CNGI: China Next Generation Internet

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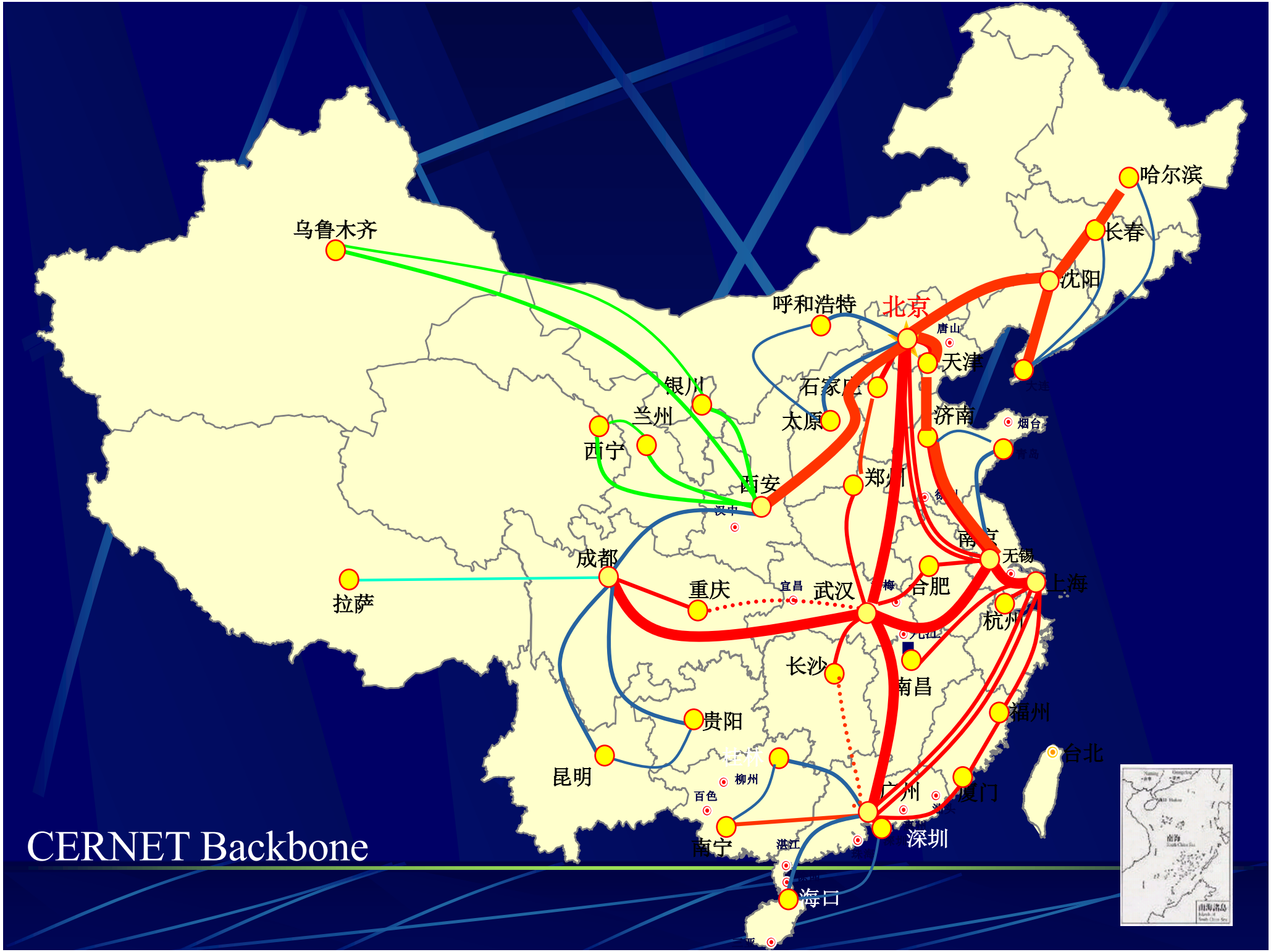
Internet development in China

- 10 years history from 1994—2004
- Internet users in China: from 78 Millions to 87 Millions within 6 months
- IP Addresses: >32M（1A+233B+146C）
- Backbone：2.5-10G DWDM+Router
- International links：>20G
- Exchange Points：> 30G（BJ，SH，GZ）
- Last Miles
  - Ethernet，WLAN，ADSL，Cable Modem，CDMA，GPRS，ISDN，Dial-up，

