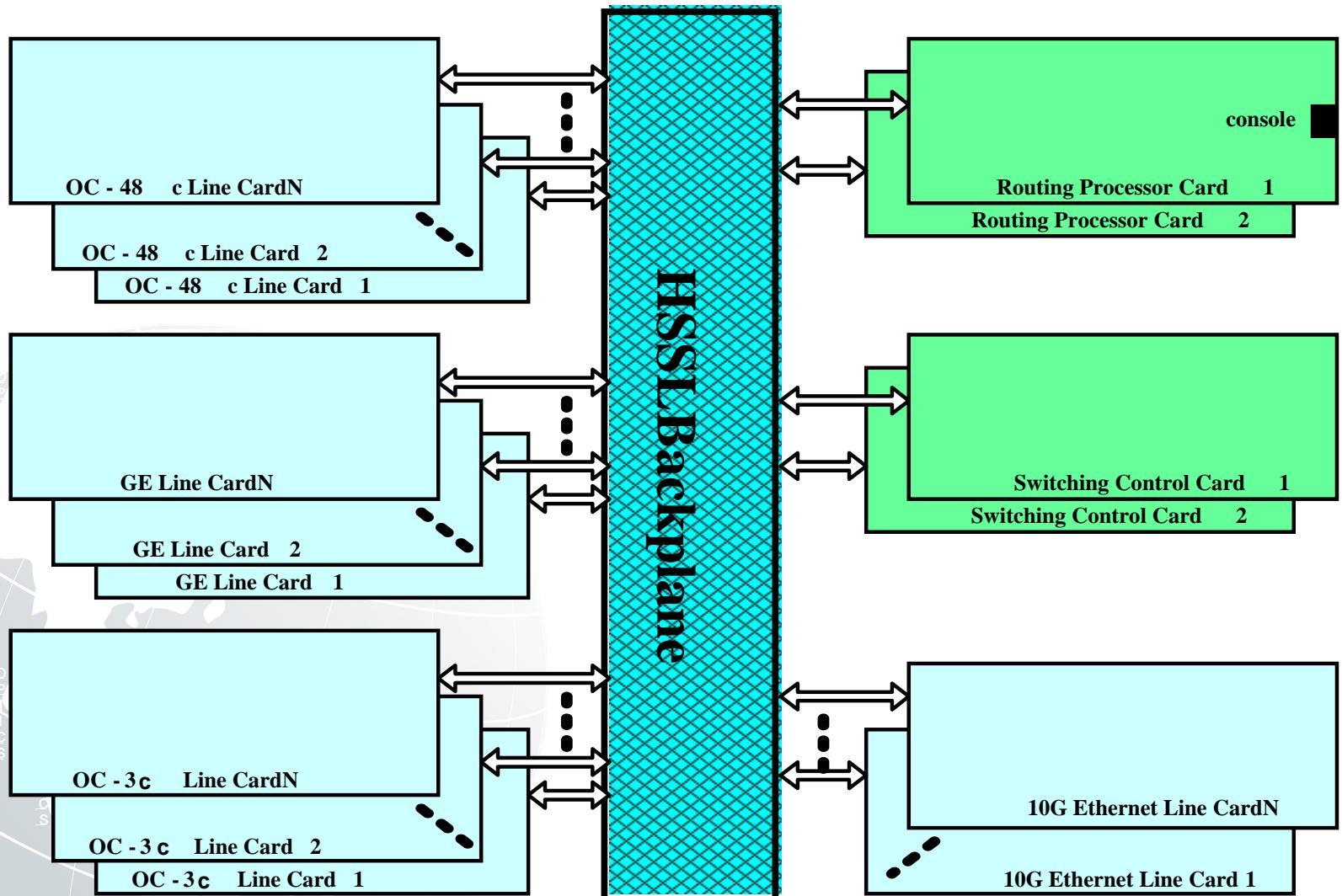


Features of BitEngine12000 IPv4/v6 Core Router

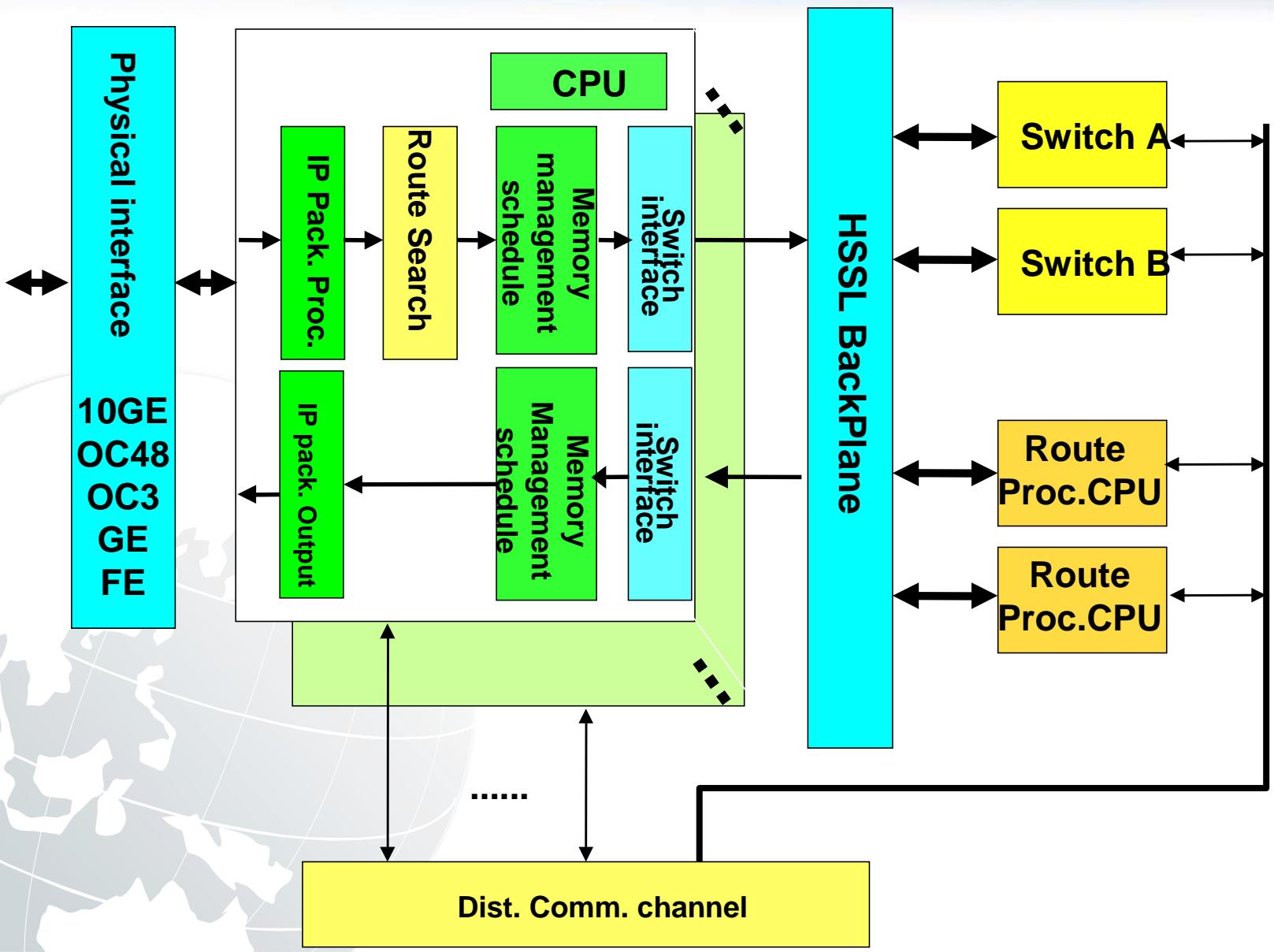
- RIPv2、RIPng、OSPFv2、OSPFv3、BGP4 +
- PIM/SM multicast protocols
- Configurated tunnel、6to4 tunnel、NAT-PT
- IPsec and IKE
- SNMP v2/v3
- IPv4/v6 packet: line rate forwarding
- Switch capacity: 320Gbps
- IPv6/IPv4 route table: 1M