Research Networks in China

- CERNET: China Education and Research Network
  - 1994, Managed by MOE, Nation wide backbone
  - 1300+ Universities and institutes, over 15 Millions users
- CSTNET: China Science and Technology Network
  - 1994, Managed by CAS, Nation wide connections
  - 100+ institutes, Users over 0.8 Millions
- NSFCNET:
  - 2000, Supported by NSFC, 6 nodes in Beijing city

CERNET DWDM/SDH Network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桂林
昆明
柳州
百色
广州
厦门
南宁
湛江
深圳
海口
CERNET Backbone

CERNET Interconnections

Some problems and challenging in Internet deployment

- Scale problem: IPv4 address limit, IPv6 needed
  - NAT is bad technology, we need more and more IP addresses for mobile, IPTV, home electronic devices
- End to end performance
  - At least 100Mbps for end to end
- QOS and multicast
  - IPTV, high quality video conference
- Security
  - Authentication, identification and authorization
- Mobile communication: anytime and every where

What is the next generation Internet we needed

- Internet have been an important infrastructure today and still deploy very fast
- Major characteristics of next generation Internet:
  - Large scale network: IPv6 address
  - End to end high performance
  - Security and trust network
  - QOS control network
  - Mobile
- There is not unify definition for next generation Internet but IPv6 should be an important part of NGI

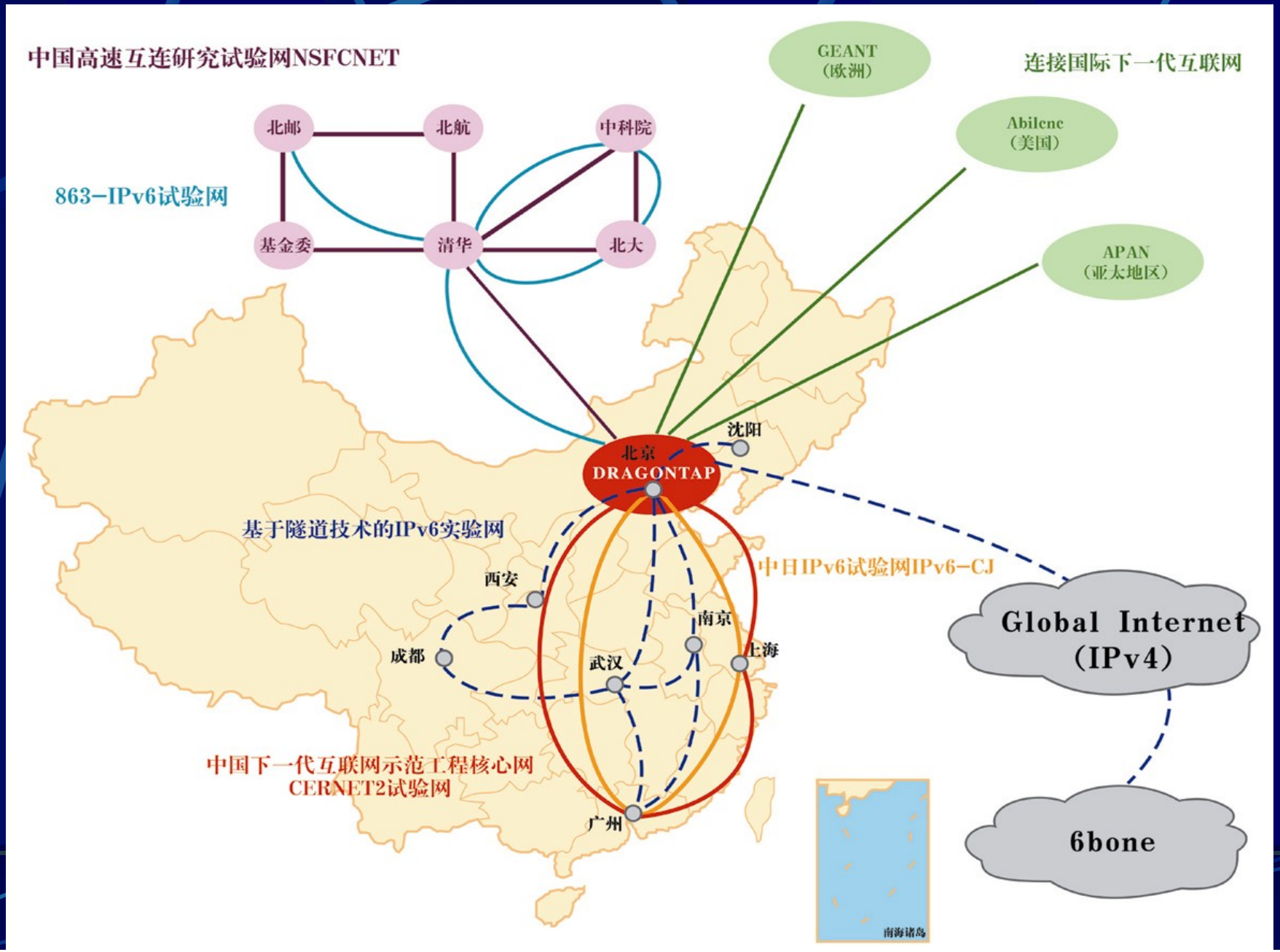
Why is IPv6 needed?

- Much larger address space
  - IPv6 Addresses: $3.4X10^{38}$
- Trust network: real IP address access
- Improved routing
  - Route aggregation reduces the size of routing tables
  - Simplified header reduces router processing loads
- Enhanced security and QoS
  - Mandatory IPsec support all fully IPv6 compliant devices
- Improved support for mobile IP and mobile computing devices
  - IP is everywhere
  - Data, Voice, Audio and Video integration is a Reality
  - Regional Registries apply a strict allocation control

Next Generation Internet and IPv6 Activities in China

- IPv6 Test bed and 6 Bone in 1998
- NSFCNET: 2000， First IPv6 network in China
- MOU with UCAID: CERNET on March 2000,
  NSFCNET and CSTNET on May 2000
- Peer Connection Agreement with Abilene:
  CERNET on March 2000
- International Connections
  - 155M to STAR TAP；45M to APAN（Japan），155M to Korea；45M to Janet
- 2003，CJ-IPv6，
- CNGI Project, CNGI-CERNET2

NGI and IPv6 in China



Global IPv6 Service Launch Event

January 15 2004

China Next Generation Internet Development Planning

- 2002—2005
  - CNGI: China Next Generation Internet
  - Key technologies and applications
  - Delivery CNGI technologies to industry
- 2006—2010
  - Largest Ipv6 networks in the world
  - Contribute something to NGI: RFC's
  - NGI application development
  - As advanced foundations for Chinese innovation