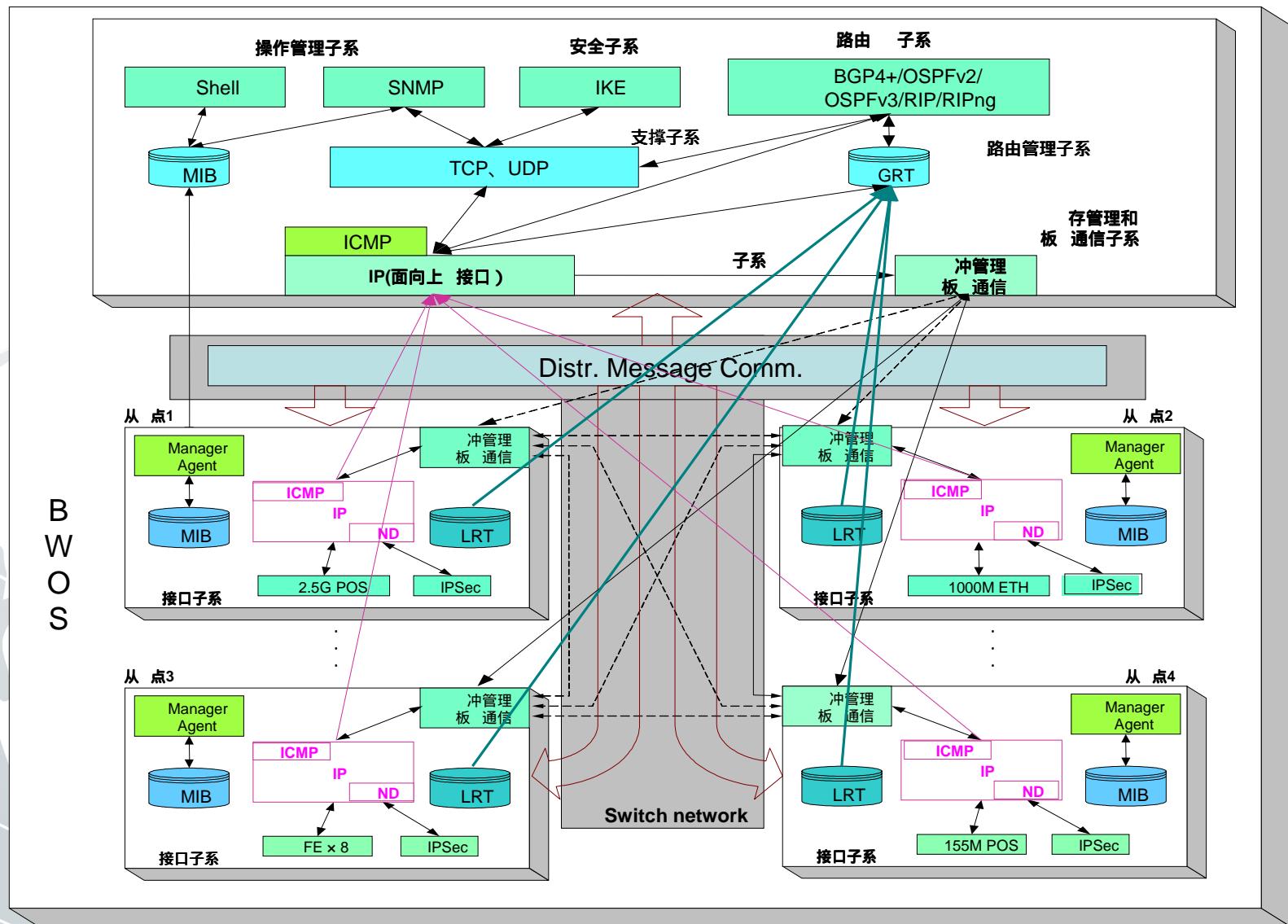
Hardware Structure



Hardware Architecture



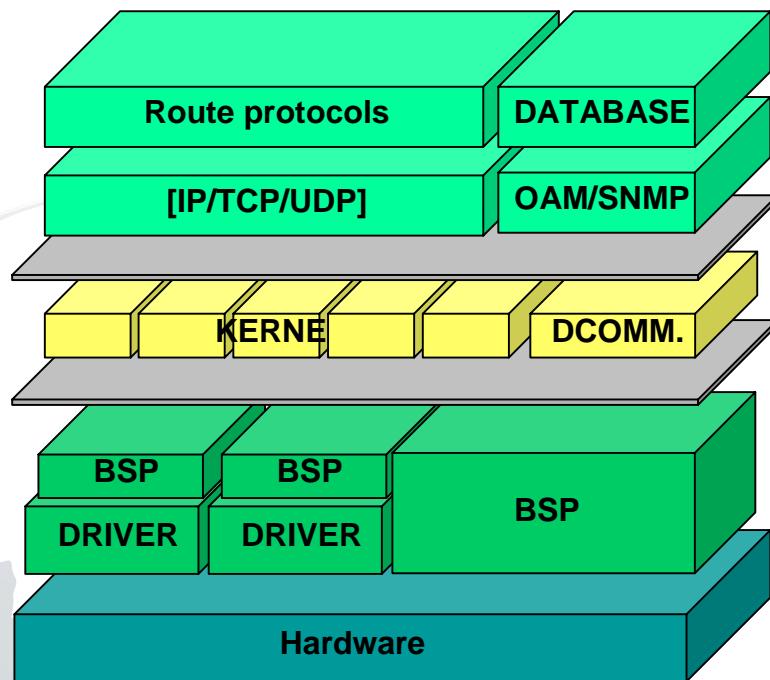
Software Architecture



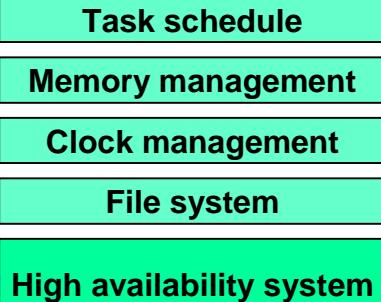
Key Technologies of BitEngine12000

- BWOS Operation System
- IPv6/IPv4 Route Management
- IPv6 and IPv4 Migration
- High Availability (HA)
- High Speed Serial Link Backplane
- High performance IP packet processing with FPGA

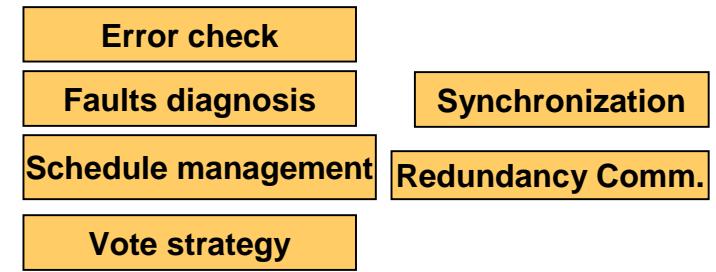
Extensional Router OS(BWOS)