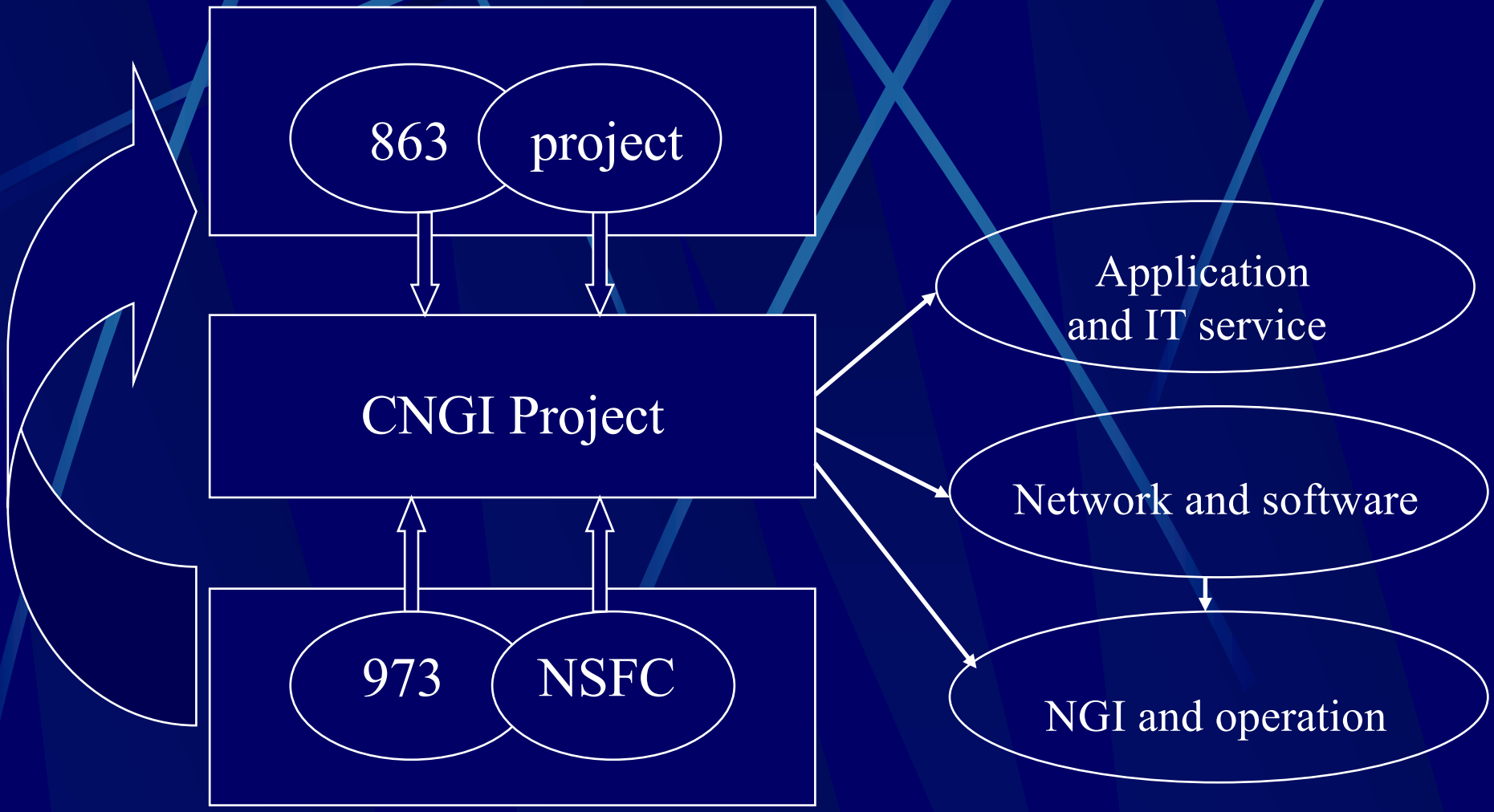
CNGI Project

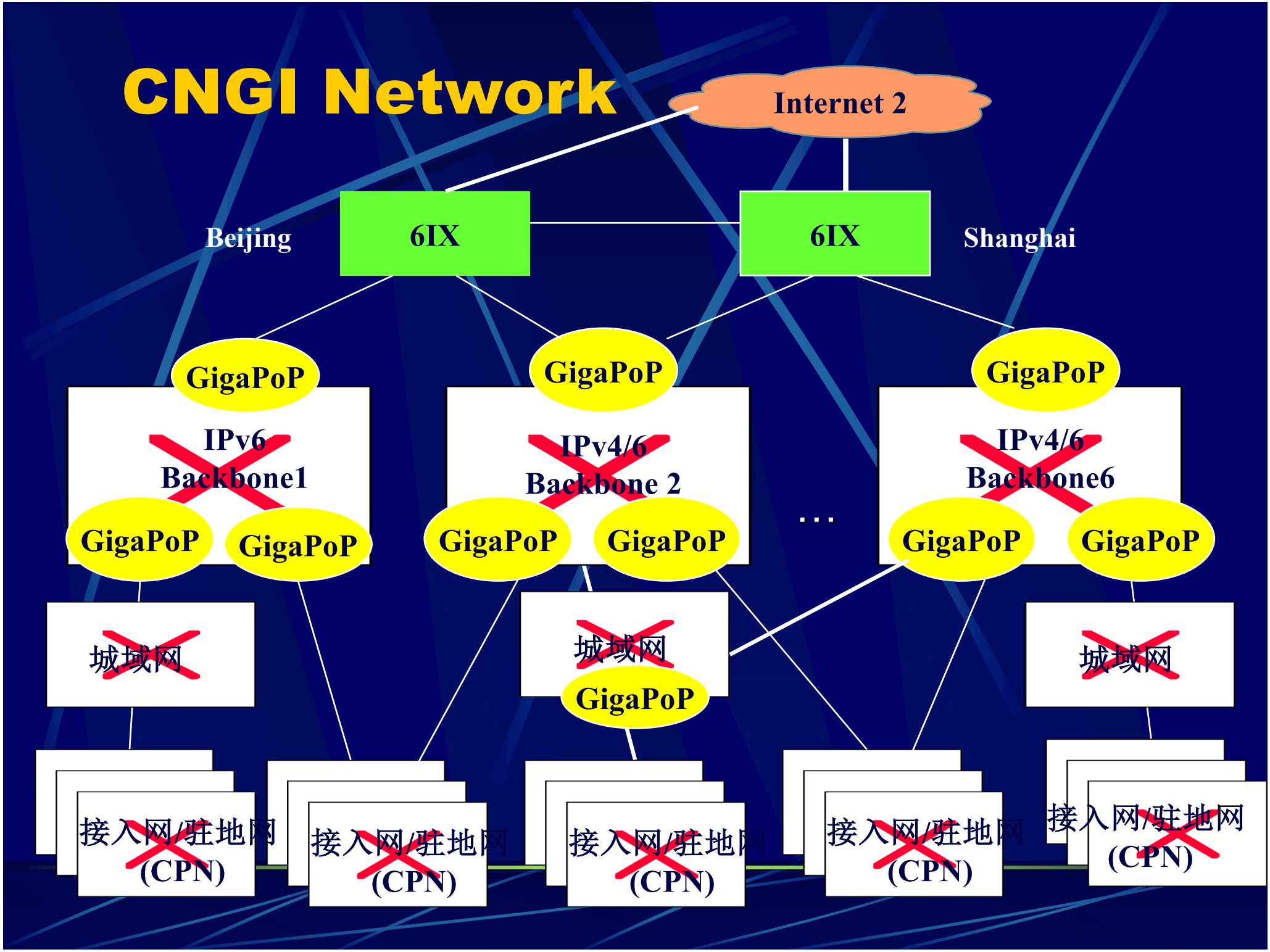
- Initiated from 2002
- Approved by Chinese State Department in 2003
- Leaded by National Reform and Development Committee, and Joint with MOST, MOE, CAS, MII, NSFC, CAE
- 170M USD
  - 75M USD for backbone
  - 95M USD for technology dev. and applications
- All NSP's will joint this project
  - CERNET, China telecom, Unicom, Netcom/CSTNET, China Mobile, Railcom

Main Contents of CNGI

- CNGI Backbone
  - 6 nation wide backbone and 30 GigaPOPs
  - 300 campus networks
  - International links
- Network technology and applications
  - Development and experimentation on network technology
  - Middleware
  - Applications
- Delivery to information industry
  - Major software and hardware
  - Application

CNGI and Another Project




CNGI Network
Internet 2
Beijing
6IX
6IX
Shanghai
GigaPoP
GigaPoP
GigaPoP
IPv6
Backbone1
IPv4/6
Backbone 2
IPv4/6
Backbone6
GigaPoP
GigaPoP
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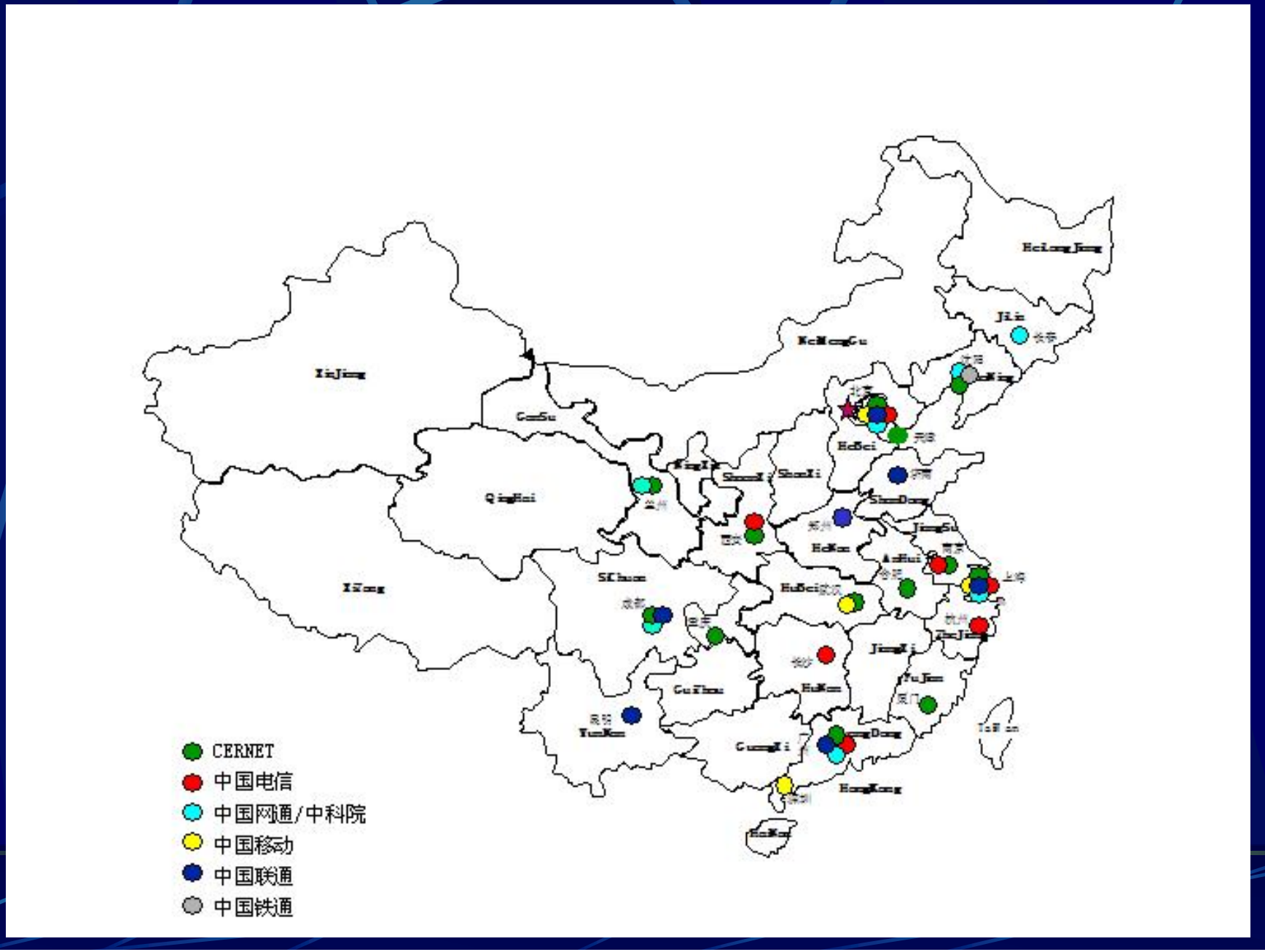
CNGI Backbone and Nodes