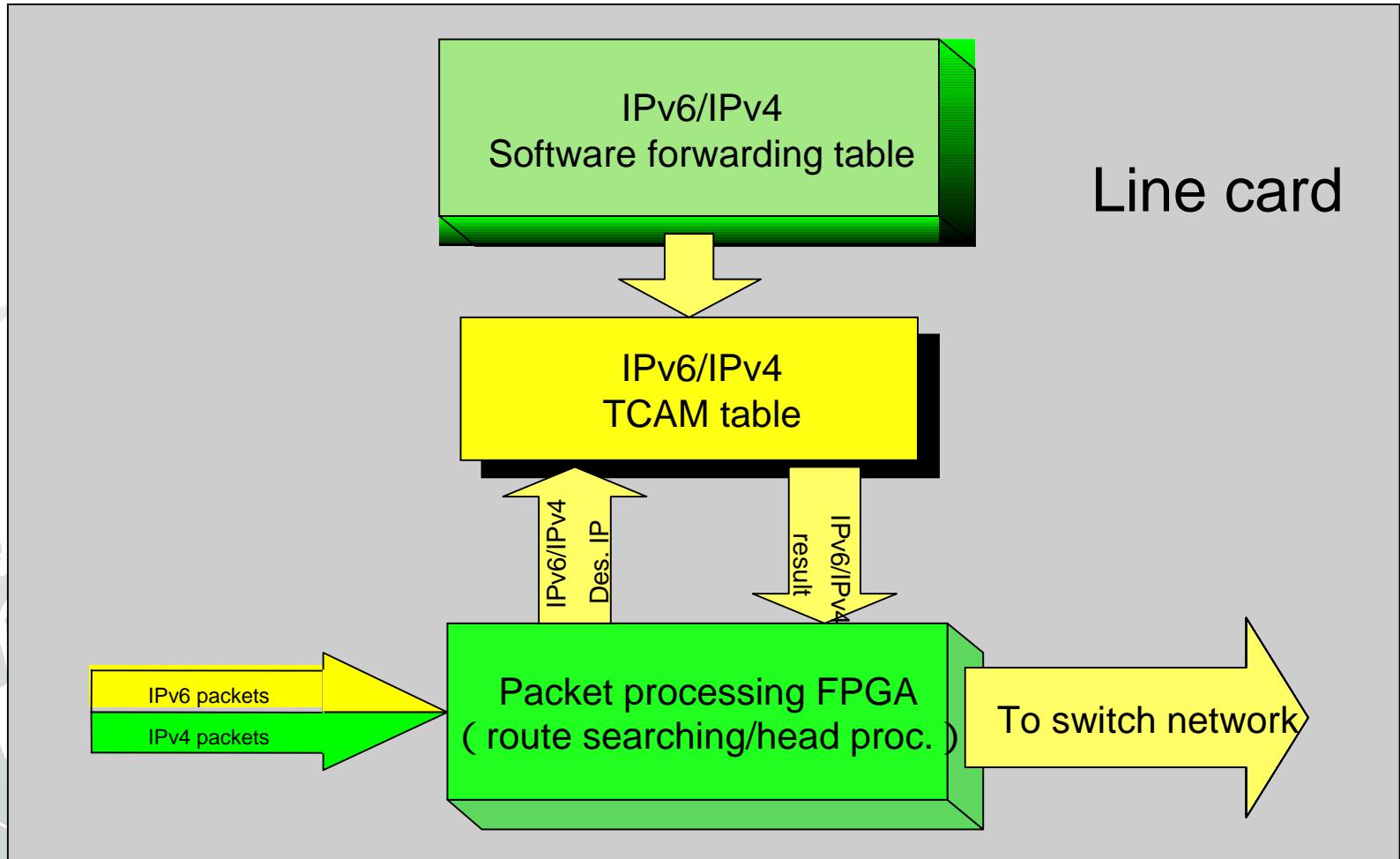
KERNEL



High availability system



IPv6/v4 dynamically self-adjustment route allocation



IPv6/v4 dynamically self-adjustment route allocation

- Fastness : has the maximum search speed 50Mpps , with TCAM , can meet 2.5G (6.1Mpps), even 10G(25Mpps) requirement.
- Dynamics : may dynamically allocation and adjustment to IPv6/IPv4 route table according to the changed route table.
- Extension : multiple TCAM cascade.