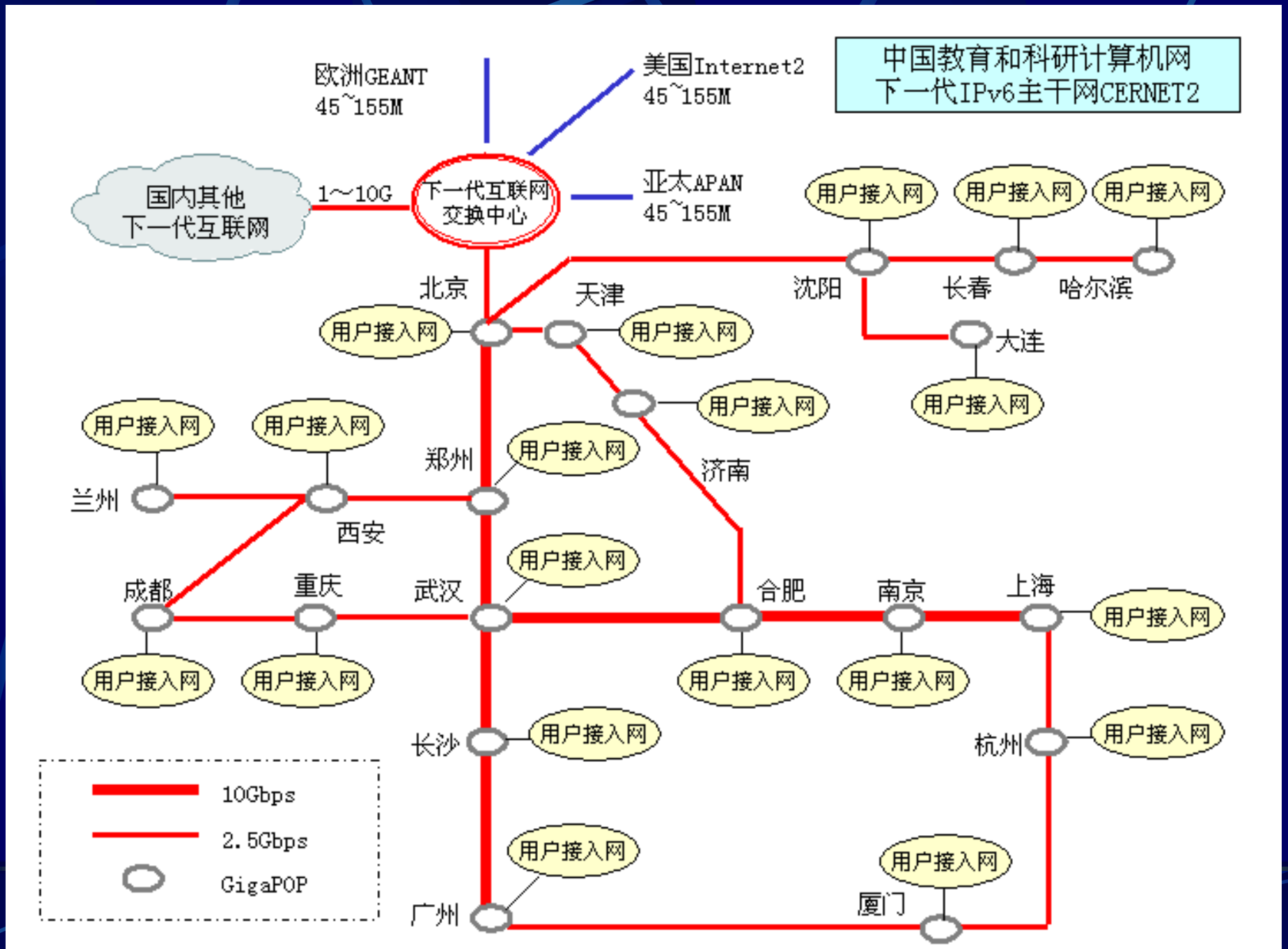
Applications

- SIP based on personal to personal communication
- Wireless and mobile applications
  - IPv6 based on ITS
  - IPv6 based on home network
- Computing Grid and Data Grid
- Video conference and HDTV
- Environment measurement
- Remote control of instrument and virtual reality
- Advanced manufacture
- Remote education and digital library
- Remote medical treatment: IPv6