IPv4 over IPv6 tunnel

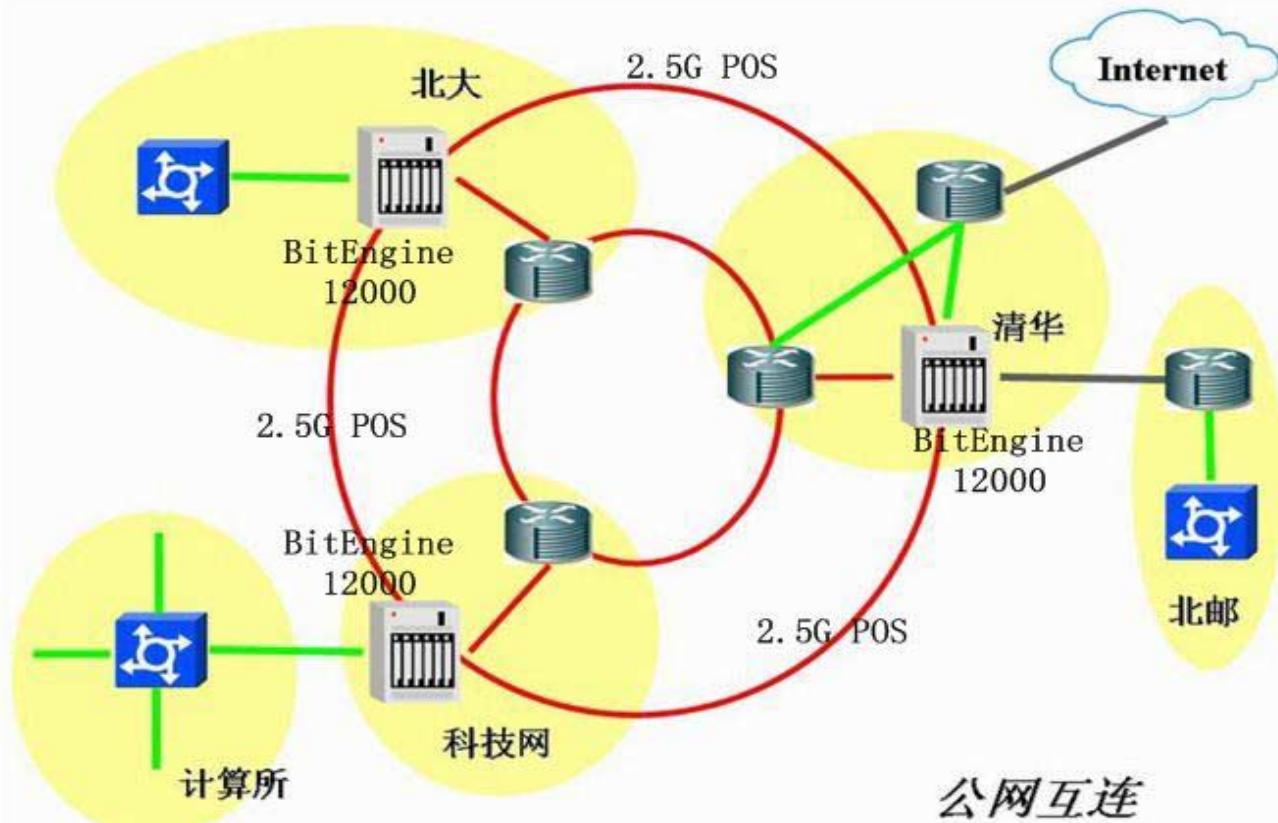
- Traditional tunnel of IPv4/v6
 - IPv6 packets over IPv4 network
 - Lack of auto-configuration and route-learn capability
- Propose a method of IPv4 packets over the pure IPv6 network
 - suitable multiple flexible IPv4 and IPv6 network interconnection cases
 - with auto-configuration of route