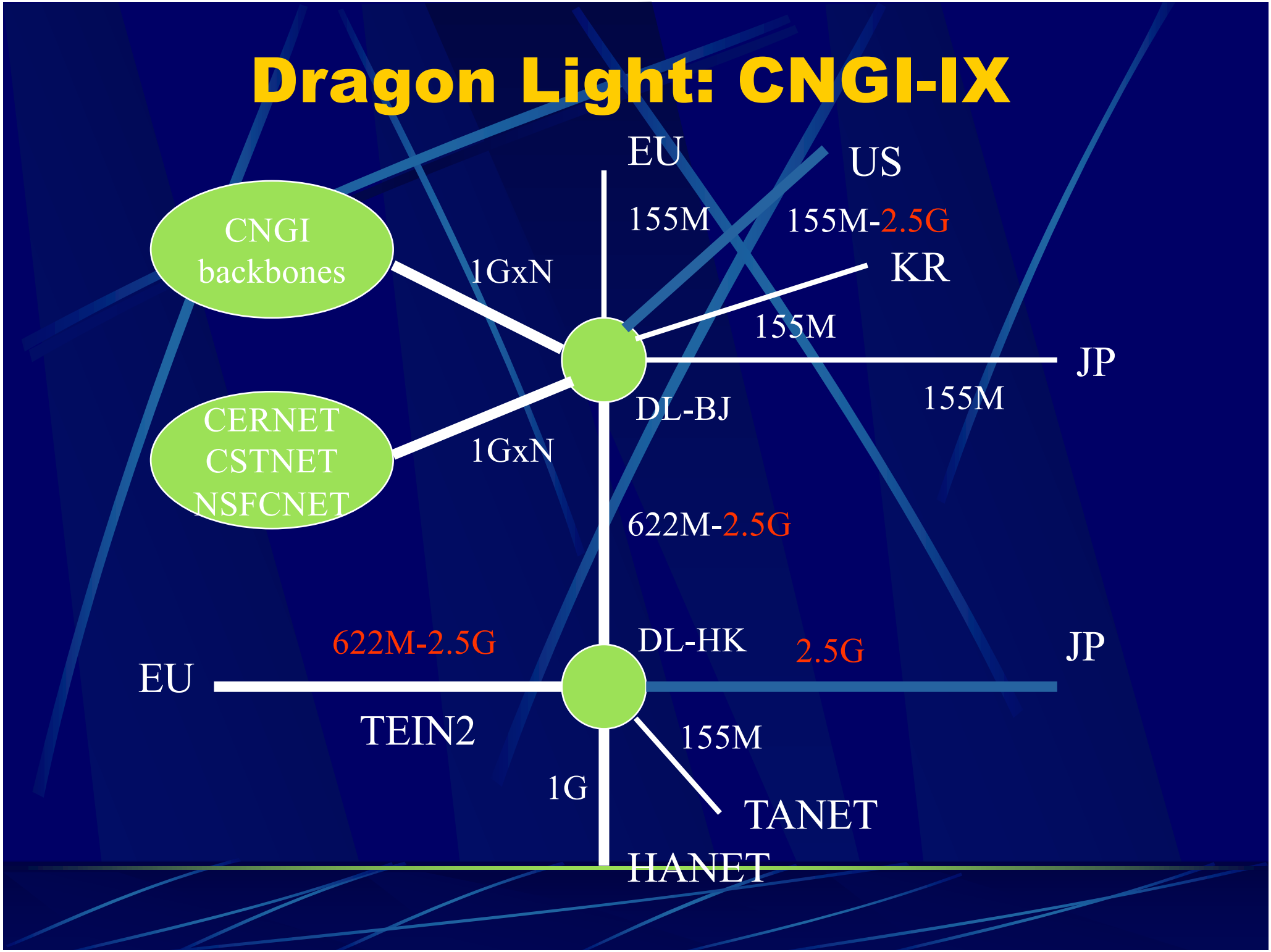
CERNET2 and Key Technologies

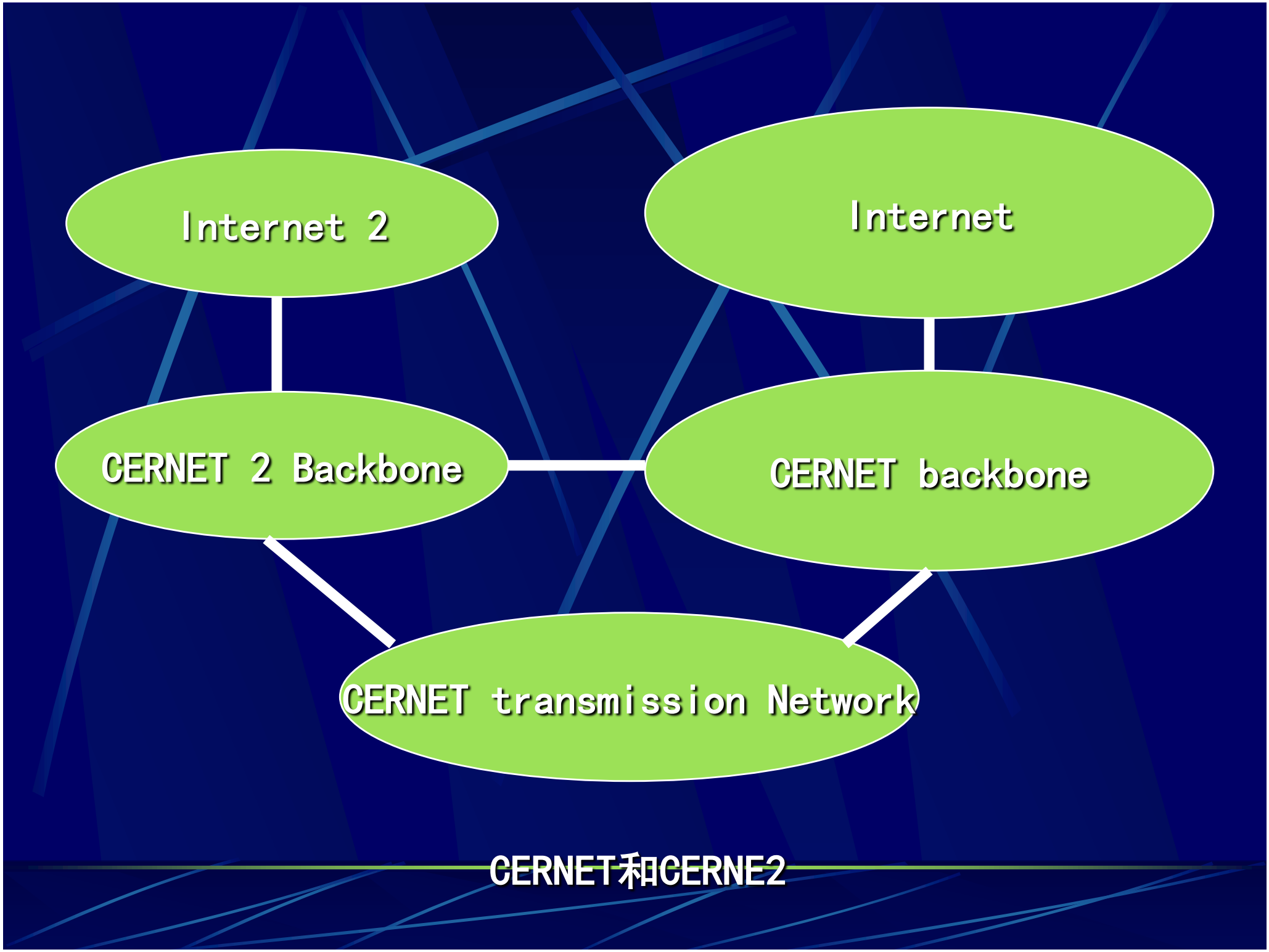
- CERNET 2: Next Generation Education and Research Network in China
- CERNET 2 Backbone connecting 15-20 GigaPOPs at 2.5G-10Gbps
- Connecting 200 Universities and 100+ Research Institutes at 1Gbps-10Gbps
- Native IPv6 and Lambda Networking
- Support/Deployment of the following technologies:
  - Multicast
  - E2E performance monitoring
  - Middleware and Advanced Applications

CERNET2: CNGI Backbone



Dragon Light: CNGI-IX





CERNET和CERNE2

IPv6 Core Routers

- CNGI project will use a part of routers made in China
- Bitway and Huawei have been selected for CERNET2 backbone
- Juniper and CISCO also will be major partners for CERNET2 backbone