High Reavailability

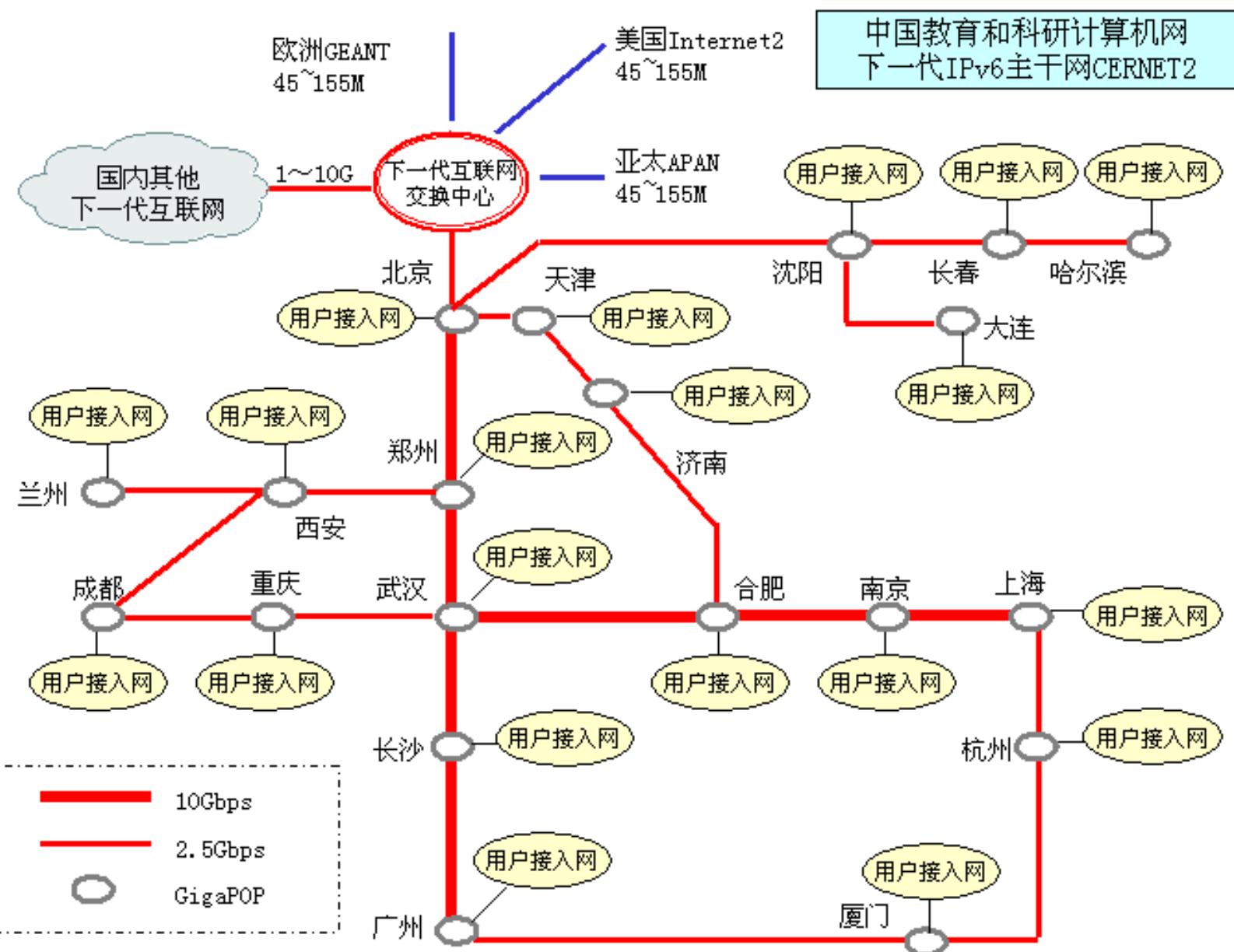
- Hardware redundancy design
 - Duplicate Route Processing (RP) CPUs
 - Duplicate data switch elements
 - Duplicate control communication channels
 - 1+1 powers and fans
- Software state duplicate
 - Master/slave RP CPU
 - Routing protocols in dual RP CPUs
 - Fault-tolerant TCP support

Trials and applications

- Since December 2003, BitEngine12000 routers were run in IPv6 testbed supported by state 863 project.



CERNET2 Testbed of CNGI



CERNET2 Backbone of CNGI

- 25 BitEngine12016 routers have been used in CERNET2 backbone since December 2004.

Some sceneries of CERNET2





The end.

Thank you!